Riparian Zones: Where the Water Meets the Land

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Although the origin of the word "riparian" refers to the land bordering rivers and streams, it is generally understood to also include those areas adjacent to wetlands and lakes. Buffer zones, of which riparian zones are a part, are more encompassing and less specific as they can be applied to both terrestrial and aquatic habitats. Riparian zones, because of the transition from aquatic to terrestrial habitats are areas of high biodiversity. Within the context of forestry, riparian zones are mandated strips of vegetation which can be of varying width left along watercourses to meet specific objectives. Partial harvesting may be permitted within these zones.

Originally, riparian zones were specifically implemented to protect stream habitat and fish populations. An excellent introduction to the history or riparian zones as well as the widely accepted 30 m width on both sides of watercourses can be found in Richardson.[1] Riparian zones help accomplish many functions. They maintain lower water temperatures through shading, a function cited as becoming more important in the face of global warming.[2] Riparian zones also provide critical habitat for flora and fauna, protect against invasive species, stabilise soils, filter sediments and nutrients, provide erosion protection, provide migration corridors and furnish coarse woody debris.[3,4,5] The leaf litter from riparian zones provides a major source of energy and nutrients to the detrital food web for in-stream communities. Approximately one-third of leaf litter in watercourses can originate from vegetation beyond 30 m riparian zones.[6] Buffer zones can regulate watercourse microclimates by modifying light, temperature, and humidity,[7,8] as well as influencing the type, amount and timing of nutrients important to stream productivity.[7,9,10]

Leopard Frog
Photo by A. Clavette

Whereas the benefits of riparian zones are unquestionable, their width, the application to intermittent and ephemeral streams, the managing for resilience rather than impacts and harvesting within the zones themselves are not as easily resolved. Linking polices to objectives that address scale would help alleviate some of these issues. The integration of riparian zones as part of an overall watershed plan as well as at the landscape scale becomes apparent when dealing with the movement of animals.[3] Nevertheless, there are local factors to be considered such as water body type, slope, water body size class, soil types, precipitation, resistance to wind-throw and type of adjacent activity[11,12,13,14]. Although considerable land would be involved, various authors;[3,12] state that buffers on low order streams including ephemeral streams (those

that dry up in the summer) should be protected as they define and characterise the receiving waters below. Buffers must also be contiguous, as any gaps would provide a point of access for sediment flow. Although, the definition of slope varies, slope is a variable in virtually all models of buffer width,[3] with an increase in width with increasing slope beyond an established baseline which is often 30 m.[15]

Partially harvesting within buffer zones in both Canada and the US occurred in 80 percent of the studies reviewed by Lee et al.[11]. Prescriptions vary and can include diameter of trees, volume, and species removed. However, there are limits. When 28% average basal area was removed in a riparian zone study by Wilkerson et al.,[14] daily maximum water temperatures were significantly higher by about 4 degrees C, believed to have resulted from disruption of groundwater flow.

The 2004 interim *Forest Management Manual for New Brunswick Crown Land*, Table 3 on page 51, lists specific buffer zones objectives, buffer zones modifiers (decisional considerations) and buffer zones widths.[17] With the exception of small watersheds of less than 600 hectares, a minimal 30 meter buffer zone is the norm and 60 meters and greater under special circumstances such as high wind-throw, critical fish habitat, provincially significant wetlands, NBDELG designated watersheds, certain wildlife travel corridors and recreational waters, and slopes greater than 25%. A descriptive text of the above with some background reference documents can be found in O'Carroll.[16] The NB Forestry manual responds to the frequently cited need to state clear objectives in setting riparian widths. Experimental design and monitoring are required to validate that the objectives are being attained or in testing alternative strategies to managing riparian zones. What Richardson proposed recently in 2012[1] appears equally true today; "Strategies to maintain ecologically functional aquatic and riparian ecosystems in the face of forest practices will require carefully designed, large-scale field experiments, coupled with long-term monitoring and explicit incorporation of spatial (catchment vs reach) and temporal scales."

Shoreline of the Restigouche River
Photo by S. Dietz

Damselflies
Photo by A. Clavette

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Outlet Stream
Photo by B. Brown