Initial Riparian Down Wood Dynamics in Relation to Thinning and Buffer Width

Paul D. Anderson, Deanna H. Olson, and Adrian Ares

Presentation Abstract

Down wood plays many functional roles in aquatic and riparian ecosystems. Simplification of forest structure and low abundance of down wood in stream channels and riparian areas is a common legacy of historical management in headwater forests west of the Cascade Range in the US northwest. Contemporary management practices emphasize the implementation of vegetation buffers adjacent to streams, and on federal lands thinning has become a predominant form of timber harvest. The combined effects of thinning and riparian buffer width on the down wood dynamics in stream channels and riparian areas are being assessed in young, managed headwater forests of the Density Management Study of western Oregon.

The riparian buffer component of our study includes unthinned controls and four buffer configurations embedded within upslope thinning treatments, applied to 35- to 80-year-old stands at multiple locations in western Oregon. Buffer configurations include one- and two-site-potential-tree-height buffers and two less conservative configurations, streamside retention (minimum 20 foot [6 m] width) and variable width (minimum 50 foot [15.2 m] width), allowing for tree harvest within riparian areas. Our assessments include pre- and post-treatment analyses of down wood volumes and decay classes within stream channels, origin of instream down wood (distance from stream), and down wood cover along transects extending from streams into upslope forests.

Along transects extending from streams through buffers into upslope forest stands, pre-treatment mean percent cover of large down wood (>30 cm diameter) ranged from ~4–17 percent in buffers and from 5–10 percent in the upslope. Pre-treatment cover of small down wood (5–30 cm diameter) ranged somewhat less, ~4–13 percent, and also varied less than large wood both within and among treatment units. Post-treatment, 2–5 years following thinning, mean down wood cover in the buffers differed less among treatments and tended to be less variable within treatments. The decreased variation among buffer treatments was due primarily to a decrease in the maximum mean cover of small down wood in streamside retention buffers, and in variable-width buffers adjacent to patch openings.

In streams, thinning and buffer configuration only affected down wood (>10 cm diameter) volumes in decay classes 1 and 2 (fresh or slightly decomposed detritus). Down wood volume was greater in the streamside buffer treatment than in the control one year after thinning, and greater than in the control and variable-width buffer treatments 2 years after thinning.

We determined the source distance-from-stream of 2,323 down wood pieces in headwater stream channels ~10 years post-thinning along a total of 25 stream reaches at 4 study sites. Mean distance

Paul D. Anderson is a supervisory research forester and **Deanna H. Olson** is a research ecologist, USDA Forest Service, Pacific Northwest Research Station, Forestry Sciences Laboratory, 3200 SW Jefferson Way, Corvallis, OR 97331; pdanderson@fs.fed.us; **Adrian Ares** is the director, Sustainable Agriculture and Natural Resource Management Collaborative Research Support Program, Virginia Tech, Blacksburg, VA 24060

from stream ranged 2.6 to 9.0 m, and maximum distance was 41 m. Most of this wood was in decay classes 3+4, indicative of older legacy deposition. Only 9 percent of 9,550 instream pieces observed were in decay classes 1+2, indicative of more recent recruitment.

Recent second thinning entries conducted 10–12 years following the initial harvest provide a new opportunity to spatially assess stream and riparian large wood dynamics in relation to direct inputs associated with harvest as well as the longer-term stability of the original buffers.

Keywords: riparian buffers, thinning, down wood, headwater streams, forest structure.

Editors' suggestion:

Anderson, P.D.; Meleason, M.A. 2009. Discerning responses of down wood and understory vegetation abundance to riparian buffer width and thinning treatments: an equivalence/inequivalence approach. Canadian Journal of Forest Research. 39: 2470–2485.