MISC0158

Woodland
Fish and Wildlife

Managing Ponderosa Pine Woodlands for Fish and Wildlife

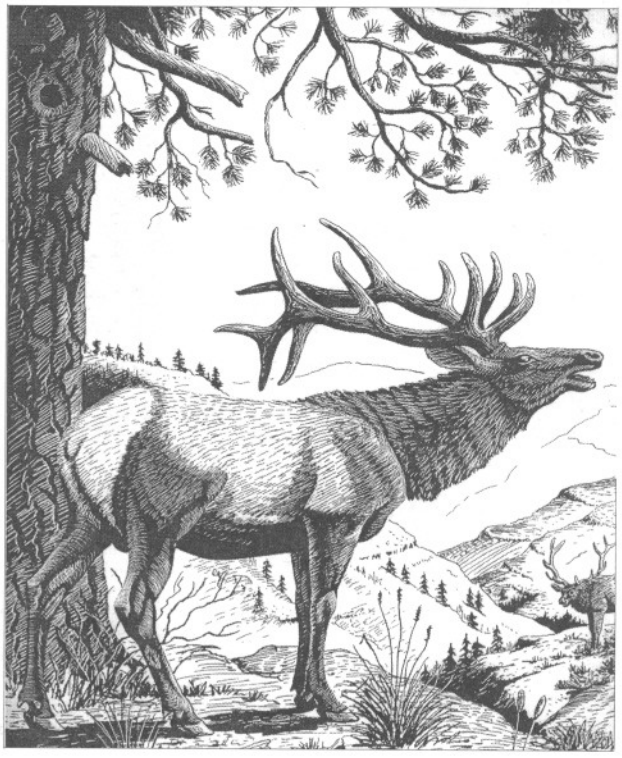
The Ponderosa pine woodland is an area of immense variety and home to a diverse fish and wildlife community. Fire, insects, disease, and wind all play a part, creating a mosaic of open meadows, dense pole stands, and park-like settings with large old trees and snags. Proper management practices can help maintain or create fish and wildlife habitat and provide a continuing supply of wood products. This publication provides information on how to manage your Ponderosa pine stand to improve wildlife habitat.

SUCCESSIONAL STAGES

Forests are made up of past and present; living and growing plants and animals. They are constantly changing. Natural development of Ponderosa pine forests historically includes fire as an important element. Mature Ponderosa pine trees are protected by their thick bark and are more resistant to fire damage than many tree species. Prior to human fire control efforts, wildfires would periodically sweep through the understory, killing the less protected trees, young seedlings, and shrubs. This explains why many virgin stands were pure Ponderosa, had park-like understories, and contained few young trees. When people began to control wildfires, young trees of various species appeared in the understory, often in excessive numbers.

The development of a Ponderosa pine forest from a bare ground condition to old growth forest can be generally divided into six successional stages: grass/forbs, shrub/seedling, sapling/pole, young forest, mature forest, and old growth. Depending on the stand's history and climatic and soil conditions, one or more of the successional stages may be skipped. Fire, insects, disease, or wind can cause a stand to revert to any one of the earlier stages, depending on the severity and timing of the disturbance. Timber management can be used to skip some stages completely or to reduce the time spent in others.

Each successional stage provides a unique blend of open land, brush land, vertical diversity, canopy cover, snags, and downed logs. This blend of



habitat elements influences the type of wildlife found in the area.

HABITAT ELEMENTS

Open land—Grassy forest openings are used by many wildlife species for feeding, mating, and nesting. Forest openings of 1/2–1 acre provide valuable habitat for quail and grouse; openings of 2–5 acres are needed for wild turkey, elk, and deer. Rodents attracted to these areas serve as food for owls, hawks, and eagles. Grass, sedge, and forb species important to wildlife found in the Ponderosa pine forest type include:

- pinegrass
- elk sedge
- mountain brome
- beadlily
- Idaho fescue
- western hawkweed
- sweet root
- blue wild rye
- bluebunch wheatgrass
- Ross sedge
- fairybells
- thick-leaved pea vine
- strawberry

Brush land—Brush or shrub cover is used as a source of food, nesting, security from predators (hiding cover), and protection against the elements (thermal cover). Shrub species important to wildlife include:

- pinemat manzanita
- mallow ninebark
- Nootka rose
- bearberry
- honeysuckle
- kinnikinnick
- pearhip rose
- creeping Oregon-grape
- Oregon boxwood
- oceanspray
- snowbrush ceanothus
- red-stemmed ceanothus
- mountain snowberry
- serviceberry
- mountain big sagebrush
- common snowberry
- bitterbrush
- curlleaf mountain mahogany
- vine maple
- blue elderberry

Vertical diversity—The diversity of canopy heights, layers, and uneven spacing provided by an assortment of tree and shrub species and ages provides wildlife with a variety of nesting, roosting, and feeding options.

Tree Canopy—Tree canopy provides nesting, roosting, and feeding habitat for birds and small mammals. The amount of canopy and the shade it casts on the ground influences the growth of understory plants. An open canopy will allow growth of grasses, forbs, shrubs, and tree seedlings. A more closed canopy provides thermal cover for big game.

Downed logs—Downed logs, in various stages of decay, serve many important functions for wildlife. They provide feeding sites for insect-eating birds, drumming logs for grouse, nesting places for some song birds and small mammals, and feeding and thermal cover for many amphibians. But these are just the obvious benefits—downed logs also have an important role to play in nutrient recycling, nitrogen fixation, and moisture retention.

Snags and wildlife trees—Standing dead or defective live trees serve as primary food sources for many species of insect-eating wildlife. A healthy population of insect-eating birds and mammals can help keep insect populations in check and can extend the interval between damaging outbreaks. The cavities found in wildlife trees are important to many animal species for nesting, roosting, resting, and escape cover.

Downed logs, in various stages of decay, serve many important functions for wildlife.

Before you can decide which wildlife species you wish to manage for, you must first determine which of the habitat elements already exist, what wildlife species are present, and what your timber management objectives are (see the Woodland Fish and Wildlife introductory bulletin, *Is There a Place for Fish and Wildlife in Your Woodland?*). A recent aerial photo of your property and surrounding land will be useful in making an inventory of the kinds and amounts of habitat available.

Standing dead trees (snags) are important wildlife habitat elements.

SPECIAL HABITATS

Some types of habitat occur as a result of varying topography, soils, vegetation, or availability of moisture. These habitat types play a unique role in the lives of some wildlife species and may be influenced by management practices.

Edges—Where two plant communities or different stages of growth within a plant community join, the common boundary is called an "edge." Wildlife "richness" (the numbers of different kinds of wildlife) is greatly affected by the amount of edge available in an area and the degree of contrast between the adjoining areas. Edges occur naturally where there is a change in soil type, topography, vegetative type, successional stage, or geographic feature such as cliffs, water, or landslides. Edges also form where fire, insects, disease, or management activity has caused part of an area to change to a different successional stage.

Riparian areas—The border of moist soils and plants next to a body of water is the most important type of wildlife habitat in the Ponderosa pine forest. A properly managed riparian area will provide a cool oasis from the hot summer sun and a source of open water during the cold of winter. These areas are also productive for timber and forage and are important for recreation and protection of water quality and quantity. For more information on how riparian areas provide essential fish and wildlife habitat and how you can protect or enhance these areas, see the Woodland Fish and Wildlife bulletin, *Riparian Areas: Fish and Wildlife Havens.*

Wet meadows—Within the Ponderosa pine forest, wet meadows provide important wildlife habitat and increase vegetative diversity. These areas contain forage plants of high nutritional value for grazing and browsing animals, and they help protect water quality.

SILVICULTURAL SYSTEMS

Management activities can be used to create a mosaic of successional stages that will support a wide variety of wildlife species.

The type of silvicultural system you choose depends on a number of factors, such as: your objectives for owning the land, topography, site quality, soil type, aspect, stand structure, and the tree and wildlife species you want to manage for. Following is a brief description of common silvicultural systems and some effects each can have on the wildlife community.

Uneven-aged Systems

Single Tree Selection. The single tree selection system involves the removal of individual trees. The objective is to maintain trees of different ages and sizes. Keeping tree canopy moderately closed by removing only scattered single trees maintains habitat for woodpeckers, nuthatches, and swifts, as well as western gray squirrels, northern flying squirrels, and martens.

Group Selection. The group selection system involves the removal of trees in small groups and is distinguished from clearcutting in that the intent is to create a balance of all age and size classes in a mosaic of small (1 acre or less), contiguous groups throughout the forest. Forage is increased somewhat if trees are harvested in large groups (2 acres or more). The group selection system benefits deer and elk while maintaining protective cover for many species.

Clearcutting

Even-aged Systems. Clearcutting is the harvesting of all the trees in an area in a single cut. Regeneration is obtained from natural seeding, artificial seeding, or planting. Clearcutting causes an area to revert to the grass/forb or seedling/shrub successional stage. Clearcut patches up to 20 acres in size are generally beneficial to deer and elk if adjacent uncut areas are available for protective cover. Palatable grasses, herbs, and browse plants may increase tenfold in the openings created. Birds and mammals that use trees for nesting and feeding may decrease. Small rodents such as deer mice and wood rats may increase in clearcut areas, particularly if logging slash is allowed to remain as cover. A few scattered wildlife trees left standing in the cut area can serve as perches for birds, including owls, hawks, and eagles that prey on rodents.

Seed-tree. The seed-tree system harvests nearly all the timber in an area in one cut. A few healthy, well-formed trees of desirable species are left to reseed the site. Potential seed-trees should be carefully examined to insure that they are not infected with dwarf mistletoe, a common parasitic plant that is easily spread from overstory trees to new seedlings. The seed-trees may be harvested after regeneration is established. The effects of the seed-tree system on wildlife are similar to those of clearcutting, but the seed-trees provide some added benefits. Their seeds can be eaten by the mountain blue bird, Stellar's jay, and other birds that depend on seeds. Leaving the seed-trees after regeneration is established provides food and/or nesting sites for these and other birds, and for small mammals, such as squirrels, bats, and foxes. These trees may eventually become snags, which are needed by such cavity-nesting birds as the mountain chickadee, western bluebird, pileated woodpecker, and pygmy nuthatch.

Management activities can be used to create a mosaic of successional stages that will support a variety of wildlife species.

Shelterwood. In the shelterwood system, the mature stand is removed in a series of two or more cuts. Enough mature, mistletoe-free trees are left after each cut to protect or "shelter" the developing seedlings from drought, wind, or frost damage. In dense stands, a light cut may be needed to make the shelter trees windfirm and improve chances for a good seed crop. Additional cuts should expose mineral soil to encourage seed germination. During this period, some habitat elements of a more advanced successional stage are created. When the seedlings are well established, a final harvest cut may remove some or all of the shelter trees. Some shelter trees may be left to serve as future sources of snags.

The best conditions for wildlife can be provided if the shelterwood system is applied in three or more cuts, and the cutting unit is less than 50 acres. Deer and elk will benefit from the increased forage that results from a more open canopy. Between the first and last cuts, enough mature forest remains as habitat for ground squirrels, and slash from cuttings provides cover for the squirrels, voles, mice, shrews, and chipmunks. These rodents are the food base for raptors and other predators, such as coyotes, bobcats, and weasels, that inhabit this forest type. Opening a stand may reduce the number of pygmy nuthatches, but could increase the number of western tanagers, warblers, juncos, and siskins.

Thinning

Thinning is one of the most important management techniques you can use to improve the health and vigor of your Ponderosa pine stand. Thinning removes some trees from a stand to obtain increased growth of remaining trees. A vigorously growing stand is less susceptible to attacks by insects. There are two methods of thinning: pre-commercial and commercial. Thinning is considered "pre-commercial," unless the trees removed from the stand are marketable and their sale covers the cost of the thinning operations, making the practice "commercial." The effect of thinning on the growth of Ponderosa pine stands varies considerably by site. Consult with a professional forester for advice on selecting trees to be removed, spacing, and timing of thinning operations.

If all the standing dead and defective trees are removed, thinning will have a negative effect on cavity-nesting birds and mammals. Thinning that eliminates clumps of trees degrades squirrel habitat. On the other hand, heavy thinning creates openings through which sunlight can reach the ground. Grasses and shrubs thrive in the openings and increase forage for grazing and browsing animals. Unwanted trees may be topped and left standing to provide snag habitat.

MANAGING YOUR PONDEROSA PINE STAND FOR WILDLIFE

If your goal is to manage your Ponderosa pine stand for a particular species of fish or wildlife, look for other Woodland Fish and Wildlife bulletins. These will provide more specific management recommendations to meet individual habitat needs. If your goal is to provide for the broad needs of a variety of fish and wildlife species, you should try to attain a mix of the six habitat elements listed in Table 1, taking into account the habitat type provided by land adjacent to yours. Below are some management techniques you can use to manage for each of the six habitat elements.

Open land—If your property already contains some open land, you can maintain a healthy mixture of grasses and forbs by periodic burning, grazing, mowing, and/or sowing a wildlife seed mix. Grazing should be light and seasonal. This habitat can be created by making openings in existing stands, using the group selection or clearcut harvest system, and seeding the disturbed areas with a grass/legume mix. Prescribed burning can be used to maintain grass stands, but it is strictly regulated and should be accomplished only with the aid of a professional forester or range conservationist.

Brush land—You can meet the shrub cover needs of wildlife by minimizing impact of management activities in riparian areas (this will benefit fish as well), leaving existing brushy areas unplanted, or opening the tree canopy to stimulate shrub growth.

Vertical diversity—Vertical diversity can be enhanced by conducting a commercial thinning operation or by using uneven-aged regeneration systems. Take care to leave some standing dead and defective live trees, as well as den or nest trees.

Ponderosa pine is also a native species west of the Cascade Mountains. The wildlife species associated with pine forests differ, depending on location. In the Willamette Valley of western Oregon and the southeastern Puget Sound region of Washington (on glacial soils), plant and wildlife species associated with Ponderosa pine are similar to those species found in Oregon white oak woodlands and savannas (see MISC 180, Woodland Fish and Wildlife publication *Wildlife on White Oaks Woodlands*).

The Willamette Valley Ponderosa Pine Conservation Association, established in 1994, can provide additional information on the management of Ponderosa pine in Northwestern Oregon. To learn more about this group, visit their web site at http://www.westernforestry.org/wvppca/index.

Table 1. Wildlife habitat elements found in each successional stage.

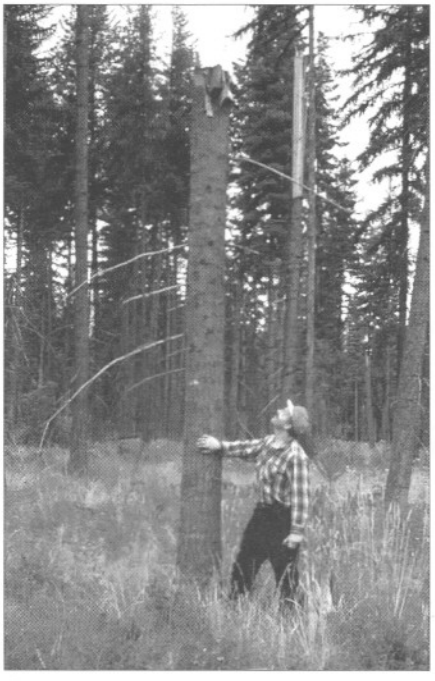
	Successional Stages					
Habitat Elements	**Shrub Seedling**	**Grass Forb**	**Sapling Pole**	**Young Forest**	**Mature Forest**	**Old Growth**
Open Land	XXXX	XXX	X	X	XX	XXX
Brush Land	X	XXXXX	X	X	XX	XX
Vertical diversity	X	XX	XX	XX	XX	XXXX
Tree Canopy	X	XX	XXX	XXXXX	XXXX	XXX
Wildlife trees	X	X	X	XX	XXX	XXXXX
Downed logs	X	X	X	X	XXX	XXXXX

X = provides none or a minor amount of this habitat
XXXXX = provides a greater amount of this habitat

Tree canopy—Thin stands periodically to maintain a healthy, vigorous condition. Given ample room to grow, Ponderosa pine trees will retain a thick crown cover over 60% of the tree, providing protective cover, and perching, nesting, and feeding habitat.

Wildlife trees—The number and size of wildlife trees needed varies with the wildlife species being considered. A mixture of species and diameters is always desirable. Cut or blast tops from some trees to create wildlife trees. Make small clearings around single, larger trees during thinning or harvesting operations to encourage large limb growth for perching and other wildlife uses. During harvesting operations, you can ensure the continued presence of wildlife trees by leaving 3–5 living trees per acre, 12–25 inches DBH. The trees should be free of mistletoe and other transmittable diseases, but can be culls with heart rot or deformities.

Downed logs—Fell and leave some trees to provide downed log habitat and small openings. To retain the benefits of downed logs, leave at least two logs per acre during harvesting. Each log should be at least 20 feet long and 12 inches or more in diameter at the small end, with the bark in place. Log quality is not important, so cull logs may be left to serve this purpose.



Snags and downed logs can be actively created.

TIMBER HARVESTING STEPS TO HELP IMPROVE WILDLIFE HABITAT

Timing and Location of Operations

1. Minimize the period of disruption to wildlife by limiting timber management activities to small areas and completing them quickly.
2. Avoid logging adjacent drainages simultaneously; ridgelines can reduce disturbance to wildlife.
3. Maintain non-activity zones adjacent to zones of activity to provide places for wildlife to hide.
4. Avoid harvesting or thinning during periods of nesting, fawning, or calving.
5. Keep roads out of riparian areas.

Treatment of Slash and Snags

1. Retain dead standing trees and some mistletoe-free, live trees for perching, nesting, and insect-eating wildlife. Mistletoe infested trees may be killed and left standing.
2. Retain woody debris (slash) for wildlife cover on at least 10% of harvested area. Leave cull logs unyarded.
3. If slash is to be scattered, crush it to less than 2 feet in depth to facilitate big game travel.
4. Pile or windrow slash to break long sight distances and to provide cover. Keep sight distances to less than 1/4 mile. Limit length of unbroken windrows to 100 feet.

Wildlife Food and Cover

1. Include legumes in seeding mix for firebreaks, skid trails, and cut/fill slopes.
2. Maintain cover around springs and riparian zones and in areas generally deficient in cover.
3. Maintain roadside vegetation cover.
4. Keep firebreaks as narrow as possible while still meeting fire control objectives. Avoid building straight stretches of road or firebreaks over 1/4 mile in length.
5. Maintain cover within known wildlife travel routes. If possible, provide a travel route of continuous cover between forested areas.
6. Maintain or plant berry-producing shrubs along edges, wet meadows, slash burn sites, or other disturbed areas where they will not interfere with tree growth.

WHERE TO GET HELP

Sources of useful information include your county Extension office, Natural Resources Conservation Service, and state forestry offices. State fish and wildlife agencies, the U.S. Fish and Wildlife Service, the Bureau of Land Management, and land grant universities have fish and wildlife specialists who can provide expert advice. The references listed at the end of this circular are sources of general fish and wildlife management information.

USEFUL REFERENCES

British Columbia Ministry of Forests. 1986. *Handbook for Timber and Mule Deer Management Co-ordination on Winter Ranges in the Cariboo Forest Regions.* Land Management Handbook No. 13.

De Calesta, D. and M.S. Deusen. 1988. *Is There a Place for Fish and Wildlife in your woodlands?* MISC0132, Washington State Univ. Extension, Pullman, WA.

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Thomas, J.W. 1979. *Wildlife Habitats in Managed Forests—the Blue Mountains of Oregon and Washington.* USDA, Forest Service, Agricultural Handbook No. 553.

USDA Forest Service. 1986. *Wildlife and Fisheries Habitat Improvement Handbook.* Wildlife and Fisheries Administrative Report.

WILDLIFE FOUND IN THE VARIOUS SUCCESSIONAL STAGES

Wildlife Species	Grass-Forb	Shrub-Seedling	Pole-Sapling	Young Forest	Mature Forest	Old Growth
X = Reproduction and Feeding		R = Reproduction Only			F = Feeding Only	
Amphibians						
tiger salamander	X					X
western toad	X	X	X	X	X	X
Pacific tree frog	X	X	X	X	X	X
spotted frog	X	X	X	X	X	
Reptiles						
western skink	X	X	X	X	X	X
ringneck snake	X	X	X	X	X	X
garter snake	X	X	X	X	X	X
western fence lizard	X	X	X	X	X	X
short-horned lizard	X	X	X	X	X	X
western whiptail	X	X	X	X	X	X
gopher snake	X	X	X	X	X	
rattle snake	X	X	X	X	X	X
Birds						
dipper	X	X	X	X	X	X
turkey vulture*	X	X				
Ferruginous hawk	F	F				
peregrine falcon	F	F	F	F	F	
black swift	X	F				
white-throated swift	X	F	X			
Say's phoebe	X	X	X	X	X	X
common raven	X	X				
canyon wren	X	X				
rock wren	X	F	X			
blue grouse	F	X	X	F	F	X
ruffed grouse		X	R	F	X	F
mountain quail*	F	X	X	X	F	
ring-necked pheasant	X	X	F	F	F	X
dark-eyed junco*	X	X	X	X	X	F
poorwill*	X	X	F	F	F	X
common nighthawk*	X	X	F	F	X	F
calliope hummingbird	F	F	F	F	F	X
black-billed magpie	F	X	X	X	X	F
pinon jay		F	F	F	F	
American robin	F	X	X	X	X	X
Brewer's blackbird	F	X	X	X	X	F
brown-headed cowbird	X	X	X	X	X	X
chipping sparrow	F	X	X	X	X	X
dusky flycatcher	F	X	X	X	X	F

*Denotes species of special interest or concern

WILDLIFE FOUND IN THE VARIOUS SUCCESSIONAL STAGES (Continued)

Wildlife Species	Grass-Forb	Shrub-Seedling	Pole-Sapling	Young Forest	Mature Forest	Old Growth
bush-tit		F	F	F	F	
northern oriole		F	F	F	F	
American goldfinch	F	X	X	X	X	F
house finch	F	X	X	X	X	X
olive-sided flycatcher	F	F	X	X	X	X
black-throated gray warbler		X	X	X	X	X
western tanager		F	F	X	X	X
red crossbill				F	X	F
Cooper's hawk*	F	F	F	X	X	X
merlin	F	F	F	F	X	X
Hammond's flycatcher		F	F	F	X	X
western wood peewee		F	F	X	X	X
solitary vireo			X	X	X	X
black-headed grosbeak	F		F	X	X	X
evening grosbeak	F		F	F	X	X
purple finch	F	F	X	X	X	X
Cassin's finch	F	F	F	X	X	X
pine grosbeak*			F	F	X	X
pine siskin	F	F	X	X	X	X
red-tailed hawk*	F	F	F	X	X	X
golden eagle*	F	F	F	F	X	X
bald eagle*	F	X	X	X	X	X
osprey*	F	F	F	F	X	X
great horned owl	F	F	F	X	X	X
common flicker	F	F	F	X	X	X
pileated woodpecker					X	X
Lewis' woodpecker*	F	F		X	X	X
Williamson's sapsucker					X	X
hairy woodpecker*				X	X	X
white-headed woodpecker					X	X
white-breasted nuthatch					X	X
pygmy nuthatch					X	X
common merganser	F	F	F	F	X	X
American kestrel*	F	F		R	R	X
barn owl*	F	F			X	X
flammulated owl*	F	F		R	X	X
pygmy owl	F	F	F	X	X	X
saw-whet owl				R	X	X
ash-throated flycatcher	F	F			X	X
violet-green swallow	F	F		R	R	X
tree swallow	F	F		R	R	X
mountain chickadee			X	X	X	X
brown creeper				F	X	R
house wren	F	F	X	R	R	R

*Denotes species of special interest or concern

WILDLIFE FOUND IN THE VARIOUS SUCCESSIONAL STAGES (Continued)

Wildlife Species	Grass-Forb	Shrub-Seedling	Pole-Sapling	Young Forest	Mature Forest	Old Growth
western bluebird*	F	F		R	R	R
mountain bluebird*	F	F		R	R	
Mammals						
western jumping mouse	X	X			X	F
western big-eared bat	X	X	F	F	F	
pallid bat*	X	X	X			
bushy-tailed woodrat	X	X	X	X	X	X
puma or cougar*	F	X	X	X	X	X
Bobcat	F	X	X	X	X	F
big horn sheep*	F	F	F	F	F	
snowshoe hare	F	X	X	X	R	
blacktail jackrabbit	X	F	X			
wolverine	F	F	F	F	F	X
lynx*	F	X	X	X	X	F
elk	F	X	X	F	F	F
mule deer	F	X	X	F	F	
white-tailed deer*	F	F	F			
porcupine	F	X	X	X	X	X
western gray squirrel*			F	X	X	X
red squirrel			X	X	X	X
chickadee			X	X	X	X
little brown myotis*	F	F			X	X
long-eared myotis	F	F	F	F	X	X
long-legged myotis*	F	F	F	F	X	X
California myotis*	F	F			X	X
silver-haired bat*	F	F	F	F	X	X
big brown bat	F	F	F	F	X	X
northern flying squirrel				X	X	X
coast mole	X	X	X	X	X	X
mountain cottontail	X	X	X	X	X	X
yellow pine chipmunk	X	X	X	X	X	X
Columbian ground squirrel	X	X			X	X
mantled ground squirrel	X	X	X	X	X	X
northern pocket gopher	X	X	X	X	X	X
Great Basin pocket mouse	X	X	X	X	X	X
deer mouse	X	X	X	X	X	X
long-tailed vole	X	X	X	X	X	X
coyote	X	X	X	X	X	X
red fox*	F	X	X	X	X	X
long-tailed weasel	X	X	X	X	X	X
badger	X	X	X	X	X	
spotted skunk	X	X	X			X

*Denotes species of special interest or concern

WILDLIFE FOUND IN THE VARIOUS SUCCESSIONAL STAGES (Continued)

Wildlife Species	Grass-Forb	Shrub-Seedling	Pole-Sapling	Young Forest	Mature Forest	Old Growth
northern water shrew	X	X	X	X	X	X
mink	X	X	X	X	X	X
river otter*	X	X	X	X	X	
marmot	X	X	X	X	X	X

*Denotes species of special interest or concern

A Woodland Fish and Wildlife Project Publication

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The Woodland Fish and Wildlife Project is a cooperative effort among the World Forestry Center, Oregon State Department of Forestry, Oregon Department of Fish and Wildlife, Washington State Department of Natural Resources, University of Washington College of Forest Resources, Oregon State University Extension Service, Washington State University Extension, Oregon Association of Conservation Districts, Oregon Small Woodlands Association, Washington Farm Forestry Association, Washington Department of Fish and Wildlife, USDA Natural Resources Conservation Service, USDA Forest Service, US Fish and Wildlife Service, and the Western Forestry and Conservation Association.

The Woodland Fish and Wildlife Project was initiated to provide information on fish and wildlife management to private woodland owners and managers. It is the intent of the organizations involved in this project to produce publications that will serve as practical guides to woodland owners.

Each publication is intended to be complete in itself. Users may find it convenient to collect all publications in this series in a three-ring binder to form a permanent reference file. Woodland Fish and Wildlife Project publications range from an overview of fish and wildlife opportunities on woodland properties to specific publications concerning techniques for managing individual species.

Titles available in the Woodland Fish & Wildlife series:

Is There a Place for Fish and Wildlife in Your Woodland?.....MISC0132
Riparian Areas: Fish and Wildlife Havens MISC0133
Managing Small Woodlands for Grouse.....MISC0141
Wood Ducks on Small Woodlands MISC0142
Managing Ponderosa Pine Woodlands for Fish and Wildlife.....MISC0158
Managing Small Woodlands for Cavity-Nesting Birds MISC0160
Trout in Small Woodlands.....MISC0161
Managing Small Woodlands for Elk.....MISC0164
Coastal Douglas-fir Forests and Wildlife.....MISC0168
Hawk, Eagle and Osprey Management on Small Woodlands MISC0169
Wetlands as Varied as our Region MISC0179
Wildlife on White Oak Woodlands.....MISC0180
Quail on Small Woodlands MISC0187
Managing Deer on Small Woodlands MISC0189
Beaver, Muskrat, and Nutria on Small Woodlands.....MISC0196
Managing Forest Habitats for Neotropical Migrant Songbirds MISC0198
Habitat Management for Bats on Small Woodlands.....MISC0226
Managing Western Juniper for Wildlife.....MISC0286
Wildlife in Broadleaf Forests of Oregon and Washington.....MISC0534
Habitat Management for Turkeys on Small Woodlands MISC0535
Managing Pacific Northwest Forests for Band-tailed Pigeons.....MISC0564

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