Strategies for Livestock Management in Riparian Areas in New Mexico

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Riparian areas are the transition zones between aquatic and upland habitats. Their proximity to water in arid states like New Mexico means they are important both ecologically and economically. Riparian areas serve numerous important ecological functions, such as filtering sediments and pollutants, slowing the velocity of water during high flow events, recharging groundwater, maintaining the stability of stream banks and reducing erosion, and providing valuable habitat for wildlife. Economically, riparian areas are important to livestock producers not only because they are often associated with sources of water for livestock but also because the quantity and quality of forage tends to be greater than in adjacent upland areas.

Figure 1. **Fences may interfere with wildlife and livestock access to water and upland pastures, subsequent foraging behavior and utilization, and aesthetic properties of riparian systems. For example, if livestock are restricted to stream access, stock trails and bank erosion at the restriction site may increase. Photograph taken on the Sacramento Ranger District, Lincoln National Forest, New Mexico.** (Photograph by Nick Ashcroft.)

The ecological and economic values associated with riparian areas are often viewed as conflicting with one another. This may be due to the fact that, historically, riparian areas were viewed as sacrifice areas, and the resultant livestock use was often quite heavy. However, the ecological importance of riparian areas has been increasingly recognized in recent years, and a number of management strategies have been developed that can maintain or improve their ecological condition and, simultaneously, improve their ability to provide high-quality forage to livestock. The critical first step toward achieving this goal requires that the livestock producer include maintaining or improving riparian condition as a management objective.

The steps that need to be taken to maintain or improve riparian condition are site-specific and largely depend on the existing condition of the system. Because riparian areas differ in terms of their hydrologic and soil characteristics, their vegetation potential differs. For instance, some riparian areas do not support woody vegetation, such as cottonwoods and willows, but instead may be dominated by sedges, rushes, and grasses. Other riparian systems may have the potential to support woody vegetation. Therefore, it is reasonable to expect different grazing strategies from one area to the next; one management approach will not work for all types of riparian systems. Given this natural variability, local knowledge

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is valuable. In particular, a livestock producer's experience and knowledge of the terrain, pasture, animal behavior, and vegetation will be invaluable in determining the appropriate grazing strategy.

As a general rule of thumb, a producer needs to assess if the stream and riparian area will be able to withstand the disturbances associated with high runoff events with no significant erosion or stream channel alteration. If so, then that is the condition, at a minimum, that should be maintained for that riparian area. High runoff or flow events may be defined as those that are expected to occur every 25 years or so. Certainly, there will be the highly abnormal flood events (for example, a 100-year flood event) that will create significant disturbance, regardless of the condition of the riparian area. Again, long-term quantitative data is valuable to making this determination.

While producers may not be able to protect against such drastic occurrences, they can try to maintain a condition that builds resilience in the stream channel and its banks from more frequent flows and flood events. Maintaining this level of condition will increase the likelihood that the stream and riparian area are able to capture sediment and facilitate improvement of the stability and shape of the channel.

In addition to local knowledge, quantitative monitoring data are useful when determining whether riparian vegetation is in suitable condition or if improvements are desired. The longer time frame the data set represents, for example five or more consecutive years, the better suited it will be for interpreting trends given interannual weather conditions and for making informed and realistic decisions. NMSU Range Improvement Task Force Reports 53, *Monitoring Rangelands in New Mexico* (http://contentdm.nmsu.edu/cdm/compoundobject/collection/AgCircs/id/74341/rec/23); 58, *Using the Rapid Assessment Methodology (RAM) to Make Adaptive Management Decisions* (http://contentdm.nmsu.edu/cdm/compoundobject/collection/AgCircs/id/74406/rec/22); and 76, *Data Entry, Organization and Analysis for Rapid Assessment Methodology* (http://aces.nmsu.edu/pubs/_ritf/RITF76.pdf) contain information on how to monitor rangelands, including riparian areas.

GRAZING SYSTEMS

Although riparian grazing plans must be tailored for site-specific conditions, there are a number of general grazing strategies that can help producers meet their specific riparian management objectives. Many of the grazing systems discussed below have been researched and tested in the Pacific and interior Northwest. This publication covers these systems and how they can be interpreted for use in the Southwest. It should be noted that virtually all grazing systems should include distribution practices that move livestock from one location to another.

Corridor Fencing

Degraded riparian area with little or no riparian vegetation may require rest or light use until monitoring data indicates management objectives have been met. Fencing selected portions of the riparian corridor may be an alternative for rapid improvement in these instances. However, fences are expensive to build, and maintenance can be particularly challenging in southwestern riparian areas, which are subject to seasonal, high-velocity floods. Fences also may interfere with wildlife and livestock access to water and upland pastures, subsequent foraging behavior and utilization, and aesthetic properties of riparian systems. For example, if livestock are restricted to stream access, stock trails and bank erosion at the restriction site may increase (Figure 1). In some cases, fences may not be practical depending on factors like topography.

If a producer decides that fencing is the best approach for recovering a degraded riparian area, creative designs should be considered that would allow the area to be included in future grazing systems and pasture rotations. Riparian pastures are one example of how this may be accomplished.

Riparian Pasture

Riparian pastures are rangeland pastures; they contain both upland and riparian vegetation that are managed together to obtain specific management objectives. Riparian pastures can be grazed or rested depending on current riparian conditions. Therefore, the objective of riparian pastures is not to exclude livestock from riparian areas, but to provide for closer management and control of their use.

Riparian pastures allow producers to readily adjust the timing of grazing and/or the level of defoliation of riparian vegetation. Riparian pastures can be used seasonally, in conjunction with rotation strategies, or as special use pastures. However, a variety of factors, such as terrain, the size of the riparian area, and fence construction and maintenance costs, may limit the practicality of a riparian pasture system.

Potential benefits of riparian pasture systems, versus exclusion of livestock grazing indefinitely, include strengthened plant vigor, increased nutritional quality of autumn/winter forage, a shift in species composition to more desirable plants, increased vegetative cover, and improved ecological status of the plant community.

Early Growing Season Grazing

In the arid Southwest, early growing season grazing occurs when sufficient rainfall or snowmelt coincides with warmer temperatures and longer days to spur plant growth. This typically occurs sometime during early to mid-summer depending on elevation, precipitation, and the amount of cool- versus warm-season grasses. Riparian vegetation often benefits from a greater availability of moisture than upland vegetation. Therefore, in some areas, riparian vegetation can begin growing much earlier than upland vegetation (Figure 2). The beginning of the growing season is site-specific, and grazing strategies should be tailored to those conditions. It should be kept in mind that suitable alternative forage, such as grasses and forbs in the uplands, will minimize livestock use of riparian vegetation.

In years of good rainfall, early growing season grazing can encourage cattle to graze in uplands, where forage palatability and climate are more favorable than in the riparian zone. The availability of succulent upland vegetation and cold-air ponding in the riparian zone may induce livestock to spend time out of the riparian area, reducing their use of riparian plants and reducing the amount of soil compaction and bank trampling.

In addition, early growing season grazing allows for more regrowth and plant recovery than summer or fall grazing, and the response of riparian vegetation can be positive, even on sites in poor condition. In fact, early growing season grazing has been shown to be helpful in establishing woody plants, although the effect of grazing on willows during flowering and early seedling establishment has not been quantified.

Figure 2. **Pasture on the Valles Caldera National Preserve where early growing season strategies are used when riparian vegetation begins growing earlier than upland vegetation.** (Photograph by Nick Ashcroft.)

Growing Season Grazing

Repeated or extended grazing during the summer season is generally considered to have negative impacts on riparian areas. When temperatures are high and water distribution is limited, livestock tend to concentrate in riparian areas during the summer, when their desire for shade and water is more intense. If growing season grazing strategies are used, using distribution aids liberally will help discourage livestock from loafing in the riparian area. Techniques to use to affect livestock distribution include herding, location of water in upland areas, controlled access to stream water, salt and mineral block placement, improved upland forage, and drift fences. Also, if growing season grazing strategies must be used, short-term or periodic rest (e.g., grazing the pasture every other year) is recommended.

Late Growing Season Grazing

Late growing season grazing is similar to season-long or deferred grazing in its effects on woody riparian vegetation. Livestock are more likely to browse woody species during this period and less likely to move away from riparian areas because of the lack of palatable forage in the uplands.

Season-Long Grazing

In season-long grazing systems, livestock are released into an allotment in the early spring and removed in the fall of the same year. Unless distribution practices are successfully implemented, cattle will likely congregate in riparian areas during the hot summer months and riparian forage will be rapidly overused. Once overuse of herbaceous riparian forage (grasses, sedges, and rushes) occurs, livestock may switch to woody riparian vegetation such as willows. Once again, distribution practices must be successfully implemented for this grazing system to maintain or improve riparian area condition. Periodic rest can help improve riparian areas grazed season-long if riparian areas are not grazed excessively.

Dormant Season Grazing

Winter grazing can be compatible with riparian habitat needs and has been successfully implemented on lower-elevation ranges. In fact, winter use may be one of the least detrimental grazing systems to riparian areas and may benefit both range and riparian conditions by improving livestock distribution and plant response. Because herbaceous riparian vegetation is not very palatable during winter, it may not receive extensive use. In some higher elevations, livestock also avoid riparian areas, which tend to be colder than surrounding uplands.

However, some evidence suggests that livestock may browse woody species more during the winter because they retain greater nutritive value than herbaceous vegetation when dormant. Livestock use of woody vegetation during winter also depends on temperatures, snow depth and duration, availability of upland forage, animal concentration and distribution, forage/browse preference, and the extent of the woody plant community.

Under certain conditions, continued dormant season grazing may exert selective pressure on the same vegetation species, thereby favoring those species that are less palatable during the dormant season. A number of successes have been observed when late dormant and early growing season grazing systems were merged.

Early Growing Season/Late Growing Season Strategies

This type of grazing system allows pastures to be used for a short period in the early growing season before summer pastures are ready and again in the fall or late growing season before cattle are moved to winter pasture (Figure 3). To be effective, this grazing system requires close monitoring of forage and browse use during the late-season period, especially for woody riparian species like willows and cottonwoods, which can receive excessive use.

This grazing system is acceptable in riparian zones if much of the woody vegetation has matured beyond the reach of livestock and if early use ends before the critical growing period. Early growing season use may have to be delayed or deferred until there is adequate forage in the uplands and on adjacent hillsides. Special care should be taken to leave adequate residual vegetation after fall grazing to help protect against high flows if spring runoff is expected.

LIVESTOCK GRAZING BEHAVIOR

Livestock grazing behaviors are a product of nature and nurture. Young animals can be influenced by their mothers during the first year. As an example, if a mother cow's foraging distribution patterns include leaving the riparian area each day, as opposed to "loafing," this can be imparted to their calves through learning. Genetics can also impact cattle use of riparian areas and mountainous terrain. Management implications include retaining animals with desirable foraging habits while culling those with undesirable riparian use characteristics. Over time, such a selection program should result in cattle spending less time in riparian zones and more time on upland slopes.

Desirable foraging distribution habits can also be reinforced with routine herding and water developments designed to reward pasture exploration in regards to foraging. Livestock will travel up to two miles in search of water. Developing water tanks on uplands and giving cattle an alternative to drinking in the stream channel has reduced the use of riparian areas.

Figure 3. **Pasture on the San Diego Grazing Allotment, Jemez Ranger District, Santa Fe National Forest, New Mexico, where early growing season and late growing season strategies are used.** (Photograph by Nick Ashcroft.)

SUMMARY

The impact of cattle grazing on riparian ecosystems depends largely on grazing management practices. It is important to remember that there is not one, simple grazing system because each situation and landscape is unique and requires its own management system. In addition, the only way to know if a particular management system is meeting the goals for a particular site is to monitor the effect of management activities. Therefore, riparian grazing plans should be site-specific and based upon available research and current monitoring.

Some of the important riparian site-specific variables include hydrology, soil moisture, soil permeability, soil depth, plant phenology, weather conditions, plant palatability, plant regrowth potential, and plant species composition. Important livestock grazing management variables include distribution practices; stocking rates; stocking density; type, breed, and age of livestock; livestock physiological condition; livestock naiveté; grazing season; and livestock behavior.

If not properly managed, livestock use can significantly alter plant community structure and species composition as well as degrade habitat quality for a variety of wildlife species. However, rather than excluding grazing indefinitely, creative and adaptive management allows the riparian forage resource to be used while simultaneously preserving the integrity of the riparian ecosystem.

Further studies are needed to better refine grazing levels and to create monitoring and management plans suitable for enhancing endangered species habitat. The grazing systems described above should not be interpreted as blanket prescriptions for livestock grazing, but rather as general guidelines that must be tailored for specific sites and conditions.

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