

Invisibility of Stream/Wetland Buffers: Can Their Integrity be Maintained?

Stream and wetland buffers are an increasingly popular watershed protection technique due to their apparent simplicity, low cost, ease of implementation, and presumed capability to protect resource areas (Figure 1). As a result, local governments across the country have incorporated stream and wetland buffer requirements into their development review process. Two recent studies, however, suggest that buffers might have limited usefulness as a watershed protection tool as they are currently enforced.

The key problem is that buffer boundaries are often invisible to property owners, contractors, and even the local governments themselves. Without defined boundaries, urban buffers face enormous pressure from encroachment, disturbance, and other incompatible uses.

The first study involved a survey of how buffer programs were administered in 36 jurisdictions around

the country (Heraty, 1993). In nearly every locale, developers were required to delineate a stream or wetland buffer on concept or final plans for purposes of development review. However, only half the jurisdictions required that buffer boundaries be clearly delimited on the plans for clearing/grading and sediment control.

This omission is significant as boundaries are needed on the plans to stake out the limits of disturbance around the buffer during construction. The absence of buffer limits on construction-stage plans increases the risk that contractors will encroach or disturb the buffer.

Local governments also contribute to the invisibility of buffers by not recording their boundaries on their own official maps. For example, Heraty found that only one-third of all survey respondents recorded buffer limits on their official property maps. Without buffer maps, local governments cannot systematically inspect

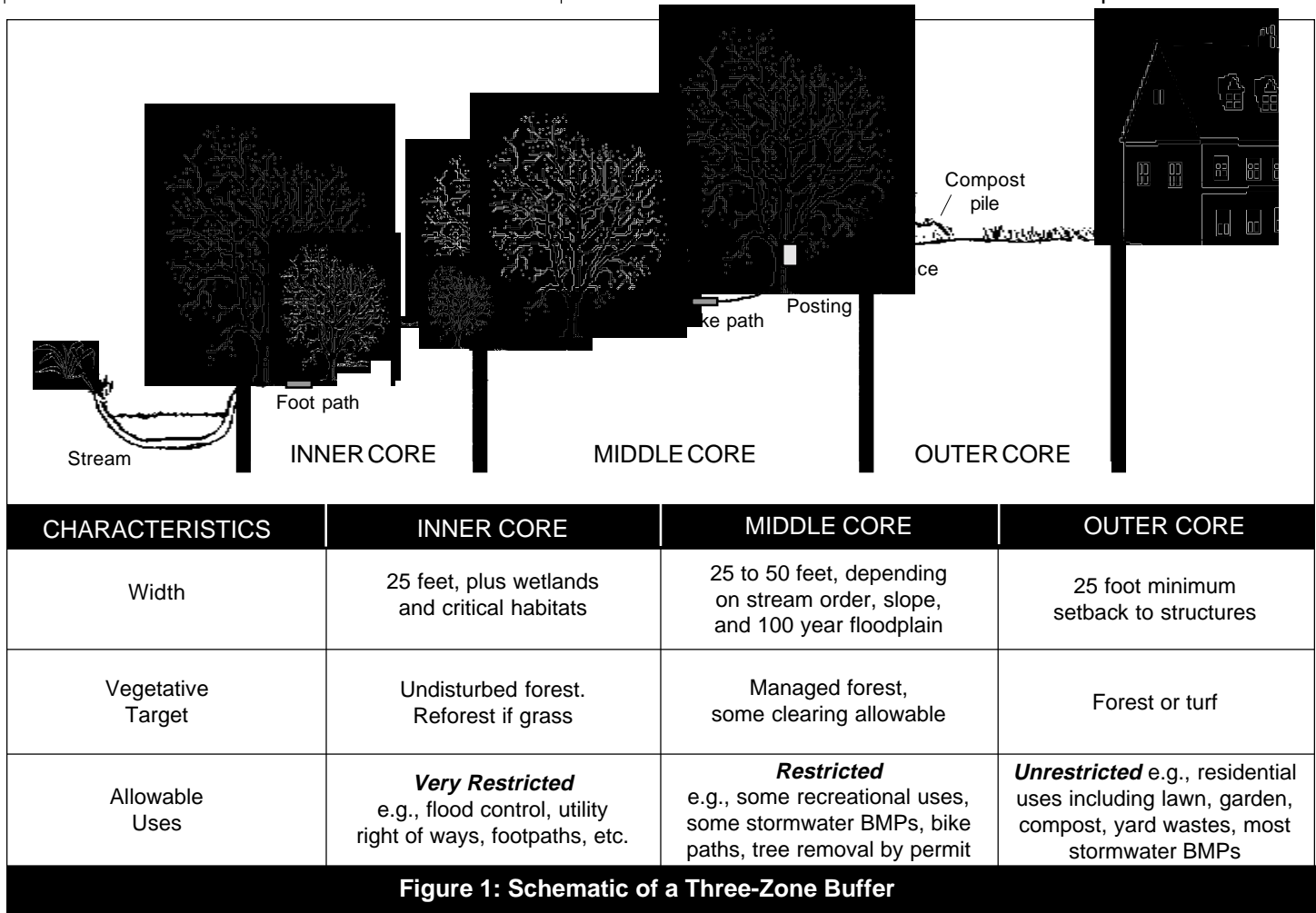


Table 1: Acceptable and Unacceptable Uses Within Stream and Wetland Buffers (Heraty, 1992)

Use	Allowed (%)	Denied (%)
Footpaths	60	8
Utility line Crossings	52	5
Water Dependent Uses	45	10
Bike Paths	30	15
Stormwater Practices	28	10
Home Additions/Decks/Gazebos	10	55
Maintenance for Flood Control	Often Allowed	
Pumphouses	Restricted	
Sewage Treatment Plants	Restricted	
Golf Courses	Restricted	
Campgrounds	Restricted	
Timber Harvesting	Restricted	
Hydropower	Restricted	
Roads/Bridges	Restricted	
Athletic Fields	Restricted	
Playground Equipment	Restricted	
Compost/Yard Wastes	Unrestricted	
Landscaping	Unrestricted	
No Uses Permitted (30%)		
No Uses Denied (15%)		

Percentages of Buffer Programs that specifically allow or deny a given use. The "Restricted" and "Unrestricted" entries refer to other stream buffer uses that are not commonly addressed in local ordinances.

greatly strengthened. For example, many were of the opinion that consultants were not always accurately delineating buffer boundaries. However, they did not have enough staff resources for technical assistance or field verification. In nearly every jurisdiction, inspection was confined to a single and often cursory visit at the end of construction. Subsequent post-construction "bufferwalks" were rarely or never performed.

Overtime, many local governments have found their buffer ordinances were too simplistic and lacked a clear vegetative goal. For example, Heraty found that two-thirds of all buffer programs required maintenance of the pre-development vegetative cover within the buffer, regardless if it was grass, weeds, or trees. About 10% of buffer programs specified retention of grass or meadow areas, and twenty percent had no vegetative cover at all. Given the importance of riparian forests in the ecology of streams in the more humid regions of the country, it would seem appropriate to clearly specify mature riparian forest cover as the ultimate vegetative goal for these buffer systems (see article 43).

As a commons area, buffers are subject to great pressure from property owners and adjacent users. In retrospect, planners have had considerable problems in defining what are acceptable, and what are unacceptable, uses of buffers in urban areas. A long list of the many proposed uses for buffers is provided in Table 1. As can be seen, planners must reconcile many different, competing, and very strong pressures in buffer areas (such as recreation, water-dependent use, utilities, and even best management practices).

One possible model (loosely adapted from Welsch, 1991) involves a series of management zones within the buffer. Unique vegetation targets and permissible uses are established in each zone. The most natural vegetation target (and most restrictive use) is located on the interior boundary of the buffer. A schematic of a three zone buffer management scheme is shown in Figure 1.

Some idea of the many pressures placed on urban buffer systems was revealed in Cooke's 1991 study of 21 wetland buffers established in the suburbs of Seattle, Washington. Each of the buffers, which ranged from two to eight years in age, were surveyed in the field. This were then compared to the original buffer plans submitted during development review. Despite the fact that they were relatively young, 95% of the buffers showed visible signs of alteration.

Forty percent of the buffers had been so altered by human activity that their capability to protect the adjacent wetland had been severely compromised. Buffer disturbances included tree removal, conversion into lawns, trampling and foot trails, filling, encroachment, dumping of yard wastes, and erosion by stormwater runoff (Table 2). Cooke found that narrow buffers located on residential lots were particularly susceptible

or manage their network of buffers, nor can they easily evaluate the impact of future development projects or proposed uses at individual locations in the buffer network.

Nearly 90% of all buffer areas are in private ownership. For most property owners, the boundaries of stream and wetland buffers are particularly invisible. Over 60% of the local governments surveyed indicated that most individual property owners were unaware of either the boundary or the purpose of a buffer. This is not surprising, given that a majority of local governments made little or no effort to inform property owners about buffer boundaries or maintenance requirements. Only 15% of all jurisdictions surveyed required that buffer boundaries be posted or fenced.

Usually, the only notification given to property owners about buffer limits were one-time legal disclosures, such as notes on the deed of sale, language in a homeowner association charter, and prescribed notice upon property resale. Few jurisdictions employed techniques to educate property owners about buffers such as pamphlets, postings, community association meetings, or individual maintenance agreements.

Heraty's survey also revealed that many community officials felt that their buffer programs could be

to alteration. In 100% of those sites the natural vegetation had been cleared and replaced by lawns (often grown with high fertilizer inputs). Buffer encroachment has also been noted in other regions of the country. One recent survey in Montgomery County, Maryland found that 10% of the total area of a stream valley park/buffer system has been lost due to encroachment in a single decade.

The clear implication from both studies is that local governments must do more than merely require buffers during development review. They must also make the effort to manage buffers after they become established. An objective should be to render them *visible* to contractors, users, and property owners who may try to encroach on them in the future. A series of planning, educational and enforcement tools for managing buffers are shown in Table 3. By incorporating some of these low cost tools into their programs, they can “buffer” their buffers, and help ensure that they are actually protected from human activities.

—TRS

References

- Heraty, M. 1993. *Riparian Buffer Programs: A Guide to Developing and Implementing a Riparian Buffer Program as an Urban Best Management Practice*. Prepared for U.S. EPA, Office of Wetlands, Oceans and Watersheds. 118 pp.
- Cooke, S.S. 1991. *Wetland Buffers—A Field Evaluation of Buffer Effectiveness in Puget Sound*. Washington Department of Ecology. 150 pp.
- Welsch, D. 1991. *Riparian Forest Buffers—Function*

and Design for Protection and Enhancement of Water Resources. USDA Forest Service. NA-PR-07-91.28pp.

Table 2: Types of Disturbance to Urban Wetland Buffers in King and Snohomish Counties, Washington (N=21) (Cooke, 1991)

Category Of Disturbance	Percent of Buffer Disturbed
Dumping of Yard Wastes	76
Conversion of Natural Vegetation into Lawn or Turf	100
Tree Removal	50
Evidence of Fertilizer Impact	55
Evidence of Stormwater Short-Circuiting Buffer	28
Increased Dominance of Invasive/Exotic Plants	67
Evidence that Buffer had been Maintained	5
Trails Established in Buffer	29
Buffers Exhibiting Signs of Alteration	95
Severely Altered Buffers (Not Protecting Adjacent Wetland)	43
Severe Encroachment or Fill	20

Table 3: Techniques to Maintain the Integrity of Stream and Wetland Buffers

Planning Stage

- Require buffer limits to be present on all clearing/grading and erosion control plans.
- Record all buffer boundaries on official maps.
- Clearly establish acceptable and unacceptable uses for the buffer.
- Establish clear vegetation targets and management rules for different lateral zones of the buffer.
- Provide incentives for owners to protect buffers through perpetual conservation easements rather than deed restrictions.

Construction Stage

- Pre-construction stakeout of buffers to define Limit of Disturbance (LOD).
- Set LOD based on drip-line of the forested buffer.
- Conduct pre-construction meeting to familiarize contractors and foremen with LOD and buffer limit.
- Mark the LOD with silt fence barrier, signs or other methods to exclude construction equipment.

Post-Development Stage

- Mark buffer boundaries with permanent signs (or fences) describing allowable uses.
- Educate property owners/homeowner associations on the purpose, limits and allowable uses of the buffer.
- Conduct periodic “bufferwalks” to inspect the condition of the buffer network (using volunteers, where possible).
- Reforest grass or lawn buffers.