RIPARIAN FOREST BUFFER 391

Louisiana
Streamside Management Zone Technical Note

Definition
A streamside management zone (SMZ) is a riparian forest buffered area of existing trees, shrubs, grasses, and other ground cover located adjacent to streams, lakes, ponds, spring seeps, vernal ponds or wetlands. Within a forested landscape, a SMZ is a critical natural vegetative filter between aquatic and terrestrial ecosystems that protects adjacent streams or water bodies and creates critical habitat for aquatic and terrestrial organisms.

Purpose
Streamside management zones of sufficient width intercept sediment, nutrients, pesticides, and other materials in surface runoff and reduce nutrients and other pollutants in shallow subsurface water flow. Woody vegetation in the zone provides food and cover for wildlife, helps lower water temperatures by shading the stream or water body, and slows out-of-bank flood flows. The vegetation closest to the stream or water body provides litter fall and large woody debris important to fish and other aquatic organisms as a nutrient source and structural components to increase channel roughness and habitat complexity. Woody plant roots increase the resistance of stream banks and shorelines to erosion caused by high water flows or waves. Judiciously applied silvicultural interventions may be applied to manage trees and shrubs in a SMZ for sawtimber, wood fiber, or other land use objectives.

Where used
Streamside management zones (SMZ) are located along or around perennial or intermittent streams, ephemeral drains, lakes, ponds, spring seeps, vernal ponds, or delineated wetlands. The presence of existing vegetation and seasonal or year-round moisture rapidly establishes the desired ecological functions of a SMZ; silvicultural interventions can be used to maintain the efficacy of these functions.

Classification, Implementation, and Management
Identifying the characteristics of a proposed SMZ is necessary to prescribe an appropriate level of protection. Usually a landowner or manager will be familiar with a source and can provide determining information. However, in some situations the landowner or manager may be uncertain or have little knowledge of a source's characteristics, and a qualified professional should be consulted. SMZ types can be classified as follows: water course protection, water body protection, and wetland landform protection.

<u>Classification</u>

Watercourse Protection:

1. Perennial Stream – A **watercourse** that has an ordinary high-water mark; has a bed and banks; flows throughout most of the year; has an easily identifiable beginning and end; and does not lose its character as a watercourse even though it may break up temporarily disappearing to reappear downstream.

2. Intermittent Stream – A **watercourse** that may have well-defined banks and natural channels. It flows only during wetter periods of the year and is dependent on seasonal precipitation or a headwater source.

3. Ephemeral Stream or Drain – A **watercourse** that generally flows in the upper reaches of a watershed following precipitation. Although well-defined channels may be present in unique situations, ephemeral streams rarely carry enough runoff to displace soil, but they may displace the litter on top of the soil. The forest floor in ephemeral areas should be protected so that sediment can be filtered out before runoff flows into intermittent and perennial streams.

Water Body Protection:

1. Lakes – A still **water body** that is navigable; has an ordinary high-water mark; and has a bed that indicates "reasonably permanent" surface water.

2. Pond - An inland **water body**, either natural or man-made, that is smaller than a lake. Ponds and lakes are distinguished from streams by current speed. Stream currents are easily observed, but ponds possess thermally driven micro-currents and moderate wind driven currents. These features distinguish a pond from many other aquatic terrain features, such as groundwater seeps and vernal pools.

Wetland Landform Protection:

1. Groundwater Seeps – A **wetland landform** found along the bases of hillsides adjacent to stream terraces. The contact zone between different geological layers causes groundwater to well up and slowly flow onto the land. The constant saturation of cool water causes peat or

muck deposits to accumulate within these groundwater seeps. This cool and wet microclimate provides an excellent habitat for many rare or endangered plant and animal species.

2. Vernal Pond – A seasonal depression-type **wetland landform** covered by shallow water for variable periods from winter to spring and, normally, completely dries for most of the summer and fall. These wetlands range in size from small puddles to shallow lakes and are usually found in a gently sloping stream terraces. Although generally isolated, they are sometimes connected to each other by small drainages known as vernal swales. Beneath vernal pools lies either bedrock or a hard clay layer in the soil that helps keep water in the pool. A vernal pond is usually devoid of fish, which allows the safe development of young amphibian and insect species. This unique environment provides habitat for numerous rare plants and animals that are able to survive and thrive under these harsh conditions. Many of these plants and animals spend the dry season as seeds, eggs, or cysts, and then grow and reproduce when the ponds are again filled with water. In addition, birds such as egrets, ducks, and hawks use vernal pools as a seasonal source of food and water.

3. Wetland – A delineated **wetland landform** where soil development is dominated by water saturation which influences the indigenous plant and animal communities. Wetlands vary widely because of regional and local differences in soils, topography, climate, hydrology, water chemistry, vegetation, and other factors, including human disturbance. For regulatory purposes under the Clean Water Act, the term wetlands means "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas." When a SMZ area contains hydric soils, a "wetland delineation" should be considered, which provides vegetative, hydrological and soils data used to identify the wetland boundary.

Implementation

A SMZ can be divided into primary and the secondary components. The primary component encompasses the identified SMZ providing direct protection with a minimum width that varies by SMZ type (Table 1) and is influenced by adjacent slope (Table 2). The secondary component expands portions of or encompasses, the primary component boundary with varying widths. This additional width is influenced by specific management objectives, or adjacent slope (Table 1).

The need for a SMZ is identified during the conservation planning process. If a need exists, determine SMZ type, watercourse, water body, or wetland landform and designate the location on the plan map. Use the Arc-Map line feature for watercourses and the polygon feature for water bodies or wetland landforms. Determine the purposed SMZ primary width, based on identified resources concerns, and use the Arc-Map buffer tool to create a primary buffer feature. If a secondary SMZ is planned, then select the primary buffer feature and create the appropriate secondary buffer feature. Once the features are complete, the buffer area, buffer length, perimeter boundary length, and GPS coordinates can be determined.

Table 1. SMZ Type by primary and secondary minimum buffer widths[1]

SMZ Type	Primary	Secondary		
	Feet Perpendicular to Water Source			
Perennial Stream		Stream	Herps	Birds/Mammals
Class A – Stream less than 20 feet wide	50	35	100	100
Class B – Stream greater than 20 feet wide	100	50	100	150
Intermittent Stream	35	35	100	100
Ephemeral Drain	15	0	100	100
Lake	50	35	100	200
Pond	35	35	100	200
Spring Seep	35	35	100	150
Vernal Pond	35	35	100	150
Wetland	50	50	100	150

[1] Total minimum buffer width = Primary width + one of the Secondary widths.

Table 2. SMZ buffer width slope adjustments[1]

Percent Slope Perpendicular Sources	SMZ Width for each stream side
	Feet Perpendicular to Source
Less than 5%	0
5% - 20%	40
21% - 40%	80
Greater than 40%	120

[1] Add Percent Slope adjustment to Total minimum buffer width

In order to optimize SMZ ecological benefits, merchantable and sub-merchantable trees must be retained between the outer edge of the SMZ primary zone and the ordinary high water mark on each side of a watercourse, or within 50 feet of water bodies and wetland landforms. Each SMZ side of a watercourse and all edges of water bodies and wetland landforms should retain tree stocking at a basal area (BA) of 40 ft^2/ acre or 100 trees per acre. Preferably, residual SMZ tree dbh (diameter at breast height) should be 8 inches or greater. If smaller trees are present then leave 100 trees per acre. Residual stand species composition should be comparable to original stand and any snag greater than 8 inches dbh may be left and counted toward the retention requirement. Shrub and sub-merchantable tree stocking density should not exceed 200 stems per acre.

SMZ Implementation Considerations:

1. Minimize disturbances that would expose the mineral soil of the SMZ forest floor. Do not operate skidders or other heavy machinery in the SMZ primary zone.

2. Locate all landings, portable sawmills and roads outside the SMZ primary zone.

3. Restrict mechanical site preparation in the SMZ primary zone, and encourage natural re-vegetation, seeding, and hand-planting.

4. Limit pesticide and fertilizer usage in the SMZ primary zone. Buffers for pesticide application should be established for all flowing streams.

5. Fell trees directionally away from water course or water body to prevent logging slash and organic debris entering the water.

6. Preplan harvesting restrictions to maintain integrity within the SMZ primary zone.

Management

Trees and shrubs in a SMZ eventually become crowded, slowing their growth and impacting understory species growth, survival, and composition. As the SMZ matures, periodic silvicultural interventions are required to remove some merchantable overstory trees and unwanted shrubs to maintain plant health and SMZ functions. Dead or dying trees, within the SMZ, can serve as nesting cavities for terrestrial organisms, as well as a source of large wood for aquatic systems.

Potential impacts of silvicultural interventions within a SMZ include:

1. Sediment production as a result of road construction and use and equipment operation;

2. Drainage alteration as a result of improper road construction;

3. Stream obstruction caused by failure to remove logging debris;

4. Soil compaction caused by operation of logging vehicles during flooding or wet weather periods (skid trails, haul roads, and log landings are areas where compaction is most severe); and

5. Contamination from improper application of pesticides.

Forestry Intervention Management Considerations:

A. Road Design and Construction Practices

1. Locate and construct forest roads according to pre-harvest planning.

   Improperly constructed and located forest roads may cause changes in hydrology, accelerate erosion, reduce or degrade fisheries habitat, and destroy or damage existing stands of timber.

2. Utilize temporary roads in forested wetlands.

   Permanent roads should be constructed only to serve large and frequently used areas, such as approaches to watercourse crossings, or as access for fire protection. Use the minimum design standard necessary for reasonable safety and the anticipated traffic volume.

3. Construct fill roads only when absolutely necessary for access, because fill roads have the potential to restrict natural flow patterns.

   If construction of fill roads is necessary, use a permeable fill material (such as gravel or crushed rock) for at least the first layer of fill. This will maintain the natural flow regimes of subsurface water. Permeable fill material is not a substitute for using

bridges where needed, or for installation of adequately spaced culverts.

4. Provide adequate cross drainage to maintain the natural surface and subsurface flow within the SMZ.

   This can be accomplished through adequate sizing and spacing of water crossing structures, proper choice of the type of crossing structure, and installation of drainage structures at a depth adequate to pass subsurface flow. Bridges, culverts, and other structures should not perceptibly diminish or increase the duration, direction, or magnitude of minimum, peak, or mean flow of water on either side of the structure.

5. Construct roads at natural ground level to minimize the potential of restricting flowing water.

Float the access road fill on the natural root mat. If the consequences of the natural root mat failing are serious, use reinforcement materials such as geotextile fabric, geo-grid mats, or log corduroy. Protect the root mat beneath the roadway from equipment damage. This can be facilitated by diverting traffic to the edge of the right-of-way, shear-blading stumps instead of grubbing, and using special wide-pad equipment. Also, protect the root mat from damage or puncture by using fill material that does not contain large rocks or boulders.

B. Harvesting Practices

1. Conduct forest harvesting according to pre-harvest planning designs and locations.

   Planning and close supervision of harvesting operations are needed to protect site integrity and enhance regeneration. Harvesting without regard to season, soil type, or type of equipment can damage the site productivity; retard regeneration; cause excessive rutting, churning, and ponding of saturated soils; and increase erosion and siltation of streams.

2. All thinning harvest interventions should maintain residual stand basal area at 40 ft^2 per acre.

3. Ensure that planned harvest activities or herbicide treatments do not contribute to problems of cumulative effects within the SMZ.

4. Select the harvesting method to minimize soil disturbance and hydrologic impacts to the SMZ.

5. When ground skidding, use low-ground-pressure tires or tracked machines and concentrate skidding to a few primary skid trails to minimize site disturbance, soil compaction, and rutting.

6. When soils become saturated, suspend ground skidding harvesting operations; and consider cable or aerial logging. Use of ground skidding equipment during excessively wet periods may result in unnecessary site disturbance and equipment damage.

C. Site Preparation and Regeneration Practices

1. Select a regeneration method that meets the site characteristics and management objectives.

   Choice of regeneration harvest method has a major influence on the stand composition and structure and on the silvicultural practices that will be applied over the life of the SMZ. Natural regeneration may be achieved by implementing shelterwood, seed tree, or clearcut regeneration harvest and relying on seed, advanced regeneration, or sprouting from cut tree stumps and roots. Successful regeneration depends on recognizing the site type and its characteristics; evaluating the stocking and species composition in relation to stand age and site capability; planning regeneration options; and using sound harvesting methods. Schedule regeneration harvests during the dormant season to take advantage of seed sources and favor stump and root sprouting. Harvest trees at a stump height of 12 inches or less, when practical, to encourage vigorous stump sprouting. To improve species composition, artificial regeneration may follow a clearcut regeneration harvest by planting seedlings or direct seeding.

2. Conduct mechanized site preparation and planting on the contour of sloping areas.

3. To reduce disturbance, conduct mechanical site preparation operations in high-water-table areas during dry periods of the year.

   The degree of acceptable site preparation depends on the amount and frequency of flooding, the soil type, and the species suitability.

4. Minimize soil degradation by limiting operations on saturated soils.

D. Chemical Management Practices

1. Apply herbicides by injection or application in pellet form to individual stems.

2. For aerial herbicide and fertilizer applications, maintain and mark a buffer strip of at least 50 feet around all surface water source to avoid drift or accidental direct application. Avoid application of pesticides with high toxicity to aquatic life.

3. Apply slow-release fertilizers when fertilization is required.

   This practice will reduce the potential of the nutrients leaching to ground water, and it will increase the availability of nutrients for plant uptake.

4. Apply fertilizers during maximum plant uptake periods to minimize leaching.

5. Base fertilizer type and application rate on soil and/or foliar analysis.

   To determine fertilizer formulations, it is best to compare available nitrogen, phosphorus, potassium, and sulfur in the soils to be treated with the requirements of the species being managed.

References

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