

RANGELAND RIPARIAN SYSTEMS¹

Wayne Elmore²

Abstract: The management and recovery of degraded riparian systems is a major conservation issue. Presently there are many grazing management strategies being applied based on the name of the technique with little incorporation of basic stream processes. Managers must understand the exact workings of grazing strategies and the individual processes of each stream before prescribing solutions to degraded riparian systems.

"Riparian" is a word that strikes fear in the hearts of many, anger in some and feelings of peaceful surroundings to others. It is a word that has grown to mean many things to many people, but is rarely understood. It has become an emotional subject that has led to one of the key public land issues in the United States today. Many people are beginning to believe in the old Will Rogers saying "Thank God we don't get all the government we pay for."

Early Oregon explorers and residents observed what our riparian areas once looked like. Peter Skene Ogden, after traveling in 1825 through the Crooked River Basin in Eastern Oregon observed willows from side to side across the valley bottom. Most of this scene is now gone. The Indian word "Ochoco," for which our Central Oregon mountains are named, means "streams lined with willows," yet today willows are uncommon. Senior ranchers in Central Oregon tell stories about the problems once encountered gathering cattle in the "thick willow stands" on Big Summit Prairie. The "thick willow stands" have been reduced to scattered clumps. Historic evidence indicates that most riparian zones were then in better condition than they are today.

The Riparian System

In recent years the management of riparian areas has typically been the primary responsibility and interest of wildlife and fisheries biologists (Elmore 1987). Improvements have been primarily judged in relation to habitat for big game, song-birds and fish. But riparian areas are more than just habitat for wildlife. They actually are functioning systems that provide physical filtering of water, bank stability, water storage, and assist in the recharge of underground aquifers along with the adjacent uplands. Wildlife habitat is a product of those functions, and should not be considered as the only emphasis for

managing riparian systems. In fact, many times wildlife benefits are among the lowest economic value received from riparian restoration.

To fully evaluate the benefits and incorporate riparian management into land use plans, I believe that we must go back to basic functions.

These functions include:

1. Physical filtering of water—Riparian vegetation can withstand high velocities of water and still remain intact. One of its functions is to slow the flow of water, literally "combing" out sediments and debris. This water purification process also helps to build banks; so channels typically become narrow and deep where once they were wide and shallow. Vegetation, such as grasses, sedges and rushes, lays down under high flows, and literally forms a blanket of protection over the banks. This process reduces bank cutting and aids in deposition of sediments. Where deposition has occurred through time, extensive wet meadows or flood plains develop (Elmore and Beschta 1987).
2. Bank stability—The diversity of grasses, forbs, sedges, rushes, shrubs and trees produces a variety of fibrous and tap roots that bind and hold settled soils in place. The binding effect of the roots helps maintain the positive factors of the bank building processes during high flows. A combination of both woody rooted and fibrous species have a reinforcing effect. The woody rooted species provide physical protection to the hydraulic forces of eroding water and allow forbs, grasses and sedges to bind the finer particles. In combination, this diversity of plant species is much more effective in promoting bank stability than is any one species by itself.
3. Water storage and recharge of underground aquifers—The aquifers in many areas of the west are going dry and one of the processes of riparian systems is to help recharge a percentage of a given aquifer. For many degraded riparian systems, all flows are contained in the channel and cannot access the banks or floodplains where water can spread. It is widely accepted that we can lower a water table and drain a stored underground aquifer through channelization or erosion. It is not readily accepted, however, that we can reverse that process and store water through recovery of riparian systems and deposition in formerly degraded channels. Riparian systems slow the flow of water and allow it to spread and soak into the banks like a sponge, which raises water

¹Presented at the California Riparian Systems Conference; September 22-24, 1988; Davis, California.

²State Riparian Specialist, Bureau of Land Management, Prineville, Oregon.

tables. When banks rebuild through filtering of sediments, they increase the area for water absorption and improve recharge of aquifers by allowing gravity to work on the stored waters.

Upland areas must not be excluded in this paper because they are an integral part of the riparian system. Overland and subsurface flows also influence sediment loads, water cycles, and recharge of aquifers.

Other processes I have observed in Eastern Oregon riparian systems, that have shown a substantial ecological improvement, include increases in the base flow (minimum flow level, i.e. the discharge to which the stream returns after storms or snowmelt periods), reduction in buildup of ice, and physical filtering of sediments by ice. Almost all of the processes I have observed as negative in our stream systems today become positive factors when those streams are in good ecological condition. The education we transfer to the managers and users of our natural resources must contain this basic information.

Management Evaluations

Understanding riparian system functions is essential to their management. In management applications as we endeavor to restore streambank conditions, we are often applying techniques based primarily on the name given the technique and not on what that technique actually does. For example, the three Pasture Rest Rotation grazing system works very well in Central Oregon on low gradient streams that are primarily grass-sedge-rush sites, but can be a disaster on streams that need shrubs for bank stability. If we look "inside" this grazing system, we find that it was designed to fit the physiological needs of grass plants and not riparian shrubs. If we look even closer at what happens under this grazing system in desert rangelands, we can see why shrubs generally decline. The first year we graze the pasture early during the growing season. The second year we graze the pasture after upland grass seeds ripen (usually mid-July), and the third year we rest the area from grazing.

During the spring use period, we receive little if any utilization on willows by livestock. Upland grasses are green and growing, providing a much more palatable forage source than shrubs. During the second year, the common utilization rate for upland grasses in this grazing system is 60 percent. These grasses are now dry and unpalatable and by the time we have achieved the desired 60 percent utilization on uplands, we have gotten 80 to 90 percent utilization on riparian zones. Our observations in Oregon show livestock will begin using the current annual growth on willows during the seed ripe treatment (mid-July through September), when riparian utilization reaches 45 percent. They will increase their use on shrubs again at approximately 65

percent and again at 85-90 percent utilization. The third year we rest the pasture and, hopefully, no use occurs. In analysis we can see that we are basically losing three years of growth on willows and only getting two years of growth back. However, at the same time we are meeting the physiological need of the sedges, rushes and grasses.

There are many things we could do to solve this problem. One is to restrict riparian utilization during the seed ripe treatment to 50 percent or less. Another is to make the riparian area a separate pasture. A third is to add more pastures to achieve more rest, or finally we could exclude the stream from grazing. The point is you must know what your proposed management is going to do, and how it will work in each individual stream system.

Other grazing systems that we commonly use in Eastern Oregon are deferred (graze after seed ripe every year) and early or spring grazing. Deferred or seed ripe use every year can quickly remove small shrubs from streams systems because of heavy riparian utilization, but can also increase sedge and rush communities in wide low gradient valley systems. Early or spring use every year can be beneficial to riparian system recovery, but many times this system can be detrimental to upland grasses if grazing always occurs during the critical part of the growing season (when flower stalks emerge from basal bud). It is very apparent that utilization of riparian vegetation should not be a major concern unless it affects stream function. This occurs commonly with deferred grazing systems on sites where regrowth is limited and in the use of three pasture rest rotation where shrubs are needed for bank stability and sediment filtering.

Figure 1 is a simplified look at how we try to analyze our riparian systems and proposed management techniques. Every management strategy exerts an amount of stress on our riparian systems. The ability that each stream has to handle this stress depends on its own natural stress or sensitivity. Some streams with high natural sensitivity such as those with bentonite soils and high erosion potential are immediately in the caution area and probably can stand little, if any, management stress (human influences). Others that are low gradient with sandy loam soils, for example, can recover under much higher management stress. In our evaluation, the stress of management must not be confused with livestock numbers. Often, for streams in poor condition, livestock reduction was proposed as a solution. However, no recovery in the stream occurred. It was not the numbers of livestock that was the problem, but the management strategy. For example, Bear Creek in the Prineville BLM District previously had 73 animal use months (forage needed to sustain a cow for one month) of grazing under a season long strategy. This was more management stress than over 300 animal use months

now exerted during early spring grazing. As a result of decreased stress, the creek is making significant improvement with a four fold increase in grazing use. There are many other examples in Oregon and throughout the Great Basin, as exhibited in research work by Bill Platts and others (Platts and Raleigh 1984; Platts and Nelson 1985).

Exclusion of livestock is a management strategy that has been proven to work in inducing the recovery of riparian areas. It continues to receive a lot of criticism from many managers and users of the public lands for several reasons. Some of them are: expense of fence construction, maintenance, wildlife concerns and livestock water. However, if we look at many streams in poor ecological condition they have become, in effect, upland exclosures. The attractant nature of streams to livestock during summer grazing periods many times excludes livestock use on 90 to 95 percent of the adjacent upland areas. What we typically observe with streams in poor ecological condition are all of the negative things we receive with improper grazing concentrated in one area. At the same time, we receive none of the positive factors of grazing in the upland areas where they were planned. We are also, I believe, many times comparing exclusion of livestock to improper grazing and not comparing it to proper grazing. There should be three scenarios in our evaluations, not two.

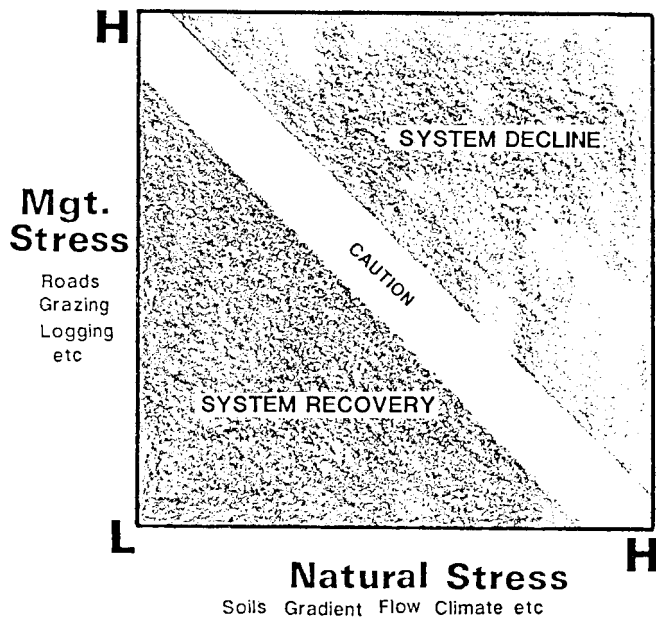


Figure 1—Natural stress or sensitivity of streams vs. management stress. Factors like soils, gradient, water column, climate, etc. must be considered when designing management strategies for system recovery.

Conclusions

We must begin to realize that we can look at things in a different way and that changes in management can provide recovery in our stream systems. The benefits from those changes far outweigh the costs of continuing with our present practices.

The watershed, not just the stream system, must be our focal point. As our energy and dollars focus on restoring degraded streams, we also have to look at the uplands. We cannot forget that the speed and clarity that water comes off our uplands has a big impact on what happens in the stream system. If our goal is a higher quality and quantity of useable water, then the other 98 percent of our rangelands must be a part of our program.

We are at a critical time in the management of riparian areas and associated uplands. "Members of the livestock industry can provide leadership in understanding and solving complex riparian questions (Elmore and Beschta 1987). We must begin to look at both private and public lands because riparian areas have never been able to tell the difference in ownerships, only in management. If we don't change our management, we will either lose the benefits of our natural resources, or we will lose the flexibility to manage for multiple use. The American public is concerned about useable water quality and quantity as evidenced by the recent Congressional override vote on the President's veto of the Clean Water Act. The public will demand more from the management of our natural resources and we must start now to meet those demands. Just remember, you will never see a picture of a degraded riparian zone on a calendar so why should we have them in our landscapes. Riparian management – full stream ahead.

References

- Elmore, W., 1987. Riparian Management: Back to basics. The Public Lands During the Remainder of the 20th Century. Univ. of Colorado School of Law. June 8-10, 1987.
- Elmore, W.; Beschta, R.S. 1987. Riparian areas: perceptions in management. Rangelands Vol. 9 (6) 260-265.
- Platts, W.S. and Raleigh, R.F., 1984. Impacts of grazing on wetlands and riparian habitat, In: Developing Strategies for Rangeland Management. National Research Council/National Academy of Sciences. Boulder, CO: Westview Press, 1105-1117.
- Platts, W.S. and Nelson, R.L. 1985. Impacts of rest-rotation grazing on streambanks in forested watersheds in Idaho. N. Amer. Jour. of Fisheries Management, 5: 547-556.