

GRAZING AND THE RIPARIAN ZONE:
IMPACT ON AQUATIC VALUES

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Abstract.--Livestock grazing is a valid and valuable use of forage on public lands. Multiple use conflicts arise where grazing has long been a dominant use and other values have been neglected. Of special concern is the fact that livestock concentrate in riparian zones and this problem is particularly acute in arid and semiarid regions where the most ubiquitous and significant damage occurs to riparian vegetation. Historically, it has been a common practice of range management to consider the stream bottom lands as "sacrifice areas." Studies on four western streams, comparing grazed and ungrazed sections, revealed 3-4 times more trout biomass in the ungrazed sections per unit area. Removal and reduction of riparian vegetation causes a loss of bank stability triggering a change in channel morphology resulting in a negative change in the habitat. There is an obvious common ground concerning fishery, wildlife and recreation values to demand changes in grazing management where damage to the riparian vegetation occurs. The riparian zone contains the richest concentration of animal life and provides the most utilized recreation areas. The recognition of the significance of the riparian ecosystem is not a new discovery, but implementation of adequate riparian protection under multiple use management on federal lands has been a slow process. This is due to ambiguous wording of multiple use guidelines, often contradictory directions from Washington to the state or regional level concerning outputs from federal lands, and pressure exerted by user groups to influence land use decisions at the local level.

Litigation may be necessary to accelerate the implementation of better multiple use management of federal lands.

INTRODUCTION

It appears that a tremendous reawakening has occurred in recent times towards an appreciation of the true significance of the riparian ecosystem for fisheries, wildlife, recreation and water quality. Besides this present symposium on the subject, symposia were held at Tucson, Arizona in July 1977 (the papers were published in U.S. Forest Service Gen. Tech. Rep. RM-43: "Importance, preservation and management of riparian habitat"), in Sparks, Nevada,

in May, 1977, on livestock and wildlife-fisheries interrelationships (symposium papers in press), in Washington, D.C., March, 1976, on improving fish and wildlife benefits in range management (published by USFWS; FWS/OBS-77/1), and future symposia include one on "grazing and riparian/stream ecosystems," sponsored by Trout Unlimited and several governmental and private organizations to be held in Denver, November 3-4, 1978, and a national riparian symposium scheduled for Atlanta, Georgia, December 11-13, 1978.

The significance and values of riparian communities have been and are being well documented. The problem is that this significance is not adequately taken into account as an integral part of revised livestock grazing plans on public lands at the local level.

With other potential multiple use conflicts, such as logging, riparian communities can be preserved if certain guidelines pertaining to buffer strips are followed. There are no such guidelines, or known range management techniques short of fencing, that can protect riparian vegetation from domestic livestock grazing. Livestock grazing continues to be the most ubiquitous and pervasive negative influence on riparian ecosystems.

About 48% of the total land area of the 11 western states is under federal control and more than 75% of this land is grazed by domestic livestock. I will state here my opinion that the use of public forage by private livestock is a valid and desirable use of public lands. Conflicts arise where this use destroys other more valuable resources, and this conflict is focused most intensely on the riparian zone. The problem is simply that livestock tend to concentrate along stream bottom lands. This problem is magnified in arid and semiarid foothill regions at lower elevations where the grazing season is longer and where, by mid summer, the only water and palatable vegetation is found along streams.

The historical aversion by federal agencies to protect the riparian zone by fencing, the common acceptance in range management practice that the riparian community is an unfortunate but unavoidable "sacrifice area," and the mass conversion to rest-rotation grazing systems, which increases the intensity of damage and prevents the establishment of woody riparian vegetation (such as willows), is leading towards legal confrontations.

Unfortunately, the issue is charged with emotion and opinions soon become polarized with a "choosing of sides." Hopefully, as more light and less heat are shed on the matter, progressive ranchers will realize that, in the long run, livestock interests have the most to gain from the reversal of the downward trend in the vegetative conditions of watersheds and from the restoration of grasslands to millions of acres of what is now essentially, barren arroyo gutted wasteland in the Southwest. In the last 100 years, the rate of "desertification" of the American Southwest has been far more rapid than in similar climatic areas of the world -- and overgrazing by domestic livestock has been the major cause of conversion of grasslands to barren wastelands.

THE PROBLEM

In areas where forage and water are well dispersed throughout a watershed and grazing intensity is moderate, livestock grazing is not harmful, and can even be beneficial to certain fishery and wildlife values. It is in the arid and semiarid regions where precipitation is sufficient to establish grasses and forbs, but not sufficient to promote rapid and vigorous growth of vegetation, where vegetation is highly susceptible to overgrazing. Once the vegetation canopy is removed, heavy rains are not absorbed into the soil but run overland causing erosion. When this occurs, the amplitudes of peak run-offs are tremendously increased. The loss of riparian vegetation results in destabilized stream banks. The energy created by the increased flood peaks causes the stream channel to trench down, creating an arroyo (or if bedrock is near the surface, the energy is dissipated by forcing the stream channel to spread out and braid). With a lowering of the stream channel to form an arroyo, the water table drops and former grasslands are converted to more xeric species of vegetation.

This pattern of dramatic changes in the watersheds and aquatic environments of the American Southwest during the past 100 years has been the major cause of the widespread replacement of native fishes by introduced species (Miller, 1961; Behnke, 1977). More specifically, trout populations are affected from the loss of riparian vegetation and destabilized stream banks by a modification of their physical habitat. Optimum trout waters are characterized by slow, deep water with abundant cover (typical of undercut bank areas). In such habitat, trout populations can expand to the limits of their food supply (abundance is food limited). Where riparian vegetation is destroyed, the banks trampled and caved-in, the stream will typically braid out or trench down and the habitat is characteristically composed of shallow, high velocity flows without adequate cover. In such situations the abundance of the trout population is limited by its physical habitat (abundance is habitat limited). In relation to the impact on trout abundance and growth, the effects of overgrazing in the riparian zone is comparable to stream channelization (Behnke and Zarn, 1976). In the paper I submitted to the symposium on livestock and wildlife-fisheries interrelationships (Behnke, 1978, in press), I pointed out that four case history studies comparing trout populations in grazed and ungrazed sections of the same stream, all agreed that trout biomass was 3-4 times greater in the ungrazed sections. The differences in the aquatic habitats between grazed and ungrazed areas, in all four studies, reflect the descriptions given above of food limited vs. habitat limited environments.

Although there is some contribution of terrestrial invertebrates (in some cases quite considerable) to the trout's diet, which is lost from destruction of riparian vegetation (Hunt, 1975; Erman et al., 1977; Meehan et al., 1977), the major detrimental influence of livestock on trout is not through modifications of the food supply, but by a modification of the physical habitat,

changing the shape of the living space, and this effect is initiated by the destruction of riparian vegetation.

THE PAST

A point that must be understood is the differences between natural erosion and accelerated erosion. It is not commonly realized that millions of acres of land in the arid regions of the American Southwest, presently dissected by deep arroyos and characterized by mesquite, sagebrush, greasewood and cactus were grasslands less than 100 years ago. The transformation of these lands is an example of accelerated erosion. The primary cause of this erosion was overgrazing by domestic livestock, particularly in the late nineteenth century, during the days of the open range. Many persons refuse to accept this conclusion, but the evidence is overwhelming. There are three possible ways to stimulate accelerated erosion: 1, climatic change (greatly increased precipitation); 2, geological changes, tilting the earth's crust to increase gradients; and 3, vegetation removal on watersheds.

Briefly summarized, the evidence is as follows: There was no detectable changes in precipitation patterns in the Southwest during the late nineteenth century in areas subjected to accelerated erosion, nor were there changes in the geological landscape. Arroyo cutting began within a few years after an area was subjected to heavy grazing pressure. Comparable areas not grazed did not undergo accelerated erosion and arroyo cutting. Areas subjected to accelerated erosion and arroyo cutting have reversed the process -- the watersheds were revegetated with the arroyo scars healing, after many years of complete protection from domestic livestock. After reviewing many case histories and literature on the subject, Hastings (1959) concluded that arguing over the question -- if livestock grazing was the major cause of the accelerated erosion in the arid Southwest -- was "beating a dead horse." There is no other reasonable conclusion; the evidence is overwhelming.

Other man induced influences such as land cleared for agriculture, river channelization, clear-cutting, etc. have a synergistic effect with overgrazing to increase the rate and magnitude of accelerated erosion. Dissmeyer (1976) examined all causes of accelerated erosion on a watershed and concluded that 92% of it was due to livestock grazing.

A sequence of the events of accelerated erosion has been documented for the Douglas Creek watershed near Rangely, Colorado (Womack, 1975). In 1883, livestock grazing was initiated on a large scale. Mr. James Rector brought in 25,000 head of cattle to the Douglas Creek watershed. Later in his life, Mr. Rector reminisced that when he first came to the area, the Douglas Creek watershed . . . "was the best cattle country you ever seen -- no brush and deep gullies like today, but lush, grass up to the stirrups of a horse." Today, the watershed is a barren expanse of greasewood, dissected by deep arroyos. A cabin built by Mr. Rector,

precariously teeters on the edge of a 40 foot arroyo channel cut by Douglas Creek.

THE PRESENT

The days of the open range came to an end with the Taylor Grazing Act. Substantial improvements in range conditions have been made in many areas, but comparable improvements in the riparian vegetation in areas exposed to livestock grazing has not occurred and they continue to decline in many grazing allotments. It is now known that areas protected from livestock grazing can be naturally restored with the establishment of good vegetative cover, stabilized stream banks, the transformation of intermittent flows to perennial flows with great reduction of sediment loads -- that is, the process of accelerated erosion can be reversed (Heede, 1976; Winegar, 1977). The papers presented at the Sparks, Nevada, livestock-wildlife-fisheries symposium, documented that stream sections protected from livestock responded rapidly with increases in trout biomass of 3-4 fold. Van Velson (1977) discussed the dramatic improvements resulting in Otter Creek, Nebraska, a small tributary to Lake McConaughy, after the riparian area was protected from grazing. Prior to 1969, Otter Creek suffered from overgrazing. The warm, shallow, silted stream was virtually barren of fish. In 1969 the Nebraska Game and Parks Commission leased the headwater area and fenced out livestock. Rainbow trout eggs were planted in Otter Creek in 1969. The stream rapidly recovered, riparian vegetation flourished, it stabilized the stream banks, deepened the channel, cooled the water and provided cover. The water ran cool and clean; gravel beds were exposed after lying for years under silt deposits. A migratory run of rainbow trout from L. McConaughy became established and produced 20,000 7-10 inch young fish to the lake fishery in 1974.

Winegar (1977) documented similar beneficial results to water flows and quality and to wildlife from the livestock enclosure zone on Camp Creek, Oregon. The abundance and diversity of wildlife in the protected riparian area is much greater than in contiguous areas, grazed by livestock (rattlesnakes are more abundant in the grazed area).

Merely by using the literature and reports generated by Bureau of Land Management employees, the values and significance of riparian communities can be well documented. Yet I have been dismayed to read recent draft environmental impact statements on BLM grazing allotments that reflect a "business as usual" attitude with neglect or even planned further degradation of riparian ecosystems. What is the cause of this apparent "bureaucratic schizophrenia?" The BLM has a long history of administrators rising in the ranks in an atmosphere of subservience to the livestock industry. Citizen advisory boards are made up of or dominated by user groups. When decisions are made at the local level regarding land use and management, livestock interests form a vocal and cohesive force; fisheries, wildlife and environmental interest groups are diffuse and ineffective in influencing a change in policy.

THE FUTURE

The BLM must prepare 212 environmental impact statements on the 150,000,000 acres of grazing lands it administers in the 11 western states. Some of the current draft EIS' I have seen or am familiar with, reflect the "business as usual" attitude in relation to livestock grazing. Heavy reliance is put on rest-rotation grazing to increase the AUM's (animal unit months). At the Sparks, Nevada symposium, previously referred to, it was brought out by fisheries biologists experienced with rest-rotation grazing, such as Dr. William Platts, USFS, that high livestock density at certain times, causes more damage to the riparian vegetation than former grazing systems. One or two years rest is not sufficient to restore the vigor of woody vegetation such as willows, which are so critical to maintain stable stream banks and channels. Thus, I predict that if the new BLM grazing proposals are instituted, a continued downward trend will occur in the riparian vegetation with further reduction in fishery and wildlife values.

The BLM is faced with conflicting, often incompatible and contradictory directives. For example, on one hand they are responsible for maintaining and enhancing fish and wildlife and their environments, and on the other, to increase the products from the land, such as red meat. When it comes to the bottom line, the environment continues to receive the lower priority.

The livestock grazing EIS' I have read are highly vulnerable to legal action under such federal laws as the National Environmental Policy Act and The Colorado River Salinity Control Act (if watersheds are in Colorado River basin) because of their overwhelming emphasis on increased grazing pressures, regardless of the loss of other values. I believe legal action or the serious threat of litigation will be necessary to remove the land management decisions, which are of national significance, from the local level and turn the situation around now.

The March, 1978 Readers Digest contained a laudatory article written by J. N. Miller on Secretary of Interior Cecil Andrus. The article is filled with optimism that at last the BLM is entering a new era of environmental enlightenment. As long as land use and management decisions are made at the local level, I foresee no dramatic change in the future. Indeed, as discussed, above, the long range plans of the BLM regarding livestock grazing calls for increased grazing pressures and a mass shift to the rest-rotation grazing system. Without fenced protective zones, the riparian communities and their fishery, wildlife and recreation values will almost certainly decline.

An obvious solution to this problem is to separate the riparian zones from regular grazing allotments and manage them with a different set of priorities (Behnke, 1977). The mechanism to do this is found in the Federal Land Policy and Management Act of 1976, which instructs the BLM to promptly develop plans for the protection of "Areas of Critical Environmental Concern" (ACEC). In

multiple use conflicts, ACEC preservation is given the highest priority.

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