

## Wildlife species

This chapter contains information on species featured in each of the ecoregions. Species are grouped by Birds, Mammals, Reptiles, Amphibians, Fish, and Invertebrates. Species are listed alphabetically within each group. A general description, habitat requirements, and possible wildlife management practices are provided for each species. Wildlife management practices for a particular species may vary among ecoregions, so not all of the wildlife management practices listed for a species may be applicable for that species in all ecoregions. Refer to the WMP charts within a particular ecoregion to determine which practices are appropriate for species included in that ecoregion.

The species descriptions contain all the information needed about a particular species for the WHEP contest. However, additional reading should be encouraged for participants that want more detailed information. Field guides to North American wildlife and fish are good sources for information and pictures of the species listed. There also are many Web sites available for wildlife species identification by sight and sound.

Information from this section will be used in the Wildlife Challenge at the National Invitational. Participants should be familiar with the information presented within the species accounts for those species included within the ecoregion identified for an Invitational.

It is important to understand that when assessing habitat for a particular wildlife species and considering various WMPs for recommendation, current conditions should be evaluated. That is, WMPs should be recommended based on the current habitat conditions. Also, it is important to realize the benefit of a WMP may not be realized soon. For example, trees or shrubs planted for mast may not provide cover or bear fruit for several years.

## Index to wildlife species

**Note: Refer to this list for the correct spelling and capitalization of species for Activity I (Wildlife Challenge).**

### Birds (86)

American bittern	golden-cheeked warbler	prairie falcon
American black duck	golden-fronted woodpecker	prothonotary warbler
American kestrel	golden-winged warbler	pyrrhuloxia
American robin	grasshopper sparrow	red-cockaded woodpecker
American wigeon	great horned owl	red-eyed vireo
American woodcock	greater prairie-chicken	red-tailed hawk
barred owl	greater roadrunner	redhead
black-backed woodpecker	greater sage-grouse	ring-necked pheasant
black-bellied whistling duck	hairy woodpecker	rock pigeon
black-capped chickadee	house finch	ruby-throated hummingbird
black-throated sparrow	house sparrow	ruffed grouse
blue-winged teal	house wren	sage thrasher
Brewer's sparrow	ladder-backed woodpecker	scaled quail
broad-winged hawk	lark bunting	sharp-tailed grouse
brown thrasher	Lawrence's goldfinch	song sparrow
California quail	loggerhead shrike	sooty grouse
California thrasher	long-billed thrasher	southwest willow flycatcher
Canada goose	mallard	spotted sandpiper
common nighthawk	marbled murrelet	spotted towhee
crested caracara	mountain bluebird	Virginia rail
crissal thrasher	mourning dove	western bluebird
dickcissel	northern bobwhite	western kingbird
dusky grouse	northern flicker	white-tailed ptarmigan
eastern bluebird	northern goshawk	white-winged dove
eastern meadowlark	northern harrier	wild turkey
European starling	northern pintail	Wilson's snipe
ferruginous hawk	Nuttall's woodpecker	wood duck
Gambel's quail	ovenbird	yellow-rumped warbler
golden eagle	peregrine falcon	

## **Mammals (34)**

American beaver  
American marten  
big brown bat  
black bear  
black-tailed jackrabbit  
black-tailed prairie dog  
bobcat  
Brazilian free-tailed bat  
collared peccary  
Columbian black-tailed deer  
common muskrat  
coyote

desert cottontail  
eastern cottontail  
eastern fox squirrel  
eastern gray squirrel  
elk  
fisher  
gray fox  
Indiana bat  
mink  
moose  
mountain cottontail  
mountain lion

New England cottontail  
pronghorn  
raccoon  
red fox  
red squirrel  
river otter  
Rocky Mountain mule deer  
snowshoe hare  
white-tailed deer  
wild pig

## **Reptiles (10)**

American alligator  
eastern box turtle  
eastern indigo snake  
eastern snapping turtle

Gila monster  
gopher tortoise  
plains hog-nosed snake  
Texas horned lizard

timber rattlesnake  
western diamond-backed rattlesnake

## **Amphibians (7)**

American bullfrog  
crawfish frog  
Monterey salamander  
northern red-legged frog

rough-skinned newt  
tiger salamander  
wood frog

## **Fish (6)**

bluegill  
channel catfish  
Coho salmon

cutthroat trout  
largemouth bass  
rainbow trout

## **Invertebrates (2)**


American bumble bee  
monarch butterfly

## Range map keys for wildlife species



*Range map key for birds:*

-  Year Round
-  Summer
-  Winter
-  Winter
-  Migratory

*Range map key for mammals,  
reptiles, and amphibians:*

-  Year Round

*Range map key for fish:*

-  Native Range
-  Introduced Range

*Range map key for invertebrates:*

-  Year Round

# Birds

## American bittern

### General information

The American bittern is a medium-sized heron typically found in dense emergent vegetation in moderately shallow freshwater wetlands. This migratory bird may be found near the coasts during winter. It is rarely seen except when flying. It moves slowly through vegetation stalking food and is well camouflaged with brown and white streaks. American bitterns occasionally use adjacent upland grasslands for nesting and foraging. Larger semi-permanent wetland complexes are favored over small, isolated wetlands.



Sallie Gentry

### Habitat requirements

**Diet:** fish, amphibians, snakes, insects, and crustaceans

**Water:** obtained from food

**Cover:** dense emergent wetland vegetation, such as reeds, cattails, or sedges; nest is built in dense cover a few inches above shallow water; water depth should be maintained at less than 2 inches throughout the year

### Wildlife management practices

**Control Nonnative Invasive Vegetation:** is necessary when nonnative invasive vegetation begins to outcompete native vegetation, limit food abundance, or alter the hydrology of a wetland favoring dryer land.

**Livestock Management:** livestock should be excluded from wetlands managed for bitterns

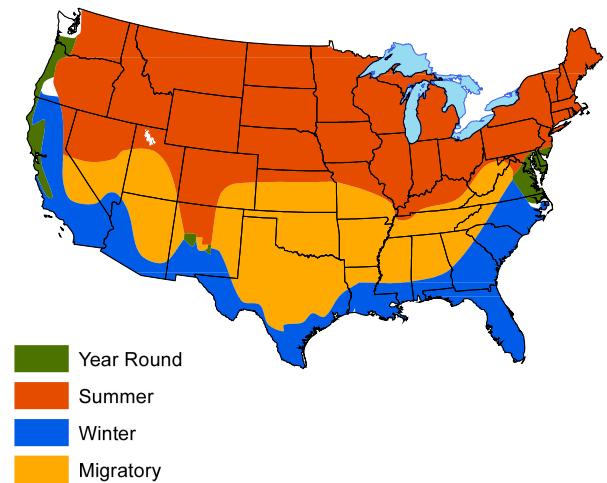
**Repair Spillway/Levee:** if not functioning properly

**Set-back Succession:** *Periodic Prescribed Fire, Disking,* and *Herbicides* may be used to maintain appropriate vegetation structure. However, disturbance should be infrequent (2-5 years) because bitterns prefer dense cover.

**Water Control Structures:** should be installed when wetlands do not have control structures to maintain appropriate water depths. Drawdowns can be conducted to favor appropriate vegetation. Drawdowns should be conducted slowly and after the breeding season (mid-August or later).

**Water Developments for Wildlife:** shallow wetlands can be constructed if habitat is not present

**Wildlife or Fish Survey:** bitterns are typically surveyed by listening for calls. Also, ropes can be dragged across the vegetation between two or more observers to flush the birds.



## American black duck

### General information

The American black duck is a large dabbling duck similar in size to mallards, ranging from 19 to 25 inches in length. They resemble the female mallard in color, though their plumage appears darker. The male and female black duck are similar in appearance. They have orange legs and feet and violet wing patches. The male black duck has a yellow to green bill, whereas hens have olive bills. Black ducks interbreed regularly and extensively with mallards. American black ducks frequent forested wetlands, tidewater areas, and coastal marshes of the eastern United States. They feed in a variety of shallow wetlands and agricultural fields. Their nests are built of vegetation and lined with down, found most often on the ground along edges of heavy cover, and generally close to water.

### Habitat requirements

**Diet:** aquatic plants, invertebrates, waste corn, and grain are primary diet items

**Water:** obtains water through diet

**Cover:** forested and emergent wetlands for loafing; they also will feed in flooded grain fields

### Wildlife management practices

**Control Nonnative Invasive Vegetation:** when nonnative invasive vegetation begins to degrade loafing or foraging cover in wetlands or nesting cover in uplands

**Leave Crop Unharvested:** to provide a winter food source

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

**Plant Food Plots:** shallowly flooded grain plots can provide a beneficial food source for migrating and wintering black ducks

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

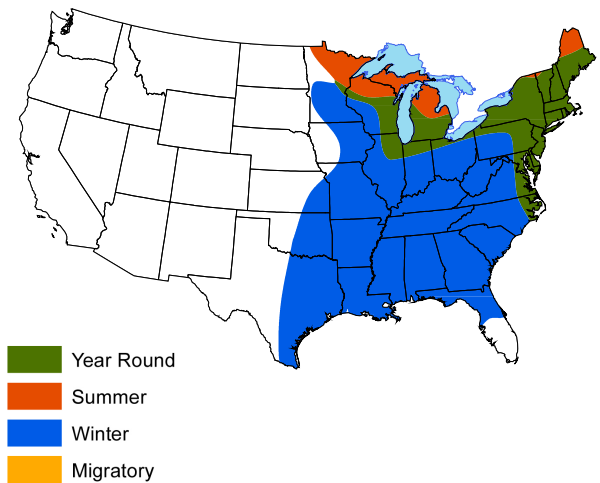
**Repair Spillway/Levee:** if not functioning properly

**Set-back Succession:** *Prescribed Fire* to rejuvenate vegetation in nesting areas and to maintain proper water and vegetation interspersions in wetlands

**Soil Conservation Agriculture:** eliminating fall tillage can provide waste grain in the winter

**Water Control Structure:** control water level in wetlands managed for waterfowl

**Water Developments for Wildlife:** shallow impoundments can be important for migrating and wintering waterfowl; flooding grain fields and planting food plots in winter makes food more available



**Wildlife or Fish Survey:** black ducks are secretive and are often in woody emergent wetlands where accurate surveys are difficult. Nonetheless, flush counts and aerial surveys are most often used to estimate black duck populations.

# American kestrel

## General information

The American kestrel is a common, widespread, small raptor resembling the size and shape of a mourning dove. The males are a colorful slate-blue on the top of the head and on the wings, with a reddish colored back and tail. Females have reddish brown wings, but both sexes have characteristic black slashes on the sides of their face. They can be found in a variety of open environments, including deserts and grasslands. Often spotted perching on power lines or other tall structures searching for prey, they swiftly move their tail to keep balanced in the wind. Because of their small size, American kestrels are preyed upon by larger raptors, such as northern goshawks and red-tailed hawks, and even snakes. They nest in cavities (often old woodpecker cavities or natural tree hollows) with loose material on the floor and have been noted to readily use man-made nesting boxes. Males search out and sometimes even defend a cavity, and later present it to a potential mate. Clutches usually contain 4 to 5 eggs. Chicks are altricial, meaning they are helpless for a couple weeks after hatching and must be fed and cared for. The American kestrel is declining in some areas of North America, including the Pacific Coast and Florida, where it is listed as threatened. The decline in these areas can be attributed to poor habitat quality with a lack of nesting cavities, early successional cover, and food resources.

## Habitat requirements

**Diet:** primarily insects and small mammals associated with open areas

**Water:** obtain necessary water from diet and do not need water for drinking

**Cover:** nest in tree cavities and other sites including holes in cliffs, canyon walls, and artificial nest boxes

## Wildlife management practices

**Control Nonnative Invasive Vegetation:** when nonnative invasive vegetation competes with native plant species and reduces habitat quality for kestrels or their prey

**Create Snags:** where needed for perches and increase potential nest cavities

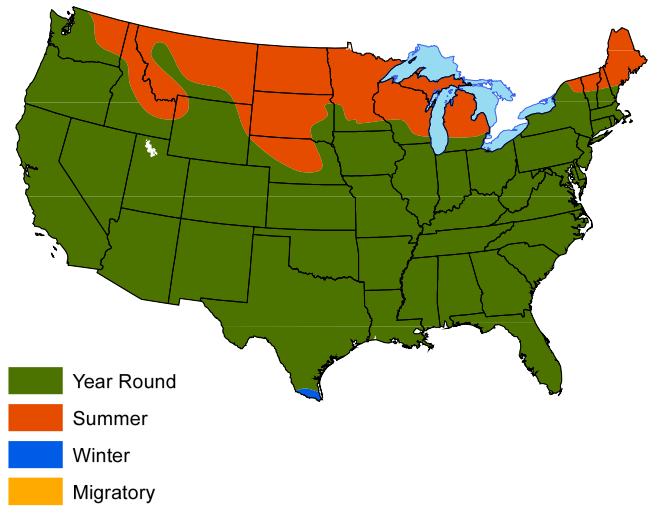
**Field Borders:** to increase cover for prey around row crop fields

**Livestock Management:** to prevent overgrazing and maintain sufficient cover for prey and maintain early succession vegetation with scattered shrub cover

**Nesting Structures:** can be used where a lack of natural nesting cavities is limiting the population; nest boxes can be placed on fence posts in open areas, and even on the back of road-side signs in open landscapes



Robert Burton



**Plant Native Grasses and Forbs:** where necessary to provide desirable cover for prey

**Plant Shrubs:** in large open areas where shrub cover is limiting

**Plant Trees:** where trees are lacking for future perching sites and cavities for nesting

**Set-back Succession:** *Prescribed Fire, Chaining, Drum-chopping, and Herbicide Applications* can maintain shrub cover and stimulate herbaceous cover; *Dozer-clearing* and *Root-plowing* can be used to convert forest to early succession

**Soil Conservation Agriculture:** will facilitate hunting prey when waste grain is available

**Wildlife or Fish Survey:** observation counts, point counts, and nest box usage rates may be used to estimate trends in populations

## American robin

### General information

American robins use a wide assortment of vegetation types, from mowed grassy areas to forested areas. In urban areas, robins use large open areas and nearby trees and shrubs. Parks, golf courses, and lawns in residential areas are attractive to robins. They are found throughout North America, though they may migrate out of northern latitudes during winters with sustained cold and snow. Robins build a nest of grass and mud on a tree or shrub limb, but will occasionally nest on building ledges. Robins spend considerable time on the ground feeding on earthworms, but also will perch on branches to eat berries, fruit, and insects.



Lee Karney

### Habitat requirements

**Diet:** insects and worms during spring and summer; soft mast from shrubs and trees in winter; seldom use artificial feeders

**Water:** require water daily in warm seasons; obtain water from low-lying areas, ponds, and rain-filled gutters

**Cover:** shrubs, evergreen trees, and deciduous trees used for nesting and escape; evergreen trees often used for early nests

### Wildlife management practices

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

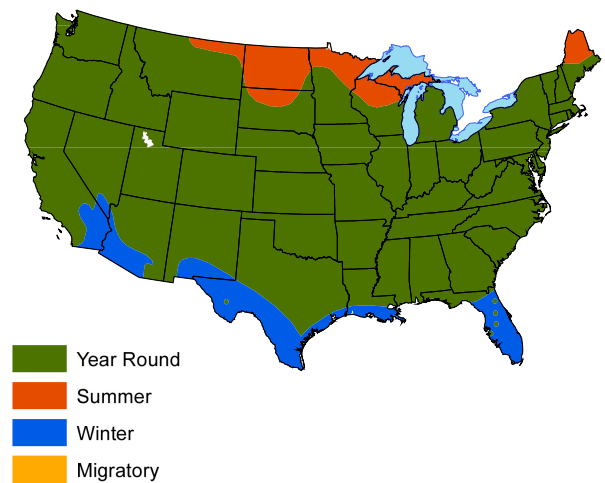
**Plant Shrubs:** where soft mast is lacking; examples might include dogwoods, hollies, golden currant, and winterberry

**Plant Trees:** both deciduous and evergreen; where nesting sites may be limiting

**Set-back Succession:** *Prescribed Fire*, *Disking*, and *Mowing* can be used to set-back succession and provide suitable structure for robins; *Mowing* may be used to maintain foraging and loafing cover for robins in **Urban** areas

**Water Developments for Wildlife:** birdbaths and pans of water can be provided in urban areas; do not place water in areas where cats can catch the birds; cats should be removed

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



## American wigeon

### General information

The American wigeon is a medium-sized dabbling duck. It is easily distinguished from other dabbling ducks by its round head, short neck, and small bill. The American wigeon's body ranges from 17 to 23 inches long. The male (drake) has a mask of green feathers around its eyes and a cream-colored cap that runs from its bill to the crown of its head. This cap gives this bird its other common name, baldpate, which means bald head. Drakes also can be identified in flight by a large white shoulder patch on each wing. Hens have primarily gray and brown plumage. Both sexes have bluish-gray black tipped bills and gray legs and feet. The American wigeon has a very distinctive call with the drake producing a three-note whistle and the hens a low growl quack. They nest in areas of tall grass or shrubs, often far from water. The nest is constructed on the ground in a depression lined with grasses and down.



Donna Dewhurst

### Habitat requirements

**Diet:** mostly aquatic plants and a few insects, and mollusks

**Water:** obtains water through diet

**Cover:** shallow freshwater wetlands, ponds, marshes, and rivers

### Wildlife management practices

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

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

**Plant Native Grasses and Forbs:** where nesting cover is limited

**Plant Shrubs:** where nesting cover is limited

**Repair Spillway/Levee:** if not functioning properly

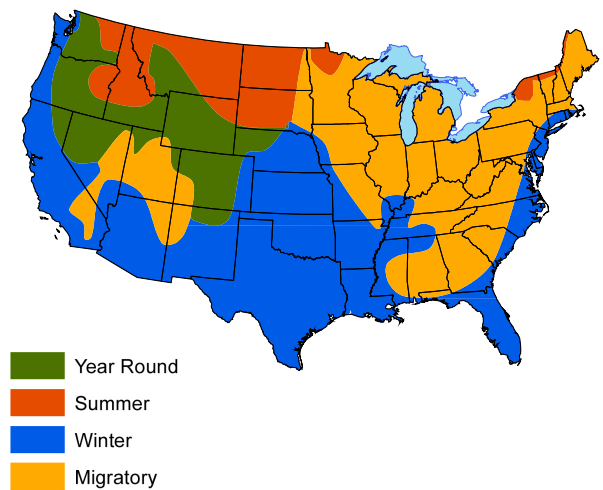
**Set-back Succession:** *Prescribed Fire* can be used to rejuvenate vegetation in nesting areas and to maintain proper water and vegetation interspersions in wetlands

**Soil Conservation Agriculture:** eliminate fall tillage to encourage vegetation in agricultural fields for grazing opportunities

**Water Control Structures:** to control water level in wetlands managed for waterfowl

**Water Developments for Wildlife:** shallow impoundments can be important for migrating and wintering waterfowl; flooding grain fields and planting food plots in winter makes food more available

**Wildlife or Fish Survey:** flush counts and aerial surveys are used to estimate populations in fall and winter





# American woodcock

## General information

The American woodcock is a ground-dwelling, migratory shorebird of the eastern United States and southeastern Canada that primarily inhabits moist, young forest and shrubland. They breed, nest, and raise their broods from March to June in their northern range. Nests are located in slight depressions among dead leaves on the forest floor. They migrate to their southern range in the fall through winter. This gamebird has declined steadily over the past 25 years as a result of land-use changes that have resulted in forest maturation, fire suppression, and increased human development. High-quality woodcock habitat has a diverse arrangement of dense, young forest (and must include some moist sites) on 80 percent of the area, interspersed with large fields and small openings in close proximity.

## Habitat requirements

**Diet:** invertebrates (earthworms represent 60 percent of diet)

**Water:** obtained through diet

**Cover:** openings with sparse herbaceous groundcover and scattered shrubs and/or young trees; for courtship and roosting; young hardwood forest 2- to 25-year-old, for foraging, nesting and brood rearing or shrub cover on moist sites

## Wildlife management practices

**Control Nonnative Invasive Vegetation:** may be necessary if habitat quality is degrading and the native plant community is being outcompeted

**Edge Feathering:** will create a soft edge between openings or agricultural fields and the forest that will encourage shrub and/or young tree growth

**Forest Management:** *Forest Regeneration*, especially *Clearcut* and *Group Selection*, can provide dense structure in young stands that woodcock select for several years, especially when a mosaic of openings and young forest is well-interspersed; *Forest Stand Improvement* also may be used to reduce overstory tree density and increase stem density in the understory and midstory.

**Livestock Management:** exclude livestock from areas managed for American woodcock

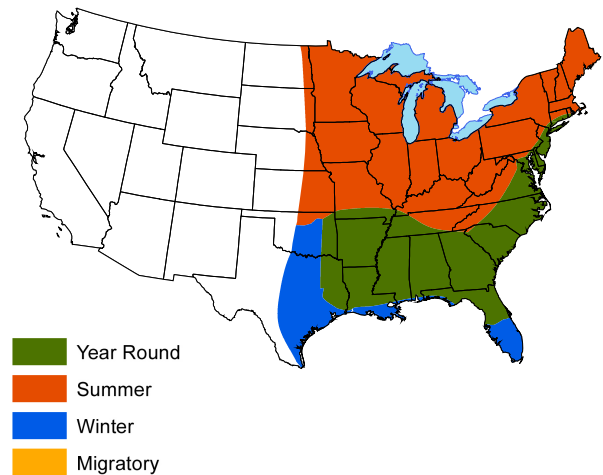
**Plant Shrubs:** where there is a lack of interspersed shrubs for foraging, nesting, courtship, or roosting cover

**Plant Trees:** where there is a lack of forest cover

**Set-back Succession:** *Prescribed Fire*, *Chainsawing*, *Drum-chopping*, and *Herbicide Applications* can be used to maintain young tree/shrub cover; *Chainsawing*, *Root-plowing*, and *Dozer-clearing* can be used to create forest openings



Mark Cunningham



**Wildlife or Fish Survey:** surveys on singing grounds can be used to estimate the relative size of the woodcock breeding population

## Barred owl

### General information

Barred owls are found in mature forests, often near water, throughout eastern North America and the Pacific Northwest. They roost on limbs and cavities during the day. They nest in cavities of large trees and snags, and will readily use man-made nesting structures for nesting and roosting. They also may nest on old platform nests built by other owls, hawks, crows, and squirrels. They hunt primarily at night, scanning for prey with keen vision and hearing and flying silently from tall perches. Their hooting call of “*Who cooks for you? Who cooks for you all?*” can be heard all year and is a common night sound where they occur. Barred owl populations have increased and spread since the mid-1960s.



Mark Musselman

### Habitat requirements

**Diet:** primarily small mammals, birds, amphibians, reptiles, fish, and invertebrates.

**Water:** requirements largely unknown. They likely obtain their water needs from the foods they consume.

**Cover:** mature forests with an abundance of relatively large trees and cavities, often near water. They also may use artificial cavities (nest boxes) when placed in mature forests where these birds are found.

### Wildlife management practices

**Control Nonnative Invasive Vegetation:** where nonnative invasive vegetation is competing with native vegetation and reducing habitat quality

**Create Snags:** where cavities are lacking for adequate reproduction

**Forest Management:** *Forest Regeneration (Shelterwood)* harvests can result in a more open, park-like forest resulting in a more open understory to favor prey

**Livestock Management:** livestock should be excluded from forests to maintain understory for prey

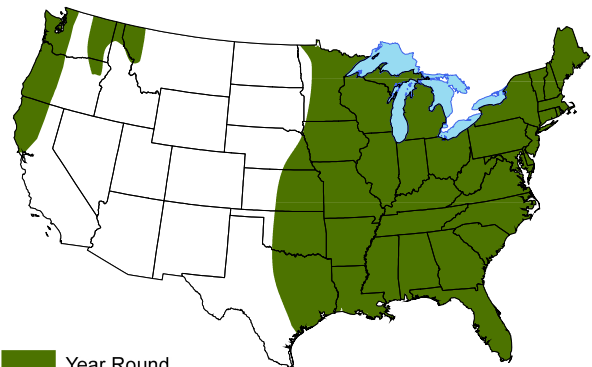
**Nesting Structures:** nest boxes may be installed in areas where nesting cavities are limiting barred owls. However, a lack of natural cavities is uncommon in mature forests that represent habitat for barred owls.

**Plant Trees:** in large open areas to create future habitat

**Set-back Succession:** low-intensity *Prescribed Fire* can be used in forests and woodlands to enhance cover for prey

**Wildlife Damage Management:** barred owls can prey upon small pets and domestic poultry. Exclusion practices should be used to discourage damage.

**Wildlife or Fish Survey:** call counts are used to monitor populations



# Black-backed woodpecker

## General information

Black-backed woodpeckers are primarily found in recently burned forests, specifically coniferous forests, where they eat bark beetles and other wood-boring beetles. Abundance of black-backed woodpeckers declines with time since fire. Habitat generally remains for 7-8 years post fire.

## Habitat requirements

**Diet:** bark beetles and wood-boring beetles in recently burned, old-growth coniferous forests

**Water:** water is obtained from food

**Cover:** nest in the sapwood of relatively hard, dead trees with little decay that have been recently burned with high concentrations of beetle larvae.

## Wildlife management practices

**Control Nonnative Invasive Vegetation:** when nonnative invasive species begin to reduce habitat quality for black-backed woodpeckers

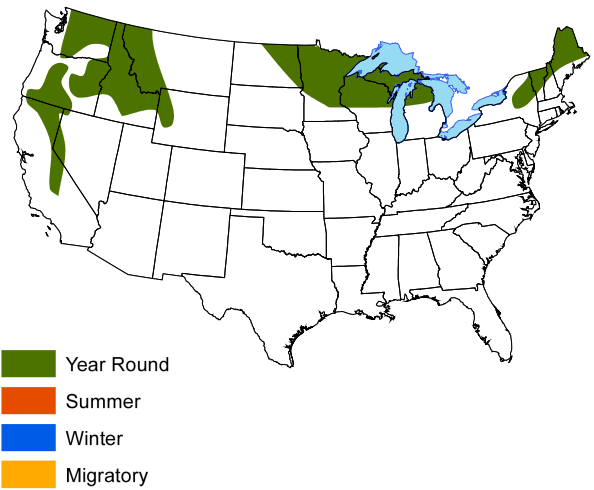
**Plant Trees:** in areas where forest regeneration is not occurring, trees may be planted to provide future habitat for the black-backed woodpecker. However, it will be many decades before these trees are of sufficient size to provide habitat for this woodpecker.

**Set-back Succession:** relatively intense *Prescribed Fire* in old-growth coniferous forests is necessary for the occurrence of black-backed woodpeckers. However, logging post-fire significantly decreases their occurrence.

**Wildlife or Fish Survey:** point counts can be conducted to listen for the distinctive drumming of the black-backed woodpeckers during the mating season



Glen Tepke



# Black-bellied whistling duck

## General information

The black-bellied whistling duck is a medium-sized duck that ranges in body length from 19 to 22 inches. The males and females look alike. They have a long red bill, long gray head with a gray face and long pink legs. The belly and tail are black, and the body, back of neck and cap are chestnut brown. The black-bellied whistling duck has a distinctive white wing bar that is unique among whistling ducks. Their call is a high-pitched, soft wheezy whistle of four to six notes, accented on the second or third syllable. Black-bellied whistling ducks are primarily cavity nesters and will use nesting boxes, but may nest on the ground if no cavities are present. The black-bellied whistling duck is unique among ducks in that they exhibit a strong bond between pairs, often staying together for many years. This duck is mainly non-migratory with only birds living in the extreme northern portion of their range moving south in winter.

## Habitat requirements

**Diet:** aquatic plants, grass, grain, insects, and mollusks

**Water:** obtains water through diet

**Cover:** tree-lined bodies of water, prefer shallow freshwater ponds, lakes, marshes, cultivated fields, and reservoirs with plentiful vegetation; prefer to nest in tree cavities

## Wildlife management practices

**Control Nonnative Invasive Vegetation:** where nonnative invasive vegetation is competing with native vegetation and reducing habitat quality

**Create Snags:** to provide potential cavity nesting sites

**Leave Crop Unharvested:** to provide grain food source

**Livestock Management:** livestock should be excluded from wetlands managed for waterfowl to maintain water quality and prevent sedimentation

**Nesting Structures:** nest boxes should be erected where there is a lack of nesting cavities

**Plant Food Plots:** grain plots can provide food source

**Plant Trees:** trees planted adjacent to wetlands can provide perching and nest cavity opportunities

**Repair Spillway/Levee:** if not functioning properly

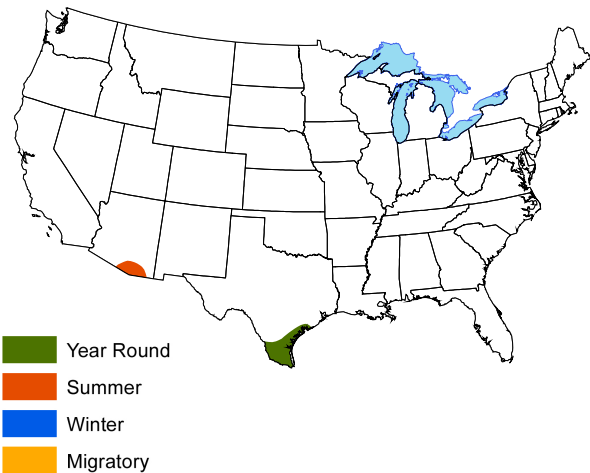
**Soil Conservation Agriculture:** eliminate tillage in the fall to provide additional waste grain during winter, especially fields that can be shallowly flooded

**Water Control Structures:** should be installed if not present to control water level in wetlands managed for waterfowl

**Water Developments for Wildlife:** shallow impoundments can be important for migrating and wintering waterfowl; flooding grain fields and planting



Robert Burton



food plots in winter makes food more available

**Decrease Harvest:** although black-bellied whistling ducks are considered migratory waterfowl, many local populations do not migrate and thus, landowners can influence populations; harvest may be decreased when local populations is declining, habitat quality is good, and data suggest mortality rate from hunting is additive

**Wildlife or Fish Survey:** flush counts and aerial surveys are used in fall and winter to estimate populations; nest box usage in summer can provide an index to population

# Black-capped chickadee

## General information

Black-capped chickadees occur throughout the upper two-thirds of the U.S. They are found in shrublands and forests. They nest in cavities in dead or hollow trees. Black-capped chickadees eat insects and spiders from the branches and bark of trees and shrubs. They also will visit bird feeders. They are often seen on the edges of forested areas.

## Habitat requirements

**Diet:** ants, caterpillars and spiders from branches, leaves and bark of trees and shrubs; also seeds from bird feeders and soft mast from shrubs

**Water:** obtain necessary water from snow and surface water

**Cover:** nest in cavities, usually in a dead or hollow tree; they can excavate a cavity only in soft wood or rotted wood and will use woodpecker holes, natural cavities, and man-made boxes; thick shrub and tree canopies provide necessary cover

## Wildlife management practices

**Control Nonnative Invasive Vegetation:** when nonnative invasive vegetation begins to reduce habitat quality for black-capped chickadee

**Create Snags:** trees may be killed where nesting cavities are limited to stimulate creation of additional cavities

**Forest Management:** *Forest Stand Improvement* practices can improve understory structure by increasing shrub cover within a stand when canopy cover exceeds 80 percent

**Livestock Management:** should prevent livestock from degrading shrub cover

**Nesting Structures:** can be provided in areas where nesting cavities are limiting

**Plant Shrubs:** in large open areas to provide shrub cover

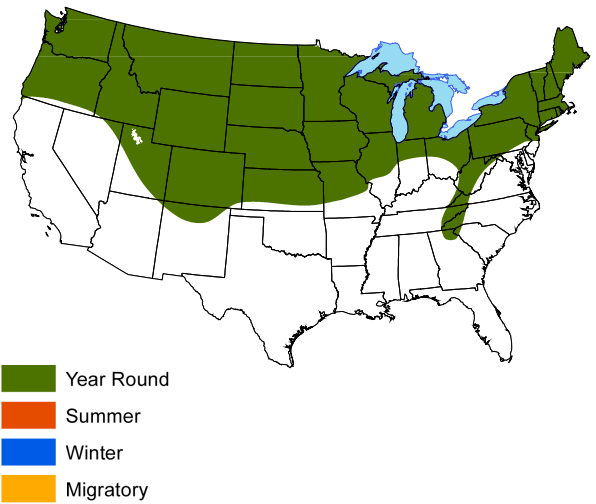
**Plant Trees:** where additional forest cover is needed

**Set-back Succession:** *Prescribed Fire* can maintain shrubby areas and thick understory cover in woods

**Wildlife or Fish Survey:** point counts are used to estimate population trends



Donna Dewhurst



# Black-throated sparrow

## General information

Black-throated sparrows are associated with shrublands, specifically sparsely vegetated desert shrubland, including mesquite, cacti, chaparral, and juniper in the southwest U.S. Their diet is mainly seeds and insects. Black-throated sparrows nest near the ground in small shrubs.

## Habitat requirements

**Diet:** insects, seeds and green herbaceous vegetation

**Water:** require water frequently during dry and cool seasons, especially when green herbaceous vegetation and insects are not available

**Cover:** nests are made from small twigs, grass, and stems placed in small shrubs near the ground; shrubs and cacti are used for hiding cover

## Wildlife management practices

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

**Livestock Management:** should prevent overgrazing within shrub cover

**Set-back Succession:** *Prescribed Fire, Chaining, and Drum-chopping* can be used to rejuvenate shrublands when they become overgrown and limit herbaceous groundcover

**Water Developments for Wildlife:** can be beneficial where water is limiting

**Wildlife or Fish Survey:** point counts are used to estimate population trends



James W. Arterburn

