RESTORATION OF SOUTHERN APPALACHIAN RIPARIAN FORESTS AFFECTED BY EASTERN HEMLOCK MORTALITY

Katherine Elliott, Chelcy F. Miniat, Jennifer Knoepp, Michael A. Crump, C. Rhett Jackson[1]

Widespread mortality of eastern hemlock (*Tsuga canadensis*) through hemlock woolly adelgid (HWA) infestation has altered riparian forest structure and function throughout the southern Appalachians. Eastern hemlock and Rhododendron maximum often co-occur in these riparian forests, where the latter species is highly shade tolerant, forms a dense shrub layer that strongly attenuates light incident on the forest floor, has little to no herbaceous cover below its canopy, negatively affects tree seedling recruitment, and decreases nitrogen availability in the soil and litter layer to non-ericaceous species. In these forests, post-mortality successional dynamics may well be dominated by rhododendron. We hypothesize that removal of rhododendron will improve these degraded forests by restoring structure and function: allowing recruitment of trees and herbs; increasing forest floor decomposition rates; increasing soil pH, nutrient availability and nutrient cycling rates; and, subsequently, raising stream pH and acid neutralizing capacity (ANC).

Here we report on a study in which we are conducting rhododendron and forest floor removal experiments in riparian corridors once dominated by eastern hemlock at two spatial scales: intensive plot scale, and un-replicated stream reach scale. For the former, sixteen 20 x 20 m replicate plots comprise a fully factorial experiment wherein aboveground rhododendron biomass removal, and O-horizon removal has two levels (removal or not). For each treatment, we are measuring microenvironment changes, the rate of recovery in vegetation dynamics (growth and recruitment), and nutrient pools and fluxes, and on the reach scale plots we are also measuring stream water quality, and in-stream processes. Pre-treatment measurements are ongoing and reported here. We will impose the rhododendron and O-horizon removal treatments in Mar-May 2015. Active and adaptive management strategies will be required to transform degraded riparian systems into more desirable states. Land managers need science-based restoration methods to aid recovery of forest structure and function after widespread loss of an important species.

[1]Katherine Elliot, Research Ecologist, Coweeta Hydrologic Laboratory, Center for Forest Watershed Research, Southern Research Station, USDA Forest Service, Otto, NC 28763
Chelcy F. Miniat, Research Project Leader, Coweeta Hydrologic Laboratory, Center for Forest Watershed Research, Southern Research Station, USDA Forest Service, Otto, NC 28763
Jennifer D. Knoepp, Research Soil Scientist, Coweeta Hydrologic Laboratory, Center for Forest Watershed Research, Southern Research Station, USDA Forest Service, Otto, NC 28763
Michael A. Crump, Hydrologist, Biological and Physical Resources, Southern Region, USDA Forest Service, Palmer, PR 00721
C. Rhett Jackson, Professor, Warnell School of Forestry and Natural Resources, University of Georgia, Athens, GA 30602

Citation for proceedings: Stringer, Christina E.; Krauss, Ken W.; Latimer, James S., eds. 2016. Headwaters to estuaries: advances in watershed science and management—Proceedings of the Fifth Interagency Conference on Research in the Watersheds. March 2-5, 2015, North Charleston, South Carolina. e-Gen. Tech. Rep. SRS-211. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 302 p.