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DecAID Advisor: A Tool for Managing Snags, Down Wood and Wood Decay in PNW Forests

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Past tools for modeling and setting guidelines for snag and down wood management have been based on theory, professional judgment, models of wildlife species use as habitat and empirical data. However, recent studies reveal that guidelines for amounts of snags and down wood on national forests of Washington and Oregon may have been lower than the new field data on use by wildlife. Wildlife studies also show that decayed wood elements consist of more than just snags and down wood and that decayed wood provides habitat and resources for a wider array of organisms and beneficial ecological processes than previously recognized. Thus, there is a need for a new approach to describe and advise on appropriate sizes and amounts of wood decay elements for forest ecosystem management.

Enter DecAID Advisor, a web-based planning tool and advisory system that presents a synthesis of research data on wildlife use of wood decay elements and inventory data on snags and down wood in forests of Washington and Oregon. DecAID means "decayed wood advisor and decision aid" and is the result of five years of work by an interagency team of nine specialists in wildlife, forest inventory, ecology, entomology and fungi.

The intended audience for DecAID includes forest managers, forest planners, wildlife biologists and silviculturists who need to either identify target size and amounts of snags and down wood (and other wood decay elements) to meet objectives for wildlife or forest ecosystem management, or who need to determine the extent to which existing snag and down wood targets will meet these objectives. Additional users of DecAID may include forest entomologists and pathologists, or others interested in learning about insects and pathogens associated with wood decay elements. Anyone can access and freely use DecAID at http://wwwnotes.fs.fed.us:81/pnw/DecAID/DecAID.nsf. The interface is very simple and requires little computer expertise.

PHOTO COURTESY OF BRUCE G. MARCOT

Wood decay elements in forest ecosystems include more than just standing snags and down logs.

DecAID is a statistical synthesis of published scientific literature, research data and databases on wildlife, insects and pathogens, and forest inventory. The data synthesis is presented at several "tolerance" levels (akin to confidence levels) with expert interpretation to help forest managers assess and determine appropriate types, sizes and amounts of wood decay elements needed to meet wildlife and forest condition objectives.

Information presented on wildlife use of wood decay elements is from empirical research studies, and information on snag and down wood amounts under natural and current conditions is based on forest inventories, research studies and other sources. Forest inventories used in DecAID include the Current Vegetation Survey (CVS), Forest Inventory and Analysis (FIA) and Natural Resource Inventory (NRI). DecAID also includes much information on forest insects and pathogens, based on empirical studies, CVS, NRI and FIA inventory data, and expert understanding of occurrence and ecology of insects and pathogens by forest condition.

Using DecAID Advisor

DecAID provides information by 10 wildlife-habitat types that are combinations of forest vegetation types and geographic distributions (e.g., westside lowland conifer-hardwood forest in the western Washington cascades) and three structural condition classes (open canopy, small/medium trees and larger trees forest conditions). For each wildlife-habitat type, DecAID first presents a narrative summary on wildlife, forest inventory, insects and pathogens, fungi, and other aspects of wood decay elements and their management considerations. From there, the user can "drill down" to many further levels to view data summaries, detailed data tables and literature citations.

DecAID summarizes wildlife use data as "cumulative species curves," which display sizes and amounts of snags and down wood used or selected by each wildlife species or species group, according to field studies. The tolerance levels are essentially percentages of observed wildlife population levels (see Figure 1). The inventory data are also presented at the same tolerance levels and describe the distribution of forest area by dead wood abundance classes in unharvested plots (a proxy for natural range of variability) and in the entire landscape (both harvested and unharvested plots). Information on forest insects and pathogens is presented in narratives and tables that summarize basic

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life history information and occurrence in the inventory plots. Further narratives describe fungi and ecosystem processes of wood decay.

Watershed and landscape scale planning

Using DecAID for a particular forest type is straightforward, although the wildlife species lists and inventory levels describe general conditions of a forest wildlife-habitat type and structural condition class, rather than specific, stand-level predictions.

Using DecAID at a watershed or landscape scale with multiple forest types and structural condition classes is more involved. Maintaining (and defining objectives for) an adequate level and mixture of wood decay elements at these broader spatial scales, such as in watersheds, can be a challenging task for any forest land manager. To plan for dead wood over time, the manager may need to link to other models of stand growth and disturbance dynamics.

USDA Forest Service Pacific Northwest Regional Office is currently developing a procedure for using DecAID to help with assessments of snags and down wood at the watershed scale. This work in progress includes some general guidelines:

- analyze each watershed individually;
- use data from ecology plots within plant association groups, series or sub-series to estimate existing snag densities;
- stratify stands and ecology plot data by stand history and condition (e.g., old clearcuts, recent clearcuts, fires not salvaged, fires salvaged and areas of significant insect mortality);
- use the snag inventory data to develop distribution histograms for snag densities that can then be compared with those in DecAID for unharvested and all conditions to determine how well current conditions meet desired wildlife-use and overall conditions; and
- use the Forest Vegetation Simulator model with the fire and fuels extension to project future snag density and compare these predictions to the DecAID inventory histograms to determine potential effects of fire on snag amounts.

Cumulative species curves for snag/tree dbh (cm) used for nesting or denning in relation to snag size for 30%, 50%, and 80% tolerance levels in the Westside Lowland Conifer-Hardwood Forest Wildlife Habitat Type, Larger trees Structural Condition Class.

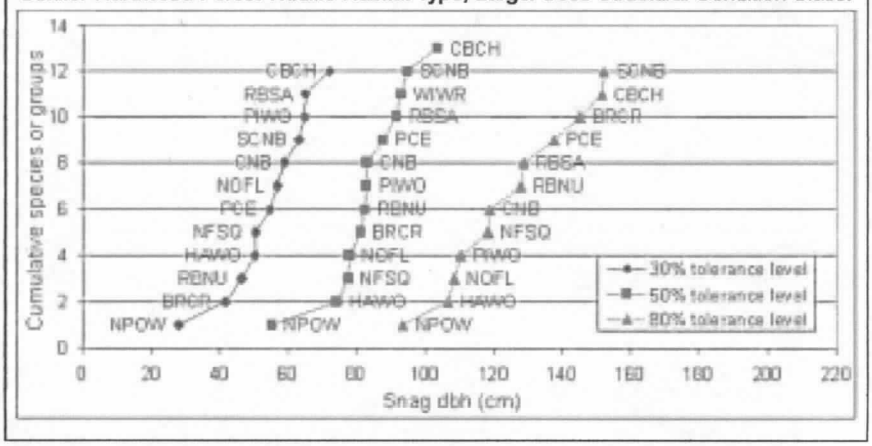

Figure 1. One example of the wildlife data summarized in DecAID Advisor. These are "cumulative species curves" that depict snag dbh used or selected by wildlife (e.g., CBCH = Chestnut-backed Chickadee) at three tolerance levels (percentages of the wildlife population). For instance, the upper left CBCH point on the 30 percent tolerance curve means that about 30 percent of the observed numbers of birds of this species, in this wildlife habitat type, would be provided by snags about 70 centimeters (28 inches) dbh. Other graphs display wildlife use and inventoried levels of snag (and down wood) densities.

Considerations beyond DecAID

DecAID does not explicitly model stand growth or landscape dynamics. Also, it is not a snag and down wood decay simulator or recruitment model, nor a wildlife population simulator or a substitute for analyzing wildlife population viability. At present, DecAID does not address wood decay elements in aquatic or riparian environments.

Decision-makers can use DecAID to learn how close they may be to meeting specific objectives, to help craft specific objectives for sizes and amounts of snags and down wood, and to learn about potential implications for other aspects of wood decay elements such as potential response by forest insects and pathogens.

For example, DecAID has provided a tool to help national forest personnel manage dead wood habitat in a manner that more closely mimics natural conditions. Previous to DecAID, snag prescriptions called for an average number of snags to be left across a planning area with some allowance for clumping. Data in DecAID indicate that snags and down wood occurred in densities that vary greatly across the landscape. Using these data, mosaics of varying densities that match the inventory data can be prescribed.

DecAID provides data that make possible analyses of fires and other snag-producing events in context of larger scales. The relationship of these "pulses" of high-density snags to overall snag densities in the larger landscape is crucial to understanding where and how much timber salvage is appropriate to meet specified objectives for maintaining or restoring wildlife habitat and natural stand conditions. Recent large fires on several national forests have been analyzed in this manner. ◆

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