

# Grazing Riparian Ecosystems: Grazing Intensity

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## The availability of forage and water, shade and smooth terrain often attracts livestock to riparian systems.

Riparian ecosystems are extremely productive, with some providing 81 percent of grazing livestock's summer forage (Roath and Krueger 1982). However, grazing-induced changes in riparian vegetation can result in a decline in soil health, loss of biotic diversity, degradation of wildlife habitat, reduced water quality and alterations in stream hydrology.

In contrast, grazing has been important for proper functioning of many riparian zones. Implementation of proper grazing management practices is essential to prevent degradation by livestock and improve riparian health.

Grazing intensity influences the health of riparian ecosystems. Overgrazing by livestock can lead to destabilization of stream banks through influences on vegetation and physical forces of hoof impacts, accelerating erosion and sedimentation. Maintaining adequate vegetative cover by using the proper grazing intensity helps stabilize stream banks by limiting trampling and benefiting deep-rooted native plant communities.

## Exclusion of Livestock

Exclusion of grazing animals from the area directly impacted by stream hydrology can be beneficial to riparian vegetation, increasing bank stability by improving the cover of native riparian vegetation, especially woody species. The greenline, a section in the riparian vegetation zone, is especially vulnerable to uncontrolled livestock grazing.

The removal of vegetation by grazing animals not only influences bank stability, but also can decrease the amount of runoff compared with heavily grazed riparian ecosystems. See Figure 1 for an example of a grazed and ungrazed riparian ecosystem.



**Figure 1.** Fence line contrast between an ungrazed (left) and grazed (right) riparian ecosystem.

However, removal of grazing animals altogether can result in decreased herbage productivity, plant vigor and forage quality of riparian vegetation.

Exclusion of livestock does not necessarily result in healthier stream conditions as compared with appropriate grazing management strategies. This is especially true in the northern Great Plains, where long-term exclusion of grazing and other natural disturbances from these ecosystems increases their susceptibility to invasion by shallow rooted, non-native species such as smooth brome grass (*Bromus inermis* Leyss.), Kentucky bluegrass (*Poa pratensis* L.) and reed canarygrass (*Phalaris arundinacea* L.) (Figure 3).

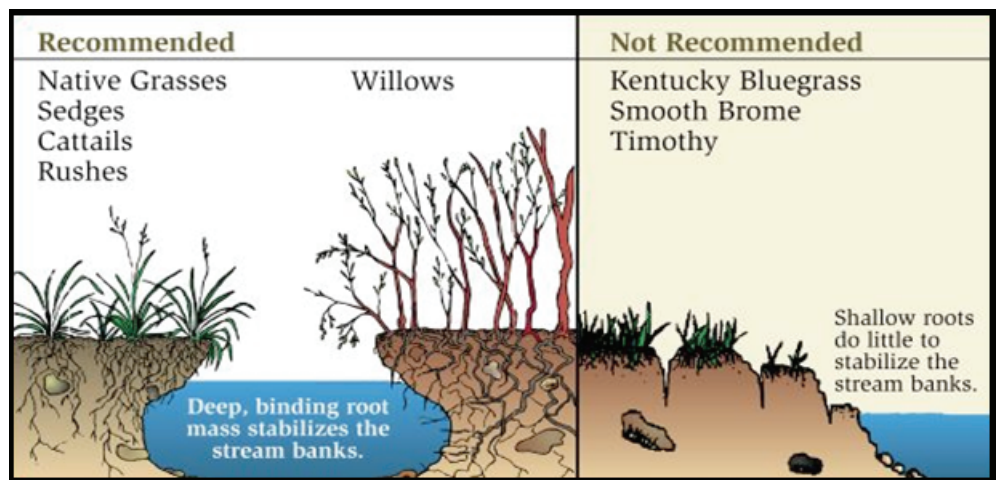
## Light to Moderate Grazing Intensity

Moderate or light grazing, utilizing 20 to 40 percent of the available herbage production, improves livestock distribution and does not alter the composition of riparian ecosystems (Sedgewick and Knopf 1991) (Figure 2).

Strongly rooted native plant species such as beaked sedge (*Carex rostrata* Stokes), water sedge (*Carex aquatilis* Wahlenb.), bluejoint reedgrass (*Calamagrostis canadensis* (Michx.) P. Beauv.) and baltic rush (*Juncus balticus* Willd.) have been reported to increase in ungrazed and lightly grazed pastures (Clary 1999) (Figure 3). Clary (1999) showed a downward trend in Kentucky bluegrass (*Poa pratensis* L.) when these strongly rooted native graminoids increased.



**Figure 2.**  
Example of a riparian ecosystem grazed at a moderate stocking rate.



**Figure 3.** Illustration depicting recommended and not recommended riparian vegetation communities.

(Courtesy of Cows and Fish: Alberta Riparian Habitat Management Society)

Although the removal of grazing livestock increases cover by woody riparian vegetation, long-term grazing exclusion can result in a closed canopy, reducing the vigor and diversity of riparian vegetation compared with light and moderate livestock grazing.

However, light to moderate grazing also can increase woody vegetation while maintaining a healthy, diverse ecosystem. Light and moderate grazing intensities have bank stability ratings similar to riparian ecosystems that exclude grazing animals.

## Heavy Grazing Intensity

Heavy grazing, or greater than 60 percent utilization of the available herbage production by livestock, can destabilize and degrade stream banks as riparian vegetation is removed and the physical forces of hoof impacts shear off bank segments (Figure 4).

Kentucky bluegrass has been noted as being widespread in riparian areas that are heavily grazed, replacing native sedge species in the plant community (Clary and Leininger 2000). Stream banks that are dominated by shallow-rooted species such as Kentucky bluegrass,





**Figure 4.** Photos depicting heavily grazed riparian ecosystems, which lead to bank instability.

instead of deep-rooted native species, are less stable and more vulnerable to erosion and mass wasting.

The decline in herbaceous vegetation associated with heavy grazing increases use of woody species, which are critical for stabilizing stream banks.

Heavily grazed riparian ecosystems have greater runoff than those that are grazed at a light or moderate intensity, potentially decreasing water quality by increasing fecal material and sediment levels in the stream.

High grazing intensity not only negatively impacts riparian ecosystems, but can lead to a decline in animal production due to a reduction in the rate of forage intake as the available herbaceous vegetation decreases.

## Conclusions

Grazing intensity is a factor that influences the health of riparian ecosystems. Heavy grazing by livestock can negatively impact riparian ecosystems, whereas moderate or light grazing typically does not alter the composition of riparian ecosystems and maintains stream bank stability and water quality.

## Literature Cited

- Clary, W.P. 1999. Stream channel and vegetation responses to late spring cattle grazing. *J. Range Manage.* 52(3): 218-227.
- Clary, W.P., and W.C. Leininger. 2000. Stubble height as a tool for management of riparian areas. *J. Range Manage.* 53(6):562-573.
- Roath, L.R., and W.C. Kruegar. 1982. Cattle grazing influence on a mountain riparian zone. *J. Range Manage.* 35(1): 100-103.
- Sedgwick, J.A., and F.L. Knopf. 1991. Prescribed grazing as a secondary impact in a western riparian floodplain. *J. Range Manage.* 44(4): 369-373.

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