



Dead and dying trees: part of a healthy forest

Richard Harris and Bill Laudenslayer

"snag" is a standing dead tree.

Snags provide habitat to innumerable organisms including fungi, insects and other invertebrates, and land animals such as amphibians, reptiles, birds, and mammals.

Logs and limbs from snags are important to the forest floor and streams. As they decay, they release nutrients essential to long-term soil productivity. Down logs and limbs also provide habitat for many animals including salamanders and carpenter ants.

There is a misconception that forest "health" is negatively affected by diseased, dying and dead trees. On the contrary, their presence is an important component of natural forest ecosystems

(although large quantities of these trees in some forests do suggest a decline in forest health). In this article, we suggest a few simple guidelines for managing and recruiting snags.

Why Are Snags Important?

Probably the single most obvious reason for a landowner to be concerned with snags is because they provide habitat for birds. Some birds, such as sapsuckers and woodpeckers, excavate their own nests in snags (primary cavity nesters). Other birds occupy abandoned nests or natural cavities (secondary cavity nesters). These secondary nesting birds comprise up to one third of the breeding birds found in some forests.

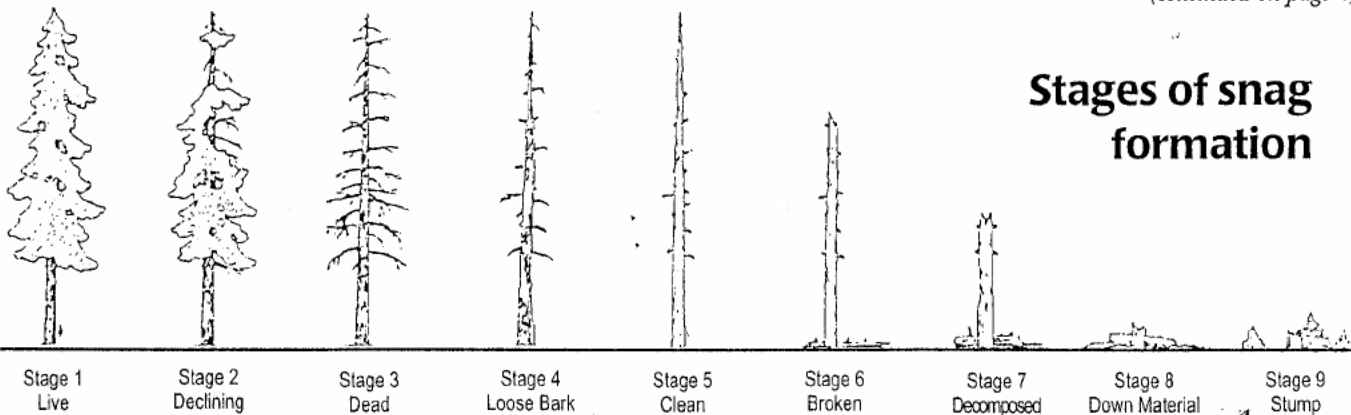
Most cavity-nesting birds consume large quantities of insects each year.

There is evidence that "biological control" by these birds can help keep populations of potentially damaging insects, such as bark beetles, below epidemic levels. Insect outbreaks often attract cavity nesting birds.

Snags are used in numerous other ways. Woodpeckers and sapsuckers communicate by "drumming" on dead branches. Squirrels and other small mammals use dying and dead trees as foraging sites, to store winter food supplies and for roosting and denning. Bats use loose bark and hollow tree trunks for roosting. A myriad of insects use dead trees as overwintering sites; some consume portions of dead trees, contributing to the decomposition process.

The death and eventual falling of

(continued on page 4)



Stages of snag formation

Cooperative Extension
Environmental Sciences, Policy, & Management
University of California

Berkeley, CA 94720-3114

ADDRESS CORRECTION REQUESTED

AUTO***3-DIGIT 937 S18 P1
William F. Laudenslayer, Jr.
USFS Forestry Sciences Lab

Fresno CA 93710-4639

Non-Profit Org.
U.S. Postage
PAID
Berkeley, CA
Permit No. 824

Snags *(continued from page 1)*

trees provide forest openings that encourage regeneration of shrubs, trees and grasses. This leads to improved habitat for species such as deer and small mammals.

Ecology of Snags

The number of snags in a forest varies. The creation of new snags depends on agents of mortality including insects, disease and fire. Tree death in the forest is patchy, episodic and grouped reflecting the ways in which natural disturbances work.

The rate at which a dead tree deteriorates determines many of its ecological properties. Larger diameter trees persist longer than smaller ones. Decay rates also vary by species. For example, ponderosa pines generally persist longer than white fir of the same diameter. Large diameter snags appear to be more valuable because they stand longer and provide habitat for birds which require large trees to nest. It is the large trees and, consequently, large snags that are becoming more scarce in our forests.

Hard or Soft

Snags may be classified as "hard" or "soft." Hard snags are essentially sound wood while soft snags are in an advanced state of decay. Hardness depends on tree species, the nature of the decay agents and snag age. Some birds and insects may only excavate in soft snags. Others, including woodpeckers, require hard snags because of the stability they provide for nest cavities. As a snag progresses from hard to soft, pieces begin to fall to the ground. Eventually, the snag is reduced to a decomposed stump and collection of downed, decayed material—in essence, forest floor woody debris.

Each stage of deterioration has importance to certain wildlife. Early in the process when bark loosens, snags become important roosting sites for bats. Advanced stages of decay are most important for insectivorous birds and small mammals.

The successional stage of the community around the snag also influences the way in which they are used. For

example, some birds will require snags in open shrub or grass communities. Others avoid snags in the open and will only use those in the closed forest.

Snag Management Guidelines

Ecological stewardship should include preservation and recruitment of snags for the benefit of wildlife and long-term soil productivity. Landowners must weigh many factors when managing for snags, including fire hazard, hazards posed to developed areas and trade-offs of productive forestland for benefits other than timber production.

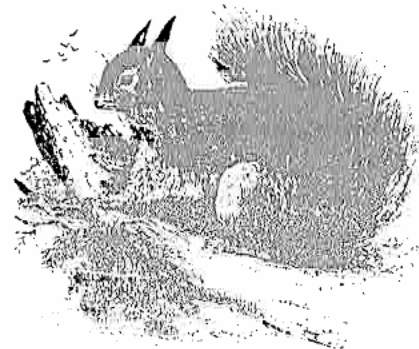
There is little reason to remove soft snags from a forest provided they are not posing safety or fire hazards. Soft snags have virtually no commercial value. Hard snags will gradually turn into soft snags so if adequate hard snags are provided, and most soft snags retained, requirements for all snag-dependent species should be met.

In general, it is most beneficial to provide a wide range of snag species and size classes. Both coniferous and hardwood snags are useful to wildlife. For example, large black oak snags are extensively used by cavity-nesting birds and small mammals. Of the conifers, ponderosa pine may be preferable to white fir. Deciduous trees such as aspen, cottonwood and willow are heavily used where available.

Snags should be well-distributed because of the territorial requirements of cavity-nesting birds. Clumping of snags in small patches has been shown to benefit some species, especially pileated woodpeckers. When selecting specific trees, suitable nest trees are indicated by signs of heart rot at the heights and diameters required by the target animal. Signs of heart rot include:

- conks of heart rot fungi,
- broken branch stubs with signs of rot,
- wounds or scars resulting from fire, lightning or mechanical damage,
- discolored or soft, decayed wood revealed in samples,
- existing woodpecker holes or cavities,
- dead areas on living trees.

It is wise to consider the position of a snag in the landscape and in relation to other trees. Snags in the lower parts



of slopes surrounded by other trees are at less risk from windthrow than isolated snags on ridgetops.

It is not advisable to give general prescriptions for the number and size of snags without considering the characteristics of the stand, including stocking levels and tree species composition and requirements of target wildlife species.

Snag guidelines for particular wildlife are available (contact Extension Forestry). For example, in a ponderosa pine forest, a minimum of 14 snags/100 acres with an minimum size equal to or greater than 20 inches dbh probably provides sufficient nesting habitat for pileated woodpecker assuming large diameter live trees are present and food supplies are adequate.

Large snags can often be substituted for smaller ones to meet habitat requirements but the reverse is not true. Caution against overly general prescriptions will prevent situations in which either too many or too few snags are provided in a specific forest type on a property.

Bottom Line

Large trees are increasingly scarce in California's forests. Without management to preserve and recruit large trees that eventually become snags, important wildlife may disappear from our forests. A landowner may find it useful to work with neighbors in trying to preserve and recruit large diameter snags so that no one person shoulders too much of a burden. Even one large snag over an area of several acres can provide significant benefits.

(Bill Laudenslayer is Research Wildlife Biologist, USDA-Forest Service, Pacific Southwest Forest and Range Experiment Station, Fresno, CA)

