EFFECTS OF SILVICULTURAL TREATMENTS ON COARSE WOODY DEBRIS IN THE CATSKILL REGION

Byung B. Park, Ruth D. Yanai, and René H. Germain

Faculty of Forestry and Natural Resources Management, State University of New York College of Environmental Science and Forestry, Syracuse, NY 13210

bbpark@syr.edu

Coarse woody debris (CWD) is an important component of forested ecosystems that requires increased attention with changing demands on forest management. CWD can be an important component of aboveground carbon and nutrient storage, but the variety of silvicultural treatments applied makes it difficult to predict.

This study was conducted to determine the effects of silvicultural treatments and harvesting practices on CWD biomass, nutrient capital and carbon content. The research plots were located in two of four model forests within the Catskill/Delaware watershed of the New York City (NYC) water supply system. The NYC watershed model forests offer an opportunity to demonstrate how the balance between a working landscape and water quality can be maintained while providing a practical means of studying and monitoring the effects of forest management on ecosystem functions and water quality. Information on CWD was collected by using the modified planar intercept method at the Lennox Memorial Model Forest with a variety of silvicultural treatments and the Mink Hollow Model Forest in the Catskills. We collected subsamples 15 cm in length by species and 4 decay classes to determine their density and nutrient concentration.

The biomass of CWD in control, crown thinning, high-grade harvesting, shelterwood cut, and patch clearcut is 10, 23, 39, 40, and 48 megagrams/ha respectively. Biomass of CWD depends on the degree of decay class of wood and the selected treatment. High-grade harvesting and light crown thinning did not produce much large CWD (> 20 cm). As expected, the proportion of low decay class in the treated sites was greater than in the control. The proportion of well-decayed CWD is highest in the control and high-grade harvesting sites. The density of CWD decreases as it falls to the ground and decays. Change in density on aboveground (D_a) and downed CWD (D_d) can be obtained from D_a = - 0.05 × (Decay class) + 0.47 (R^2 = 0.36) and D_d = -0.08 × (Decay class) + 0.46 (R^2 = 0.60).

Nitrogen concentration consistently increased as decay progressed in all species, but P, K, Ca, and Mg were less predictable. Nutrient content of CWD was the lowest (37, 2, 5, 30, and 3 kg/ha for N, P, K, Ca, and Mg respectively) in the control and the highest in the patch clearcut (109, 7, 40, 363, and 21 kg/ha for N, P, K, Ca, and Mg respectively). The carbon storage of CWD remaining on site is 5, 11, 19, 19, and 23 ton/ha for control, crown thinning, high-grade harvesting, shelterwood cut, and patch clearcut treatment respectively.

This study shows that silvicultural methods can significantly influence the amount of CWD and nutrient, especially soon after cutting. This study will provide valuable information in selecting treatments to accommodate non-timber values such as wildlife habitat, nutrient cycling, and carbon storage.