Woodland
Fish and Wildlife

July 1991

Managing Ponderosa Pine Woodlands for Fish and Wildlife

Proper management of Ponderosa pine forests can maintain fish and wildlife habitat while providing a continuing supply of wood products. *(ODFW photo)*

The Ponderosa pine forest type 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 living and growing plants and animals and are constantly changing. The natural development of the Ponderosa pine forests historically included fire as an important element. Mature Ponderosa pine trees, protected by their thick bark, are more resistant to fire damage than many tree species. Prior to man's fire control efforts, fires would periodically sweep through the understory killing the less protected trees, young seedlings and shrubs. This explains why many virgin stands were pure Ponderosa pine, had a park-like understory and contained few young trees. When people began to control wildfires, young trees of a variety of species, often in excessive numbers, appeared in the understory.

Standingdead or defective trees are important food, shelter and nesting sources for wildlife.

The development of a Ponderosa pine forest from a bare ground condition to old growth forest can generally be divided into six successional stages: grass/forb, shrub/seedling, sapling/pole, young forest, mature forest, old growth. Depending on the history of the stand, or the climatic and soil conditions an individual stand may skip one or more of the successional stages. Fire, insects, disease, or wind, may 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 completely skip some stages or reduce the time spent in others.

Each successional stage provides a unique blend of openland, brushland, vertical diversity, canopy cover, snags and downed logs. This blend of habitat elements influences the type of wildlife found in your 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 valu-

able habitat for quail and grouse; openings of 2-5 acres are needed for wild turkey 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
- sweetroot
- blue wildrye
- bluebunch wheatgrass
- Ross sedge
- fairybells
- thick-leaved peavine
- 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

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 - The 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, perches for grouse, nesting places for some song birds and small mammals, and thermal cover for amphibians such as Pacific tree frogs. But these are just the obvious benefits. They also have an important role to play in nutrient recycling, nitrogen fixation, and moisture retention.

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 lengthen the interval between damaging outbreaks. The cavities found in wildlife trees are important to

SUCCESSIONAL STAGES

TABLE 1. *The following table gives a visual perspective of the wildlife habitat elements that can be found in each of the successional stages.*

Habitat Elements	Grass Forb	Shrub Seedling	Sapling Pole	Young Forest	Mature Forest	Old Growth
Open land	XXXXX	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

Proper forest management can provide nesting and resting places for a variety of raptors which feed on insects and rodents detrimental to the forest. *(Wm. Finley Photo–Oregon Historical Society)*

many species for nesting, roosting, escape cover and as resting places.

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 circular). 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.

SPECIAL HABITATS

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

Edges - Where two different 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 stages 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 type. 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 circular "Riparian Areas: Fish and Wildlife Havens".

Wet meadows - Within the Ponderosa pine type, 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 protect water quality.

SILVICULTURAL SYSTEMS

To support a wide variety of wildlife species you can use management activities to create a mosaic of the different successional stages.

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. The following is a brief description of common silvicultural systems and some of the possible effects each will 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 of group selection is to create a balance of all age and size classes in a mosaic of small, (one acre or less) contiguous

Thinning is important to improve the health and vigor of a stand. Various kinds of thinning can impact different types of wildlife. *(USFS Photo)*

Riparian areas are the most important type of wildlife habitat in the Ponderosa pine forest. *(ODFW Photo)*

groups throughout the forest. Forage is increased somewhat if trees are harvested in large groups (two acres or more). The group selection system benefits deer and elk while maintaining protective cover. There is little loss of habitat for squirrels except where harvested trees were used for nesting.

Even-aged Systems
Clearcutting

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 are generally beneficial to deer and elk if adjacent non-cut 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 woodrats may increase in clearcut areas, particularly if logging slash is allowed to remain as cover. A few scattered wildlife trees, or clumps of trees left standing in the cut area will serve as perches for birds such as 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, which is easily spread from overstory trees to new seedlings. The seed-trees may then 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 bluebird, and Stellar's jay and other birds which depend on seeds. Leaving the seed-trees after the regeneration is established, will provide food and/or nesting sites for these and other birds, and for small mammals, such as squirrels, bats and foxes. These trees may, in time, become snags, which are needed by such cavity-nesting birds as the mountain chickadee, western bluebird, pileated woodpecker, and pigmy nuthatch.

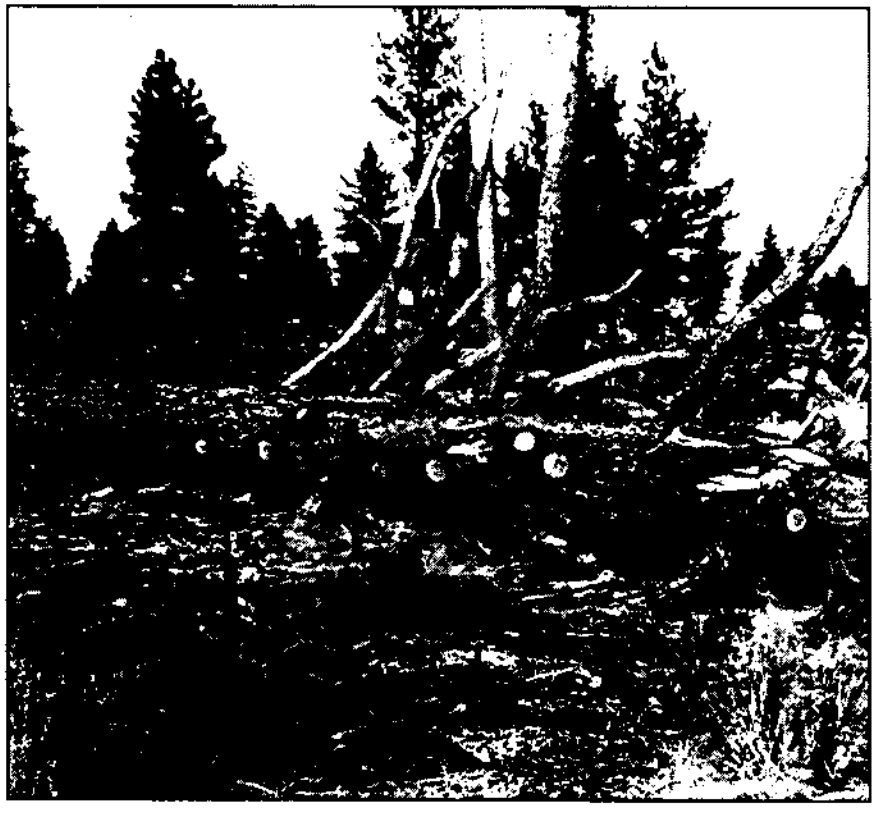
Shelterwood

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 the chances for a good seed crop. Additional cuts should expose mineral soil to encourage seed germination. During this period some of the 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 the shelter trees. Some shelter trees may be left to serve as a future source 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 which results from a more open canopy. Between the first and last cuts enough mature forest remains as habitat for ground squirrels and northern flying squirrels and slash from cuttings provides cover for ground squirrels, voles, mice, shrews, and chipmunks. These rodents are the food base for raptors and other predators like coyotes, red foxes, and bobcats that inhabit this forest type. Opening a stand may reduce the numbers of pygmy nuthatches, but could increase the number of western tanagers, warblers, juncos, and siskins.

Thinning

Thinning is one of the most important practices you can carry out to improve the health and vigor of your Ponderosa pine stand. Thinning removes some trees from a stand to increase the growth of the 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



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

removed from the stand are saleable and their sale covers the cost of the thinning operations, then the practice is considered commercial. The effects 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 live trees are removed, thinning can have a negative effect on cavity-nesting birds. 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 circulars. 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 listed some management techniques you can use to manage for each of the six habitat elements.

Thinning allows sunlight to reach the ground where grasses and shrubs can thrive providing food and cover for wildlife. (ODFW Photo)

Open land - If your land already contains some open land you can maintain a healthy mixture of grasses and forbs by periodic burning, grazing, or mowing. This habitat can be created by making openings in existing stands using a group selection or clearcut harvest system and seeding the disturbed area with a grass/legume mix. Prescribed burning can be used to maintain grass stands but is strictly regulated and should only be accomplished 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 by opening up 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 and den or nest trees.

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 percent of the tree providing protective cover, perching, nesting and feeding habitat.

Wildlife trees - Cut or blast the top from some trees to create wildlife trees, create 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, 12-25 inches d.b.h., per acre. The trees should be free of mistletoe or other trans-

mittable diseases and can be cull (due to heart rot or deformities). The number and size of wildlife trees needed varies with the wildlife species being considered. A mixture of species and diameters is always desirable.

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

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 over a short period of time.

2. Avoid logging adjacent drainages simultaneously; disturbance to wildlife is reduced by ridgelines.

3. Maintain non-activity zones adjacent to zones of activity to provide wildlife a place to hide.

4. Avoid harvesting or thinning during periods of nesting 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 feeding wildlife.

2. Retain woody debris (slash) for wildlife cover on at least 10 percent of harvested area. Leave cull logs unyarded.

3. If slash is to be scattered crush the slash so that it is less than two 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 fire breaks as narrow as possible while still meeting fire control objectives. Avoid building straight stretches of road or firebreak 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.

WHERE TO GET HELP

There are many sources of useful information. Your county extension office is a good place to start, as are county Soil Conservation Service offices and State Forestry offices. State fish and wildlife agencies, the U.S. Fish and Wildlife Service, the Bureau of Land Management, and the land grant universities all 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

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Choices in Silviculture for American Forests, Society of American Foresters with Cooperation of the Wildlife Society. 1981. 80pp.

Is there a place for Fish and Wildlife in your Woodlands? October 1988–Riparian Areas: Fish and Wildlife Havens. Woodland Fish and Wildlife Group. World Forestry Center. June 1989

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 treefrog	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 humingbird	F	F	F	F	F	X
black-billed magpie	F	X	X	X	X	F
pinon jay		F	F	F	F	X
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
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
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
chickaree			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
northern water shrew	X	X	X	X	X	X
mink	X	X	X	X	X	X
river otter*	X	X	X	X	X	
badger	X	X	X	X	X	X
marmot	X	X	X	X	X	X

** Denotes species of special interest or concern.*

Our Purpose...

This leaflet was written by Russ Hatz, state staff forester, U.S.D.A. Soil Conservation Service, Portland, Oregon.

The Woodland Fish and Wildlife Project is a cooperative effort among the World Forestry Center, Oregon State Department of Forestry, Washington State Department of Natural Resources, Oregon State University Extension Service, Washington State University Cooperative Extension, University of Washington Center of Streamside Studies, Oregon Association of Conservation Districts, Oregon Small Woodlands Association, Washington Farm Forestry Association, Oregon Department of Fish and Wildlife, Washington Department of Fisheries, Washington Department of Wildlife, Oregon Soil Conservation Service, Washington Soil Conservation Service and the USDA Forest Service. The World Forestry Center serves as the coordinating organization for the project.

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.

These publications can be obtained from any of the cooperating organizations or by contacting the World Forestry Center, 4033 SW Canyon Road, Portland, OR 97221, (503) 228-1367.

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