

DEVELOPING RIPARIAN GUIDELINES ON FOREST SERVICE LAND IN THE SOUTHERN APPALACHIANS

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REFERENCE: *Proceedings of the 2005 Georgia Water Resources Conference*, held April 25-27, at The University of Georgia. Kathryn J. Hatcher, editor, Institute of Ecology, The University of Georgia, Athens, Georgia

Abstract. During the past few years six forests in the Southern Region have gone through the process of forest plan revision. As part of this revision process, forests were expected to define and provide management guidelines for riparian areas. However, riparian management became a contentious issue and one of the most difficult challenges in the planning process. Controversy arose around slope dependent fixed riparian buffer width design and management within these areas. A riparian prescription was developed to protect and/or restore all functions and values in the Riparian Area with flexibility to adjust buffer widths on the basis of site specific reviews. This paper will hopefully shed some light on the difficult issues surrounding riparian management in the Southern Region and offer some explanation and rationale for the approach used in the planning process.

INTRODUCTION

Riparian areas are particularly valuable for a myriad of resources in addition to the hydrologic and aquatic resource functions they provide. Specifically, riparian areas provide valuable habitat for a number of wildlife species and unique plants. Riparian areas are rich in biologic diversity as many species interact in the transition zones between streams and upland areas. Riparian areas provide food material for aquatic organisms, provide large woody debris for stream stability and shade for water temperature (USACOE, 1991). Because of the relationship between streams and adjacent terrestrial ecosystems, land management activities have the potential to affect the functions and values of riparian areas, and associated streams (Reid, 1998). Consequently, identification of riparian areas with specific management guidelines must be developed during forest planning to insure long-term ecosystem integrity.

BACKGROUND

A Forest Service regional team was assigned the task of developing a riparian prescription for all forests going

through plan revision. The forests in revision included the: Jefferson National Forest (Va), Daniel Boone National Forest (Ky), Chattahoochee-Oconee NF (Ga), National Forests in Alabama, Cherokee National Forest (Tn), and the Francis Marion-Sumter NF (Sc). Guidelines for the riparian prescription were given by the Regional Forester for consistency between these forests. With the six Forests undergoing simultaneous revisions, and some forests having common watershed boundaries, we reasoned there should be consistency in managing riparian areas. Consequently, it was essential that riparian areas share a common definition, a common desired future condition and common protective requirements for the various "multiple functions and values". We recognized that physical characteristics would vary from the mountainous terrain to the coastal plains but assumed there would be sufficient commonality to develop a prescription that would cover most of the functions and values.

Riparian buffer widths may be fixed or variable based on physical characteristics of the adjacent landform. Variable delineation requires expertise or an ability to specifically identify riparian characteristics whereas fixed width buffers can be easily implemented by field crews. Fixed width buffers also insure a set level of protection or management. It was decided to use the fixed width buffer approach with variable application where site specific review by an interdisciplinary team was feasible.

Table 1 Riparian Corridor buffer width by slope class for perennial and intermittent streams

Slope Class	Distance
0-10%	100 feet
11-45%	125 feet
45% +	150 feet

Table 2 Riparian Corridor buffer width by slope class for intermittent streams

Slope Class	Distance
0-15%	50 feet
16% and greater	30 feet + 1.5 (x) % slope

THE DEFINITION PROCESS

The first issue the riparian team addressed was clarification of the definition of a riparian area. A review of forest service manual direction and the Code of Federal Regulations served as a starting point (FSM 2530 and CFR 219.27 (e)). The Forest Service defines a riparian area as an area comprised of the riparian and aquatic ecosystems. The aquatic ecosystem is the stream channel, water and stream bed. A riparian ecosystem is the land adjacent to the stream and is contingent on free and unbound water with distinctive vegetation and soils. This definition does not include the area of influence adjacent to a riparian area. As well, the CFR recommendation is general in nature and does not speak to the many values in riparian areas. CFR 219.27 requires that special attention be given to land and area for approximately 100 feet from the edges of all perennial streams, lake and water bodies.

This gives rise to a complex dilemma. How well does the Forest Service manual set the stage or define a riparian area managed for multiple resources and does the 100 feet special attention area referenced in CFR 219.27 provide adequate protection for all riparian functions and values? If a riparian area is dependent on adjacent vegetation for stream protection and associated habitat, how does one define and delineate this area which is not by definition all "riparian"? This is an important concept because some have argued there is no need to protect a riparian area beyond that which is defined by soils, vegetation and hydrology. Furthermore, if the riparian area is expanded to include the adjacent area of influence, how extensive should that area be and what criteria should be used to delimit a boundary? To answer this question an extensive literature review of riparian area management was conducted.

A review of riparian definitions from various sources, including other federal agencies, revealed there were many definitions of riparian areas. Some were three dimensional which included the adjacent uplands or area of influence while others were similar to the Forest Service definition. (Ilhardt 2000, Todd 2000, Palone 1997, Wingert, 2000). The team concluded that the more recent findings and literature supported the concept that riparian management must consider the area beyond that immediately adjacent to a stream if the multiple riparian functions and values are to be protected and maintained.

Another problem surfaced in the debate over defining a common riparian area across the Southern Appalachians, which stretches across three physiographic provinces- the coastal plain, piedmont and mountains. If a riparian area is defined on the basis of water-dependent vegetation, soils, and hydrologic function, a riparian area

in the coastal plains would generally be very wide (based on high ground water in these flat-bottomed streams) whereas a riparian area in the mountains would typically be more limited with generally narrow floodplains. Therefore, if the strict riparian definition is applied across the Southern Appalachians, riparian area width would range significantly in width from the low lying coastal plains to the mountains.

Using a strict riparian definition presents a problem if the objective is to develop common or consistent riparian buffers that capture most of the riparian functions and values. However, if a reasonable approach is used where the riparian area and adjacent area of influence is protected with management standards, it is possible to establish adequate buffer widths across forests that vary in climate, terrain and hydrologic function.

The riparian team designated a riparian management area that included the riparian and adjacent area but used the term "riparian corridor". This solved the issue of conflicting with the Forest Service definition. Furthermore, by defining the riparian corridor as a management area for all functions and values, buffer widths could be established based on needs beyond the immediate area influenced by water, vegetation and soils. This in essence made it possible to develop a desired future condition and a management prescription that included buffer widths for the protection of the "corridor" as well as the classically defined riparian area and stream system.

Management standards were developed for the riparian corridor to address silvicultural activities, forest health, recreation, and other multiple uses. It was clearly stipulated that silvicultural activities were done to improve or restore riparian functions and values and not conducted as part of a planned timber sale program.

ESTABLISHING BUFFER WIDTHS

Once a definition for riparian areas and riparian corridors was agreed upon, slope dependent fixed buffers had to be established for perennial, intermittent and ephemeral streams. By definition perennial streams generally flow all year, intermittent streams flow seasonally and ephemeral streams flow in response to storms. Each stream has defined characteristics such as annual scour and supports or does not support aquatic life. Ephemeral streams do not typically have a water influence zone with unique vegetation and soils found adjacent to perennial and intermittent streams. Therefore, ephemeral streams are protected with standards beyond the riparian prescription.

After a review of the literature which included Forest Service research publications, universities, other agency research papers, and documents related to riparian management, slope dependent fixed buffer widths were established that would be used in forest plans for the

Southern Appalachians (Wenger 1999, Degraff 2000, Palone 1997, Swift 2000). In summary, buffer widths selected varied by slope class for perennial and intermittent streams and could be adjusted based on on-site reviews. The buffer widths increased from a minimum of 50 feet to a maximum of 150 feet by slope class as shown in tables 1 and 2.

A review of Southern Appalachian State Best Management Practice guidelines for streamside management zones indicated that the selected buffer widths were generally equal to or greater than the published guidelines. A review of the literature indicated that these buffer widths would address many of the functions and values of riparian areas even though the literature showed a range from 15 feet to 2000 feet, depending on the resource (Wenger 1999, Degraff 2000, Desbonnet 1994, Fishcher 2000, Palone 1997). For example extremely wide buffer widths were often recommended for migratory birds. However, it would not be practical or appropriate to prescribe riparian buffers hundreds of meters wide across the Southern Appalachians for all possible migratory birds. Rather, on-the-ground reviews or local knowledge would determine where an adjustment to the buffer widths would be made during project planning.

THE RIPARIAN PRESCRIPTION ISSUES

A number of issues were raised by the public and other agencies about the riparian prescription developed for the Southern Appalachian forest plans. Diametrically opposing viewpoints were presented, depending on resource concerns and perceptions about riparian management. Some expressed concerns that riparian buffer widths and standards were inadequate and that riparian areas should not be actively managed but rather left in a "natural" state. Others commented that the riparian standards and buffer widths did not provide sufficient protection for all resource values. During the development of the riparian prescription, buffer widths were considered as default widths to be used when it was not feasible to do a thorough field review. If local resource concerns were raised or a field investigation confirmed a more accurate riparian area, the widths could be changed. The Forest Service also explained that riparian areas can be restored or maintained through active management where treatment is needed for insect infestation, vegetation improvement or wildlife needs.

Opposing concerns expressed that the riparian standards and protection measures were unwarranted and not based on research findings in the Southern Appalachians. Forest Service research papers in the Southern Region were reviewed and research station scientists participated in a review of the draft riparian prescription. However, much of the Forest Service

research that was reviewed pertained to effectiveness of streamside management zones and effects of road construction on streams rather than management effects on the many functions and values of riparian areas previously cited in this paper (Swift 1986). Current research in the southern region is planned to study the effectiveness of riparian buffers in protecting and maintaining multiple riparian resource values. It was acknowledged in the planning process that the slope adjusted buffer widths may be wider than some had recommended in the literature and narrower in other instances. However, the buffers would address most of the functions and values.

CONCLUSIONS

The riparian prescription, buffer widths, and standards for the Southern Appalachian forest were developed after an extensive review of the literature (some of which are cited in this paper) with a particular focus on all functions and values of the riparian area. The buffer widths were designed to capture most of the resource concerns while acknowledging that riparian functions and values may require less or greater protection. Between draft and final release of the forest plans, forests were given the flexibility to deviate from the prescribed buffer widths where justified. Only slight variations developed between the forests in their revised plans. A review of the literature indicated that the chosen buffer widths represented a conservative and balanced approach to riparian protection. Standards developed for the riparian corridors were designed to allow use and management of the riparian areas while providing protection to maintain the habitat and functioning of riparian areas. On-going research is focused on better quantifying the wildlife needs of riparian areas.

Exact quantification of riparian resource needs and protection is difficult and the literature clearly shows that there is a wide array of opinion. This presents an opportunity and demonstrates a need for research and further study. In the interim, the forest service has chosen to use a conservative and balanced approach to management until such time as riparian resource values are better defined.

LITERATURE CITED

- Alabama Forestry Commission. 1998. Alabama's Best Management Practices for Forestry. 30 pp.
- Belt, G. H., J. O'Laughlin, and T. Merrill. 1992. *Design of Forest Riparian Buffer Strips for the Protection of Water Quality: Analysis of Scientific Literature*. Idaho Forest, Wildlife and Range Policy Analysis Group Report No. 8. University of Idaho, Moscow, ID. 35 pp.
- Comerford, N. B., D. G. Neary, and R. S. Mansell. 1992. *The Effectiveness of Buffer Strips for Ameliorating*

- Offsite Transport of Sediment, Nutrients, and Pesticides from Silvicultural Operations.* NCASI
- DeGraaf, R. M., and M. Yamasaki. 2000. Bird and Mammal Habitat in Riparian Areas. In: *Riparian Management in Forests of the Continental Eastern United States.* Washington, D.C.: Lewis Publishers. Pp. 139-156.
- Desbonnet, A., P. Pogue, V. Lee, and N. Wolff. 1994. *Vegetated Buffers in the Coastal Zone -- A Summary Review and Bibliography.* Coastal Resources Center Technical Report No. 2064. University of Rhode Island Graduate School of Oceanography. Narrangansett, RI. 72 pp.
- Fischer, R. A., C. O. Martin, and J. C. Fischenich. 2000. Improving Riparian Buffer Strips and Corridors for Water Quality and Wildlife. In: *AWRA Proceedings. International Conference on Riparian Ecology and Management in Multi-Land Use Watersheds.* American Water Resources Association, Middleburg, VA. TPS-00-2:457-462.
- Georgia Forestry Commission. 1999. *Georgia's Best Management Practices for Forestry.* 66 pp.
- Hagar, J. C. 1999. Influence of riparian buffer width on bird assemblages in western Oregon. *Journal of Wildlife Management* 63:484-496.
- Harmel, R. D., A. Fallon, and M. D. Smolen. 1999. *Riparian Buffer Systems for Oklahoma.* Oklahoma Cooperative Extension Service. OSU Extension Facts F-1517
- Ilhardt, B.L., E. S. Verry, and B. J. Palik. 2000. In: *Riparian Management in Forests of the Continental Eastern United States.* Washington, D.C.: Lewis Publishers. Pp. 139-156.
- Kappesser, G., and D. Kirk. 2000. Desired Future Condition and Standards for Riparian Ecosystems for the Jefferson NF for Land and Resource Management Plans. Draft Edition. U.S. Department of Agriculture, Forest Service, Southern Region. 11 pp.
- Kiffney, P. M., and J. S. Richardson. 2001. Reductions in Organic Matter Related to Riparian Buffer Width. *Bulletin of the North American Benthological Society* 18(1):209.
- Klapproth, J. C., and J. E. Johnson. 2000. *Understanding the Science Behind Riparian Forest Buffers: Effects on Water Quality.* Virginia Cooperative Extension. Publication Number 420-151.
- Palone, R. S. and A. H. Todd (editors). 1997. *Chesapeake Bay Riparian Handbook: A Guide for Establishing and Maintaining Riparian Forest Buffers.* USDA Forest Service. Northeastern Area State and Private Forestry. Publication Number NA-TP-02-97. Radnor, PA.
- Pauley, T. K., J. C. Mitchell, R. R. Buech, and J. J. Moriarty. 2000. Ecology and Management of Riparian Habitats for Amphibians and Reptiles. In: *Riparian Management in Forests of the Continental Eastern United States.* Washington, D.C.: Lewis Publishers. Pp. 169-192.
- Reid, L.M and Hilton, S. 1998. Buffering the Buffer. USDA Forest Service Gen. Tech Report. PSW-GTR-168.
- Swift, L.W. Jr. 1986. Filter Strip Width for forest roads in the Southern Appalachians. *Southern Journal of Applied Forestry* 10:27-34.
- Todd, A. H. 2000. Making Decisions about Riparian Buffer Width. In: *AWRA Proceedings. International Conference on Riparian Ecology and Management in Multi-Land Use Watersheds.* American Water Resources Association, Middleburg, VA. TPS-00-2:445-450.
- US Army Corp of Engineers. 1991. Buffer Strips for Riparian Zone Management (prepared for State of Vermont).
- Wenger, S. 1999. *A Review of the Scientific Literature on Riparian Buffer Width, Extent and Vegetation.* Institute of Ecology, University of Georgia. Athens, GA.