Riparian guidelines – guide for evaluation

Key points to remember during evaluation:

- SFRA requires guidelines to address water, air, soil, biotic, recreational resources
- Statewide guidelines are necessarily broad and cannot address every possible situation
- There is a need for simplicity in our riparian recommendations (2 categories max?)
- RSTC report serves as the technical basis for evaluation

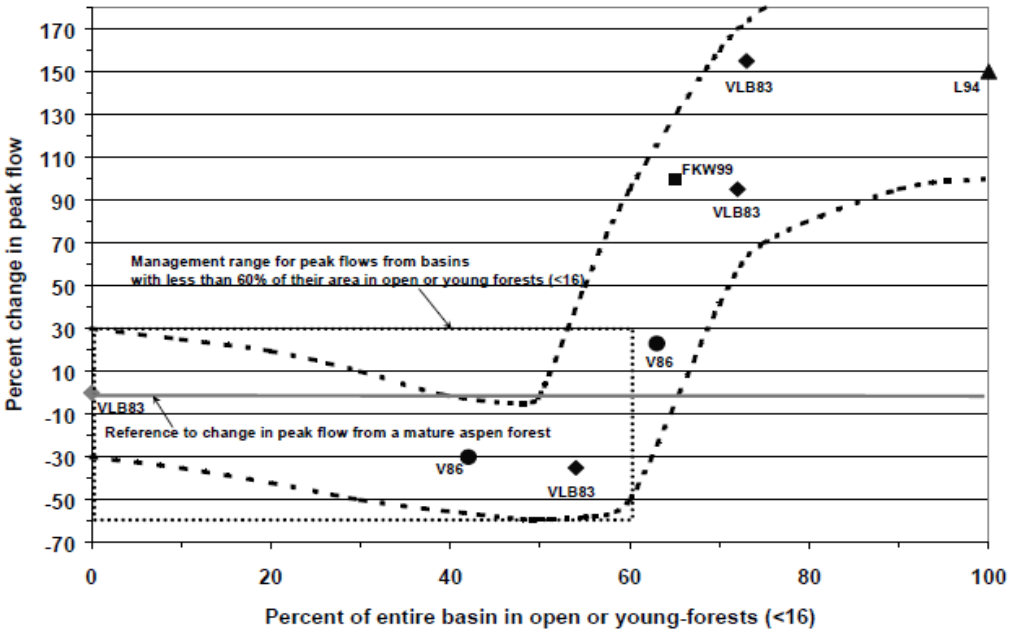
Topic 1: Scale of recommendations

The existing guidelines are largely focused on activities at the site level, with little attention to the landscape scale and the potential for cumulative effects. The RSTC clearly identified overall watershed condition (i.e., landuse, harvest, and covertype patterns) as a key driver of hydrology and habitat functions in forested landscapes, and made several recommendations for consideration during guideline revision including:

- Developing a different set of guidelines for watersheds that are 50% or less forested

- Identifying watershed thresholds where cumulative impacts will occur.

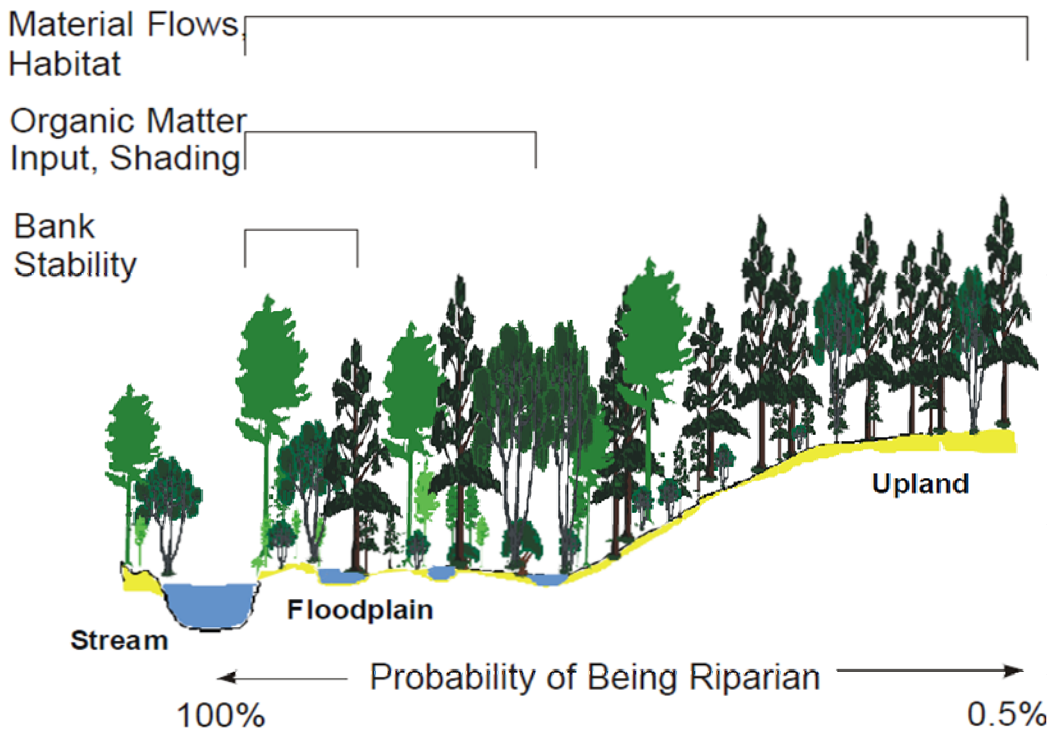
Several of the scoping comments also recommended adoption of watershed threshold guidelines related to the amount of forest harvesting as a percentage of total watershed area. The recommendations are based on a large number of studies which have demonstrated a change in streamflow (baseflow, peakflow, etc.) associated with various levels of harvesting. Work by S. Verry presented in the RSTC report demonstrates this:



The MN AFS recommended that a threshold of 20% be established, based largely on a review conducted by Stednick (1996). In that review, Stednick (1996) concluded that at least 20% of a watershed needs to be harvested in order for a detectable change in streamflow to occur, which a more recent review (with more studies evaluated) also concluded (Brown et al. 2005). However, equating detectable change in streamflow with detriment is problematic, as impacts will be dependent on stream geomorphology, precipitation patterns, spatial arrangement of harvests, and length of time the threshold is exceeded. For example, Verry's work suggests that greater than 50-60% of the watershed needs to be cut or in an open condition before a change in peakflow will occur, and the review by Brown et al. (2005) highlighted the return to equilibrium conditions as the harvested forest regenerates and grows. A threshold harvest pattern where impacts to water quality occur is strongly supported in the literature, but quantification of those patterns for a variety of watershed conditions has not been assessed.

Topic 2: RMZ Widths

A major component of RMZ recommendations is the recommended width or distance from the associated water feature. Conceptually, the influence of RMZ width on riparian functions is variable, depending on the specific function in question and the absolute distance from the stream (see figure below). Although the optimum RMZ width for protection of functions is being debated, there is clearly some point of diminishing return where increasing width has marginal benefit to function.



The following table summarizes the existing RMZ widths, the recommendation from the RSTC, and the two broad views from the scoping comments.

Entity	Width (s)	Comments
Existing MFRC guidelines	Non-trout=50-100 ft Trout=150 ft	Variable depending on stream/lake size, management. Supporting science unclear
RSTC	Non-trout=120 ft Trout = 165 ft	Specific rec. based on analysis by S. Verry that accounted for windthrow and beaver, but general width increase supported by larger RSTC analysis
MN American Fish. Soc.	10x'x bankfull width + 50ft, or minimum of 165ft.	State that this distance would cover the active floodplain of most rivers in MN
MFI/MLEP/TPA	50-60 ft.	State that RSTC found that most water quality functions maintained at this width

Neither of the two opposing views from the scoping comments provided substantive information in support of their respective views. MFI/MLEP stated that the RSTC found most sediment functions were maintained at a width of 50 ft. which is true, but the RSTC also found that other water quality parameters (e..g, stream temp as modified by shade) required greater widths than 50 ft. MNAFS recommendation is based on a concept of a variable width RMZ that encompasses a streams' active floodplain (Verry et al. 2004, Ward et al. 2002), but did not provide data showing that their recommendation would encompass the floodplain of most rivers in the State. The MNAFS minimum width of 165 ft is based on the recommendation of the RSTC, as their definition would result in a narrower RMZ for streams less than 11ft wide. Both of the respective views related to RMZ width appear to be focused on the stream (i.e., either water quality or aquatic habitat) alone, and do not address other resources as required under the SFRA (e.g., habitat).

The RSTC concluded in general that widths needed to increase for all water feature types to protect riparian-related habitat, specifically recommending 165 ft for all trout streams and lakes, and 120 feet for other streams and lakes. These recommendations account for blowdown and beaver as discussed by S. Verry in Appendix C of the RSTC report. The RSTC also noted that a RMZ width of 300ft may be necessary to discourage beaver activity in some high-risk cold water trout streams.

Topic 3: RMZ Residual basal area

The existing guidelines recommend a minimum RBA of 60 ft^2 for trout waters, and a range of 25-80 ft^2 for all others. The range was developed to address a spectrum of management actions and landowner objectives including establishment of early successional vegetation such as aspen.

There are many "flexibility" considerations listed in the existing guidelines related to RBA, but the guidelines generally recommend management for longer-lived mixed species stands (see General Guidelines, pg.38-39).

The RSTC recommended a minimum RBA of 75 ft^2 for all water features, which is based on the minimum stocking levels for a variety of stand types in MN. The RBA recommendation was made primarily to address concerns with habitat functions, but also to maintain sufficient shade near streams. However, the RSTC also noted a need to adjust RBA depending on desired future conditions within the RMZ, and were concerned that the RBA would be treated as a rigid standard regardless of circumstances. There will be conditions where more or less RBA will be appropriate to achieve desired environmental benefits and future riparian conditions. See Appendix C-6 in the RSTC report for more detail.

The MNAFS position on RBA is not clear to me, but they generally recommend uneven-aged management, or limited harvest following consultation with the Area Fisheries Supervisor. Their focus appears to be on harvesting only if it benefits the stream, wildlife, or native plant communities.

The counter view (MFI/MLEP/Ruffed Grouse Soc./etc.) expressed support for a range of RBA to accommodate a range of riparian conditions and landowner objectives. In particular, several comments provided citations related to early successional forest habitat needs for several bird species including the golden winged warbler and the American woodcock. There are a large number of papers that document the importance of early-successional habitat for certain bird species, including some that are ETS and common to Minnesota. However, I did not find any mention that these species were dependent on early-successional habitat in or near riparian areas. Several of the scoping comments made the following statement: *"Hunter et al. (2001) identified 16 bird species native to Minnesota that utilize dense shrub understories or shrub-dominated habitats associated with riparian conditions for breeding."* Hunter et al. (2001) did identify shrub-scrub dependent bird communities, but made no claim that they were primarily associated with riparian areas. Hanowski et al. (2005) noted that only larger streams or rivers would likely have riparian-dependent bird species.

Topic 4: Counting RMZ area towards leave tree area

Current recommendations explicitly exclude RMZ area as counting towards the recommended leave tree area of 5% of harvest area (for the clump option). This guideline, in combination with a recommendation to locate leave tree clumps next to RMZ's is part of a strategy to address blowdown of residual trees in the RMZ (Rationale section, Riparian areas, pg 10), which essentially creates a buffer that protects trees within RMZ area. These recommendations benefit riparian area functions (including habitat), but may be detrimental to wildlife in other areas of the harvest unit if large swaths of land end up with no leave trees (i.e., if stream is at the harvest edge). If recommended RMZ widths were to increase as suggested by the RSTC, then it may be

appropriate to :1) remove recommendation to locate clumps next to RMZ's so that clumps are more evenly dispersed across the harvest unit, and 2) allow RMZ area to count towards leave tree area if the RMZ is within the interior of the harvest unit (not adjacent). **Note that the current recommended RBA in leave tree clumps is 80 ft^2 $acre^{-1}$ to maintain functionality.** If RMZ area is allowed to count towards leave tree area, then the differing RBA for clumps and RMZ's will need to be addressed (e.g., make one RBA recommendation for both).

Literature Cited

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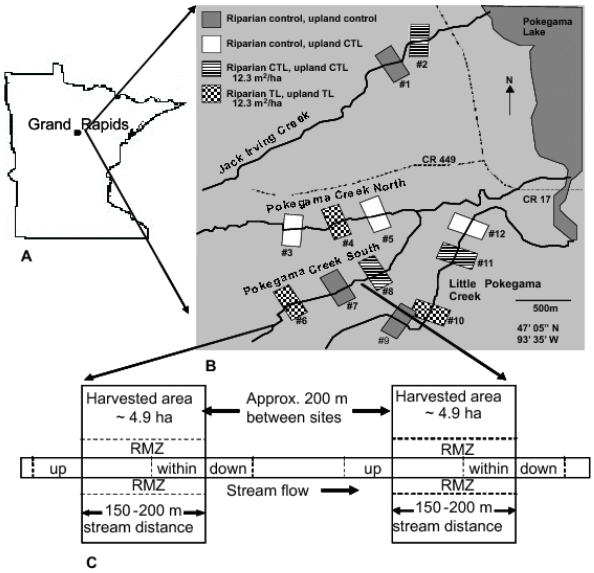
Additional information for evaluation

The following is a summary of research studies in MN that assessed the effect of variable levels of residual basal area (RBA) in riparian management zones on aquatic organisms, birds, and vegetation. Because variable RMZ widths were not assessed, inference is limited to the fixed width used in each study (100 or 150 ft.). In general, the major findings agree with the findings of the RSTC. More information is available at: http://rmzharvest.cfans.umn.edu/index.htm

Pokegama Basin Study (south of Grand Rapids, MN)

Objective: test the shade strip guidelines (pre-1999) on mitigating impacts on birds, terrestrial, and aquatic systems within the Pokegama basin.



Study design

Four treatments, replicated three times

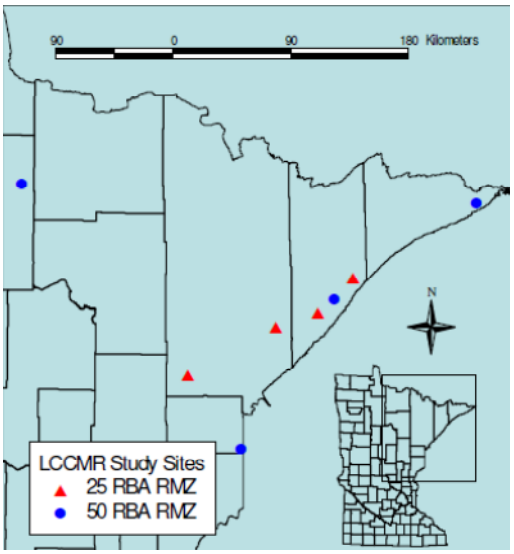
- Control (no harvest in upland)
- Riparian control (upland harvested)
- Riparian harvest with cut to length
- Riparian harvest with feller buncher/grapple skidder

Riparian management zone characteristics

- width = 100 ft, RBA = 50 ft^2

Late summer harvest in 1997, post-treatment samples from 1997-2000, 2006-08

Broader RMZ study (8 sites in northern MN)



Objectives: test various levels of RBA on mitigating impacts on birds, terrestrial, and aquatic systems.

Study design

Eight sites with 2 RBA treatments adjacent to clearcuts

- riparian control (no harvest in RMZ)
- RBA of 50 ft^2
- RBA of 25 ft^2

Harvest blocks = 8 ac cut on 1 side of the stream
Riparian management zone width = 150 ft

Winter harvests 2004-05, post-treatment sampling to 2008

Major Findings (general)

- Partial harvest increased early successional bird species, reduced late successional bird species (3 yr post harvest, 8 northern sites; Chizinski et al. 2011)
- Bird communities in control areas and uncut RMZ's very similar after 9 years; communities in partial cut RMZ's becoming more similar but still higher amount of early successional species (9 yrs, Pokegema, Hanowski et al. 2007)
- No detectable effect of variable RBA on aquatic macroinvertebrates or fish communities (3 yrs post harvest, all sites; Chizinski et al. 2010)
- No effect of harvest system on fish communities, but large increases in sedimentation in all treatments (including controls)(3yrs post harvest, Pokegema; Hemstead et al. 2008).
- Large increases in sedimentation across all treatments associated with bank instability and high amounts of windthrow (10 yrs post harvest; Pokegema, Merten et al. 2010)
- Greater stream warming in harvested RMZ relative to unharvested RMZ (10yrs post-harvest, Pokegema; Merten et al. 2010).
- Partial harvest in RMZ reduced aspen suckering by ~60% relative to adjacent clearcuts; no effect of harvest system in suckering (3 yrs post harvest, Pokegema, Palik et al. 2003)
- Partial (low and intermediate RBA) RMZ harvests had substantial aspen and hardwood regeneration; intermediate RBA resulted in more hardwood regeneration, maintained leaf litter inputs to streams, and promoted development of mixed species stands (3yrs post harvest, 8 northern sites; Blinn 2008 – final report to LCCMR).

Citations

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