

# Comparison of Streamside Management Zone Requirements in the Southeast

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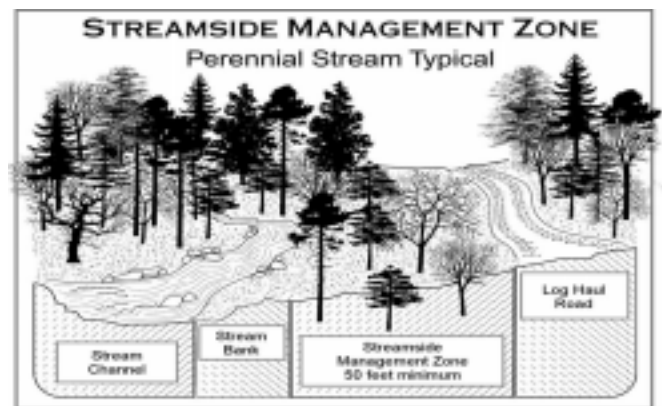
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## ABSTRACT

Streamside management zones (SMZs) are used in forestry to help improve water quality and to protect the integrity of streams. Other benefits include high quality timber, an increase in wildlife habitat and the potential for additional income to the landowner. Several studies have researched the benefits of SMZs, but very few studies have addressed the most suitable amount of harvesting and silviculture treatment types within the SMZ. Using Best Management Practice (BMPs) manuals, comparisons for both the type of requirements and the amount of harvesting allowed within these SMZs were conducted for the Southeast region of the USA. Requirements vary for each state depending on slope gradient, stream type, and special concern areas. SMZ widths range from 25-200ft. All southeastern states allow timber harvesting in SMZs and the majority of these states must meet residual density guidelines and specific harvesting treatments. Disturbance measurements vary from no requirements in a SMZ to allowing less than 20% bare ground.

## INTRODUCTION

“Streamside management zones (SMZ) are buffer strips adjacent to perennial or intermittent streams or other bodies of water (lakes, ponds, reservoirs, etc.) that should be managed with special considerations to protect water quality” (GFC 1999). A cross-sectional diagram of a SMZ is shown in Figure 1. SMZ specifications are found in forestry BMP manuals of each state. Best management practices (BMPs), which are methods, measures, or practices that are designed to maintain water quality were developed under Section 208 of the Clean Water Act. It states that each state shall develop plans that would assess nonpoint source pollution and then develop and implement BMPs to manage water quality (AFPA 1993). SMZs are primarily designed to focus on the main issue of water quality, but they also contain several benefits such as high value timber, an increase in aquatic and wildlife habitat, and they also may provide income to the owner of the property.



**Figure 1.** Diagram of a streamside management zone, Virginia BMP manual.

The Department of Forestry of each state or related state agency may design SMZ requirements and over the years there have been revisions. This study compares the SMZ width requirements and the amount of harvesting allowed within each state throughout the southeast. Specifically, how Virginia's plan relates to states with similar geographic regions, vegetative species, and non-regulatory laws for water quality.

## METHODS

There is not a universal delineation of which states are included in the Southeast region. However, the United States Forest Service defines the southern region to include TX, OK, AR, LA, MI, AL, SC, NC, VA, TN, and KY. The Environmental Protection Agency delineates the southeastern region to include FL, GA, SC, NC, AL, MI, TN, and KY. The Forest Resource Association considers its southeastern region to be VA, NC, SC, GA, and FL. Based on these organizations and other sources, the southeast region for this study was delineated to contain these states with similar physiography regions and vegetative species (Table 1). BMP manuals were located and attained for each state by means of the internet, mail, and personal communication with professors, experts and students.

## RESULTS

Each state has designed their own specifications for SMZ requirements and some states share certain similarities. Results from this study are given in Table 1. KY, SC, GA, MI, TN, AR, and FL have SMZ requirements for perennial and intermittent streams that are slope dependant. Their widths range from 25ft to 300ft. LA, VA, NC, and AL, are the remaining states that have SMZ widths for perennial and intermittent streams that are not slope dependant. AR, VA, NC, and AL have the same SMZ widths for perennial and intermittent streams, whereas the other states have separate specifications. FL and LA are the only states that have different widths depending on the width of the perennial stream. KY, SC, NC, VA, and GA have set guidelines for special concern areas such as cold water fisheries. GA, VA, and FL are the only states that have determined SMZ widths for municipal water supplies. KY, VA, and FL have also set specifications for sensitive areas such as wetlands.

**Table 1.** Comparison of SMZ requirements in the southeast region.

State	Perennial			Intermittent	CWF*	Wetlands	Municipal Water Supplies
	(All widths ft)	(0-20 ft)	(20-40 ft)				
<i>Alabama</i>	35			35			
<i>Arkansas</i>	35-80sc			35-80sc			
<i>Florida</i>		35	75-200	35-300sc		50	200
<i>Georgia</i>	40-100sc			25-50sc	100		50-150
<i>Kentucky</i>	25-55sc			N/A	60	50	
<i>Louisiana</i>		50	100	35			
<i>Mississippi</i>	30-60sc			30			
<i>North Carolina</i>	50			50	50-125sc		
<i>South Carolina</i>	40-160sc			40-160sc	40-200sc		
<i>Tennessee</i>	25-145sc			25-145sc			
<i>Virginia</i>	50			50	60-120sc	50	100-200sc

\* Cold water fisheries

sc: slope class dependant

The BMPs of all southeastern states allow timber harvesting in SMZs that must meet residual density guidelines and specific harvesting treatments. Results of these requirements are given in Table 2. KY, SC, and LA haven't set any requirements within SMZs of intermittent streams. SC, GA, MI, and AR require residual stand density of 50ft<sup>2</sup>/ac that is evenly distributed throughout the area. KY, GA, TN, VA, and AL specify that 50% of canopy cover must be left in the stand. KY and GA set separate specifications for cold water fisheries.

KY, GA, and VA mention harvesting in wetlands and set the same specifications as allowed in perennial zones. North Carolina specifies that no more than 20% bare grounds, evenly distributed; result from harvesting operations in perennial zones. Florida doesn't allow any harvesting within 35ft of the stream however, they are allowed to clearcut 25% of the SMZ, excluding the first 35ft. They also require a residual stand density of 70ft<sup>2</sup>/ac in perennial zones.

**Table 2.** Comparison of the harvesting SMZ requirements in the southeast region.

<b>State</b>	<b>Perennial</b>	<b>Intermittent</b>	<b>CWF</b>	<b>Wetlands</b>
<i>Alabama</i>	50% canopy cover	partial or regeneration cut		
<i>Arkansas</i>	50ft <sup>2</sup> /ac	50% canopy cover		
<i>Florida</i>	30ft <sup>2</sup> /ac			
<i>Georgia</i>	50ft <sup>2</sup> /ac or 50% canopy cover	25ft <sup>2</sup> /ac or 25% canopy cover	25ft <sup>2</sup> /ac	
<i>Kentucky</i>	50% overstory	N/A	25% canopy cover	50% canopy cover
<i>Louisiana</i>	N/A	N/A		
<i>Mississippi</i>	50ft <sup>2</sup> /ac selective harvest	regeneration harvest		
<i>North Carolina</i>	<20% bare ground	40% canopy cover		
<i>South Carolina</i>	50ft <sup>2</sup> /ac	N/A		
<i>Tennessee</i>	50% canopy cover	50% canopy cover		
<i>Virginia</i>	50%BA or 50% canopy cover	50% canopy cover		50% canopy cover

## **DISCUSSION**

Each state from the southeastern region has developed their own BMP manual with a section denoted to SMZs. In general the manuals discuss their requirements, definitions related to SMZs, and their purpose. It is important to educate the reader of the manual that SMZs have economic value, benefits to wildlife, and improves water quality and aquatic habitat.

After reviewing all BMP manuals, Florida seems to have the most complex and detailed SMZ requirements. When determining widths for the specified water body, there are five parameters that must be measured. These include the stream type, the width of the stream, the level of soil erodability, the K-factor that's dependant on soil type, and slope gradient. This may be a

disadvantage because it will require more time and knowledge to determine the effective width. The plan is also difficult to follow and requires the operator to refer to several appendices and tables to attain the desired result. On the other extreme, Alabama only sets a universal width requirement for perennial and intermittent streams. The majority of the other states have plans that seem feasible and practical to apply in the field. Virginia's SMZ requirements are both feasible and practical, but there are still some factors that need to be addressed. In the BMP manual it states that "steep slopes, cold water fisheries, and municipal water supplies all need wide SMZs to protect water quality" (DOF 2002) yet the widths for warm water fisheries are not dependant on slope. It is proven that in most cases the steeper the slope the faster the runoff and therefore the more potential for soil erosion (USDA 1984). Most states have identified this relationship and developed their requirements according to slope gradients. However, there is an issue pertaining to the difficulty in attaining an accurate slope percentage due to the variation of slope over the length of a SMZ.

The majority of states have set similar harvesting guidelines, however there have been limited studies that actually quantify the impacts of harvesting on water quality (Liechty 2000). There are also very few states that specify what type of harvest (selective, partial or regeneration) is allowed in the SMZ, even though most states suggest that the residual stand will remain evenly distributed. North Carolina is the only state that measures bare ground percentages instead of basal area or canopy cover. These figures were based on information from the State Sedimentation Pollution Control Act of North Carolina and research studies from Coweetha Experimental

Forest. Virginia is one of those states that allow 50% of the basal area or 50% of the canopy cover in the perennial and intermittent zones. Other states that use this measurement include TN, KY, AL, and GA. More research is needed to determine if this limit is based on science. It is also important to note that basal area is more feasible to measure than canopy cover when pertaining to the operator. Canopy cover requires the use of instruments or the operator leaving the machine to get an accurate estimate. Further research studies should be designed to attain the scientific data needed to measure the impacts of harvesting and treatment types selected on water quality.

## CONCLUSION

Southeastern states have specified requirements for SMZ widths in their BMP manuals based on a variety of factors. Some states set recommendations that are based on stream type, and others use slope class to set guidelines. Some manuals mention water municipalities, cold water fisheries, lakes, ponds, and wetlands, while others only mention perennial and intermittent streams. Overall, the majority of states have set similar SMZ guidelines, while few states fall on extreme sides such as FL and AL. This also applies for the amount of harvesting allowed within a SMZ. Parameters used to measure the amount of harvesting include basal area, canopy cover, bare ground percentage, and treatment types. This study has shown that states are concerned about water quality and the integrity of the stream by setting SMZ widths and harvesting limits. In the future, studies should be designed to address the most suitable amount of harvesting and silviculture treatment types within the SMZ.

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