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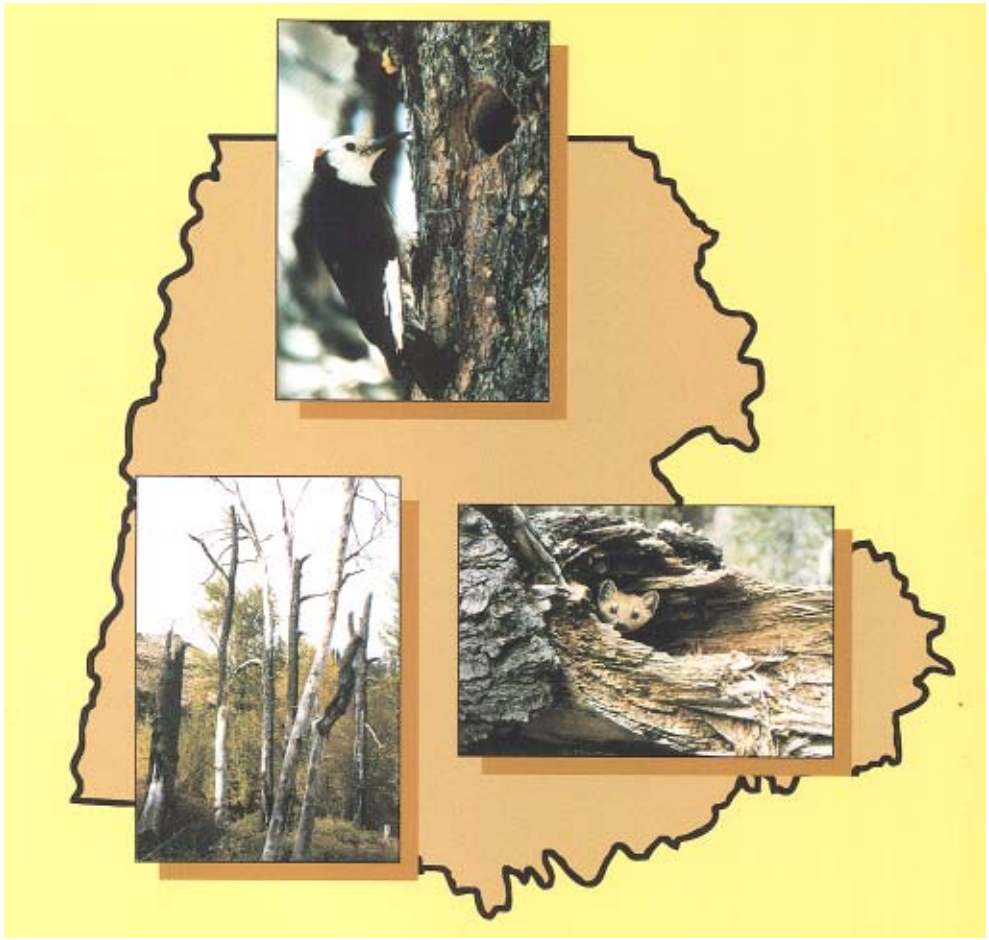
Field Guide for the Identification of Snags and Logs in the Interior Columbia River Basin

Catherine G. Parks, Evelyn L. Bull, and Torolf R. Torgersen



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Abstract

Parks, Catherine G.; Bull, Evelyn L.; Torgersen, Torolf R. 1997. Field guide for the identification of snags and logs in the interior Columbia River basin. Gen. Tech. Rep. PNW-GTR-390. Portland, OR: US. Department of Agriculture, Forest Service. Pacific Northwest Research Station. 40 p.

This field guide contains descriptions and color photographs of snags and logs of 10 coniferous and 3 deciduous tree species found in the interior Columbia River basin. Methods arc described to distinguish among the different species when various amounts of branches, cones, and bark arc missing. Wildlife use of the different species of snags and logs are listed. Snags and logs are each classified into three categories based on structural features. Six indicators of fungal decay are illustrated.

Keywords: Cavity nesters, decay fungi, habitat monitoring, hollow trees, interior Columbia River basin, logs, snags, wildlife, wood decay.

Contents

Introduction

The purpose of this field guide is to assist with the species identification of snags (completely dead trees) and down woody material, referred to here as logs. This guide is specific to the interior Columbia River basin which includes Oregon and Washington east of the Cascade Crest, all of Idaho, and a portion of western Montana (fig. I).

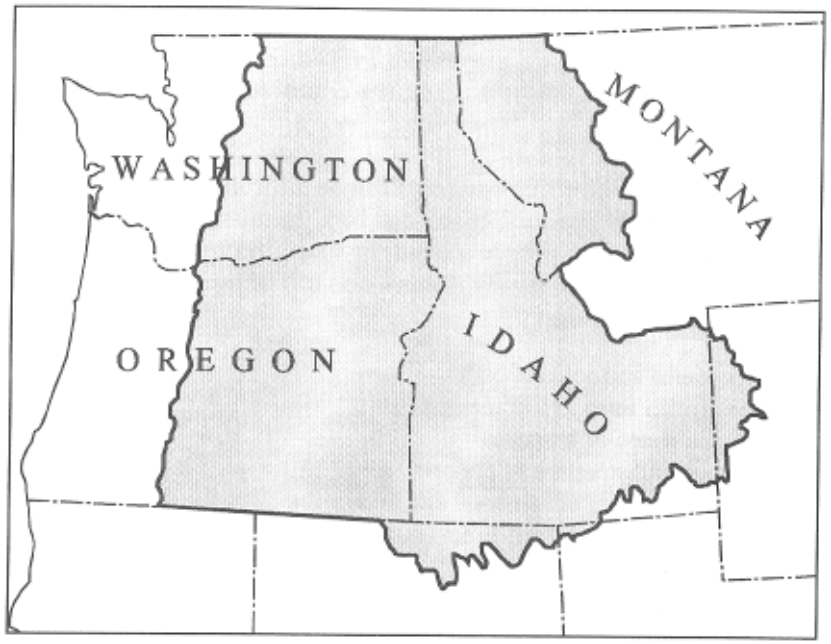

Figure 1—The interior Columbia River basin.

Only tree species typically found in commercial coniferous forest lands are included here and are presented in order of their elevational occurrence (low to high). Three species of deciduous trees (black cottonwood, (Populus trichocarpal); quaking aspen, [Populus tremuloides); paper birch, (Betula papyriferal]) are included because they typically occur in coniferous stands and arc of significant value to wildlife in the interior Columbia River basin. Coniferous species that typically occur at higher elevations (mountain hemlock, [Tsuga mertensiana]; Pacific silver fir, (Abies amabilis]; alpine larch, [Larix lyallii]; and whitebark pine, (Pines albicaulis]) are not included in this guide because stands containing these species are not usually harvested. Inventories of snags and logs, therefore, arc typically not done at higher elevations.

To provide snags and logs fox wildlife, it is essential to know which tree species are being left Although various tree species arc used by woodpeckers for nesting, the wood must be decayed or softened in order for woodpeckers to excavate a cavity. Some tree species are more susceptible to the appropriate decay organisms than others. Woodpeckers, black bears (Ursus *americanus),* American martens *(Manes americana),* and small mammals use hollow frets and logs; only a few tree species decay in the manner that creates a hollow fret. Carpenter ants *(Camponotus* spp.), a primary food source of pileated woodpeckers (Dryocopus *pileatus)* and black bears, favor some tree species over others. To provide the best habitat to meet specific wildlife needs, it is critical to identify the tree species.

Determining species of snags and logs can be difficult, especially when various amounts of branches, cones, and bark are missing. Observations of the species of living trees in a stand can help in identifying snags and logs on the site. The following features also can be useful in identifying species of snags and logs:

- Appearance and color of bark
- Tree growth form and branching habit
- Size and shape of branches
- Presence and structure of cones
- Relative amounts of sapwood and heartwood
- Indications of activity of fungi (for example, blue stain, conks, and cankers)
- Patterns of galleries left by bark beetles
- Special features evident in the texture of the wood

This field guide provides distinguishing characteristics for species of snags and logs larger than 12 inches in diameter. We define large snags and logs as those larger than 20 inches in diameter. We describe the bark, growth form, branching pattern, wood condition, and wildlife value for snags and logs typical of the species. Stand conditions, like density of trees and site moisture, influence the characteristics of living trees and therefore affect the physical appearance of snags or logs. Some snags and logs will have atypical characteristics. Although snags and logs are valuable to many birds, small mammals, reptiles, and amphibians, we emphasize the predominant wildlife use of these structures for which there is specific information. This guide is particularly suited to identifying snags and logs that are still mostly intact. Once they have deteriorated to the point that they arc crumbling or "melting" into the soil, the distinction of species has lost much of its significance to wildlife.

A classification system for snags and logs based on structural features is presented, as well as indicators of decay. This guide is designed specifically for field use. More detailed information, including references, for use during project planning is available in the companion document PNW-GTR-391.[1]

' Bull, Evelyn L.; Parks, Catherine G.; Torgersen, Torolf R. 1997. Trees and togs important to wildlife in the interior Columbia River basin. Gen. Tech. Rep. PNW-GTR-391 . Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

Ponderosa Pine

(Pinus ponderosa)

Bark: Thick, orange colored and flaky; in large plates near the base on large trees (figs. 2 and 3); underside of bark plates often blonde; outer bark is blackish on small trees, although bark may be orange colored in faster growing trees; bark usually retained fewer than 10 years on snags.
Form: Variable; branches often restricted to upper half of bole and seldom extend to base on large trees (fig. 4).

Branches: Large diameter and widely spaced on large trees (fig. Q).

Wood: Thick layer of sapwood (up l0 50 percent of volume of tree); blue stain of sapwood common; split wood without dimples as compared to the dimpled wood of lodgepole pine (Pinus contorta); wood occasionally may be bright yellow because of rosin in wood (fig. 5); spiral grain may be evident; sinuous galleries of western pine beetle (Dendroctonus brevicomis) (fig. 6) and longitudinal galleries of mountain pine beetle (Dendroctonus ponderosae) (fig. 7) may help to confirm identification of this species.

Wildlife value: Highly preferred by woodpeckers for nesting because of the rapid decay in the thick layer of sapwood; sapwood of other fret species is not sufficiently thick for woodpeckers to nest in. Existing cavities used by many secondary cavity nesters, including the flammulated owl (Otus flammeolus), which is largely restricted to pine forests. Commonly used by woodpeckers, which forage in and under the bark (fig. 3). White-headed woodpeckers (Picoides albolarvatus) arc particularly dependent on this tree species for nesting and foraging.

Figure 2—

Figure 3—

Figure 4—

Figure 5—

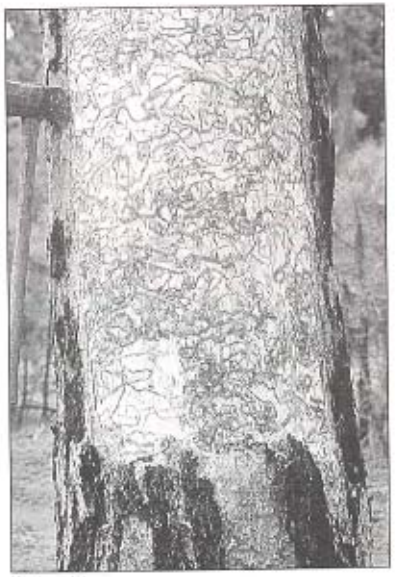

Figure 6—

Figure 7—

Western White Pine

(Pinus monticola)

Bark: Gray to light brown; bark plates well-defined smallish rectangles (fig. 8); shape of bark plates consistent along entire bole (fig. 9); not flaky; lacking the large orange, thick, platelike bark of ponderosa pine; can be confused with grand fir (Abies *grandis)* except that the rectangles of bark are smaller and more uniform than those of grand fir; bark tends to crack and start to slough off within a few years after death.

Form: Long, straight bole; limbs frequently limited to upper half of bole (fig. 10).

Branches: Small and dense; limbs tend to point downward; branches retained for along time after death; branches smaller than those on ponderosa pine.

Wood: Thick layer of sapwood; scars caused by cankers from the fungus white pine blister rust *(Cronartium ribicola)* common (fig. 1 I).

Wildlife value: Not extensively used by woodpeckers, although pileated woodpeckers occasionally use it for nesting and foraging.

Figure 8—

Figure 9—

Figure 10

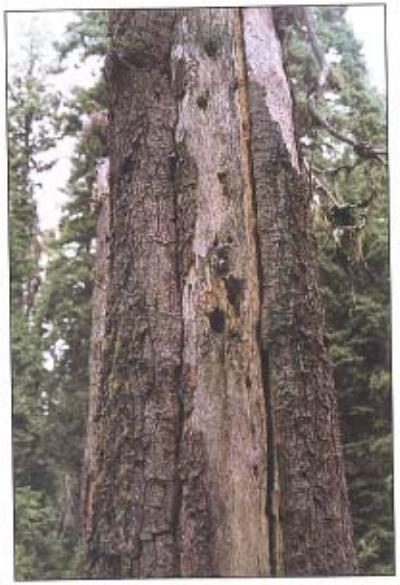

Figure 11—

Douglas-Fir

(Pseudotsuga menziesii)

Bark: Not flaky; deep furrows in large trees; similar to grand fir except cross section of bark reveals marbling of dark brown with buff (lacking the red present in grand fir) (fig. 12); thick layer of bark; snags and logs usually retain their bark for a long time.
Form: In open-grown situations, large branches often to base of free in large trees (fig. 13); mistletoe *(Arceuthobium* spp.) brooms common (fig. 14), unlike grand fir which rarely has mistletoe brooms.

Branches: Large; fine twigs showing tiny needle pegs; cones rarely present.

Wood: Thin layer of sapwood that decays rapidly; reddish heartwood that is resistant to decay: galleries of Douglas-fir beetle *(Dendroctonus pseudotsugae)* found predominantly on this species dominated by 12-inch longitudinal galleries, finer galleries across the grain (fig. l5).

Wildlife value: Bark and interior of wood frequently used for foraging by woodpeckers; relatively rapid decay of sapwood may be a deterrent to cavity excavation in some localities; in other areas, snags arc used for nesting by various woodpeckers; mistletoe brooms retained on snags may be used by long-cared *(Asia otus)* and great horned *(Bubo virginianus)* owls for nesting, and by American martens, fishers *(Manes pennanti),* and porcupines *(Erethizon dorsatum)* for cover.

Figure 12—

Figure 13—

Figure 14

Figure 15—

Photo by Dave Overhulser

Grand Fir
(Abies grandis)
and
White Fir
(A. concolor)

Bark: Platelike in lower bole with deep furrows in large trees (fig. 16); smooth in upper bole, sometimes showing resin blisters; not flaky; gray; cross section of bark reveals marbling of dark red or purplish-red with light red (or peach) blotches (fig. 76): bark retained for a long time after death.

Form: Limbs often to base of tree; top often broken off and hollow (figs. 17 and 18).

Branches: Small; fine branches relatively smooth with rounded needle scars instead of needle pegs as in Douglas-fir; cones rare; mistletoe brooms absent.

Wood: Thin layer of sapwood; brownish-colored heartwood that is often extensively decayed by Indian paint fungus (Echinodontium tinctorium) (fig. 17) leaving heartwood hollow or with stringy fibers of wood (fig. 19); transverse egg galleries of fir engraver beetle (Scolytus ventralis) (fig. 20) common on true firs and a good characteristic to distinguish from Douglas-fir.

Wildlife value: Snags frequently used as nest sites by sapsuckers, nuthatches, and chickadees; occasionally used by pileated woodpeckers for nesting. Hollow snags extremely valuable to pileated woodpeckers for roosting at night, to black bears for hibernation, to American martens for dens and rest sites, to bushy-tailed woodrats (Neotoma cinerea) and flying squirrels (Glaucomys sabrinus) for cover, to Vaux's swifts (Chaetura vauxi) for nest and roost sites. Hollow logs are valuable as dens and rest sites for mammals such as black bears, American martens, squirrels, and other small mammals. Snags and logs used extensively by pileated woodpeckers and black bears for foraging on ants in the interior wood.

Figure 16—


Figure 17—


Figure 18—


Figure 19—


Figure 20—

Lodgepole Pine

(Pinus contorla)

Bark: Very thin; dark; flaky (fig. 21). Bark often sloughs off within 4 to 8 years after death.

Form: Typically small trees less than 12 inches diameter at breast height; long, straight bole; branches may be along entire bole or on upper half of bole (fig. 22).

Branches: Small diameter with persistent small cones often attached (fig. 23).

Wood: Relatively thick layer of sapwood, but less so than ponderosa pine; blue stain fungi common; small dimples on split wood, compared to no dimples on ponderosa pine; beetle-killed trees with 12- to 36-inch longitudinal galleries of mountain pine beetle. Several species of canker forming fungi may leave characteristic fusiform depressions in stern (fig. 24).

Wildlife value: Used by black-backed (Picoides areticus), three-toed (P. tridactylus), and hairy woodpeckers (P. villosus) for nesting and foraging; rarely contains ants and is therefore seldom used by pileated woodpeckers for foraging in interior wood; pileateds may forage under the bark for mountain pine beetle larvae.

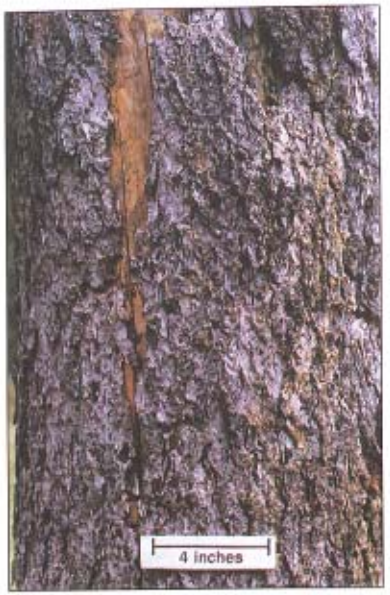

Figure 21—

Figure 22—

Figure 23—

Figure 24—

Western Larch

(Larix occidentalis)

Bark: Thick layer of deeply fissured bark at base of large trees (fig. 25); flaky in flat-plated ridges higher on bole of large trees (fig. 26); underside of bark plates orange or dark red; outer bark appears orangish or dark brown.

Form: Long, straight, limbless bole (fig. 27); branches mostly gone when tree dies; often gnarled with large knots of wood where branches once erupted from trunk (fig. 28).

Branches: Brittle branches with tiny cones on recently dead trees; cones with scales that may have bracts protruding from between them (fig. 29); twigs with globose buds from which clusters of needles grew (fig. 29); witches brooms caused by dwarf mistletoe.

Wood: Thin layer of sapwood; both sapwood and heartwood moderately resistant to decay; some large snags contain extensively decayed heartwood.

Wildlife value: Commonly used for nesting by pileated and blackbacked woodpeckers and by sapsuckers; frequently contains colonies of carpenter ants and therefore used extensively by pileated woodpeckers and black bears for foraging on these ants. Mistletoe brooms used for nesting by great gray owls *(Strix nebulosa),* great horned owls, northern goshawks *(Accipiter gentilis),* and red-tailed hawks *(Buteo jamaicensis);* mistletoe brooms used as rest sites by American martens. Natural cavities formed from top injuries used by barred *(Strix varia)* and great horned owls for nesting.

Figure 25—

Figure 26—

Figure 27—

Figure 28—

Figure 29—

Western Redcedar

(Thuja plicata)

Bark: Shaggy, reddish-brown; can be pulled off in strips with long straight furrows between; outer texture of bark hairy (fig. 30); usually some bark present on snags and logs.

Form: Long, straight bole (fig. 31); often has multiple tops; top may be broken: branches generally limited to upper half of bole; fluted buttress form at base of tree.

Branches: Small, flexible branches predominate, although large branches resembling upturned "arms" common (fig. 32).

Wood: Extensive heart-rot decay in older trees, although young trees are resistant to decay; commonly hollow at base of tree (fig. 33); wood tends to come apart in plates.

Wildlife value: Used for roosting by pileated woodpeckers, bats, and

Figure 30—

Figure 31—

Figure 32—

Figure 33—

Western Hemlock

(Tsuga heterophylla)

Bark: Gray; somewhat platy, but plates not as large as those on grand fir or Douglas-fir (figs. 34 and 35); narrow vertical furrows; cross section of bark reveals reddish maroon color without marbling thin layer close to the cambium is a bright maroon.

Form: Branches occur on at least upper half of bole; top often broken (fig. 36).

Branches: Brittle branches; branch nubbins may be all that remain (fig. 37).

Wood: Decays quickly in dead trees and logs.

Wildlife Value: Woodpeckers may forage in or under bark but no extensive foraging for ants. Pileated, three-toed, and hairy woodpeckers and northern flickers *(Colaptes auratus)* may use it for nesting and roosting.

Figure 34—

Figure 35—

Photo by Cathy Ravey

Figure 36—

Figure 37—

Engelmann Spruce

(Picea engelmannii)

Bark: Scalloped bark in thin, loosely attached flakes in rather squarish pieces (fig. 38); lower end of flake often unattached; thin layer: bark characteristics primary means of distinguishing from subalpine fir.

Form: Dense branches to base of tree, often sloping downward (fig. 39); broom rust (Chrysomyxa arctostaphyli) occasional (fig. 40).

Branches: Small: dense fine twigs with tiny needle pegs.

Wood: Thin layer of sapwood.

Wildlife value: Occasionally used for nesting by woodpeckers; frequently used by woodpeckers for foraging in and under the bark (fig. 41), particularly on bark beetles; bark appears orange from the removal of the outer bark flakes where woodpecker foraging has occurred. Brooms formed by broom rust arc used by American martens for rest sites.

Figure 40—

Figure 41—

Subalpine Fir

(Abies lasiocarpa)

Bark: Very smooth, thin layer; silver gray (fig. 42); peels away from bole in sheets after being dead for some time (fig. 43).

Form: Branches to base of tree (fig. 44); lower branches often pointing downward (fig. 45); gradual taper giving spirelike form; broom rust (Melampsorella caryophyllacearum) occasional.

Branches: Small; very dense branching (fig. 44); branches persistent and tend to lie closer to the bole than those on Engelmann spruce.

Wood: Thin layer of sapwood; light-colored wood; Indian paint fungus common in some areas.

Wildlife value: Snags and logs occasionally used by woodpeckers for foraging. Primary value is in brooms created by broom rust. Brooms are commonly used by American martens as rest sites.

Figure 42—

Figure 43—

Figure 44—

Figure 45—

Black Cottonwood

(Populus trichocarpa)

Bark: Thick, deeply furrowed; not flaky; gray to grayish-brown to yellowish brown (figs. 46 and 47); underside is fibrous (fig. 46).

Form: Single or multiple stems; V-form common (figs. 48 and 49)

Branches: Large; often originating low on bole.

Wood: Soft. light colored wood; sapwood white; heartwood palc yellowish-brown; coarse.

Wildlife value: Valuable riparian habitat species; bole and branches commonly used for nest cavities by northern flickers and Lewis' woodpeckers *(Melanerpes lewis)* because of the soft decayed wood; used by pileated woodpeckers for nesting and roosting in Montana. Old woodpecker cavities and natural cavities located on bole at branch scars used by many secondary cavity nesters including western screech-owls *(Otus kennicottii)* and northern saw-whet owls *(Aegolius acadicus)*.

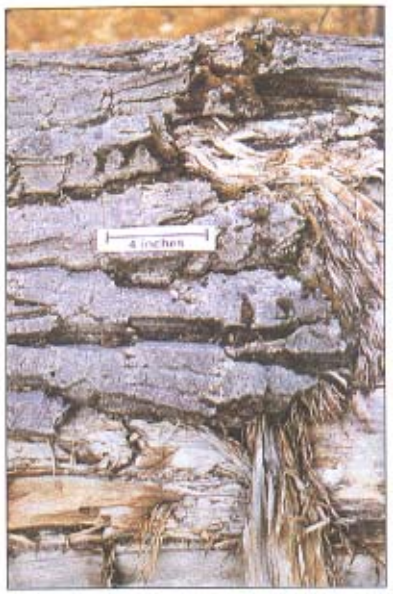

Figure 46—

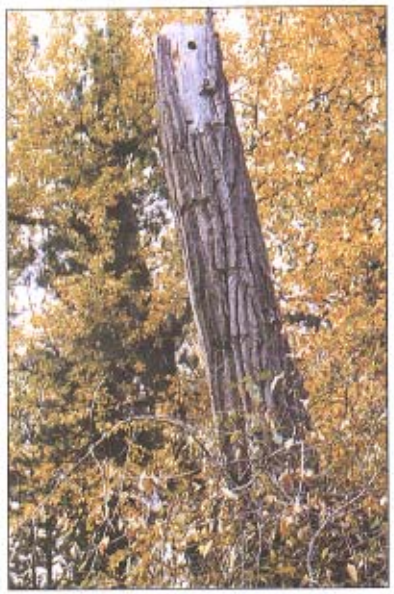

Figure 47—

Figure 48—

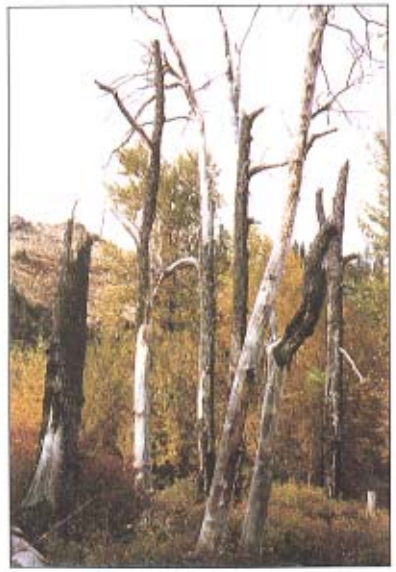

Figure 49—

Quaking Aspen

(Populus tremuloides)

Bark: Smooth; thin; white or light gray (fig. 50); dark horizontal lenticels.

Form: Long, straight bole (figs. 51 and 52); brancbes in upper crown of larger trees.

Branches: Small with knots common.

Wood: Light colored, soft wood; conks of *Phellinus iremulae* common (fig. 53).

Wildlife value: Commonly used for nest cavities by woodpeckers, sapsuckers, and secondary cavity nesters because of the soft decayed wood.

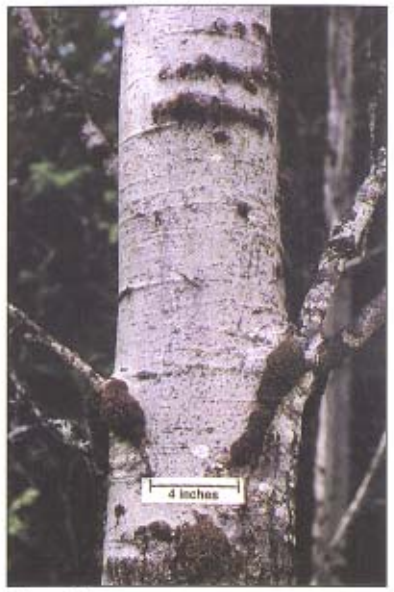

Figure 50—

Figure 51—

Figure 52—

Figure 53—

Paper Birch

(Betula papyrifera)

Bark: Thin white bark (fig. 54); papery; peels in strips horizontally.

Form: Single or multistemmed; top breakage common (figs. 55 and 56); often branches along upper three-quarters of bole.

Branches: Small: break off soon after death.

Wood: Light-colored wood; very susceptible to the heart-rot fungus *Fomes fomentarius* (fig. 57).

Wildlife value: Commonly used for nesting by woodpeckers, particularly northern flickers and sapsuckers.

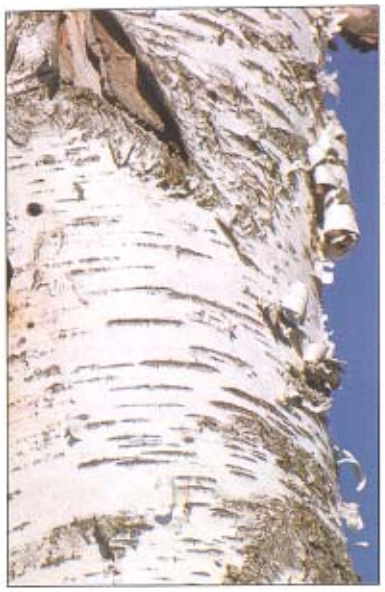

Figure 54—

Figure 55—

Figure 56—

Figure 57—

Structural Classes for Snags

Just as it is impottant to identify the species of a snag or log, it is equally important to identify the structural classes of snags that occur in a stand. We have categorized the structure of snags into three classes (fig. 58). This classification system is designed to fit most snags. There will be some snags that do not readily fall into one of the classes. The structural class is identified by the amount of bark and branches, condition of the tree top, and condition of the wood. These characteristics of the snag determine which wildlife is likely to use the snag. Representatives in each class should be retained in a stand with more emphasis on the first two classes, because they eventually decay into the third class.

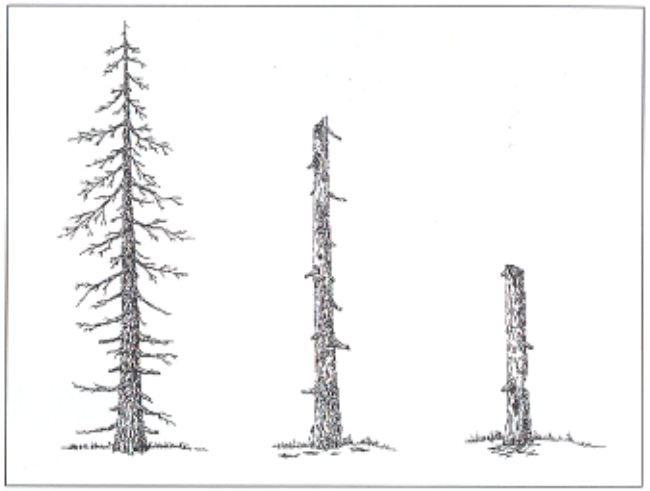

Figure 58—Three structural classes of snags.

Structural class 1 represents those trees that have died recently and retain most of their bark and most of their branches; the top is intact (fig. 59). Very little decay has occurred in the wood, unless the tree had heart-rot decay when it was living. Class 1 snags typically are used primarily for foraging by woodpeckers on bark beetles in and under the bark. Once the bark loosens, bats can roost and brown creepers *(Certhia americana)* can nest under the bark.

Structural class 2 represents those snags that have been dead at least several years and have lost some branches and some bark (except grand fir and Douglas-fir, which tend to retain their bark after death); tops are often broken; there is some evidence of decay (figs. 60 and 61). Class 2 snags typically are used by woodpeckers for nesting, foraging in the bark, and foraging in the interior after carpenter ants.

Figure 59—Snag structural class 1.

Figure 60—Snag structural class 2.

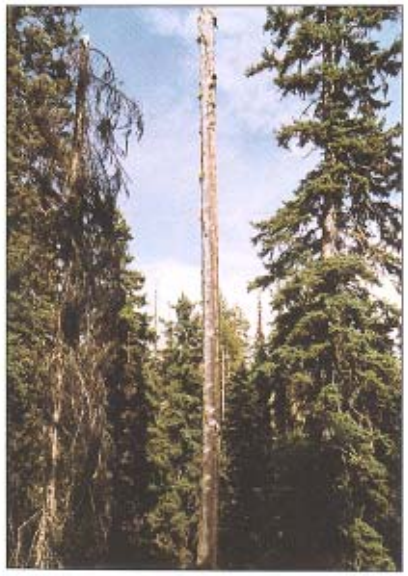

Figure 61—Snag structural class 2.

Structural class 3 represents those snags that have been dead a long time and lack branches and bark (except grand fir and Douglas-fir, which tend to retain their bark after death). Tops are broken off, and the sapwood and heartwood are extensively decayed (fig. 62). The primary use of these trees is by woodpeckers foraging on carpenter ants and woodboring beetle larvae. Most of these trees arc too decayed for woodpeckers to excavate a cavity in them, although existing cavities may be used by secondary cavity nesters.

Hollow snags are unique structural features and should be noted as such. All hollow snags should be retained because of their value as nest and roost sites for Vaux's swifts, roost sites for pileated woodpeckers acid northern flickers, and rest sites for bushy-tailed woodrats, flying squirrels, weasels, and other small mammals. Evidence that large-diameter trees have hollow interiors includes:

- A broken bole with a bayonet top formed over the break
  More than one pileated woodpecker entrance hole
- Fruiting bodies of Indian paint fungus
- An old injury or bend along the bole where a new leader formed a new trunk inany years ago

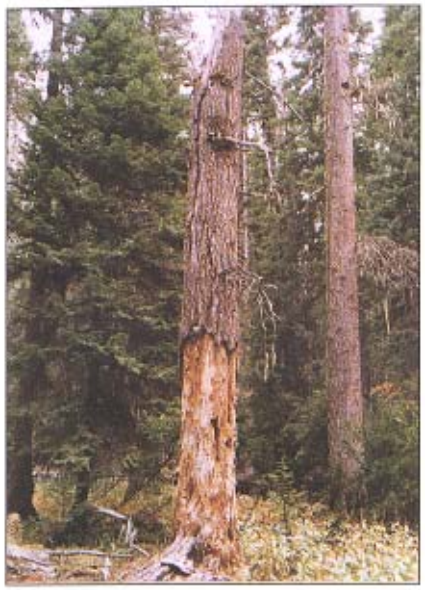

Figure 62—Snag structural class 3.

Structural Classes for Logs

Log classification by structural classes is based on the amount of bark and branches, amount of ground contact, decay condition of the wood, and how intact the log is (fig. 63). Representatives in each class should be retained with more emphasis on the first two classes.

Structural class 1 for logs represents those trees that have just fallen over, retain their bark and branches, have little decay in the wood, and are resting largely above the ground (fig. 64). These logs are used primarily as cover by American martens, squirrels, black bears, deer, elk, mountain lions *(Fells concolor),* and other mammals.

Structural class 2 represents those logs that are in contact with the ground, have lost some of their bark and branches, and have some decay in the wood (fig. 65). These logs are used extensively by pileated woodpeckers and black bears for foraging on carpenter ants and by American martens and small mammals for cover.

Structural class 3 represents those logs that have begun decomposing into the forest floor, arc not intact, are extensively decayed, and lack both limbs and bark (fig. 66). These logs are used for foraging by pileated woodpeckers and black bears, by small mammals for shelter and cone stashes, and by amphibians and reptiles for cover.

Logs that are hollow are unique structural features and should be noted as such in inventories. All hollow logs should be retained because of their value as den sites for American martens, hibernation sites for black bears, and shelter for small mammals.

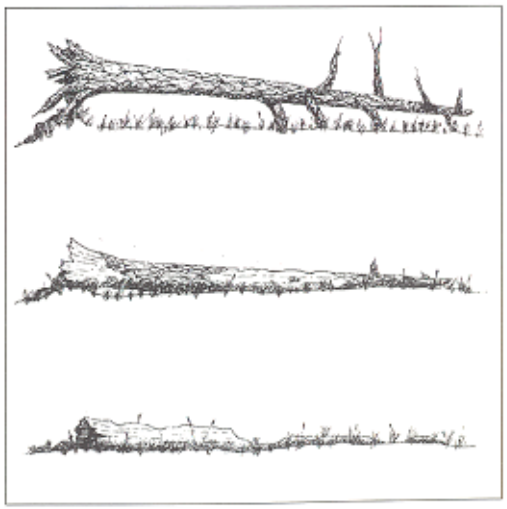

Figure 63—Three structural classes of logs.

Figure 64—Log structural class 1.

Figure 65—Log structural class 2.

Figure 66—Log structural class 3.

Indicators of Decay

Fruiting bodies (conks) of decay fungi are good indicators of softened wood, although fruiting bodies are frequently not present on decaying trees and logs. In the absence of fruiting bodies, broken tops, fire scars, and other wounds are all indicators of internal decay. Several of the more common decay fungi arc described and illustrated below, although dozens more are commonly associated with decomposing logs. The decay types are presented by those that cause internal decay in the heartwood, external decay in the sapwood, and symptoms of root disease. It is important to differentiate the decay type in order to predict the form the substrate (snag or log) will assume over time.

Indian paint fungus decays heartwood of living and dead grand fir and western hemlock so extensively that hollow interiors are created; other tree species are rarely infected. Fruiting bodies of this fungus are large, black, perennial woody conks with the entire undersurface toothed (fig. 67). The inside of the conk is brick-red. Fruiting bodies are found on the bole on the underside of branches. Trees with one or more fruiting bodies usually have extensive decay.

Red ring rot *(Phellinus pini)* decays heartwood of living and dead conifers, infecting most western conifer species. The perennial, woody fruiting bodies differ in size and shape but are typically bracketlike or hoof shaped (fig. 68). The lower pore surface is usually a rich, rust-brown. The upper surface is darker brown and is usually marked by several concentric furrows.

Quinine or brown trunk rot (Fomitopsis officinalis) decays heartwood in large dead trees; it is rarely found in young stands. Conks are large, pendulous or hoof shaped, and chalky in color and texture (fig. 69). They are found most commonly on western larch; occasionally on Douglas-6r, pines, spruce, and hemlock; and rarely on true firs.

The pouch fungus (Cryptoporus volvatus) decays sapwood, is characterized by small leathery, whitish "bubbles," and is abundant when found (fig. 70). The pouch fungus occurs on all recently dead western conifer species up until 18 months after death. Snags with these fruiting bodies should be listed in structural class 1.

Figure 67—

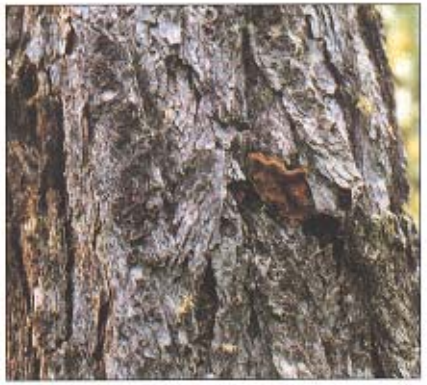

Figure 68—

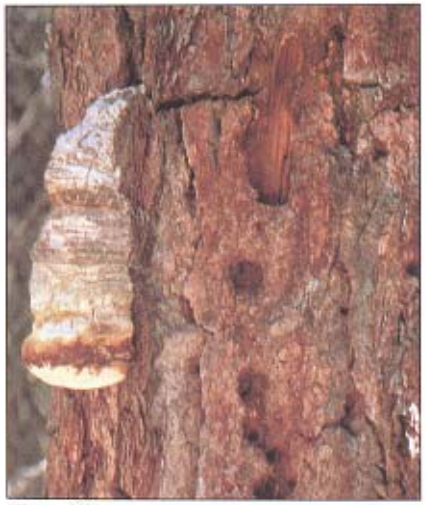

Figure 69—

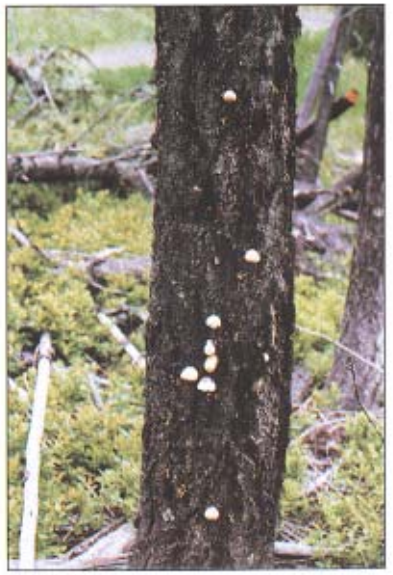

Figure 70—

Red belt fungus (Fomitopsis pinicola) decays both the sapwood and heartwood of dead trees. Older conks are small to large, flat to hoof shaped with a white lower surface and gray to black upper surface (fig. 71). A conspicuous reddish margin develops between the two surfaces, thus the name red belt. Young conks are small, white, and round- This common fungus is found on most western conifer species.

Root diseases are caused by a group of decay organisms that infect roots and spread through root contact. Characteristically, root disease pockets start in a tree or stump and spread outward in all directions. Typically, the oldest dead tree will be in the center and fringed by dying or recently dead trees on the outer edge (fig. 72). Trees infected with root disease may add to the snag component for only a short period because they are prone to fall over.

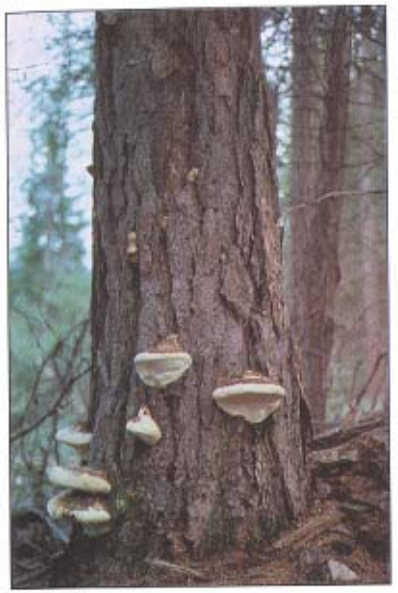

Figure 71—

Figure 72—

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Parks, Catherine G.; Bull, Evelyn L.; Torgersen, Torolf R. 1997. Field guide for the identification of snags and logs in the interior Columbia River basin. Gen. Tech. Rep. PNW-GTR-390. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 40 p.

This field guide contains descriptions and color photographs of snags and logs of 10 coniferous and 3 deciduous tree species found in the interior Columbia River basin. Methods are described to distinguish among the different species when various amounts of branches, cones, and bark are missing. Wildlife use of the different species of snags and logs are listed. Snags and logs are each classified into three categories based on structural features. Six indicators of fungal decay are illustrated.

Keywords: Cavity nesters, decay fungi, habitat monitoring, hollow trees, interior Columbia River basin, logs, snags, wildlife, wood decay.

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