

Ecoregions

Areas of the country can be separated into ecoregions having similar climate, vegetation and wildlife. Ecoregions are described in general terms. Wetlands and urban areas are found within all ecoregions.

At the end of each ecoregion description is a list of wildlife species recommended to use when evaluating an area in that ecoregion. Only those species listed for a particular ecoregion will be used in the National Invitational event. However, coordinators of state and local contests, of course, may use any species they choose. Some of the species listed are considered a nuisance in some areas and circumstances. Contest coordinators may exclude such species from local activities or center the activities on why the species are pests and what can be done to decrease problems.

Each ecoregion description is followed by a matrix table that identifies wildlife management practices for the wildlife species listed for that ecoregion. Specific information on why various wildlife management practices are recommended for a species can be found in the **Wildlife Species** section, and more general information about wildlife practices can be found in the **Wildlife Management Practices (WMPs)** section.

List of Ecoregions

Eastern Deciduous Forest

Great Plains Grassland – Shortgrass Prairie

Great Plains Grassland – Tallgrass/Mixed Prairie

Hot Desert

Intermountain – Foothills

Intermountain – Montane

Intermountain – Sagebrush

Intermountain – Subalpine

Mediterranean

Northeast Mixed Forest

Pacific Coastal Forest

Prairie Brushland

Southeast Mixed and Outer Coastal Plain Forest

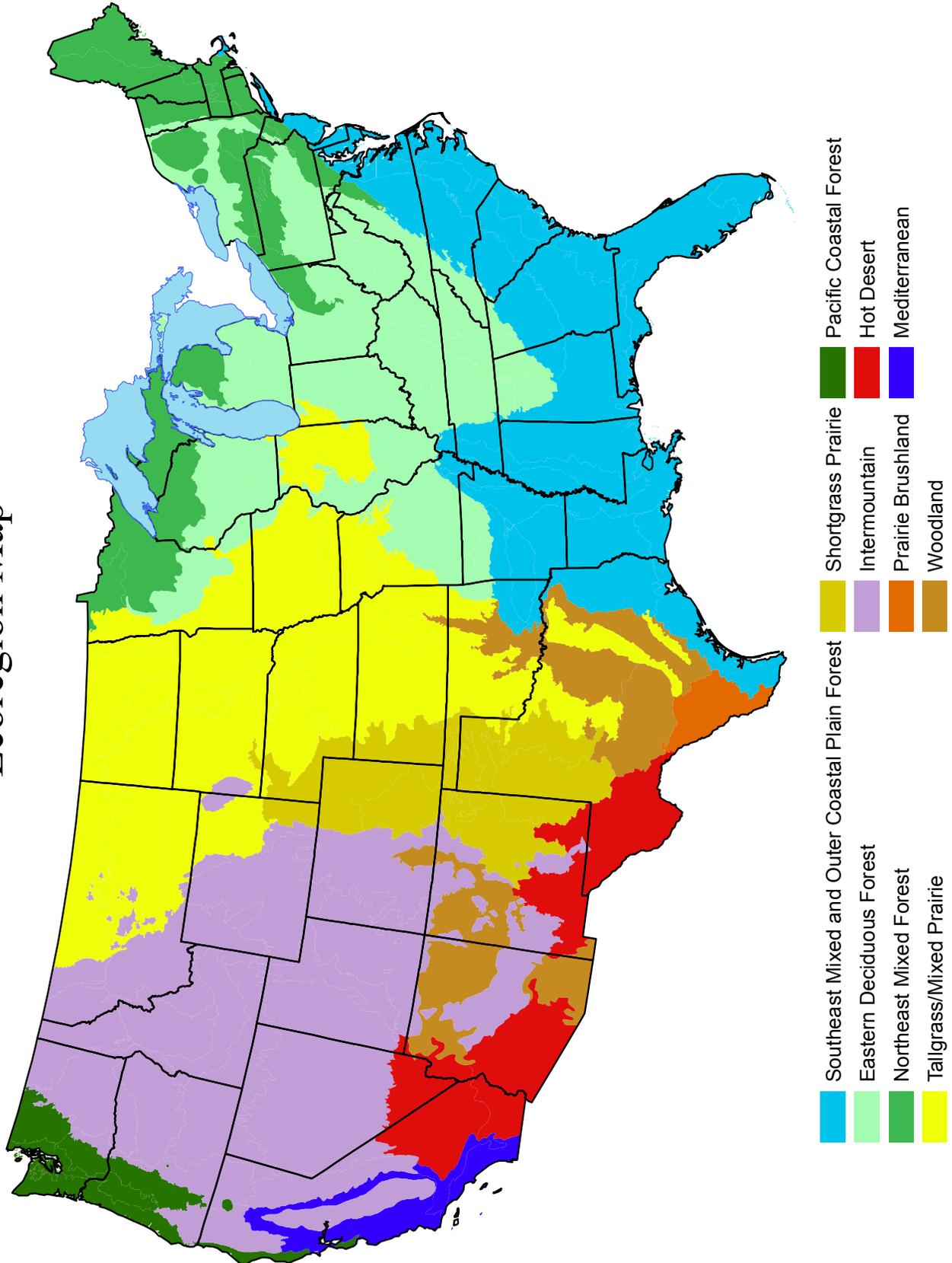
Woodland

Special area considerations within each ecoregion:

Urban

Wetlands

Ecoregion Map



Eastern Deciduous Forest

Physical description

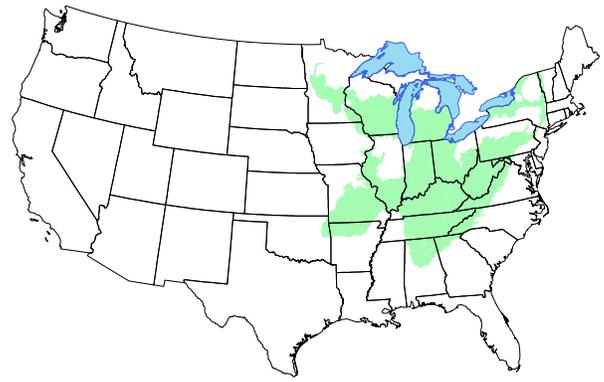
Most of the terrain is rolling except for the Appalachian Mountains and Ozark Mountains, which can be steep. The average annual precipitation ranges from approximately 35 inches to 90 inches and is usually well-distributed throughout the year. Summers are hot; winters are cold.

Dominant vegetation

Deciduous trees dominate the landscape across the Eastern Deciduous Forest ecoregion where there is a lack of disturbance. Depending on location, trees such as oaks, hickories, maples, American beech, basswood, buckeye, yellow-poplar, and black walnut are common in the overstory and can be indicators of a climax successional stage. Prevalent midstory trees include flowering dogwood, sassafras, sourwood, eastern redbud, hophornbeam, American hornbeam, and striped maple. Common shrubs include arrowwood, black huckleberry, blueberries, hawthorn, pawpaw, spicebush, viburnums, and witchhazel. A wide variety of forbs and ferns may be found in the understory. Common evergreen trees on many sites undergoing succession include eastern redcedar, Virginia pine, and shortleaf pine. In the Appalachians, eastern hemlock has been an important component in the Eastern Deciduous Forest. However, its decline following invasion of the Asian hemlock adelgid will surely lead to functional changes within this ecoregion.

Changes in the composition, structure, and function of the Eastern Deciduous Forest have already occurred during the past 100 years with the loss of American chestnut and the near total exclusion of fire. Prior to fire suppression, savannas and woodlands dominated by oak and shortleaf pine (depending on geographic location) were prevalent over much of this ecoregion.

Well-interspersed with forested areas in the Eastern Deciduous Forest ecoregion are agricultural fields,



pastures and hayfields, and fields undergoing succession. “Old-fields” are those that were cropped in the past, and the vast majority of these has since been planted to nonnative grasses, especially tall fescue. Restoring old-fields and other open areas that contain nonnative sod grasses to native forbs and grasses is a major objective concerning wildlife conservation in this ecoregion. Common native grasses, forbs, brambles, and shrubs occurring naturally in openings and savannas include bluestems, panicgrasses, indiagrass, switchgrass, asters, lespedezas, tick-trefoils, partridge pea, pokeweed, blackberry, wild plum, and sumacs.

Commonly occurring nonnative invasive plants in the Eastern Deciduous Forest ecoregion include tall fescue, orchardgrass, bermudagrass, Japanese stiltgrass (or japangrass), sericea lespedeza, Oriental bittersweet, multiflora rose, royal paulownia, tree-of-heaven, callery pear, autumn and Russian olive, Japanese honeysuckle, bush honeysuckles, Chinese privet, and bicolor lespedeza.

Farming and ranching

Large areas of the Eastern Deciduous Forest ecoregion have been cleared for crop production and livestock forage. The major agriculture crops in the ecoregion are corn, soybeans, wheat, grain sorghum, and cotton. The dominant grasses grown for pasture and hayfields include tall fescue, orchardgrass, bermudagrass, dallisgrass, and bluegrass, all of which are nonnative. Depending on how croplands and pastures are managed, some wildlife



Deciduous forest occurs over the Eastern Deciduous Forest ecoregion, except where areas have been cleared for agriculture and livestock.

species benefit. However, crop-fields are harvested in late summer or early fall (unless winter wheat is growing), pastures are most often overgrazed (leaving no cover for nesting or loafing), and hayfields consist of nonnative sod-grasses that provide poor structure for most wildlife species. The vast majority of fields that are not in crop

production are hayed (or mowed for aesthetic purposes) at least twice per year, usually once during the height of the nesting season for grassland birds, and once in late summer/early fall, which destroys any value as winter cover for wildlife.

Plant succession

Annual forbs such as common ragweed (shown below) and grasses with a few perennial species represent the **initial successional stage**.



Perennial forbs and grasses (such as broomsedge, goldenrod, ironweed (purple flower), and thoroughwort (white flower) shown below) and brambles represent the **second successional stage**.



Pioneering tree and shrub species, such as wild plum and winged sumac (shown below), winged elm, eastern redcedar, Virginia pine, birches, and black cherry, represent the **third successional stage**.



Hardwood forests dominated by species including oaks, hickories, red maple, and yellow-poplar typically represent the **fourth successional stage**. Of course, succession is determined by the plant species present. However, young forests (below, top) provide a different structure than older forests (below, bottom). Wildlife associated with forests that are only 2- to 4-years-old often are the same species associated with brushy cover provided in the third successional stage (such as eastern cottontail, northern bobwhite, brown thrasher).



Wildlife associated with Eastern Deciduous Forest

American woodcock
brown thrasher
eastern meadowlark
golden-winged warbler
great horned owl
mourning dove
northern bobwhite
ovenbird
wild turkey
wood duck
black bear
bobcat
eastern cottontail
eastern gray squirrel
gray fox
Indiana bat
white-tailed deer
eastern box turtle
timber rattlesnake
bluegill
American bumble bee
monarch butterfly

Eastern Deciduous Forest	American woodcock	brown thrasher	eastern meadowlark	golden-winged warbler	great horned owl	mourning dove	northern bobwhite	ovenbird	wild turkey	wood duck	black bear	bobcat	eastern cottontail	eastern gray squirrel	gray fox	Indiana bat	white-tailed deer	eastern box turtle	timber rattlesnake	bluegill	American bumblebee	monarch butterfly	
Habitat Management Practices																							
Conservation Easement			X	X			X									X			X		X	X	
Control Nonnative Invasive Vegetation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X
Do Not Feed Wildlife									X		X			X			X						
Edge Feathering	X	X		X	X		X		X		X	X	X		X	X	X		X		X	X	
Field Borders		X			X		X		X			X	X		X		X	X			X	X	
Forest Management	X	X		X	X		X		X	X	X	X	X	X	X	X	X	X	X				
Leave Crop Unharvested						X	X		X	X	X		X	X			X						
Livestock Management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	
Nesting Structures										X													
Plant Food Plots						X	X		X	X	X		X	X			X						
Plant Native Grasses and Forbs			X			X	X		X				X				X	X			X	X	
Plant Shrubs	X	X		X	X		X		X	X	X	X	X		X		X	X					
Plant Trees	X			X	X	X		X	X	X	X	X		X	X	X	X	X	X				
Repair Spillway/Levee						X				X										X			
Set-back Succession	X	X	X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	
Soil Conservation Agriculture					X	X	X		X	X	X		X				X						
Water Developments for Wildlife						X			X	X		X				X	X	X			X		
Population Management Practices																							
Decrease Harvest							X		X		X	X	X	X	X		X			X			
Increase Harvest									X		X	X	X	X	X		X			X			
Wildlife Damage Management					X				X		X	X	X	X	X		X		X				
Wildlife or Fish Survey	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Fish Pond/Stream Management Practices																							
Construct Fish Pond																					X		
Control Aquatic Vegetation																					X		
Fertilize/Lime Fish Pond																					X		
Reduce Turbidity in Fish Pond																					X		
Restock Fish Pond																					X		
Streams: Create Pools																							
Streams: Remove Fish Barriers																							

Great Plains Grasslands – Shortgrass Prairie

Physical description

The terrain is flat to rolling with occasional valleys, canyons, mesas, and buttes. Average annual precipitation ranges from 10 to 25 inches.

Dominant vegetation

In the western Great Plains (or shortgrass prairie), climax vegetation typically consists of short grasses, such as the grammas, buffalograss, needlegrasses, and wheatgrasses. In many areas, various species of shrubs, such as sagebrush, sumacs, salt bush, winterfat, and cholla, are found mixed with the grasses. Locoweed, sunflowers, ragweed, lupine, and herbaceous sage are common forbs present in this area.

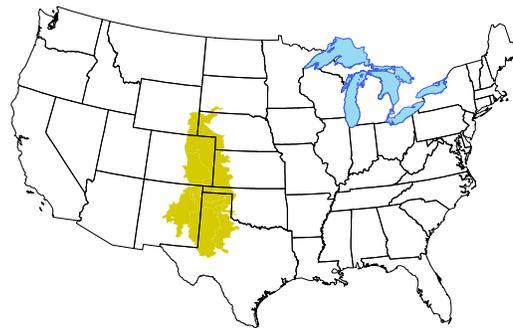
Within this ecoregion, there are large areas along major rivers and drainages dominated by trees and shrubs, such as cottonwood, American elm, box elder, and various willows. These sites are very attractive to species of wildlife that require woody cover.

Depressions (potholes) caused by glaciation in the north and closed drainages (playas) in the south fill with water, creating numerous wetlands that are extremely valuable to wildlife. These wetlands, especially the smaller ones, are susceptible to periodic drought.

Typical nonnative invasive plants in the Shortgrass Prairie include cheatgrass, Old World bluestem, saltcedar, yellow sweetclover, knapweed, and leafy spurge.

Farming and ranching

Cultivated cropland is found in portions of this ecoregion. Where precipitation is adequate or where irrigation is possible, large areas are planted to agricultural crops, such as cereal grains, grain sorghum, flax, sunflowers, and alfalfa. Changes in farm machinery and management have produced large areas of cropland with little or no native vegetation available for wildlife. Recent irrigation water management techniques have reduced the amount of wetlands and riparian vegetation associated with



irrigated crops. In the past, large areas of wetlands were drained or altered in some manner so crops could be grown and this practice continues. Much of this area is native rangelands, most of which is grazed by livestock, except for a few locations where terrain is too rugged or water is unavailable. Many acres of rangeland and former cropland have been converted to nonnative grasses, such as Old World bluestem and smooth brome, which have limited wildlife value.

Special: Planting trees for wildlife in this ecoregion is only recommended in areas where trees would have occurred historically, such as in riparian areas or major drainages. The historic occurrence of these trees was influenced by soils, moisture, and fire. Eastern redcedar and ashe juniper are very invasive in this ecoregion and control is important where they occur.

Plant succession

Annual forbs and grasses represent the initial successional stage. Perennial forbs and grasses represent the second successional stage. Shrub cover occurs in some areas and represents a third successional stage. Perennial grasses and forbs with scattered shrubs is the final stage of succession over most of the Shortgrass Prairie. Shrubs and trees are common along riparian areas.

Wildlife associated with Shortgrass Prairie

- | | |
|---------------------|--------------------------|
| American kestrel | black-tailed prairie dog |
| American wigeon | coyote |
| blue-winged teal | pronghorn |
| lark bunting | Rocky Mountain mule deer |
| mallard | plains hog-nosed snake |
| mourning dove | bluegill |
| northern harrier | largemouth bass |
| scaled quail | monarch butterfly |
| sharp-tailed grouse | |



Dwayne Elmore

In some areas of prairie, shrubs such as yucca provide important diversity that several wildlife species require.



Dwayne Elmore

Shortgrass prairie is dominated by low-growing grasses.

Great Plains Grassland: Shortgrass Prairie	American kestrel	American wigeon	blue-winged teal	lark bunting	mallard	mourning dove	northern harrier	scaled quail	sharp-tailed grouse	black-tailed prairie dog	coyote	pronghorn	Rocky Mountain mule deer	plains hog-nosed snake	bluegill	largemouth bass	monarch butterfly
Habitat Management Practices																	
Conservation Easement																	X
Control Nonnative Invasive Vegetation	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X
Do Not Feed Wildlife					X						X	X					
Edge Feathering											X	X					X
Field Borders	X							X	X		X	X	X				X
Forest Management											X	X					
Leave Crop Unharvested			X		X	X	X	X	X				X				
Livestock Management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Nesting Structures	X																
Plant Food Plots		X	X		X	X			X			X	X				
Plant Native Grasses and Forbs	X	X	X	X	X	X	X	X	X		X	X	X	X			X
Plant Shrubs	X					X		X	X	X	X		X				
Plant Trees	X					X							X				
Repair Spillway/Levee		X	X		X	X									X	X	
Set-back Succession	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X
Soil Conservation Agriculture	X	X	X		X	X	X	X	X				X				
Water Developments for Wildlife		X	X		X	X		X				X	X				
Population Management Practices																	
Decrease Harvest								X	X	X	X	X	X		X	X	
Increase Harvest										X	X	X	X		X	X	
Wildlife Damage Management										X	X		X				
Wildlife or Fish Survey	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fish Pond/Stream Management Practices																	
Construct Fish Pond															X	X	
Control Aquatic Vegetation															X	X	
Fertilize/Lime Fish Pond															X	X	
Reduce Turbidity in Fish Pond															X	X	
Restock Fish Pond															X	X	
Streams: Create Pools																	
Streams: Remove Fish Barriers																	

Great Plains Grasslands – Tallgrass/ Mixed Prairie

Physical description

The terrain is characterized by flat to rolling plains. Average annual precipitation ranges from 20 to 40 inches. Precipitation increases from west to east and is received primarily as spring and summer rain and winter snow. Winters are cold; summers are hot.

Dominant vegetation

Tall grasses, such as various bluestems, indiangrass, and switchgrass, represent the dominant vegetation in the eastern Great Plains (or tallgrass prairie). Commonly occurring forbs include sunflowers, broomweed, western ragweed, and lespedezas. Tall grasses dominate moist sites with soil depth greater than 20 inches, such as floodplains and valleys. Dry sites, such as hilltops and south-facing slopes, are dominated by shortgrass species. Transition sites (in-between areas) consist of a mixture of tall, mixed, and short grasses, including bluegrasses, prairie sandreed, grama grasses, and various dropseeds are found in this area.

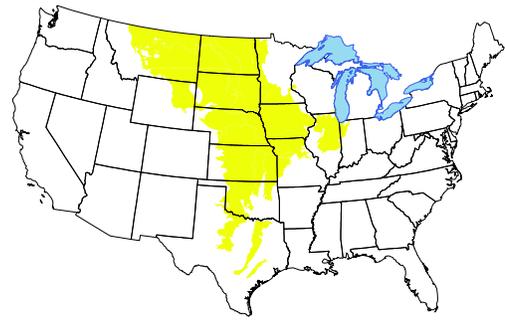
Drainages and other moist areas may have shrubs and trees, such as native plum, buttonbush, and cottonwood. Trees and shrubs, such as cottonwood, green ash, bur oak, American elm, box elder, eastern redcedar and various willows, occur along riparian areas. These sites are very attractive to various wildlife species that are adapted to woody vegetation cover.

Woodlands dominated by post oak and blackjack oak occur on upland sites in the southeast portion of the tallgrass prairie. This area is known as the Cross Timbers. It extends from northern Texas through central Oklahoma into Kansas. All of these vegetation types were historically maintained by a combination of grazing and fire. The lack of fire is a major cause of rangeland deterioration throughout this ecoregion.

Depressions (potholes) caused by glaciation in the north and closed drainages (playas) in the south fill with water, creating numerous lakes, ponds, and other wetlands that are extremely valuable to wildlife. These wetlands, especially the smaller ones, are susceptible to periodic droughts.

Typical nonnative invasive plants in the Tallgrass ecoregion include sericea lespedeza, bermudagrass, Canada thistle, smooth brome, musk thistle, and tall fescue.

Special: Planting trees for wildlife in this ecoregion is only recommended in areas where trees would have occurred historically, such as in riparian areas or major



drainages. The historic occurrence of these trees was influenced by soils, moisture, and fire.

Farming and ranching

Cultivated cropland is found in portions of this ecoregion where precipitation is adequate or irrigation is possible. Large areas are planted to agricultural crops, such as barley, wheat, millet, flax, oats, corn, sunflowers, and alfalfa. In the eastern part of the Great Plains and other areas where soil is fertile, the main crops include wheat, sugarbeets, corn, soybeans, grain sorghum, and alfalfa.

Changes in farm machinery and management have produced large areas of cropland with little or no other types of vegetation available for use by wildlife. Recent irrigation water management techniques have reduced the amount of wetlands and riparian vegetation associated with irrigated crops.

Most of the native range is grazed by livestock except for a few locations where terrain is too rugged or water is unavailable. Many acres of native rangelands in this ecoregion are being invaded by juniper (eastern redcedar) because of fire suppression. Fire is a critical component to rangeland health. The current lack of fire is the greatest threat to wildlife in this ecoregion.

Plant succession

Annual forbs and grasses represent the initial successional stage. Perennial grasses and forbs dominate the second successional stage. The climax community or third stage consists of woody species, such as juniper, osage orange, and elms. Shrubs and trees dominate riparian areas and other sufficiently moist areas that can support woody vegetation.

Wildlife associated with Tallgrass/Mixed Prairie

American wigeon
blue-winged teal
dickcissel
grasshopper sparrow
greater prairie-chicken
mourning dove
northern bobwhite
northern harrier
ring-necked pheasant

wild turkey
coyote
eastern cottontail
red fox
white-tailed deer
plains hog-nosed snake
bluegill
largemouth bass
monarch butterfly

Great Plains Grassland: Tallgrass/Mixed Prairie	American wigeon	blue-winged teal	dickcissel	grasshopper sparrow	greater prairie-chicken	mourning dove	northern bobwhite	northern harrier	ring-necked pheasant	wild turkey	coyote	eastern cottontail	red fox	white-tailed deer	plains hog-nosed snake	bluegill	largemouth bass	monarch butterfly
Habitat Management Practices																		
Conservation Easement				X	X													X
Control Nonnative Invasive Vegetation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X
Do Not Feed Wildlife										X	X			X				
Edge Feathering							X		X	X	X	X	X	X				X
Field Borders			X		X		X		X	X	X	X	X	X				X
Forest Management							X		X	X	X	X	X	X				
Leave Crop Unharvested		X	X		X	X	X	X	X	X		X		X				
Livestock Management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Nesting Structures																		
Plant Food Plots	X	X			X	X	X		X	X		X		X				
Plant Native Grasses and Forbs	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X
Plant Shrubs						X	X		X	X	X	X	X	X				
Plant Trees						X			X	X				X				
Repair Spillway/Levee	X	X				X										X	X	
Set-back Succession	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X
Soil Conservation Agriculture	X	X	X		X	X	X	X	X	X		X		X				
Water Developments for Wildlife	X	X				X				X				X				
Population Management Practices																		
Decrease Harvest					X		X		X	X	X	X	X	X		X	X	
Increase Harvest									X	X	X	X	X	X		X	X	
Wildlife Damage Management										X	X	X	X	X				
Wildlife or Fish Survey	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fish Pond/Stream Management Practices																		
Construct Fish Pond																X	X	
Control Aquatic Vegetation																X	X	
Fertilize/Lime Fish Pond																X	X	
Reduce Turbidity in Fish Pond																X	X	
Restock Fish Pond																X	X	
Streams: Create Pools																		
Streams: Remove Fish Barriers																		



Prairie is not only composed of grasses, but forbs are equally important. This recently burned prairie (left) has abundant forbs and bare ground. Large expanses of prairie (right) are critical to grassland species, such as the greater prairie-chicken.

Dwayne Elmore

Hot Desert

Physical description

The terrain is relatively flat to rolling with isolated buttes and mountains. Annual precipitation varies from 2 to 25 inches, depending on elevation, but seldom exceeds 7 inches over most of the ecoregion. Moisture is usually received in the form of short, violent storms or cloudbursts in summer and fall.

Summers are hot; winters are cool. Extreme differences in the daily high and low temperatures encourage nightly dew formation. Dew formation is an important water source for wildlife where precipitation is low.

Dominant vegetation

Vegetation is sparse and dominated by cacti and thorny shrubs over most of the ecoregion. Depending on geographic location, the most common plants are creosote bush, bur sage, chamise, paloverde, ocotillo, saguaro, and cholla. Shrubs are often widely spaced with a few short annual grasses growing among them. After rains, many flowers and grasses appear, quickly go to seed, and disappear until the next rain.

Vegetation associated with river and stream courses is more diverse and abundant than in the surrounding areas. Cottonwoods, willows, tamarisk, mesquite, and a variety of grasses and forbs dominate riparian areas. The abundance and variety of vegetation and presence of water compared to the surrounding desert makes riparian areas very attractive to wildlife.



Plants in the Hot Desert are adapted for high temperatures and low rainfall. Many species of cacti, grasses, and shrubs dominate.

Dwayne Elmore



Dwayne Elmore



Typical nonnative invasive plants in the Hot Desert ecoregion include African rue, Malta starthistle, Russian knapweed, medusahead, buffleggrass, and saltcedar (tamarisk).

Farming and ranching

Water is diverted from large rivers, such as the Colorado, to irrigate orchards, grain, hay, and vegetable crops. Irrigation water is expensive, which encourages the use of modern irrigation systems that do not waste much water. When wastewater is present, it supports a wide variety of vegetation and wetlands not common to this ecoregion. Wildlife species not normally associated with the desert are found in these areas.

Livestock grazing is common where water is available or can be developed. Riparian and wetland areas are attractive for livestock grazing, which must be managed to avoid damaging wildlife habitat.

Plant succession

Plant succession is not conspicuous in the desert. When vegetation is disturbed, it is often replaced by the same type without intervening stages. Replacement of disturbed vegetation can take a long time because of the harsh environment. Annual and perennial grasses and forbs may be found, with a lot of bare ground in between. Shrubs and cacti also are common and represent the final successional stage, except along riparian areas where shrubs and trees are common.

Wildlife associated with Hot Desert

- | | |
|-----------------------------|--------------------------|
| American kestrel | black-tailed prairie dog |
| black-throated sparrow | coyote |
| blue-winged teal | desert cottontail |
| crissal thrasher | mountain lion |
| Gambel's quail | pronghorn |
| golden eagle | Rocky Mountain mule deer |
| ladder-backed woodpecker | Gila monster |
| southwest willow flycatcher | bluegill |
| white-winged dove | largemouth bass |

Although deserts may appear barren, there are many species that occur here.

Hot Desert	American kestrel	black-throated sparrow	blue-winged teal	crissal thrasher	Gambel's quail	golden eagle	ladder-backed woodpecker	southwest willow flycatcher	white-winged dove	black-tailed prairie dog	coyote	desert cottontail	mountain lion	pronghorn	Rocky Mountain mule deer	Gila monster	bluegill	largemouth bass
Habitat Management Practices																		
Conservation Easement						X		X										
Control Nonnative Invasive Vegetation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Do Not Feed Wildlife											X				X			
Edge Feathering																		
Field Borders	X										X	X			X			
Forest Management							X											
Leave Crop Unharvested			X		X				X			X			X			
Livestock Management	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X
Nesting Structures	X																	
Plant Food Plots			X		X				X			X		X	X			
Plant Native Grasses and Forbs	X		X						X	X	X	X		X	X			
Plant Shrubs	X			X	X			X	X		X	X	X		X	X		
Plant Trees	X						X	X	X									
Repair Spillway/Levee			X														X	X
Set-back Succession	X	X	X	X		X		X	X	X	X	X	X	X	X			
Soil Conservation Agriculture	X		X						X			X			X			
Water Developments for Wildlife		X	X	X	X				X				X	X	X	X		
Population Management Practices																		
Decrease Harvest					X					X	X	X	X	X	X		X	X
Increase Harvest										X	X	X	X	X	X		X	X
Wildlife Damage Management						X	X			X	X	X	X	X	X			
Wildlife or Fish Survey	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fish Pond/Stream Management Practices																		
Construct Fish Pond																	X	X
Control Aquatic Vegetation																	X	X
Fertilize/Lime Fish Pond																	X	X
Reduce Turbidity in Fish Pond																	X	X
Restock Fish Pond																	X	X
Streams: Create Pools																		
Streams: Remove Fish Barriers																		

Intermountain – Foothills Zone

Physical description

The terrain varies from steep hills at the base of large mountains, to dissected plateaus and flat valleys. Average annual precipitation is between 10 and 25 inches. Most of the moisture is received in winter at higher elevations and in late summer at lower elevations. The summers are warm, and the winters are moderately cold.

Dominant vegetation

The Foothills zone is found directly below the Montane zone (in elevation) and is associated with most major mountain ranges in the western U.S. The upper reaches of this ecoregion have many of the characteristics of the Montane zone, whereas the lower reaches have similarities with the Sagebrush zone. Typically, shrubs such as scrub oaks, mountain mahogany, serviceberry, bitterbrush, manzanita, buckbrush, and sagebrush, dominate the ecoregion. Perennial grasses and many different forbs also are common. Occasionally, aspen and ponderosa pine are found on moist sites. In the southern areas of this ecoregion, pinyon and juniper trees are found on drier sites.

As with most of the ecoregions in the arid West, vegetation associated with rivers and streams is more diverse and abundant than in surrounding areas. Riparian areas are usually dominated by cottonwood, willow, tamarisk, Russian olive, sumac, silver buffaloberry, and a variety of grasses and forbs. The abundance and variety of vegetation and the availability of water make these areas very attractive to wildlife.

Typical nonnative invasive plants in the Foothills include cheatgrass, saltcedar, yellow star thistle, knapweed, halogeton, Dyer's woad, and Canada thistle.

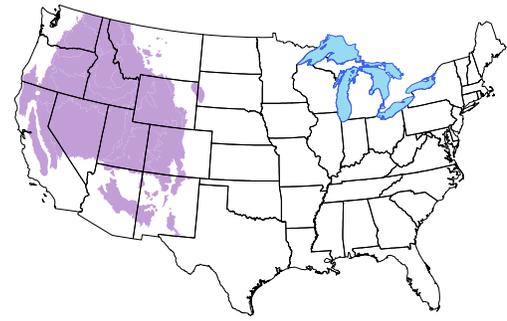
Farming and ranching

Water is often diverted to irrigate crops in the valleys and other areas where slopes are gentle. Hay,



Dwayne Elmore

Foothills typically support mixed grass, shrub, and trees. This variety of vegetation provides habitat for a diversity of wildlife species.



alfalfa, and oats are the most common crops. The terrain often makes managing irrigation water difficult. Water that runs off irrigated fields and leaks out of earthen delivery ditches often creates wetlands and/or supports vegetation similar to that found in riparian areas. In some areas, non-irrigated crops, such as wheat and barley, are grown. Most of the ecoregion is used for livestock grazing except where slopes are extremely steep. Cattle and sheep are the most common grazers.

Plant succession

Annual forbs and grasses represent the initial successional stage. Perennial forbs and grasses follow, and shrubs represent the third successional stage. Fire has historically maintained perennial grasses and forbs and shrubs. However, fire does not always revert shrubland to perennial grasses and forbs because many of these shrubs resprout following fire. Shrubs and trees are dominant along riparian areas.

Wildlife associated with Intermountain Foothills

American kestrel
dusky grouse
mallard
mourning dove
northern flicker
red-tailed hawk
spotted towhee
wild turkey
black bear

coyote
elk
mountain cottontail
Rocky Mountain mule deer
rainbow trout
monarch butterfly



Dwayne Elmore

Fire suppression in the Foothills has allowed fire-intolerant species, such as juniper, to spread into the valley floors. Encroachment of woody species has negatively impacted some species and favored others.

Intermountain Foothills	American kestrel	dusky grouse	mallard	mourning dove	northern flicker	red-tailed hawk	spotted towhee	wild turkey	black bear	coyote	elk	mountain cottontail	Rocky mountain mule deer	rainbow trout	monarch butterfly
Habitat Management Practices															
Conservation Easement															X
Control Nonnative Invasive Vegetation	X	X	X	X	X	X	X	X	X	X	X	X	X		X
Do Not Feed Wildlife			X					X	X	X	X		X		
Edge Feathering		X				X	X	X	X	X	X		X		X
Field Borders	X	X				X		X		X			X		X
Forest Management		X	X		X	X	X	X	X	X	X	X	X		
Leave Crop Unharvested			X	X				X	X				X		
Livestock Management	X	X	X	X			X	X		X	X	X	X	X	X
Nesting Structures	X														
Plant Food Plots			X	X				X	X		X	X	X		
Plant Native Grasses and Forbs	X	X	X	X		X		X		X	X	X	X		X
Plant Shrubs	X	X		X	X	X	X	X	X	X		X	X		
Plant Trees	X	X		X	X	X		X	X		X		X		
Repair Spillway/Levee			X	X										X	
Set-back Succession	X	X	X	X	X	X	X	X	X	X	X	X	X		X
Soil Conservation Agriculture	X		X	X		X		X	X				X		
Water Developments for Wildlife			X	X				X			X		X		
Population Management Practices															
Decrease Harvest		X						X	X	X	X	X	X	X	
Increase Harvest								X	X	X	X	X	X	X	
Wildlife Damage Management					X	X		X	X	X	X	X	X		
Wildlife or Fish Survey	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fish Pond/Stream Management Practices															
Construct Fish Pond														X	
Control Aquatic Vegetation														X	
Fertilize/Lime Fish Pond														X	
Reduce Turbidity in Fish Pond														X	
Restock Fish Pond														X	
Streams: Create Pools														X	
Streams: Remove Fish Barriers														X	

Intermountain – Montane Zone

Physical description

The terrain includes high rugged mountains of volcanic origin. Average annual precipitation is highly variable, ranging from 10 to 100 inches, depending on the site. The majority of the moisture comes in winter and early spring, except for areas in the southwestern U.S., which also receive monsoon rains in late summer.

Dominant vegetation

Dense coniferous forests of western hemlock, Sitka spruce, redwood, Douglas fir, incense cedar, and ponderosa pine are trees usually associated with the final successional stage. Aspen and lodgepole pine dominate large areas for long periods of time in the Rocky Mountains at the higher elevations. In the northern reaches of this ecoregion, silver fir, Sitka spruce, and Alaskan cedar are common.

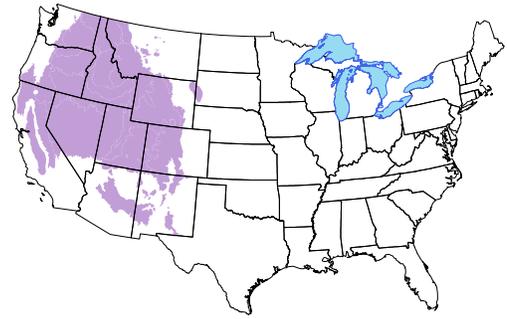
In mature forests, shrub, and herbaceous layers are poorly developed. Dense shrub cover of salal, vine maple, salmon berry and devil’s club may be found in openings of the northwest and northern Rocky Mountains. Serviceberry, chokecherry, scrub oak, mountain mahogany, ceanothus, and snowberry are found in the central and southern Rocky Mountains. Manzanita, sticky laurel, currant, waxberry, and buckthorn commonly grow in the Sierra Nevada Mountains. Perennial grasses and a variety of forbs also are common in open areas.

Typical nonnative invasive plants in the Intermountain Montane include cheatgrass, saltcedar, yellow star thistle, knapweed, halogeton, Dyer’s woad, and Canada thistle.



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Aspen is an important plant in the montane zone. There are many bird species, such as dusky grouse and ruffed grouse, which depend on it for habitat.



Farming and ranching

Water is diverted from nearby streams and rivers in the larger valleys to irrigate crops. Livestock grazing is common in this ecoregion where slopes are not too steep. Open areas dominated by shrubs and grasses, as well as areas adjacent to rivers and streams, are used most often for grazing. In some areas, crops such as small grains and alfalfa are grown in the valleys and other areas cleared of native vegetation.

Plant succession

Annual forbs and grasses represent the initial successional stage. Perennial grasses and forbs represent the second successional stage. Shrubs and aspen follow as the third successional stage, and coniferous forest represents the final successional stage.

Wildlife associated with Intermountain Montane

- | | |
|-----------------------|--------------------------|
| dusky grouse | American marten |
| hairy woodpecker | black bear |
| mountain bluebird | elk |
| northern goshawk | Rocky Mountain mule deer |
| ruffed grouse | snowshoe hare |
| spotted towhee | cutthroat trout |
| yellow-rumped warbler | rainbow trout |
| American beaver | monarch butterfly |



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Open stands of ponderosa pine are maintained by frequent fire in the montane zone.

Intermountain Montane	dusky grouse	hairy woodpecker	mountain bluebird	northern goshawk	ruffed grouse	spotted towhee	yellow-rumped warbler	American beaver	American marten	black bear	elk	Rocky mountain mule deer	snowshoe hare	cutthroat trout	rainbow trout	monarch butterfly
Habitat Management Practices																
Conservation Easement																X
Control Nonnative Invasive Vegetation	X	X	X	X	X	X	X	X	X	X	X	X	X			X
Do Not Feed Wildlife										X	X	X				
Edge Feathering	X		X			X				X	X	X				X
Field Borders	X		X									X				X
Forest Management	X	X		X	X	X	X		X	X		X	X			
Leave Crop Unharvested										X		X				
Livestock Management	X	X	X		X	X	X	X			X	X	X	X	X	X
Nesting Structures			X													
Plant Food Plots										X	X	X	X			
Plant Native Grasses and Forbs	X		X								X	X				X
Plant Shrubs	X		X		X	X	X	X		X		X	X			
Plant Trees	X	X	X	X	X		X	X	X	X	X	X	X			
Repair Spillway/Levee															X	
Set-back Succession	X		X		X	X	X			X	X	X				X
Soil Conservation Agriculture										X		X				
Water Developments for Wildlife											X	X				
Population Management Practices																
Decrease Harvest	X				X			X	X	X	X	X	X	X	X	
Increase Harvest								X	X	X	X	X	X	X	X	
Wildlife Damage Management		X						X		X	X	X	X			
Wildlife or Fish Survey	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fish Pond/Stream Management Practices																
Construct Fish Pond																X
Control Aquatic Vegetation																X
Fertilize/Lime Fish Pond																X
Reduce Turbidity in Fish Pond																X
Restock Fish Pond																X
Streams: Create Pools														X	X	
Streams: Remove Fish Barriers														X	X	

Intermountain – Sagebrush Zone

Physical description

The terrain includes large, undulating hills within small interior basins that are often surrounded by mountains. Annual precipitation averages 5 to 20 inches and occurs most often in winter and spring. Summers are hot and winters are moderately cold.

Dominant vegetation

Sagebrush dominates the lower elevations along with other shrubs, such as shad-scale, bitterbrush, fourwing saltbush, rabbitbrush, and horsebrush. Perennial grasses, such as wheatgrasses, needlegrasses, and bluegrasses, are common and intermixed with the shrubs. Forbs, such as lupines, buckwheats and mallows, also are present.

Riparian vegetation is usually much different than the surrounding vegetation and is dominated by cottonwoods, willows, tamarisk, Russian olive, silver buffaloberry, and a variety of grasses and forbs. The abundance and variety of vegetation and the availability of water makes riparian zones very attractive to wildlife.

Typical nonnative invasive plants in the Intermountain Sagebrush include cheatgrass, saltcedar, yellow starthistle, knapweed, halogeton, Dyer's woad, and Canada thistle.

Farming and Ranching

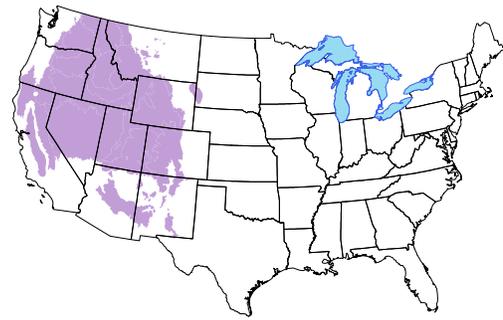
Water is diverted from nearby streams and rivers to irrigate crops, such as corn, barley, wheat, and alfalfa, in the lower elevations, and to irrigate grass hayland at higher elevations. The terrain often makes management of irrigation water difficult. Water that runs off irrigated fields and leaks out of earthen delivery ditches often creates wetlands or supports vegetation similar to that found in riparian areas, which is attractive to a variety of wildlife species.

In areas where irrigation water is not available and terrain and climate permit, native rangeland has been converted to non-irrigated cropland. Small grains, such as barley and wheat, are the most common crops. Near croplands are areas not cultivated and remain in native vegetation. This mix of dry cropland and rangeland is important to many wildlife species.

There are large areas of shrubs and grasslands in this ecoregion that are primarily used for livestock grazing. In winter, large herds of domestic sheep often use rangelands within this ecoregion.

Plant succession

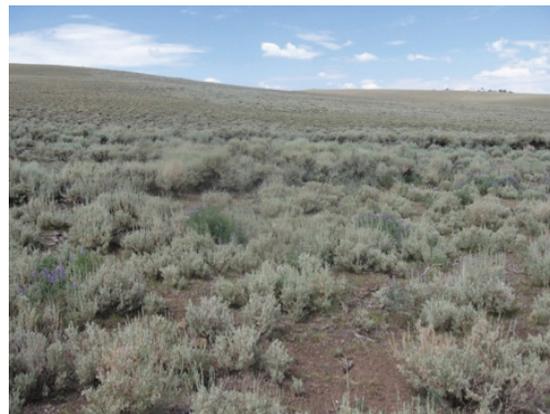
Annual forbs and grasses represent the initial stage of succession. Perennial grasses and forbs represent the second stage. Shrubs, along with perennial grasses and



forbs are the third successional stage. Shrubs dominate the fourth successional stage. Continued overgrazing of perennial grasses will lead to the grass disappearing and shrubs will dominate.

Wildlife associated with the Intermountain Sagebrush

American kestrel	sage thrasher
Brewer's sparrow	coyote
ferruginous hawk	desert cottontail
greater sage-grouse	pronghorn
mallard	Rocky Mountain mule deer
mourning dove	rainbow trout
northern flicker	



Dwayne Elmore

Sagebrush is the dominant plant in the sagebrush zone. Some species, such as greater sage-grouse, depend on this plant to survive.



Dwayne Elmore

Disturbance, such as fire, often removes sagebrush. Managing vegetation other than sagebrush can both negatively and positively benefit various species. It is important to manage disturbance such that a variety of native species can persist in the sagebrush zone.

Intermountain Sagebrush	American kestrel	Brewer's sparrow	ferruginous hawk	greater sage-grouse	mallard	mourning dove	northern flicker	sage thrasher	coyote	desert cottontail	pronghorn	Rocky Mountain mule deer	rainbow trout
Habitat Management Practices													
Conservation Easement				X									
Control Nonnative Invasive Vegetation	X	X	X	X	X	X	X	X	X	X	X	X	
Do Not Feed Wildlife					X				X			X	
Edge Feathering												X	
Field Borders	X								X	X		X	
Forest Management							X						
Leave Crop Unharvested					X	X				X		X	
Livestock Management	X	X	X	X	X	X			X	X	X	X	X
Nesting Structures	X												
Plant Food Plots					X	X				X	X	X	
Plant Native Grasses and Forbs	X		X		X	X			X	X	X	X	
Plant Shrubs	X	X		X		X	X	X	X	X		X	
Plant Trees	X		X			X	X						
Repair Spillway/Levee					X	X							X
Set-back Succession	X	X	X		X	X	X	X	X	X	X	X	
Soil Conservation Agriculture	X		X		X	X				X		X	
Water Developments for Wildlife					X	X					X	X	
Population Management Practices													
Decrease Harvest				X					X	X	X	X	X
Increase Harvest									X	X	X	X	X
Wildlife Damage Management							X		X	X	X	X	
Wildlife or Fish Survey	X	X	X	X	X	X	X	X	X	X	X	X	X
Fish Pond/Stream Management Practices													
Construct Fish Pond													X
Control Aquatic Vegetation													X
Fertilize/Lime Fish Pond													X
Reduce Turbidity in Fish Pond													X
Restock Fish Pond													X
Streams: Create Pools													X
Streams: Remove Fish Barriers													X

Intermountain – Subalpine zone

Physical description

The terrain is steeply sloping mountains crossed by many valleys. Average annual precipitation is highly variable, typically ranging from 30 to 60 inches with some areas receiving more than 100 inches. The majority of the moisture comes in the winter and early spring as snow.

Dominant vegetation

Subalpine is directly above the Montane zone in elevation and is associated with most major mountain ranges in the western U.S. The lower reaches have many of the characteristics of the Montane zone. In the Sierra Nevada Mountains, coniferous forests of mountain hemlock, California red fir, western white pine, and whitebark pine occur. In the Rocky Mountains, subalpine fir and Engelmann spruce are the dominant tree species. In the Gila Mountains, Engelmann spruce, and corkbark fir dominate.

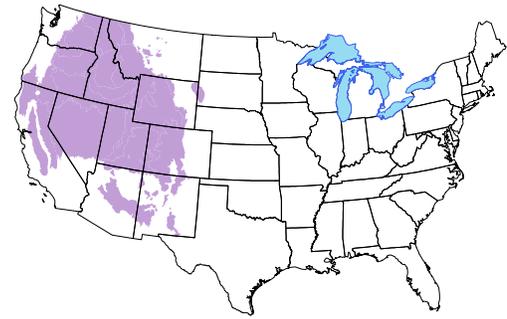
Understory vegetation usually consists of sedges, a variety of forbs, and low-growing shrubs, such as vaccinium, elderberry, bearberry, currant, and willow. Understory plants are sparse where the forest canopy is dense.

Subalpine meadows dominated by grasses, sedges, and forbs, are scattered throughout this ecoregion. Common species include purple reedgrass, alpine fescue, slender wheatgrass, falsebulrush sedge, whiproot clover, and bistort. In high mountain valleys, streams and bogs are surrounded by thick stands of willow and subalpine meadow vegetation. Aspen occurs in the middle stages of plant succession.



Dwayne Elmore

Trees in the Subalpine (such as this Subalpine fir) grow slowly and rarely attain a tall structure because the growing conditions are so harsh.



Farming and ranching

An extremely short growing season, rocky soils, and steep slopes prohibit crop production in the subalpine. In some areas, water is diverted from streams to irrigate high mountain meadows for grass and sedge-hay production. Livestock grazing occurs in localized areas and is usually restricted to the mountain meadows and aspen stands where slopes are less steep.

Plant succession

Annual forbs and grasses represent the initial successional stage. Perennial grasses and forbs represent the second successional stage. Various shrubs and aspen represent the third successional stage, which may be the climax stage on dry, steep slopes with southern exposures. Various conifer trees represent the fourth successional stage in Subalpine. It should be noted that succession takes much longer in Subalpine than in most other ecoregions because of the harsh conditions.

Wildlife associated with the Intermountain Subalpine

- | | |
|------------------------|--------------------------|
| black-capped chickadee | elk |
| dusky grouse | red squirrel |
| hairy woodpecker | Rocky Mountain mule deer |
| northern goshawk | snowshoe hare |
| white-tailed ptarmigan | cutthroat trout |
| yellow-rumped warbler | rainbow trout |
| American marten | |



The growing season is short in the Subalpine with most plants going dormant by October.

Intermountain Subalpine	black-capped chickadee	dusky grouse	hairy woodpecker	northern goshawk	white-tailed ptarmigan	yellow-rumped warbler	American marten	elk	red squirrel	Rocky Mountain mule deer	snowshoe hare	cutthroat trout	rainbow trout
Habitat Management Practices													
Conservation Easement													
Control Nonnative Invasive Vegetation	X	X	X	X	X	X	X	X	X	X	X		
Do Not Feed Wildlife								X		X			
Edge Feathering		X						X		X			
Field Borders													
Forest Management	X	X		X		X	X	X	X	X	X		
Leave Crop Unharvested													
Livestock Management	X	X	X		X	X		X	X	X	X	X	X
Nesting Structures	X												
Plant Food Plots													
Plant Native Grasses and Forbs		X						X		X			
Plant Shrubs	X	X			X	X				X	X		
Plant Trees	X	X	X	X		X	X	X	X	X	X		
Repair Spillway/Levee													X
Set-back Succession	X	X				X		X		X			
Soil Conservation Agriculture										X			
Water Developments for Wildlife								X		X			
Population Management Practices													
Decrease Harvest		X			X		X	X	X	X	X	X	X
Increase Harvest							X	X	X	X	X	X	X
Wildlife Damage Management			X					X		X	X		
Wildlife or Fish Survey	X	X	X	X	X	X	X	X	X	X	X	X	X
Fish Pond/Stream Management Practices													
Construct Fish Pond													X
Control Aquatic Vegetation													X
Fertilize/Lime Fish Pond													X
Reduce Turbidity in Fish Pond													X
Restock Fish Pond													X
Streams: Create Pools												X	X
Streams: Remove Fish Barriers												X	X

Mediterranean

Physical description

Mediterranean climates are found in only five places on Earth: California and Baja California, the basin of the Mediterranean Sea, southwestern Australia, the western cape of South Africa, and the central coast of Chile. The geologic history of California has produced a complex landscape with variations in topography and climate. The Mediterranean climate ecoregion lies west of the Sierra Nevada and includes a portion of coastal Baja California. The terrain includes gently to steeply sloping mountains, coastal plains, and interior valleys. Average annual precipitation ranges from 12 to 40 inches with most of it occurring in winter as rain. Summers are hot and dry, whereas winters are mild and rainy.

Rocky or shallow soils have evergreen shrublands called chaparral. Oak woodlands occur where soils are deeper or moisture is more available. Drier areas along the coast and inland at the transition to deserts support coastal sage scrub. Chaparral is the most abundant vegetation type. Mediterranean vegetation is dominated by evergreen trees and trees with short, hard, dense leaves (sclerophyllous). These plants are adapted to fire, summer drought, and cool, moist winters.

Dominant vegetation

Three common but different vegetation types are found in this ecoregion: chaparral, oak woodlands, and coastal sage. The chaparral is dominated by chamise, ceanothus, mountain mahogany, and manzanita. The southern oak woodlands are dominated by Engelmann oak, coast live oak, interior live oak, and California walnut. The coastal sage, also called soft chaparral, is dominated by California sagebrush and black sage, as well as California buckwheat. Each vegetation type is summarized below.

Chaparral or Hard Chaparral: Found from 1,000 to 5,000 feet in elevation. At its lower limits, annual grasslands and coastal sage blend in. Most shrubs are 3 to 10 feet tall, with small leathery leaves adapted to hot dry summers. This vegetation type is adapted to a 20-year fire-return interval. Many plants such as creosote contain flammable oils.

Southern Oak Woodlands: Found throughout the Sierra Nevada and Coast Range foothills and lower montane elevations from 1,800 to 4,850 feet, often on steep rocky slopes where snow and cold temperatures occur. Trees are highly variable, growing from 15 to 70 feet tall, depending on the oak species, elevation, and soil type. With frequent annual burning (at lower elevations and on



warmer sites), woodlands with large oaks and well-developed grassy understories of native perennial bunchgrasses are common.

Coastal Sage or Soft Chaparral: The coastal sage plant community of California exists along the coast from about San Francisco and Lafayette down through San Diego and inland as far as Riverside in southern California. These shrubs are generally less than 6 feet tall with multiple woody stems. Leaves are often aromatic, gray, woolly, or sticky. Leaves are pliable and thin (malacophyllous), which is why it also called the soft chaparral.

Typical nonnative invasive plants in the Mediterranean ecoregion include red brome, yellow starthistle, leafy spurge, scotch thistle, and medusahead.

Farming and ranching

Agriculture is widespread and diverse within this ecoregion. Stream valleys, coastal plains, and interior valleys are planted in a wide variety of vegetable crops, grain crops, orchards, vineyards, cotton, and hay.

In the drier areas of the ecoregion, water must be diverted from rivers and streams to irrigate orchards, vineyards, citrus, hay, and grain crops. Irrigation water is expensive, which encourages the use of modern irrigation systems that do not waste much water. Waste water, when present, often supports a wide variety of riparian vegetation and wetlands. In the moister areas, crops such as lemons, avocados, vegetables, and flowers are grown.

Ranching operations are present in areas where slopes are not too steep or rocky. Grass for grazing is available for a few years when the oak woodlands burn. Caution must be taken when ranching. Overgrazing can create long-term damage to the vegetation. Overgrazing weakens the native vegetation, allowing aggressive nonnative species to establish.

Plant succession

Oak Woodland: Annual forbs and grasses represent the initial successional stage. Young oaks with open grassland or shrubby understory represent the second successional stage. Mature oaks with an open grassland or shrubby understory represent the final stage of succession.

Coastal Sage: Annual forbs and grasses, especially mustard, filaree, soft chess, represent the initial successional stage. Perennial grasses and forbs may occur afterward, but shrubs, such as chamise and manzanita, often pioneer in following the annual grasses and forbs. These shrubs often resprout following fire so succession does not always revert to an earlier stage after fire.

Chaparral: annual forbs and grasses represent the initial stage of succession and are usually present immediately after a fire. Shrubs, such as shrub oak, dominate within 2 to 5 years following fire and represent the final successional stage.

Wildlife associated with Mediterranean

All species listed are not found in all of the vegetation types described.

American kestrel	largemouth bass
California quail	monarch butterfly
California thrasher	
Lawrence's goldfinch	
mallard	
mourning dove	
Nuttall's woodpecker	
western kingbird	
desert cottontail	
raccoon	
Rocky Mountain mule deer	
wild pig	
Monterey salamander	
bluegill	



Dwayne Elmore

The Mediterranean-like climate found in California creates a grassland that is maintained by fire.



Dwayne Elmore

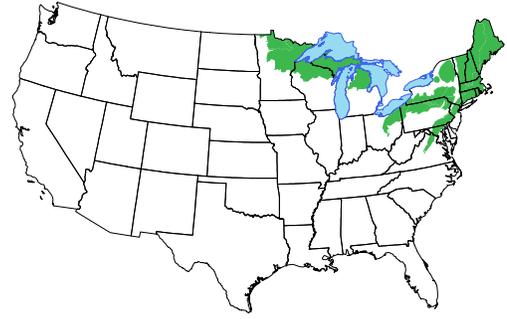
Many species of shrubs and small trees exist within the grasslands of central California. Periodic fire reduces their structure, but they return quickly after fire.

Mediterranean	American kestrel	California quail	California thrasher	Lawrence's goldfinch	mallard	mourning dove	Nuttall's woodpecker	western kingbird	desert cottontail	raccoon	Rocky Mountain mule deer	wild pig	Monterey salamander	bluegill	largemouth bass	monarch butterfly
Habitat Management Practices																
Conservation Easement				X												X
Control Nonnative Invasive Vegetation	X	X	X	X	X	X	X	X	X	X	X					X
Do Not Feed Wildlife					X					X	X	X				
Edge Feathering		X						X		X	X					X
Field Borders	X	X						X	X	X	X					X
Forest Management			X	X	X		X		X	X	X		X			
Leave Crop Unharvested		X			X	X			X	X	X					
Livestock Management	X	X	X		X	X			X	X	X			X	X	X
Nesting Structures	X															
Plant Food Plots		X			X	X			X	X	X					
Plant Native Grasses and Forbs	X	X			X	X		X	X		X					X
Plant Shrubs	X	X	X			X		X	X	X	X		X			
Plant Trees	X	X		X		X	X			X	X		X			
Repair Spillway/Levee					X	X				X				X	X	
Set-back Succession	X	X	X	X	X	X		X	X	X	X					X
Soil Conservation Agriculture	X	X		X	X	X			X	X	X					
Water Developments for Wildlife		X		X	X	X				X	X					
Population Management Practices																
Decrease Harvest		X							X	X	X			X	X	
Increase Harvest									X	X	X	X		X	X	
Wildlife Damage Management							X		X	X	X	X				
Wildlife or Fish Survey	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fish Pond/Stream Management Practices																
Construct Fish Pond														X	X	
Control Aquatic Vegetation														X	X	
Fertilize/Lime Fish Pond														X	X	
Reduce Turbidity in Fish Pond														X	X	
Restock Fish Pond														X	X	
Streams: Create Pools																
Streams: Remove Fish Barriers																

Northeast Mixed Forest

Physical description

The terrain is flat with some rolling hills and low mountains. The average annual precipitation ranges from 24 to 45 inches. Most of the precipitation is received in the summer, but snow is usually on the ground all winter. Summers are warm and winters are very cold.



Dominant vegetation

This ecoregion is transitional between the evergreen-dominated forests to the north and the broadleaf-dominated forests to the south. The final stage of succession can be dominated by both tall broadleaf (deciduous) and evergreen (coniferous) trees. They can be mixed together or in separate stands adjacent to each other. The dominant conifers are white pine, red spruce, subalpine fir, eastern hemlock, and eastern redcedar. American beech, sugar maple, and basswood are the most common deciduous trees. Common shrubs are rhododendron, dogwood, cranberry, and hobblebush. A wide variety of forbs and grasses are found on the forest floor. Typical invasive plants in the Northeast Mixed Forest include Japanese stiltgrass, Canada thistle, garlic mustard, Russian olive, and tree-of-Heaven.

Farming and ranching

Very large areas of this ecoregion have been cleared of native vegetation for industrial use, urban sprawl, and production of crops and livestock forage. In some areas, extremely poor soils and short growing seasons put limitations on agriculture. Depending on how the pastures and croplands are managed, some species of wildlife may benefit from farming, especially if trees and shrubs are nearby.



This mature stand of aspen, eastern hemlock, and sugar maple is displaying peak autumn coloration. This picture shows the aspen slowly giving way to the more shade-tolerant eastern hemlock and sugar maple.



The lush herbaceous understory of this 22-year-old northern hardwood forest provides optimum brooding cover for ruffed grouse.

Plant succession



Kip Adams

Annual forbs and grasses with a few perennial species represent the initial successional stage. Perennial forbs and grasses and brambles, such as goldenrods, wildryes, and blackberry, represent the second successional stage.

Young trees and shrubs, such as alder and aspen, along with perennial grasses and forbs, represent the third successional stage.



Kip Adams



Kip Adams

Without disturbance, especially fire, aspen gives way to the fourth successional stage, which is usually represented by various hardwoods, such as maples, northern red oak, American beech, and birches.

The fifth successional stage is dominated by more shade-tolerant species, such as eastern hemlock, American beech, sugar maple, white pine, and red spruce.



Kip Adams

Wildlife associated with Northeast Mixed Forest

American black duck
American woodcock
black-backed woodpecker
brown thrasher
northern goshawk

ovenbird
ruffed grouse
wild turkey
black bear
fisher

moose
New England cottontail
red squirrel
snowshoe hare
white-tailed deer

wood frog
bluegill
largemouth bass
monarch butterfly

Northeast Mixed Forest	American black duck	American woodcock	black-backed woodpecker	brown thrasher	northern goshawk	ovenbird	ruffed grouse	wild turkey	black bear	fisher	moose	New England cottontail	red squirrel	snowshoe hare	white-tailed deer	wood frog	bluegill	largemouth bass	monarch butterfly
Habitat Management Practices																			
Conservation Easement												X							X
Control Nonnative Invasive Vegetation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X
Do Not Feed Wildlife								X	X						X				
Edge Feathering		X		X			X	X	X			X			X				X
Field Borders				X				X				X			X				X
Forest Management		X		X	X		X	X	X	X	X	X	X	X	X				
Leave Crop Unharvested	X							X	X						X				
Livestock Management	X	X		X		X	X	X	X			X	X	X	X	X	X	X	X
Nesting Structures																			
Plant Food Plots	X							X	X			X		X	X				
Plant Native Grasses and Forbs	X							X				X			X				X
Plant Shrubs		X		X			X	X	X		X	X		X	X				
Plant Trees		X	X		X	X	X	X	X	X	X	X	X	X	X	X			
Repair Spillway/Levee	X										X						X	X	
Set-back Succession	X	X	X	X			X	X	X		X	X		X	X				X
Soil Conservation Agriculture	X							X	X						X				
Water Developments for Wildlife	X							X			X				X	X			
Population Management Practices																			
Decrease Harvest							X	X	X	X	X	X	X	X	X		X	X	
Increase Harvest								X	X	X	X		X	X	X		X	X	
Wildlife Damage Management								X	X	X				X	X				
Wildlife or Fish Survey	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fish Pond/Stream Management Practices																			
Construct Fish Pond																	X	X	
Control Aquatic Vegetation																	X	X	
Fertilize/Lime Fish Pond																	X	X	
Reduce Turbidity in Fish Pond																	X	X	
Restock Fish Pond																	X	X	
Streams: Create Pools																			
Streams: Remove Fish Barriers																			

Pacific Coastal Forest

Physical description

The terrain includes coastal plains and broad interior lowland plains and valleys associated with the Puget Sound and Willamette Valley. It also includes ridge and valley zones associated with Coast Ranges and temperate forest zones extending up the western slopes of the Cascade Mountains, as well as those on all sides of the Olympic Mountains. Many narrow river valleys and adjacent steep slopes are associated with these forests. Average annual precipitation ranges from under 30 inches to 180 inches, most in the form of winter rainfall.

Dominant vegetation

Final stage of plant succession is typically dense coniferous forests. Depending on the location and elevation, western hemlock, Sitka spruce, Douglas fir and western redcedar are species associated with the climax stage. Grand fir also may be found in the climax stage, and Pacific silver fir and noble fir are often found dominating in the higher mountain zones within the Pacific Coastal Forest. Red alder, either in pure stands or intermixed with earlier stages of plant succession, are found throughout the Pacific Coastal Forest. Big-leaf maple can be found through all stages of plant succession, but seldom in pure stands. In older, managed, even-aged forests, shrub and herbaceous layers are poorly developed. Dense and diverse shrub layers may be found in forest openings, early successional areas and in mature forests.

Some dominant shrub species include salal, vine maple, salmonberry, devil's club, vaccinium, elderberries, and swordfern, depending on site conditions. Serviceberry, chokecherry, Oregon white oak, snowberry, Oregon grape, oceanspray, hazel, scrub oaks, and ceanothus may dominate on some of the drier sites within this ecoregion. Perennial grasses and a variety of forbs are also common in open areas. Typical invasive plants in the Pacific Coastal Forest include Scotch broom, gorse,



English ivy, knapweeds, reed canarygrass, butterfly bush, and purple loosestrife.

A major portion of the area consists of managed forest, owned or operated by state agencies, industrial landowners, and nonindustrial private landowners. Many of these managed forests are characterized by even-aged stands of few species, usually Douglas fir or western hemlock. These forests are often managed for wood-fiber production by occasional thinning and clearcut harvest, usually by 70 years of age.

Farming and ranching

In larger valleys, some water is diverted from nearby streams and rivers to irrigate grass hay. Crops such as corn, small grains, fruits, and alfalfa are grown in the lower valley floodplains. Livestock grazing is common and widespread on both the original prairies and pastures converted from forests and wetlands. Dairy farming is common throughout the ecoregion, especially along the coastal corridor.

Plant succession

Annual forbs and grasses represent the initial successional stage. Perennial grasses and forbs represent the second successional stage. Various shrubs, alder, and vine maple follow as the third successional stage. Coniferous forests, especially Douglas fir, represent the fourth successional stage. Western Hemlock often replaces Douglas fir as a fifth successional stage.



Industrial coniferous forest provide habitat for many wildlife species in the Pacific Coastal Forest ecoregion.



Livestock grazing, especially cattle and sheep, is common along the coastal corridor.

Wildlife associated with Pacific Coastal Forest

great horned owl
hairy woodpecker
marbled murrelet
red-tailed hawk
ruffed grouse

sooty grouse
spotted towhee
wood duck
American beaver
bobcat

Columbian black-tailed deer
coyote
elk
red squirrel
northern red-legged frog

rough-skinned newt
Coho salmon
monarch butterfly

Pacific Coastal Forest	great horned owl	hairy woodpecker	marbled murrelet	red-tailed hawk	ruffed grouse	sooty grouse	spotted towhee	wood duck	American beaver	bobcat	Columbian black-tailed deer	coyote	elk	red squirrel	northern red-legged frog	rough-skinned newt	Coho salmon	monarch butterfly
Habitat Management Practices																		
Conservation Easement			X															X
Control Nonnative Invasive Vegetation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
Do Not Feed Wildlife											X	X	X					
Edge Feathering	X			X			X			X	X	X	X					X
Field Borders	X			X						X	X	X						X
Forest Management	X		X	X	X	X	X	X		X	X	X	X	X	X			
Leave Crop Unharvested								X			X							
Livestock Management	X	X			X	X	X	X	X	X	X	X	X	X	X	X		X
Nesting Structures								X										
Plant Food Plots								X			X		X					
Plant Native Grasses and Forbs	X			X		X					X	X	X					X
Plant Shrubs	X			X	X	X	X	X	X	X	X	X						
Plant Trees	X	X	X	X	X	X		X	X	X	X		X	X	X			
Repair Spillway/Levee								X								X		
Set-back Succession	X		X	X	X	X	X	X		X	X	X	X					X
Soil Conservation Agriculture	X			X				X			X							
Water Developments for Wildlife								X		X	X		X		X	X		
Population Management Practices																		
Decrease Harvest					X	X			X	X	X	X	X	X				
Increase Harvest									X	X	X	X	X	X				
Wildlife Damage Management	X	X		X					X	X	X	X	X					
Wildlife or Fish Survey	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fish Pond/Stream Management Practices																		
Construct Fish Pond																		
Control Aquatic Vegetation																		
Fertilize/Lime Fish Pond																		
Reduce Turbidity in Fish Pond																		
Restock Fish Pond																		
Streams: Create Pools																		
Streams: Remove Fish Barriers																	X	

Prairie Brushland

Physical description

The terrain is level to rolling hills. Average annual precipitation is between 17 and 32 inches, increasing from southwest to northeast. Most of the moisture is received in the fall and spring. The summers are hot and winters are warm.

Dominant vegetation

Climax vegetation is characterized by dense shrubland, often with more open stands of shrubs with grasses and forbs forming a shrub savanna. Depending on the area, shrubs such as mesquite, black brush, catclaw, huisache, and guajillo are common in the final successional stage. Other species that contribute to the shrub layer include white brush, bluewood, lotebush, coyotillo, live oak, cenizo, prickly pear, and chollas. Some of the more common grasses associated with climax vegetation include various species of bluestem and paspalum, Arizona cottontop, buffalograss, burgrass, dropseed, windmillgrass, slender grama, hairy grama, common sandbur, and various species of bristlegrass.

Vegetation associated with riparian areas is different than the surrounding vegetation. Trees, such as live oak and hackberry, are common in riparian areas. Mesquite grows much larger, looking more like a tree than a shrub, and the vegetation is generally more robust along rivers and streams where moisture is abundant. The abundance and variety of vegetation combined with the availability of water make these areas attractive for wildlife.

Typical nonnative invasive plants in the Prairie Brushland include old world bluestem, buffelgrass, Lehmann lovegrass, and Chinese tallow tree.



Farming and ranching

There is very little farming in this ecoregion. The large areas of shrubs and grasslands are used primarily for livestock grazing. Continual heavy grazing of perennial grasses will reduce perennial grasses and lead to near complete shrub cover, which directly impacts habitat for wildlife and graze-able acreage for livestock.

Plant succession

Annual forbs and grasses represent the initial successional stage. Perennial forbs and grasses follow and represent the second successional stage. Shrubs with perennial grasses represent the third and final successional stage, except along drainages where trees may be found.

Wildlife associated with Prairie Brushland

black-bellied whistling duck	coyote
crested caracara	white-tailed deer
golden-fronted woodpecker	wild pig
long-billed thrasher	Texas horned lizard
northern bobwhite	bluegill
pyrrhuloxia	largemouth bass
western kingbird	monarch butterfly
white-winged dove	
wild turkey	
collared peccary	



Brush country in south Texas. Mesquite and prickly pear are prevalent with cottonwood in the drainages. This landscape provides habitat for wild turkey, northern bobwhite, American kestrel, coyote, white-tailed deer, and many other species.



Openings within brush country add considerable diversity to the landscape matrix and provide food and cover resources for several wildlife species.

Selma Glasscock

Prairie Brushland	black-bellied whistling duck	crested caracara	golden-fronted woodpecker	long-billed thrasher	northern bobwhite	pyrrhuloxia	western kingbird	white-winged dove	wild turkey	collared peccary	coyote	white-tailed deer	wild pig	Texas horned lizard	bluegill	largemouth bass	monarch butterfly
Habitat Management Practices																	
Conservation Easement																	X
Control Nonnative Invasive Vegetation	X	X	X	X	X	X	X	X	X	X	X	X		X			X
Do Not Feed Wildlife									X	X	X	X	X				
Edge Feathering					X	X	X		X		X	X					X
Field Borders				X	X	X	X		X		X	X					X
Forest Management																	
Leave Crop Unharvested	X				X			X	X			X					
Livestock Management	X	X			X			X	X		X	X			X	X	X
Nesting Structures	X																
Plant Food Plots	X				X			X	X			X					
Plant Native Grasses and Forbs					X			X	X		X	X					X
Plant Shrubs		X		X	X	X	X	X	X	X	X	X		X			
Plant Trees	X	X	X	X				X	X								
Repair Spillway/Levee	X														X	X	
Set-back Succession		X	X		X	X	X	X	X	X	X	X		X			X
Soil Conservation Agriculture	X				X			X	X			X					
Water Developments for Wildlife	X			X		X		X	X	X		X					
Population Management Practices																	
Decrease Harvest	X				X				X	X	X	X			X	X	
Increase Harvest									X	X	X	X	X		X	X	
Wildlife Damage Management			X						X		X	X	X				
Wildlife or Fish Survey	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fish Pond/Stream Management Practices																	
Construct Fish Pond															X	X	
Control Aquatic Vegetation															X	X	
Fertilize/Lime Fish Pond															X	X	
Reduce Turbidity in Fish Pond															X	X	
Restock Fish Pond															X	X	
Streams: Create Pools																	
Streams: Remove Fish Barriers																	

Southeast Mixed and Outer Coastal Plain Forest

Physical description

The terrain is rolling hills to mostly flat. Marshes, lakes, and swamps are numerous along the Coastal Plain. The average annual precipitation ranges from 40 to 60 inches. Precipitation is received throughout the year. Summers are hot and winters are mild.

Dominant vegetation

The final stage of succession usually consists of deciduous trees, such as oaks, hickories, American beech, blackgum, red maple, redbay, Southern magnolia, laurel oak, and American holly. However, on many upland sites, especially where prescribed fire is used, longleaf or loblolly pine are often the principal overstory species. Fire suppression has decimated the longleaf pine ecosystem to a fraction of its former range throughout the ecoregion. Planted loblolly pine is widespread over much of the ecoregion, but without fire and judicious thinning, the value of loblolly plantings for wildlife is low. Gum and cypress are dominant on moist areas along the Atlantic and Gulf coasts and along major river drainages. Midstory trees throughout much of the ecoregion include dogwoods, American hornbeam, redbud, sweetbay, titi, and shadbush. Native forbs and grasses commonly found include lespedezas, partridge pea, ragweed, pokeweed, bluestems, paspalums, wiregrass, povertygrass, and many others. Vines, such as Virginia creeper, trumpet creeper,



grapes, yellow jessamine, and greenbriar, are common. Shrubs include sumacs, viburnums, elderberry, wild plum, blueberry, blackberry, hawthorns, and wax myrtle.

Typical nonnative invasive plants in the Southeast Mixed Forest include bermudagrass, bahiagrass, cogongrass, kudzu, Japanese honeysuckle, privets, Japanese climbing fern, chinaberry, tree-of-heaven, mimosa, and popcorn tree.

Farming and ranching

Many wetlands along major rivers have been drained and forests cleared to grow crops such as cotton, tobacco, soybeans, corn, and other grain crops. Large areas of forests also have been cleared and planted to nonnative grasses, especially bermudagrass and bahiagrass, for livestock. Unfortunately, most of these are not beneficial for wildlife.



Dwayne Elmore

Mature pine stands, especially longleaf, are best managed by thinning to a predetermined basal area, which allows better tree growth and a diverse understory. Prescribed fire is used to manage the composition and structure of the understory.

Plant succession



John Gruchy

Annual forbs and grasses represent the initial successional stage. Here, a strip was disked in a field dominated by perennial native warm-season grasses to enhance brooding cover for northern bobwhite. Note the common ragweed and open ground space in the disked strip (center) as compared to the relatively dense native grass on the right.

Perennial forbs and grasses represent the second successional stage.



Mike Hansbrough

The second successional stage slowly gives way to the third. Broomsedge bluestem, blackberry, goldenrod, and other forbs commonly succeed to sweetgum, red maple, loblolly pine, and eastern redcedar. This transition provides excellent cover for northern bobwhite, loggerhead shrike, and eastern cottontail.

Various shrubs (such as wild plum) and trees (such as eastern redcedar, sweetgum, and winged elm) represent the third successional stage. Planted loblolly pine stands often represent a third successional stage. Longleaf pine also represents a third successional stage. Longleaf pine is maintained with frequent prescribed fire, which prohibits succession from advancing further.



Mixed hardwood forest dominated by various oaks, hickories, maples, and sweetgum represent the fourth successional stage. Loblolly, shortleaf, and Virginia pine are often a component in these forests. More shade-tolerant species, especially American beech and American holly, become more prevalent in stands that are not disturbed with prescribed fire. Unmanaged forests often lack a developed understory, such as seen in this picture.



Planted pines, especially loblolly, are common across the Southeast. Early successional vegetation is provided for a few years until the canopy of the pines closes. These pictures show the same loblolly pine stand 4 years after planting and 8 years after planting. Although it is the same loblolly pine stand, the wildlife species found in this stand 4 years apart are quite different because the structure of the stand has changed dramatically.

Wildlife associated with Southeast Mixed and Outer Coastal Plain Forest

barred owl
loggerhead shrike
mourning dove
northern bobwhite
prothonotary warbler
red-cockaded woodpecker
red-eyed vireo
wild turkey
wood duck
coyote
eastern cottontail
eastern fox squirrel
raccoon
white-tailed deer
wild pig
American alligator
eastern indigo snake
gopher tortoise
channel catfish
largemouth bass
American bumble bee
monarch butterfly

Southeast Mixed and Outer Coastal Plain Forest	barred owl	loggerhead shrike	mourning dove	northern bobwhite	prothonotary warbler	red-cockaded woodpecker	red-eyed vireo	wild turkey	wood duck	coyote	eastern cottontail	eastern fox squirrel	raccoon	white-tailed deer	wild pig	American alligator	eastern indigo snake	gopher tortoise	channel catfish	largemouth bass	American bumble bee	monarch butterfly	
Habitat Management Practices																							
Conservation Easement		X		X		X											X	X			X	X	
Control Nonnative Invasive Vegetation	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X			X	X	
Do Not Feed Wildlife								X		X			X	X	X								
Edge Feathering		X		X				X		X	X	X	X	X							X	X	
Field Borders		X		X				X		X	X		X	X							X	X	
Forest Management	X			X	X	X	X	X	X	X	X	X	X	X			X	X					
Leave Crop Unharvested			X	X				X	X		X	X	X	X									
Livestock Management	X	X	X	X	X			X	X	X	X	X	X	X					X	X	X	X	
Nesting Structures	X				X	X			X														
Plant Food Plots			X	X				X	X		X	X	X	X									
Plant Native Grasses and Forbs		X	X	X				X		X	X			X			X	X			X	X	
Plant Shrubs		X	X	X				X	X	X	X		X	X									
Plant Trees	X	X	X		X	X	X	X	X			X	X	X			X	X					
Repair Spillway/Levee			X		X				X				X			X			X	X			
Set-back Succession	X	X	X	X		X		X	X	X	X	X	X	X			X	X			X	X	
Soil Conservation Agriculture			X	X				X	X		X	X	X	X									
Water Developments for Wildlife			X		X			X	X			X	X	X		X	X						
Population Management Practices																							
Decrease Harvest				X				X		X	X	X	X	X					X	X			
Increase Harvest								X		X	X	X	X	X	X				X	X			
Wildlife Damage Management	X							X		X	X	X	X	X	X	X							
Wildlife or Fish Survey	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Fish Pond/Stream Management Practices																							
Construct Fish Pond																			X	X			
Control Aquatic Vegetation																			X	X			
Fertilize/Lime Fish Pond																			X	X			
Reduce Turbidity in Fish Pond																			X	X			
Restock Fish Pond																			X	X			
Streams: Create Pools																							
Streams: Remove Fish Barriers																							

Urban

Physical Description

According to the U.S. Census Bureau in 2010, more than 80 percent of the American population lived in or near an urban area. The Census Bureau defines an urban area as a large central place with a total population of at least 50,000. In addition to a large human population, urban areas are characterized by residential and commercial development connected and crisscrossed by infrastructure, such as roads, train tracks, and utilities. Areas such as neighborhood parks offer the best possibility for wildlife habitat within an urban environment.



Dominant vegetation

It is not possible to identify dominant vegetation common in urban areas because urban areas are found in all ecoregions of the U.S. However, urban ecoregions typically contain gravel and paved areas, annual plantings, perennial grasses and forbs, shrubs, and young and mature trees. The vegetation is as likely to be an introduced species as a native species. Additionally, vegetated areas are typically manipulated in a landscaped manner versus “letting nature take over” as in rural areas. Interspersion is an important concept to understand in urban areas because of the fragmented landscape from residential and commercial development.

Urban areas are often dominated by non-native, invasive vegetation because of the disturbed and fragmented landscape and because many varieties of nonnative ornamentals are planted for aesthetic purposes. Educating the public about native versus nonnative cultivars and monitoring should be implemented in all urban areas.

Wildlife associated with Urban areas

- | | |
|-----------------------|---------------------------|
| American robin | ruby-throated hummingbird |
| bluebird ¹ | song sparrow |
| common nighthawk | big brown bat |
| European starling | cottontail ² |
| house finch | coyote |
| house sparrow | eastern gray squirrel |
| house wren | raccoon |
| northern flicker | white-tailed deer |
| peregrine falcon | monarch butterfly |
| rock pigeon | |

¹bluebird: may include eastern, mountain, or western

²cottontail: may include desert, eastern, or mountain

Considerations for Urban Wildlife management practices

Attracting wildlife for viewing is popular among people in urban and suburban areas. However, many wildlife species can quickly become a nuisance, especially when

they find protective shelter in unintended areas (under houses, in attics) or begin to damage property (chewing/drilling holes in wooden siding, defecating on property). Care must be exercised when attracting wildlife in urban and suburban areas, especially when using artificial feeders, which can also attract unwanted species, such as mice and rats, and make desirable species more susceptible to unnatural predators (house cats). If you care about small wildlife, keep your cat indoors!

Although there are several active management practices that can be implemented, such as artificial feeders, mowing, planting flowers, and rooftop/balcony gardens, there are also some common-sense considerations that should always be given. For example, when nests of desirable species are found, care should be taken not to disturb them.

NOTE: Urban areas vary considerably in the amount of open space available, number of buildings, population density, etc. Thus, there are several wildlife management practices that are applicable in some urban or suburban areas and not in others. Some WMPs, such as those related to livestock and row crops, are not considered applicable for Urban ecoregion. Forages, such as clovers, may be sown in open areas to attract species such as cottontails and white-tailed deer, but grain plots are not applicable.



Dwayne Elmore

Wildlife damage management is an important consideration in urban areas as wildlife frequently conflict with people. Here, netting is preventing gulls from roosting on houses.



Dwayne Elmore

Urban areas provide habitat for some wildlife species. The presence of wildlife is considered beneficial to many people.

Urban	American robin	bluebird	common nighthawk	European starling	house finch	house sparrow	house wren	northern flicker	peregrine falcon	rock pigeon	ruby-throated hummingbird	song sparrow	big brown bat	cottontail	coyote	eastern gray squirrel	raccoon	white-tailed deer	monarch butterfly
Habitat Management Practices																			
Conservation Easement																			X
Control Nonnative Invasive Vegetation	X	X					X	X			X	X		X	X	X	X	X	X
Do Not Feed Wildlife															X	X	X	X	
Edge Feathering		X												X	X	X	X	X	X
Field Borders																			
Forest Management								X				X		X	X	X	X	X	
Leave Crop Unharvested																			
Livestock Management																			X
Nesting Structures		X					X		X										
Plant Food Plots																			
Plant Native Grasses and Forbs		X			X							X		X	X			X	X
Plant Shrubs	X	X			X		X	X			X	X		X	X		X	X	
Plant Trees	X	X			X		X	X			X		X			X	X	X	
Repair Spillway/Levee																	X		
Set-back Succession	X	X	X		X			X				X	X	X	X		X	X	X
Soil Conservation Agriculture																			
Water Developments for Wildlife	X				X							X	X				X	X	
Population Management Practices																			
Decrease Harvest														X	X	X	X	X	
Increase Harvest														X	X	X	X	X	
Wildlife Damage Management				X		X		X	X	X			X	X	X	X	X	X	
Wildlife or Fish Survey	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fish Pond/Stream Mgmt Practices																			
Construct Fish Pond																			
Control Aquatic Vegetation																			
Fertilize/Lime Fish Pond																			
Reduce Turbidity in Fish Pond																			
Restock Fish Pond																			
Streams: Create Pools																			
Streams: Remove Fish Barriers																			
Additional Urban Practices																			
Artificial Feeders					X			X			X	X							
Plant Flowers											X								
Rooftop/Balcony Gardens											X								

Wetlands

Physical description

Wetlands can be described as the zone between deep water and upland areas. They are characterized by various amounts of open water and vegetation with soil that is often wet or covered with shallow water. There are many types of wetlands, including beaver ponds, potholes, playas, ephemeral (temporary) ponds, small lakes, marshes, rivers, streams, swamps, and others. They are found in all of the ecoregions described in this manual.

Dominant vegetation

Aquatic vegetation can survive in the water or on lands flooded or saturated with water for extended periods. Upland vegetation cannot tolerate saturation for long periods. The vegetation found in association with wetlands varies with permanence of the water, depth of water, salinity, and substrate (bottom). Wetlands with deep, permanent water typically have less emergent (above the water surface) vegetation and more floating or submerged (below the water surface) aquatic vegetation. As the water depth decreases, emergent aquatic vegetation becomes more prevalent. Less vegetation is found on rock and gravel bottoms than on bottoms with more silt, clay, and organic material (dead plants and animals that are decomposed). Emergent aquatic vegetation may include trees, shrubs, grasses, forbs, sedges, and rushes.

Examples of trees often found in wetlands include willows, cottonwood, various oaks, tupelo gum, tamarack, cypress, mangroves, red bay, black spruce, Atlantic white cedar, and pond pine. Shrubs commonly found in and adjacent to wetlands include willows, alders, bog birch, bog laurel, Labrador tea, coastal sweetbells, inkberry, sea myrtle, and marsh elder. Emergent grasses and grass-like vegetation commonly found in wetlands include cattails, bulrushes, saltgrass, cordgrass, saw grass, sedges, arrow grass, shoal grass, eel grass, and wild rice. Water lilies, pondweeds, wild celery, water milfoil, duckweeds, and coontails are examples of floating and submerged aquatic vegetation. Typical invasive plants found in wetlands include purple loosestrife, hydrilla, Eurasian watermilfoil, reed canarygrass, water hyacinth, alligatorweed, and phragmites.

The amount of open water and vegetation is important in determining how suitable the wetland is for different wildlife species. For example, young ducks need open water and emergent vegetation for hiding. Floating and submerged vegetation supports large amounts



of food high in protein, such as snails, mollusks, and crustaceans, which young ducks need for fast growth. Emergent vegetation may supply nesting areas, such as trees for wood ducks, grass for mallards, and cattails for red-winged blackbirds and muskrats. Exposed mudflats are another critical habitat component for some wildlife species, especially shorebirds, which rely on these areas to search for invertebrates in the mud.

Wetlands with stable, nonflowing water levels go through succession similar to the process in uplands. Open-water areas fill with silt and dead vegetation, which allows emergent aquatic vegetation to become dominant. As the wetland continues to fill, it becomes drier, allowing upland vegetation to become dominant.

Plant succession

Wetland succession typically proceeds in the following stages:

Stage 1: deep water with little vegetation

Stage 2: shallow water dominated by submerged and floating aquatic vegetation

Stage 3: very shallow water or wet ground dominated by any variety of emergent aquatic vegetation

Stage 4: ground becomes drier and upland vegetation similar to the surrounding area becomes dominant.

Succession proceeds slowly in wetlands with large amounts of deep water or a rocky bottom. Fluctuations in water levels can cause the final stage of succession to regress to an earlier stage. For example, if a wetland in Stage 3 succession is flooded with deep water for a period of time, the aquatic emergent vegetation may die, reverting a wetland to an earlier successional stage. The extent of this regression depends on the length of time the wetland is flooded with deep water, how much the water level changes, and the extent (length of time) the present vegetation can survive in the changed water level.

Management of water levels is an important tool in managing wetlands for wildlife. The succession process described above is often not applicable to wetlands with constantly moving water, such as rivers, streams, and tidal areas.



Stage 1 wetland—characterized by open water and limited vegetation.



Stage 2 wetland—this beaver-influenced wetland provides a mosaic of open water with submerged vegetation, as well as floating islands of debris and emergent vegetation.



Over time, Stage 2 wetlands dominated by floating and submerged aquatic vegetation succeed into Stage 3 wetlands with more emergent vegetation, including sedges, rushes, grasses, and shrubs.



Stage 3 wetland—this natural emergent freshwater marsh is covered with several species of native grasses and sedges. Over time, these freshwater wetlands become more similar to the adjacent uplands as they slowly fill in.



Stage 3 wetland – Forested bottomland swamps, such as this cypress swamp in the Lowcountry of South Carolina, often are relatively stable wetlands because of their proximity to major river systems.



Stage 4 wetland — these wetlands are rarely flooded. Here, a riparian area along the Missouri River has recently flooded and sediment is deposited along the river. However, most of the time, this area is dry.

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Wildlife associated with Wetlands

American bittern	spotted sandpiper
Canada goose	Virginia rail
mallard	Wilson’s snipe
northern pintail	American beaver
redhead	common muskrat

mink	crawfish frog
raccoon	tiger salamander
river otter	bluegill
eastern snapping turtle	channel catfish
American bullfrog	largemouth bass

Wetlands	American bittern	Canada goose	mallard	northern pintail	redhead	spotted sandpiper	Virginia rail	Wilson's snipe	American beaver	common muskrat	mink	raccoon	river otter	eastern snapping turtle	American bullfrog	crawfish frog	tiger salamander	bluegill	channel catfish	largemouth bass
Habitat Management Practices																				
Conservation Easement																X				
Control Nonnative Invasive Vegetation	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X			
Do Not Feed Wildlife		X	X									X								
Edge Feathering												X								
Field Borders												X								
Forest Management			X									X								
Leave Crop Unharvested		X	X	X								X								
Livestock Management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Nesting Structures																				
Plant Food Plots		X	X	X								X								
Plant Native Grasses and Forbs		X	X	X		X										X	X			
Plant Shrubs									X			X				X	X			
Plant Trees									X			X					X			
Repair Spillway/Levee	X	X	X	X	X	X	X			X	X	X	X	X	X			X	X	X
Set-back Succession	X	X	X	X	X	X	X	X		X	X	X								
Soil Conservation Agriculture		X	X	X								X								
Water Developments for Wildlife	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
Population Management Practices																				
Decrease Harvest									X	X	X	X	X	X	X			X	X	X
Increase Harvest									X	X	X	X	X	X	X			X	X	X
Wildlife Damage Management		X							X	X	X	X	X	X						
Wildlife or Fish Survey	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fish Pond/Stream Management Practices																				
Construct Fish Pond																		X	X	X
Control Aquatic Vegetation																		X	X	X
Fertilize/Lime Fish Pond																		X	X	X
Reduce Turbidity in Fish Pond																		X	X	X
Restock Fish Pond																		X	X	X
Streams: Create Pools																				
Streams: Remove Fish Barriers																				

Woodland

Physical description

The Woodland ecoregion is dominated by various types of woodlands. There are woodlands in other ecoregions, but the Woodland ecoregion is distinguished by species composition and structure of the vegetation community. Terrain in the Woodland ecoregion is irregular with large hills and mesas that are often dissected by narrow drainages. The average annual precipitation ranges from 10 to 25 inches. Most of the precipitation is received in winter and late summer. Summers have hot days and cool nights. Winters are cold.

Dominant vegetation

In the Woodland ecoregion, pinyon pine and juniper are most often associated with the final stage of plant succession. In the southern areas of this ecoregion, species of oaks such as live oak, Spanish oak, and shin oak represent the final stage of plant succession. Woodland shrubs include bitterbrush, mountain mahogany, scrub oak, and sumac. In addition, in areas where there has been a disturbance, mesquite may dominate. Areas dominated by sagebrush may be interspersed with tree-dominated areas similar to those described in the Intermountain Sagebrush ecoregion.

A variety of perennial and annual grasses and forbs can be found in the herbaceous layer. The amount of grass, forbs, and shrubs depends on the amount of trees in the area. Canopy cover is one of the primary factors influencing understory vegetation in forest and woodland vegetation. Usually the herbaceous layers decrease as the amount of trees increase.

The vegetation associated with riparian areas is often much different than the surrounding vegetation. The vegetation in riparian areas is more abundant and is represented by different species. Riparian areas are



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Oak savanna and woodlands are maintained by frequent fire and contain abundant grass cover.



Dwayne Elmore

In the absence of fire, juniper often is the dominant plant, which hosts an entirely different set of wildlife species than those in more open woodland.

dominated by cottonwoods, willows, tamarisk, silver buffaloberry, boxelder, and a variety of grasses and forbs. Russian olive is a common nonnative invasive shrub along riparian areas. In the southern part of the Woodland ecoregion, hackberry, Spanish oak, and live oak occur. The variety and abundance of vegetation compared to the surrounding areas makes riparian areas very attractive to wildlife.

Typical invasive plants in the Woodland ecoregion include leafy spurge cheatgrass, Canada thistle, dalmatian toadflax, and yellow toadflax.

Farming and ranching

Water for irrigation is limited and necessary to grow crops in this ecoregion. Where available, water is diverted from rivers and streams to grow crops such as corn, wheat, barley, alfalfa, and grass pasture and hay. Farming is important only in small, localized areas in valleys and on flat terrain. Livestock grazing is common in the ecoregion. Livestock management may be used to exclude livestock from sensitive areas, or may be used to benefit wildlife by adjusting stocking rate, season of use, or grazing system.

Plant Succession

Annual forbs and grasses represent the initial stage of succession. Perennial grasses and forbs represent the second stage. Shrubs, along with perennial grasses and forbs are the third successional stage. Oak and/or juniper woodland dominate the fourth successional stage.

Wildlife associated with Woodland

American wigeon	northern bobwhite	black-tailed jackrabbit	western diamond-backed
golden-cheeked warbler	prairie falcon	Brazilian free-tailed bat	rattlesnake
greater roadrunner	red-tailed hawk	coyote	bluegill
ladder-backed woodpecker	western bluebird	white-tailed deer	largemouth bass
mourning dove	wild turkey	wild pig	monarch butterfly

Woodland	American wigeon	golden-cheeked warbler	greater roadrunner	ladder-backed woodpecker	mourning dove	northern bobwhite	prairie falcon	red-tailed hawk	western bluebird	wild turkey	black-tailed jackrabbit	Brazilian free-tailed bat	coyote	white-tailed deer	wild pig	western diamond-backed rattlesnake	bluegill	largemouth bass	monarch butterfly
Habitat Management Practices																			
Conservation Easement		X				X													X
Control Nonnative Invasive Vegetation	X	X	X	X	X	X		X	X	X	X		X	X		X			X
Do Not Feed Wildlife										X			X	X	X				
Edge Feathering						X		X	X	X			X	X					X
Field Borders						X		X	X	X			X	X					X
Forest Management		X	X			X		X	X	X			X	X					
Leave Crop Unharvested					X	X				X				X					
Livestock Management	X			X	X	X			X	X	X		X	X			X	X	X
Nesting Structures							X		X										
Plant Food Plots	X				X	X				X				X					
Plant Native Grasses and Forbs	X				X	X		X	X	X			X	X		X			X
Plant Shrubs			X		X	X		X	X	X	X		X	X		X			
Plant Trees		X		X	X			X	X	X				X					
Repair Spillway/Levee	X				X												X	X	
Set-back Succession	X	X	X		X	X	X	X	X	X	X		X	X		X			X
Soil Conservation Agriculture	X				X	X		X		X				X					
Water Developments for Wildlife	X				X					X		X		X					
Population Management Practices																			
Decrease Harvest						X				X	X		X	X			X	X	
Increase Harvest										X	X		X	X	X		X	X	
Wildlife Damage Management				X				X		X	X	X	X	X	X	X			
Wildlife or Fish Survey	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fish Pond/Stream Management Practices																			
Construct Fish Pond																	X	X	
Control Aquatic Vegetation																	X	X	
Fertilize/Lime Fish Pond																	X	X	
Reduce Turbidity in Fish Pond																	X	X	
Restock Fish Pond																	X	X	
Streams: Create Pools																			
Streams: Remove Fish Barriers																			