

RIPARIAN AREA HARVESTING IMPACTS ON VEGETATION COMPOSITION AND DIVERSITY

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In the southern Appalachians USA, the boundaries of riparian areas are often hard to define. Vegetation is often used as a riparian indicator and plays a key role in protecting water resources, but adequate knowledge of floristic responses to riparian disturbances is lacking. Our objective was to quantify floristic composition and diversity of the riparian communities before (2004) and one, two, and seven years after harvest treatments with varying buffer widths. The treatments were harvest distances of 0 m, 10 m, and 30 m away from the stream edge. Sites were harvested between 2005 and 2006. The harvest method for all treatments was a heavy selection cut followed by a highlead, cable-yarding leaving a low residual basal area (ca. 5.0 m²/ha) within the harvested zone. We examined: (1) differences among sites using a mixed linear model with repeated measures (SAS 9.4); (2) multivariate relationships among ground-layer species composition and environmental variables (soil water content, light transmittance, tree basal area, shrub density, and distance from stream) using nonmetric multidimensional scaling (NMS); and (3) species composition among sample years using a multiresponse permutation procedure (MRPP) in PC-ORD version 5. The first year after harvest, overstory density and basal area were reduced by 83 percent and 65 percent, respectively, for the 0-m buffer site; reduced by 50 percent and 74 percent for the 10-m buffer site; and reduced by 45 percent and 29 percent for the 30-m buffer site. After 7 years, however, both the 0-m and 10-m buffer sites had nearly three times greater density than before the harvest treatments, whereas density in the 30-m buffer site was similar to its pretreatment condition. Basal area remained significantly lower on all harvested sites over time compared to the reference. Ground-layer species composition differed significantly overtime for the 0-m buffer (MRPP; $T = -5.709$, $A = 0.044$, $P < 0.0001$) and 10-m buffer (MRPP; $T = -5.485$, $A = 0.041$, $P < 0.0001$), but the 30-m buffer (MRPP; $T = -1.021$, $A = 0.008$, $P = 0.1510$) and reference (MRPP; $T = 1.242$, $A = -0.009$, $P = 0.9141$) sites did not change after harvest treatments. Average Sørensen distance increased after 7 years, indicating greater within-group heterogeneity (species diversity) after harvesting. These vegetation recovery patterns provide critical information for evaluating management options in riparian zones in the southern Appalachians.

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