



SNAGS, COARSE WOODY DEBRIS, AND WILDLIFE

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As any tree farmer or forestland owner knows, keeping trees alive and growing can require a tremendous effort. In fact, a large amount of the research, education, and management effort expended by forestry agencies and organizations is devoted to protecting forests from disease, fires, severe storms, competing vegetation, predation, insects, and anything else that kills or damages trees. Furthermore, some of these dead and dying trees can be hazardous to human life and buildings. Why all the fuss over protecting standing and fallen dead trees? Worse yet, why do some of us persist in suggesting you create these conditions? The short answer is when a tree dies; life begins for a lot of our native wildlife. In fact, more than a third of our wildlife species (including some fish and aquatic vertebrates) are dependent on dead and dying wood for their survival and well-being. First, let's define what it is that is so important then consider some management options to protect this resource while eliminating or minimizing the economic cost to the landowner.

VALUE TO WILDLIFE

SNAGS: Snags are standing dead trees. They are important as nesting habitat to more than 60 cavity nesting birds and mammals; species (woodpeckers and flickers) that either excavate holes in dead wood for nest and den sites, and those called secondary cavity nesters such as: bluebirds, flying squirrels, and wood ducks that use holes for nests and dens that were created by the cavity excavators. Some additional cavity work may be performed by some of the secondary cavity nesters. Several species of birds and mammals such as brown creepers and several species of bats nest or roost behind loose bark on those snags that have not yet decayed to the point the bark is gone. Some birds such as Vaux's swifts, and small and large mammals alike, from flying squirrels and pine martens, to black bears; use large hollow snags for nesting, roosting, and denning. Some species such as eagles, ospreys, and some hawks and owls build nests in the broken top snags or uppermost large branches. Snags are important as perch sites and even launch sites for foraging forays by some raptors (hawks, owls, eagles) and flying squirrels. Some raptor species use the tops of large snags as a sentry post within their territory or for plucking posts for eating their captured prey. Some woodpeckers hammer or drum on hard snags as a form of territorial and/or mating communication. Another extremely important function of snags is a large number of bird species use them as a food source. They glean insects and other invertebrates from dead wood, bark, fissures, and cracks in dead and dying wood. A few species even use cavities and crevices in snags to cache their food for later use. In total, more than 100 species of wildlife need snags for nesting, roosting, shelter, and feeding. The majority of these species consume vast quantities of insects, many of which are injurious not only to trees, but to crops and humans as well.

Many live trees may also be classed as snags or “wildlife trees”. These include trees with large broken tops and ensuing decay and rot/or a significant number of large dead branches, hollow trees created by advanced heart rot fungal growth, as well as those severely infected with mistletoe and covered with brooms. Some may live for long periods with the defect created by storms, disease, fire, and insects; yet they are functioning as snags for wildlife.

COARSE WOODY DEBRIS: Coarse woody debris includes fallen trees and large branches as well as logs and large pieces of wood left from logging operations. This habitat component serves many of the same purposes as snags: nesting, denning, roosting, foraging, and hiding cover and shelter from inclement weather. At least as many vertebrate species use coarse woody debris as they use snags. Some are the same species such as black bears using large hollow logs and woodpeckers foraging for insects. Some are seen on the exterior such as ruffed grouse using logs for drumming sites as part of their mating ritual. A lot of small mammals use this habitat type for hiding and food caches. Probably the most unique life form using coarse woody debris is several salamander species. Some may spend just their adult life phase in a rotting log foraging for invertebrates and hiding, whereas a few species may spend their entire life in a single log from egg phase through adulthood. Coarse woody debris is host to a huge number (about 400 known) of insects and an unknown but large number of non-insect invertebrates. These are used as food sources by many of the vertebrate species found on and in coarse woody debris. The ultimate fate of all these species, in conjunction with the decomposing forces of fungi is to break down the woody fiber into organic matter that is utilized by the surrounding growing forest.

SNAG AND COARSE WOODY DEBRIS CHARACTERISTICS

From a wildlife perspective, not all snags and downed logs are equal. Factors influencing their value to wildlife include: stage and type of decay, size, and species. Furthermore, the total number and distribution throughout the forested landscape are important.

DECAY AND DECOMPOSITION: Snags and coarse woody debris go through an entire decomposition cycle, from the hardest and greenest fresh stage through the final stages where they are almost completely decomposed. The various species of wildlife that use these habitat features are selective in that not all stages of decomposition are used by the same wildlife. Furthermore, not all snags decay at the same rate or in the same way; it depends on the size of the tree or log, the species, the agent that killed the tree, and of course, the environment and location. As a rule of thumb, more wildlife species use the harder snags and downed logs than those of the more advanced stages of decay. Forest stands with only highly decayed snags and coarse woody debris, even if in large quantities and well distributed, can be expected to have low populations of wildlife dependent on this habitat type. Nesting and denning habitat is best prepared in not only firm snags and logs but in those that are hollow, as a result of heart-rot causing fungi, or have large internal cavities or crevices in them. While the several root rots readily kill many conifers, the decay usually starts in the cambium layer causing rot from the outside working towards the tree’s center. While this allows foraging habitat as insects attack the cambium, few nesting or denning opportunities are created. Furthermore, many trees killed by some roots, rot and do not last long either as a standing snag or as a piece of coarse woody debris.

SIZE: The height and diameter of snags and coarse woody debris is important. As a general rule, as diameter and height or length increases, more species of wildlife can be supported. Furthermore, the largest snags and coarse woody debris usually last longer in the environment and are useful to wildlife for a longer period than the smaller diameter and shorter snags and logs. While snags as small as six inches in diameter and about six feet in height are used for nesting, denning, and foraging by a few species of wildlife; snags greater than 20 inches in diameter and 60 feet tall can accommodate all snag dependent species. Occasionally, large diameter stumps at least three feet tall can be used for some denning, roosting, and even nesting by some species of the smaller cavity nesting birds as well as some forest bats and flying squirrels. A special concern, however, is for species such as black bears. Use of winter dens and summer shelter often occurs in large hollow trees. These need to be upwards of three feet in diameter to be accessible by bears.

Foraging occurs on all sizes of snags and dead wood. But like cavity nesting, the larger pieces can support more invertebrates and thus, more foraging. However, a large number of even the smallest snags and downed logs, including those killed by suppression mortality, as well as high stumps can and do supply a great deal of foraging habitat.

Like snags, the larger pieces of coarse woody debris are necessary to support a full compliment of wildlife dependent on this habitat feature. To really begin to be useful, this component should be at least 10 inches in diameter and 12 feet long. However, the greatest use for the longest period is in those pieces at least 30 feet long and at least 20 inches in diameter. Again, black bears need even larger diameter hollow logs for denning. Stumps and large diameter butt ends of logs left over from logging operations will be used by some species of wildlife needing large coarse woody debris.

TREE SPECIES DIFFERENCES: Not all species of snags and coarse woody debris have the same value. While all species of conifers and hardwoods are used, some marked differences in the level and intensity of use by some wildlife species on certain tree species have been documented. East of the Cascade Mountains ponderosa pine, western larch, quaking aspen, and paper birch are some of the most favored conifers and hardwoods. West of the mountain crest, Douglas fir and western red cedar replace pine and larch for favored status. Hardwoods also get utilized and where available, big-leaf maple and cottonwood are readily used. As a matter of fact, the larger cottonwood trees get heavy use on both sides of the mountains. Their distribution on the east side is relegated more to the riparian and wetland zones. While red alders are well distributed and do see good use for cavity nesting and foraging, they only last a few years at best after death, either standing or down. Another important tree for cavity nesters on both sides is grand fir. This species is very susceptible to some heart-rot causing fungi (as many tree farmers are aware). This feature makes the larger grand firs very valuable to all cavity nesters and denners including black bears.

NUMBER AND DISTRIBUTION: This feature, along with size requirements, probably causes the most controversy and problems for forestland owners as well as the wildlife that use snags and coarse woody debris. A great deal of research has been conducted and results interpreted and applied, including as regulation, across the northwestern states. In determining the necessary number and distribution of snags, a lot depends on the requirements of existing wildlife, location, forest type, past management, and the condition of surrounding lands. Obviously,

identifying these conditions is not always possible when managing a given piece of forestland. Therefore, some generalities can be applied. The existing forest practice requirements and recommendations in Oregon and Washington will accommodate a minimum number of dependent wildlife species when properly applied. However, they do not equal conditions found in older unmanaged forests that contain healthy and viable populations of snag and coarse woody debris dependent wildlife. East of the Cascade Mountains, the most recent studies revealed that to retain viable populations of cavity nesters, about four snags greater than 10 inches in diameter were needed on a per acre basis with about two of these greater than 20 inches in diameter. Numbers were similar but slightly higher on the westside. Variation in height, diameter, and numbers has been recorded in individual studies, but all showed that more snags and the larger class sizes are needed than what present forest practices calls for. These studies were most concerned with nesting, denning and maintaining viable populations of cavity nesters. They did not take into consideration the need and impact of all foraging habitat components such as the very small diameter snags and large diameter stumps. In one earlier study on the westside, it was shown that an average of 16 snags per acre of all sizes, decay classes, and species were present in unmanaged stands containing healthy populations of all snag-dependent wildlife expected in that area.

The requirements for coarse woody debris are not as well defined as for snags. However, every study shows that more and of larger sizes than are presently required in managed forests is needed to maintain healthy populations of wildlife dependent on this feature. Eastside forests with healthy populations of coarse woody debris dependent wildlife contained about 90 logs per acre, averaging 34 feet in length and at least 15 inches in diameter. Studies in westside forests have shown similar trends and a need to upgrade the number and size behind in logging operations.

In unmanaged forest landscapes, distribution of both snags and coarse woody debris shows trends of both clumping and individually scattered snags and pieces. This is to be expected as these habitat features are formed from fires, storms, insects attacks, and disease; events that kill trees both in patches or clumps as well as scattered randomly across the landscape. While present harvest management trends are to clump these components near streams or wetlands, the presence and need for these habitat components exists on the forested uplands, side slopes, and ridge tops as well.

SNAG AND COARSE WOODY DEBRIS MANAGEMENT

The cheapest and best method for managing these resources is to retain them where they exist, and allow natural processes to continue recruiting new material into each forested stand. Where forestland is being managed or has experienced intensive management in the recent past, this practice often conflicts with management objectives or does little for wildlife species needing these forest components. For example, thinning programs often remove not only existing snags and coarse woody debris, but also those poorer quality and defective trees that would be recruited into these components in the future. Additional management may then be necessary to speed the development of these habitat resources, to reduce overall costs of lost harvest opportunities to the landowner, and to reduce hazardous situations. Numerous management techniques have been developed and are too lengthy to include here for each situation. Nonetheless, several approaches that have worked are listed briefly below. Just keep in mind what snag and coarse woody debris dependent wildlife need and what and where

these features are (or are absent) in your stands. Incorporate some of these measures and any others that may be useful wherever possible during harvest planning or other stand management activities. Most of the implementation costs can often be cost-shared through several federal and state programs.

- Retain snags and coarse woody debris wherever possible.
- Select poorly formed or low quality trees for retention as future snags (and eventually coarse woody debris). Trees with obvious defect including fire scars, broken tops, dead branches, signs of heartwood decay, etc., are excellent ones to leave for future wildlife use.
- Leave cull logs and butt ends and tree tops scattered throughout the logging unit instead of piling and burning on landings.
- Clump green trees and retention trees around existing dangerous snags so they may be left.
- Reduce broadcast burning in areas with good or large pieces of coarse woody debris and snags; spot burn around those areas.
- Create snags by cutting, blasting, or girdling at the point of desired breakage. While the larger ones are most desirable, all sizes may be created. Select the poorest quality trees if necessary for creating snags. By killing poorer quality trees, no poor genetic material will be broadcast in their seed nor will they compete for light and nutrients with crop trees. Where creating living snags is possible, top or girdle above the fourth or fifth whorl of branches.
- Consider leaving high stumps wherever possible in harvest units. These may be those with obvious butt swell and/or defect that would have little or no merchantable value.
- While thinning may reduce future snag recruitment, it also offers an excellent opportunity for creation of low cost (or no cost) snags during harvest activities. Chainsaw fallers and especially mechanical harvesters can be used to create snags of all heights and diameters while on the unit. A variable density-thinning regime can be employed to protect and create snags, as well as other wildlife habitat components such as understory shrubs and forbs. Very light or no thinning can be included around existing potentially dangerous snags. New snags can be created out of low quality trees within areas being thinned. This may require thinning those areas more heavily to allow equipment in and to reduce hazard situations. These more heavily thinned patches, promote the development of understory vegetation to the benefit of other classes of wildlife.

Many landowners put up bird nesting boxes. While many of these do enhance nesting opportunities for the short term, they do not replace snags and their entire associated wildlife habitat uses for the long term, nor do they supply foraging substrate or coarse woody debris.