

COMMERCIAL TIMBER VALUE OF STREAMSIDE MANAGEMENT ZONES IN MANAGED PINE AND HARDWOOD STANDS

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Abstract—Streamside management zones (SMZs) are widely recommended for protection of water quality, but the costs associated with maintaining SMZs are not well documented. This project documented the commercial timber values of 16 watersheds in the Piedmont region and 16 watersheds in the Allegheny Plateau region before and after SMZs were established. Four blocks were established in each region, and 5 combinations of SMZ width (25, 50, and 100 feet) and harvest level (none versus 50 percent in the 50 and 100 feet SMZ widths) were installed in each block. The average value of the residual timber was greater in the Allegheny Plateau region (high value sawtimber species) than in the Piedmont (pine plantations with low grade hardwoods near streams). Overall, the partial harvests may be more sustainable in the Allegheny region due to the presence of desirable shade tolerant species, in contrast to the Piedmont where partial harvests favor lower-value species.

INTRODUCTION

Streamside management zones (SMZs) are widely recommended for the protection of water quality during and after forest harvesting (Blinn and Kilgore 2001, VDOF 2002). Research has indicated that SMZs can be important for collecting and filtering runoff from harvested sites as well as reducing thermal pollution from direct sunlight (Castelle and others 1994). It is also widely accepted that these riparian buffers have significant value as wildlife habitat. However, SMZ maintenance is a cost burden for landowners who leave them (Shaffer and others 1998). The timber volume in the SMZ remains unharvested and is often left susceptible to storm and insect damage, and SMZ acreage is generally lost to future production.

Most state BMP manuals recommend a variety of SMZ widths as well as partial harvests within SMZs (Blinn and Kilgore 2001). Few studies have examined the impact of varying SMZ widths and harvest levels on commercial timber values realized by landowners who harvest timber. Active management of SMZs could offer landowners opportunities to realize additional income from current and future harvests.

EXPERIMENTAL DESIGN AND SITE CHARACTERISTICS

This study includes a set of 32 total watersheds with 16 in the Allegheny Plateau in Randolph County, WV, and 16 in the Piedmont Plateau in Buckingham County, VA. Each area is treated as a separate incomplete block design with four blocks and four treatments. The SMZ treatments are (1) 25-foot-wide, (2) 50-foot-wide with no thin, (3) 50-foot-wide thinned, and (4) 100-foot-wide with no thin. SAS[®] software (SAS Institute, Cary, NC) was used to determine significant differences between treatment means by the Tukey procedure.

The Piedmont plateau of Virginia is typical of the Piedmont in the southeast in general. Elevations range from 200 feet above sea level to the east and 1,200 feet above sea level to the west. Local slopes occasionally exceed 30 percent. Extensive agriculture since the 1700s has led to severe soil erosion and

loss of significant site productivity. The watersheds are dominated by old field sites that were abandoned after the Civil War and reclaimed by native shortleaf pine (*Pinus echinata* Mill.) and Virginia pine (*Pinus virginiana* Mill.) as well as a mix of hardwood species such as white oak (*Quercus alba* L.), scarlet oak (*Quercus coccinea* Muenchh.), hickory (*Carya* spp.), red maple (*Acer rubrum* L.), and black gum (*Nyssa Sylvatica* Marsh.) (table 1). Non-native loblolly pine (*Pinus taeda* L.) plantations were initially planted in the 1970s (Gembroys 1974, Schultz 1997, USDA 2002, VanLear and others 2004).

The Allegheny Plateau of West Virginia has very little agricultural history, but the stands have been selectively harvested in the past century. Earlier logging methods involved animal power and narrow gauge railroads for transportation, but more recent harvesting activities have utilized bladed skid trails on steep slopes and rubber-tired skidding equipment. These bladed skid trail networks often lead to severe local erosion and stream sedimentation. Elevations range from 2,000 feet above sea level in the valleys to 3,000 feet above sea level on the ridge tops. Local slopes often exceed 60 percent. Dominant tree species are sugar maple (*Acer saccharum* Marshall), northern red oak (*Quercus rubra* L.), yellow poplar (*Liriodendron tulipifera* L.), and American beech (*Fagus grandifolia* Ehrh.) (table 1; Sharp 2003).

Table 1—The five most important commercial timber species found in SMZs by physiographic region

Rank	Region	
	Allegheny Plateau	Piedmont Plateau
1	Sugar maple	Red maple
2	Yellow poplar	Blackgum
3	American beech	White oak
4	Basswood (<i>Tilia</i> spp.)	Scarlett oak
5	Yellow birch (<i>Betula lutea</i>)	Loblolly pine

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RESULTS AND DISCUSSION

There were no significant differences between different SMZ widths for residual dollar value per acre in the Allegheny Plateau. The average residual value across all un-thinned treatments was \$1,457.00 per acre. The thinned SMZ treatments had significantly less residual value (\$160.27 per acre) due to the 50 percent canopy removal during thinning. It is clear that a landowner can minimize residual SMZ value by leaving as little acreage as needed to protect water quality and selectively thinning SMZs where possible with the intent to remove the most valuable 50 percent of the canopy. Thinned SMZs still function with regard to water quality and wildlife habitat (Kochenderfer and Edwards 1990, VDOF 2002), and the less-dense canopy cover after thinning will likely encourage natural regeneration (Governo and others 2004). This subsequent regeneration may further enhance the filtering capacity, wildlife value, and future commercial value of the SMZ.

These sites demonstrate that there are significant opportunities for landowners to manage and harvest value from SMZs while adhering to BMPs in the Allegheny Plateau of West Virginia (table 2). These riparian zones will likely continue to produce higher value sawtimber on a continuous basis which can be selectively harvested again at the next rotation. The dominance of sugar maple, a shade tolerant species with high monetary value, is and will be a very important component in these SMZs. Future management options and timber values within SMZs will be largely dependent upon the commercial market for sugar maple (Sharp 2003).

The commercial value of residual timber across all SMZs was \$891.00 per acre in the Piedmont Plateau. These SMZs are dominated by low-value species like red maple, blackgum, and yellow poplar (Easterbrook 2005). The low overall value of these species made it difficult to thin significant amounts of timber revenue from the SMZs. In most cases, loggers would not thin SMZs even when required to do so. Logger reluctance

was due to a combination of environmental, production efficiency, and low timber value concerns. The site productivity in these areas tends to be higher than surrounding uplands, but lack of active management and desirable shade tolerant species composition also make future revenue from these SMZs marginal. Shorter rotations of the loblolly pine plantations on the surrounding uplands make it unlikely that slower-growing hardwoods in the SMZs will be available for selection at the next harvest.

These sites demonstrate that there are less significant opportunities for landowners to manage and harvest value from SMZs while adhering to BMPs in the piedmont of Virginia (table 2). These riparian zones will likely continue to produce lower-value red maple and blackgum without active management. Future harvest opportunities will largely be dependent upon the commercial market for hardwood pulpwood and small diameter hardwood logs.

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Table 2—Mean production acreage and dollar value of merchantable timber lost per linear mile of SMZ for the Allegheny and Piedmont Plateau sites

Site	SMZ type	Acreage per linear mile	Value lost per linear mile
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Allegheny Plateau	25 feet	3.03	4,414.27
	50 feet	6.06	8,829.42
	50 foot thin	6.06	971.24
Piedmont Plateau	100 feet	12.12	17,658.84
	25 feet	3.03	2,699.73
	50 feet	6.06	5,399.46
	50 foot thin	6.06	5,399.46
	100 feet	12.12	10,798.92