

The road to rangeland reform: a history, review, and prospectus

by

Peter B. McIntyre

Preface

As I began background work for this paper, my goal was to investigate a few recently proposed solutions to the problems caused by mismanagement of federal lands in the west for grazing purposes. In particular, I was intrigued by the idea of leveling the playing field for all categories of public-land users, allowing non-ranchers to bid on the use of federal property in the same way that ranchers do. Mark Muro's columns in *The Earth Times* had introduced me to this idea, and he proved to be a willing source of information and suggestions. Having seen cattle and ranchers for most of my life in Texas, I hoped that I could just leap right into this subject without spending too much time on background details. After all, the merits of clear, well-reasoned solutions should be so robust and self-evident that they stand almost independent of the problems which they were designed to fix, right? Wrong.

Federal grazing policy is an issue of extraordinary complexity, and I soon discovered that interpreting and assessing the proposed solutions would require considerable familiarity with the extent and nature of the problems themselves. I set to work reading about the ecology of western rangelands and the federal policies which have given rise to the current plight of western residents, including plants and animals, human and non-human. Along with combing the literature on the subject, I talked to John Horning, the range specialist for a New Mexican environmental group, the Forest Guardians. He was a great help, and described to me his perspective on the evils of Great Basin grazing. I also

corresponded with Carl Bock, a rangeland ecologist from Colorado, who has studied the effects of domestic grazers on native animals and plants for decades. The details that these two men shared with me and that I read were often horrifying, particularly those concerning riparian areas and the unique freshwater communities which had evolved in the west. "How could this have happened?", I wanted to know. The obvious place to look for answers to this question is the three key pieces of legislation which have addressed western public-land grazing in the last sixty years.

That brought me to several key sources for this paper. First, I learned that there is no substitute for reading the relevant legislation and its accompanying history. Despite the best attempts to suppress it, much sentiment lies beneath the surface of Congressional language, sentiment that is only available to the perceptive reader who becomes intimate with the bills themselves. In the case of recently-proposed public land use legislation, there is also an incredible stock of information and feeling to be found in the testimony presented to the Congressional committees examining the issue. Closely reading both the written and orally presented testimony from ranchers, environmentalists, and politicians accentuated the "people issues" which must be considered when we seek to change a system so heavily ingrained in the public mindset and entwined in the regional economy.

My final, and perhaps most important, source of fact, opinion, and perspective was former Governor of Wyoming Michael Sullivan. Governor Sullivan tested both my facts and my ideas, and, more than anyone else, forced me to recognize that the grazing issue involves too many people and too many facets of western life to be assigned a simple solution. He gave freely of his time and mind while a fellow at the Institute of Politics, and for that I am deeply indebted to him.

You, the reader, now know the source of the information and many of the ideas elaborated below. I hope that you enjoy the journey—for me it was an protracted epiphany—as much as I have.

Introduction

"Beef. It's what's for dinner."

--line from a series of television commercials created by a beef producers' consortium.

One of the chief characteristics of the western states is the high proportion of land within their boundaries that belongs to the federal government. Of the roughly one-third of the U.S. that remains in federal hands ([Table1](#)), nearly ninety percent lies in the western-most

twelve states (Figure 1). Within the eleven western-most, contiguous states, anywhere from thirty-three to eighty-two percent of the ground—an average of one-half—belongs to the federal government (Hess and Holechek 1995), and many state governments also have substantial holdings (e.g. about five percent in Wyoming; Sullivan, pers. comm.).

If one examines the distribution of ownership in any one state, a "checkerboard" pattern emerges, in which state, federal, private, and corporate (especially railroad) properties are intermingled. Large, continuous blocks of any one category are unusual. This patchy pattern of ownership is an artifact of many federal laws and policies, including those by which the states were annexed, the Homestead Act, and the railroad grant acts (Francis and Ganzel 1984). Each category of land is, by definition, managed by an entirely different political entity, and the rules governing grazing vary greatly between and among federal, state, and private managers.

Between the Forest Service, a division of the Department of Agriculture, and the Bureau of Land Management (BLM), part of the Department of the Interior, livestock grazing is permitted on approximately 268 million acres of federal property, almost entirely in the western-most sixteen contiguous states (see Figure 1). This rangeland has been divided into about 31,000 grazing allotments, for which grazing privileges are leased on a case-by-case basis to ranchers. Allotments average over 8500 acres (13 square miles), with a range from forty acres to more than one million. Despite the vast number of cattle, sheep, and horses that graze on public lands, less than five percent of American beef cattle and thirty percent of sheep ever use western public ranges. However, fully one third of the cattle produced in the west spend at least part of the year on public lands, including many calves destined for the midwestern feedlots (GAO 1988b).

A common claim among public-land ranchers is these public lands are better off now than they were at the turn of the century. This assertion is based on a statement by the Bureau of Land Management (BLM) to the same effect, which is presented in virtually all of the pamphlets and guides that it publishes (e.g. BLM 1992). Although there is undeniable evidence that nineteenth century ranchers over-grazed the open range in particular regions (e.g. Abruzzi 1995), the empirical proof for this sweeping generalization is tenuous at best. Several federal recent grazing laws have stated that little was known about the condition of most rangelands even when they were passed (1976 and 1978, respectively), let alone during the previous three-quarters of a century.

Regardless of the validity of the BLM's conclusions about historical range conditions, current conditions continue to generate much concern. [Table 2](#) shows the percentages of BLM rangeland in improving (18%), stable (70%), and declining (12%) condition. Although these figures were better in 1991 than in 1974, they are nonetheless quite alarming. Thirty-one percent of BLM ranges remained in fair condition and another six percent in poor condition in 1990 ([Table 3](#)). A cooperative study by the National Resources Defense Council and the National Wildlife Federation in 1985 indicated that, according to BLM's own data, nearly half of the BLM range was in "unsatisfactory" condition, and only two percent in "excellent" shape (quoted in Franklin 1986). These conflicting conclusions are reminders that any figures generated by either the government

or interest groups must be accepted with caution, but regardless of which numbers you believe, there is good reason for alarm.

Riparian habitats, the strips of vegetation along rivers and streams, are of particular concern, and have received more attention in the last decade than any other single issue associated with grazing. Though, they cover less than one percent of western rangelands (GAO 1988a), riparian zones nonetheless harbor or are necessary for much of the region's biodiversity (reviewed in Fleischner 1994), and are the most productive part of the range (Kauffman and Krueger 1984). They serve many well known functions for both the terrestrial and aquatic communities. The riparian plant community is more diverse than any other in the west, and this vegetation is vital for trapping eroded soil and vegetation before it reaches the stream. This benefits streams by preventing sedimentation, and it also enriches the soils in the riparian zone and maintains a high water table (GAO 1988a). Up to ninety percent of the organic matter necessary to support streams comes from riparian inputs (reviewed in Kauffman and Krueger 1984), so the energetic linkage between western streams and adjacent lands is tight under natural circumstances.

Cattle appreciate the vegetation and cool temperatures associated with riparian zones as much as any human. Because they spend so much time at streamside, the degrading effects of grazing are most magnified in these areas. Livestock alter bank vegetation and soil structure directly, while directly and indirectly influencing stream channel morphology and water quality (Fleischner 1994). The soil is compacted in heavily grazed areas, which decreases soil water retention and thereby increases runoff. This affects plant growth, as does browsing and trampling by cattle. As plant community density and diversity are reduced, the buffering capacity of the riparian zone is reduced, and more soil reaches streams. This affects both the physical characteristics of streams (water chemistry and channel morphology) and their suitability for aquatic life. In particular, the removal of willow and cottonwood seedlings along western rivers and streams has resulted in more erosion and higher temperatures both on the bank and in the water (Szaro and Pase 1983, Fleischner 1994). As vegetation is removed and streambanks widen, the water table drops, affecting subterranean water availability on the nearby rangeland as well as near the water.

Though recent reports by the Environmental Protection Agency, BLM, Forest Service, General Accounting Office (GAO), private professionals, ranchers, and academics all agree that the current state of federal rangelands and grazing policies must be improved in the near future (reviewed in Kauffman and Krueger 1984, Fleischner 1994), they typically differ in their outlook on the historical patterns which have led to present conditions. It is this history to which we will turn first; understanding the three major federal grazing regulations which have governed the public-lands livestock industry over the last sixty years is requisite to any fair evaluation of the present state of the western range, politics, or economy.

After reviewing that legislation, I will turn to the present state of enforced stewardship on public lands. I will frame my discussion around the interaction between market forces,

history, and the presently-mandated conservation of public lands. The web of good and bad subsidies and bureaucracy which the federal government has erected to support western grazing efforts makes the situation complex for all parties involved, and particularly for those who depend upon grazing privileges: the ranchers. As some critics have come to recognize, the regulatory jumble actually obstructs conservation efforts by ranchers concerned for the health of their ranges. Responsibility for this folly lies in the historical inertia behind well-intentioned but ineffective and ecologically damaging regulations, and the trepidation of industry groups when faced with the prospect of mandated, as opposed to involuntary, changes.

Many solutions to these problems have been proposed, and these will be the subject of the final section. They range from radical shifts in the way federal lands are administered to minor, across-the-board alterations to current policy guidelines. I have selected four well-documented approaches, each of which will be thoroughly reviewed in light of the full breadth of problems facing western rangelands.

Federal Legislative History

From the point-of-view of western settlers, ranching was probably never seen as an easy way to make a living. The early homesteaders had each been given 160 acres of select land under the Homestead Act of 1862, which was designed to create a network of small, independent farmers in the Jeffersonian tradition. Although these parcels were typically situated near a reliable source of water, they were nonetheless too small and the soils too dry to produce a steady, salable harvest of traditional crop plants. Surrounded by vast tracts of arid and semi-arid grasslands, the settlers realized that only sheep and cattle would grow well under the circumstances, and the xeric soils seemed resilient to grazing. This realization may also have been catalyzed by the observation that stray cattle from the long Texas-Montana drives did exceedingly well roaming freely in the west (Sullivan, pers. comm.). The result was that, prior to 1934, control of most western rangelands lay entirely in the hands of ranchers, who "built fences, controlled water for livestock, and formed policing associations to protect the unowned grass resource from overuse" (Hess and Holechek 1995). The federal government largely ignored this violation of the "open range" policy on public lands until the turn-of-the-century, when public concern over diminishing timber reserves and grassland quality increased.

The creation of the national Forest Service by Theodore Roosevelt and Gifford Pinchot in 1905, coupled with the concomitant rise in public concern for the conservation of natural resources, resulted in more intensive regulation of the public rangelands. Much of the federal range was to be administered by the new Forest Service, which resolved to charge

fees for grazing privileges. This sparked rebellion within the ranching community, which opposed grazing fees on the grounds that they would diminish profit margins and constituted unnecessary and unwelcome government intervention (Francis and Ganzel 1984). Their protest was to no avail; the Forest Service began collecting grazing fees anyway, but with little effect on the problems of overgrazing and range degradation. Thus, Congress was forced to address the issue for the first time in 1934 with the passage of the Taylor Grazing Act.

The Taylor Grazing Act of 1934

Federal grazing policy on public lands has changed remarkably little since its inception. The Taylor Grazing Act of 1934 was enacted in response to concerns about the over-utilization, and resulting degradation, of federal lands by large-scale ranchers (Mackey 1996). With increasing grazing pressure and noticeable erosion occurring on western rangelands, Congress hoped to allay fears of a western "dustbowl" caused by mass-removal of vegetative ground-cover. There was a need, it believed, to erect policy guidelines that would stabilize the western ranching industry, embracing both economics and ecology. Fodder for cattle and sheep was recognized as a renewable resource, and thus a desirable component of a secure state and federal economy. Although nothing could match the immediate benefits of mineral extraction, grazing offered the opportunity to build lasting communities of self-reliant ranchers who could augment the supply of red meat from the midwest and south.

Despite great protest from both early western ranchers and their Congressional representatives, the Act governed the use all federal lands managed by the Department of the Interior. Contrary to its interpretation by some ranchers (Mackey 1996), the conservationist doctrine espoused by the Act was not anti-grazing by any measure. Instead, it advocated the scientific management of resource consumption, which was viewed as the ultimate solution to the problems of both ranchers, who were concerned about decreased range productivity, and the public, which feared degeneration of federal lands. Of course, American solutions are traditionally recorded in the form of regulatory laws, and so it was with the conservationist's panacea for over-grazing (Hess 1996). The Taylor Grazing Act was passed, charting the course for grazing policy-makers ever since. Each section of the Act will be described below, accompanied by a brief interpretation of its significance and intent.

Land Management

The Act's first two sections (§ 2-3) declare that the government must facilitate the dedication of those public lands "which...are chiefly valuable for grazing and raising forage crops" to their "highest use." This was tantamount to ordering grazing on all public lands in the west. In order to accomplish this goal, the Secretary of the Interior (hereafter Secretary) was instructed to divide the western states into large grazing districts. Thereafter, the sole condition under which high-quality federal land could be dispensed to the public was if a small (less than 320 acres) area was more suitable for cropland than rangeland, then any qualifying citizen could make a homestead claim upon it. As intended, this froze federal land holdings at their 1934 levels by ending homesteading (Mackey 1996), although there have been many challenges to federal retention of property since. Not coincidentally, many of these challenges have originated from rancher complaints (e.g. the Sagebrush Rebellion; Francis and Ganzel 1984).

Hunting and fishing on federal property were explicitly permitted, and were not to be impacted by grazing district boundaries. The Secretary was to create and enforce rules for using the public lands with the following goal: "to preserve the land and its resources from destruction or unnecessary injury, to provide for the orderly use, improvement, and development of the range." If these rules were willingly violated, fines were authorized. Other acceptable domestic and commercial uses for federal lands were also discussed in the Act. Grazing animals used for domestic purposes were exempted from grazing fees, and the Act could have no influence on timbering or mineral extraction activities on public lands. In both cases, the public (i.e. multiple use) nature of the lands involved was recognized, privileging both temporary, high-yield resource extraction and non-commercial, personal use over grazing. However, this public-use terminology meant little at the time, because most non-commercial and recreational user-groups were probably made up of the ranchers themselves. The endorsement of public use simply protected the extraction of timber and minerals from rancher interference, and extended the list of acceptable activities on federal rangelands to include hunting and fishing by the few people who already had access to them: the ranchers, and perhaps other influential community members.

Permits and Fees

Since the passage of the Act, the sections dealing with fees and permits have been the most influential (§ 3, 10-11). It directs the Secretary to establish a permit system under which rangeland allotments will be made to individual ranchers, and an annual fee paid to the Treasury. The system was designed to preferentially grant permits to individuals owning property or water rights within the grazing district in which they sought the permit. In this way, the government could permanently end long cattle drives and opportunistic use of federal lands, instead limiting usage rights to nearby landowners who could compensate for the shortcomings of federal lands (e.g. lack of water) with

resources from their own property. By legally linking adjacent properties for a single purpose, Congress sought to optimize the use of the public lands, essentially privatizing their use, while retaining the deed to these lands in the public name. The fee, like the one imposed earlier by the Forest Service, was intended primarily as a means of offsetting the operating expenses of the managing agency rather than feeding the federal Treasury.

Furthermore, permit renewal was guaranteed to the present permittee, provided that no regulations were violated, if losing the permit would in any way compromise the security of a loan. This clause was clearly written in deference to the banking industry, on which the western ranchers have come to depend. To allow stockmen to use their public-land leases as collateral on loans, it was necessary to grant them sustained tenure—a fundamental property of private lands. The duration of the permit period was limited to ten years, and the Secretary was given the right to "specify from time to time numbers of stock and seasons of use," thus further defining the lease conditions to facilitate banking arrangements. Lenders could be confident in a debtor's long-term income potential and semi-liquid assets (i.e. livestock), while debtors remained secure in the knowledge that they would have ample opportunity to earn freedom from their debts and make their fortunes.

If disaster were to strike, the Secretary was authorized to refund or reduce the grazing fees owed during emergency periods (e.g. drought or disease). Again, the interest of the lenders was probably at least as influential as that of the ranchers in motivating these protections. Yet, despite all of the above safeguards against the vicissitudes of nature and of government regulation, Congress made certain to state that the "Act [did] not create any right, title, interest, or estate in or to the lands" affected, nor did it restrict the uses to which water rights might be put. Thus was born a sort of public-private hybrid, created to perpetuate the western cowboy image and culture and nicknamed "cowboy socialism" by its critics, and with it the facade of rugged independence which has typified ranchers ever since.

The Act also provided directions for the allocation of the grazing fee receipts, and these have been among its most controversial prescriptions. For most federal lands, one half of the grazing receipts were to be disbursed to the state from which they were raised, and further distributed to the individual grazing districts from which they were collected. Another twenty-five percent of all receipts were given, upon Congressional approval, to the Secretary to be used for the "construction, purchase, or maintenance of range improvements." If the relevant lands belonged to the Indians, the division of the moneys was to be as follows: twenty-five percent was allocated by the Secretary for range improvements, twenty-five percent went to the state to be spent on the schools and roads of the county containing the leased land, and the remaining fifty percent of the grazing receipts were to be given directly to the involved Indian group. Since relatively little of the federal land authorized for grazing was on Indian grant lands, the former set of provisions was the most important for its potential contribution to the federal budget; one quarter of the fee income would reach the federal coffers, while the remainder would be redistributed within the ranching communities via range improvements and funding of

state and local infrastructure and management expenses. This was clearly a major subsidization of western ranching from the beginning.

Range Improvements

Section 4 authorized the construction of range improvements, such as reservoirs, fences, and wells, on public lands. In the event that a permit was to change hands, the Act required the new permittee to remunerate his or her predecessor for the present value of the improvements. Thus, range improvements "constructed and owned" by a one lessee were not incorporated into the grazing fee, nor were they truly federal property, but rather both the costs and the benefits were passed between successive users. It is unclear whether this applied only to those improvements paid for exclusively by the lessee, or also to those improvements supported by direct government subsidization.

Agency Jurisdiction

Noting the discrepancies between the grazing policies observed by the Interior and Agriculture departments, Congress also sought to address the relationships between federal agencies in the Taylor Act (§ 12). The Secretary was authorized to cooperate with any other government department in addressing livestock issues, while the President could shift jurisdiction over all federal lands used chiefly for grazing to the Department of the Interior, and give control over all forests to the Forest Service. These rules had the potential to reduce the confusion over conflicting policies in the Forest Service and BLM; however, they have not been applied consistently or rigorously.

Throughout the Act, emphasis is placed on empowering local citizens to avail themselves of public resources. Congress seemed to subscribe to the invisible hand approach to range health, attempting to effect sustainable usage of the rangelands by restricting access rather than emphasizing qualitative or quantitative criteria for acceptable range quality. Economics took precedent over ecology, and if subsidization was needed to make ranching a more palatable undertaking, that was permissible. The unpredictability of western ranching dictated that stockmen should even be insured against disaster by the federal government. The Act demonstrated that the government shared the vision of rugged, American independence, and was willing to pay for it if necessary.

Conclusion

Even in the 1930's, ranching was probably never anticipated as a major contributor to the federal budget. Rather, it was hoped that that portion of the Interior Department's

bureaucracy would become self-supporting (Mackey 1996), and that livestock production would become the foundation for long-term economic stability in western communities and states. In terms of their local fiscal contribution, ranchers are wonderful citizens: they are consumers of fencing materials, troughs, and other goods manufactured elsewhere; producers of meat and wool; and employers of local people. Too, the long-term nature of raising long-lived animals made ranching a tradition on whose longevity the banking industry could rely. All of these factors, and their respective lobbies, made institutionalized public-land ranching appeal to Congress. Both the wording of the Act and its inclusion of many other high-profile provisions in the same section downplay the importance of the grazing fee. Fee collection was treated casually, as something "to be fixed or determined from time to time," rather than as the legislative centerpiece which it has since become. In fact, it was not until 1939 that grazing fees were imposed by the Grazing Service, the agency which later became the BLM (Francis and Ganzel 1984). Although Congress would not have objected to seeing the Treasury benefit directly from western grazing, it was undoubtedly more concerned with the apparent jeopardy of public land degradation and with establishing self-perpetuating communities between the great plains and the west coast.

Similarly, livestock density and season of range use were included in the Act only as administrative details to be addressed by the Secretary. The perceived problem with ranching was the distribution of ranchers, not of cattle or sheep. In keeping with Pinchot's tenet of scientific management, it was believed that good advice from trained government employees would remedy range degradation as long as the ranchers were confident in the security of their tenure. Ranchers could be good stewards of the public trust if given the chance, and grazing was clearly the highest use for which most arid public lands were suitable. As long as timbering and mining, which could produce real, short-term profits for the government, were not impeded, cropping the grasslands could do no harm. In fact, compared to the obvious destruction wrought by mining or tree-cutting, ranching seemed quite benign, as long as there were still big game to shoot and trout to catch. With these goals in mind, Congress optimistically passed the Act in hopes that both the economy and ecology of the west would improve.

The Federal Land Policy and Management Act of 1976

Despite its good intent, the Taylor Act did not reverse the degradation of rangelands in the ensuing forty years. It did, however, produce small, stable communities in the west based on feeding, supplying, and financing ranchers. Employment could be found either

on a ranch or with a public agency addressing ranch issues, and many ranch families added generation upon generation of stockmen who managed the family ranch, including both the private base ranch and the public range leases. Although the total number of head run was declining (see [Figure 2](#) for Wyoming), there was still enough margin for most ranchers to continue in the business.

However, in the 1950s and 60s, there was a major change in the American political landscape. During and following the post-World War II boom, Americans from outside the west discovered the recreational opportunities which it held (Francis and Ganzel 1984). In response to the accurate perception that a monopoly had been granted to cattlemen and foresters on public lands, Congress passed the Multiple Use-Sustained Yield Act in 1960, which directed the Forest Service to pursue a long-term policy of sustainable use of surface resources, including recreational opportunities (Jordan 1994). Thus, the terminology of multiple use and sustained yield were introduced into the natural resources debate, pitting the average recreational user of public lands against the entrenched industries built upon past Congressional approval of extractive and damaging resource consumption. Concern about environmental degradation and loss of recreational and aesthetic resources continued to grow through the 1970s, while consumptive users of these resources became increasingly bitter and embattled.

In 1976, Congress introduced the new natural resource terminology into the guidelines for use of all federal lands. The Federal Land Policy and Management Act (FLPMA) was intended to redress public fears of unfair subsidization and monopolization of natural resource consumption by large, uncaring corporations. It declared that: all federal lands shall remain publicly owned unless unmanageable; public resources should be inventoried and their present uses reviewed; binding yet flexible plans should be created for resource use, and, in particular, allotment management plans should be prepared for all livestock operations on public property; all management should adhere to the goals of multiple use and sustained yield; public lands must be preserved in their natural state to permit continued usage by wildlife and people; "fair market value" should be paid for consumption of public resources; use of the public land should recognize the public's need and demand for domestic sources of minerals, food, timber, and fiber; and the federal government should compensate the state and local governments for their loss of tax revenue due to federal land ownership within their boundaries.

Many of these clauses had clear implications for western grazing policy by elaborating upon, amending, or supplementing the terms of the Taylor Grazing Act. In particular, the clause mandating the inventorying of federally owned natural resources was a necessary step towards instilling responsibility in federal agencies. Never before had the BLM surveyed the state of all its rangelands within the same decade, nor had it maintained records of returns from sub-leasing federal property by permittees (Committee on Natural Resources 1994). Those functions are vital to the agency's long-term management purposes, and their consideration in FLPMA was of great, often unacknowledged, importance.

As defined in FLPMA, multiple use requires that public lands be managed in such a way that their utilization best meets the present and future needs of the American people. The Act explicitly stated that optimal utility did not equate with optimal economic return or greatest unit output, although it failed to suggest what other indices might be comparable. Sustained yield referred to the maintenance in perpetuity of high annual or periodic levels of renewable resource production from public lands. Clearly, these provisions were so loosely defined as to be almost useless to policy makers, but they were sufficient to quiet the outcry over public land abuse. And despite their generality, the calls for sustainability and multiple use did establish the basis for later legal challenges of resource over-consumption in the west.

Allotment Management Plans

The concept of an allotment management plan (AMP) was created specifically to address the sustainability of grazing on western public lands, and to do so on a permit-by-permit basis. AMPs, which are still used today, are documents "prepared in consultation with the lessees and permittees involved," and apply to both BLM and Forest Service lands. They prescribe the specific range improvements and activities permissible on federal grazing leases, and are required by FLPMA to be reassessed with every permit renewal in order to ensure that the recipient was following the sustained yield and multiple use guidelines. However, the Act provided recourse to an appeals process if a lessee disputed the legitimacy of the conditions given in an AMP. It was also decreed that AMPs should be designed and incorporated into grazing lease requirements by October 1, 1988, although this goal still has not been met (e.g. Wyoming BLM 1992).

Fees

FLPMA demanded that a joint study on fair grazing fee levels be conducted by the BLM and Forest service with regard to their holdings in the 11 contiguous western states. The western range had continued to degenerate, and Congress believed that the clear solution was to be found in the "installation of additional range improvements [that] could arrest much of the continuing deterioration and could lead to substantial betterment of forage conditions with resulting benefits to wildlife, watershed protection, and livestock production." Of course, additional range improvements required reallocation of or additions to the federal funds available for the purpose. Whereas the Taylor Act had only earmarked twenty-five percent of receipts explicitly for the purpose, Congress ordered that fifty percent of grazing fee receipts from non-Indian lands were to go into a special fund for improvements, sending the other half to the Treasury. Half of this money was to be channeled directly to the grazing district, region, or National Forest in which the fees were collected, and the other half would be dispensed by the Secretary. In both cases, the moneys were for use in "on-the-ground range rehabilitation, protection, and

improvement...including seeding and reseeded, fence construction, weed control, water development, and fish and wildlife habitat enhancement." FLPMA also excluded those funds and their uses from the environmental impact statements (EIS) required under the National Environmental Policy Act. Thus, there was little basis on which to predict the potentially negative repercussions of range improvement, making it difficult to detect the occurrence of knowing violations of the sustained yield or multiple-use clauses.

A new formula for calculating the federal grazing fee was also established by FLPMA (U.S. Code—Legislative History 1976). In 1966, the Secretaries of Agriculture and Interior cooperated in a study of the market value of grazing privileges on federal land as compared to private land. Through a combination of surveys and interviews, they estimated that the cattle fee should be \$1.26 per AUM and the sheep fee \$1.13, when calculated separately. The weighted average of the two is \$1.23, thus saving the cattlemen, who undoubtedly bought a stronger lobby than the sheep growers, \$.03 per AUM (see [Table 12](#)). FLPMA adopted that average as a fair starting point, then compensated for inflation in private property lease rates, yielding a 1976 base fee of \$1.40 per AUM if the lands required more than eleven acres per AUM or \$1.70 if less area was required. After 1976, the grazing fee was to be adjusted by multiplying the base fee by a scaling factor: (100 plus the Beef Price Index minus the Cost of Production Index) divided by (100). The annual adjustment was an attempt to buffer the public-land livestock industry against vacillating markets for production inputs and beef. This protectionist strategy has wrought much grief for both government agencies and environmental groups, and the issue will be discussed at length later.

It is important to note that FLPMA marked the inception of the concept of "fair market value" in grazing policy: for the first time, the market price of both the materials and results of the production process were incorporated into the fee assessed for using federal rangelands. Regardless of the shortcomings of this initial attempt to recover the true value of federal resources harvested for profit, it has nonetheless become a policy landmark. From 1976 onward, grazing subsidies were subject to more cautious review by both Congress and the public, with the result that both groups are more aware of both the costs and benefits of subsidizing activities on federal land. Although substantive change has been immeasurable until recently, this was a necessary and vital first step (Committee on Natural Resources 1994).

Permits

The conditions attached to grazing permits were also modified. All permits were to last exactly ten years, and the Secretary had the absolute right to cancel or suspend, with a minimum of two years notice, permits for any violation of the grazing regulations. Current lessees were granted absolute priority in reissuance of permits as long as "the lands for which the permit or lease [was] issued remain[ed] available for domestic livestock grazing" as planned, and all laws applicable to public lands had been observed. Finally, the Secretary could specify, in the permittee's terms of contract, the number of animals to be grazed and the seasons of use for federal lands. These figures were subject to review and adjustment at any time by the Secretary, and if he or she opted to cancel or

suspend a grazing permit, the government was required to reimburse the permittee for the adjusted value of any privately funded range improvements.

Payment in Lieu of Taxes

The FLPMA implied that states and localities should be recompensed for the property tax dollars which they would have received from private landowners if all federal lands were liquidated. The motivation for such a program was quite reasonable: counties containing a high proportion of federal lands, as is often the case in the western states, had a very small tax base on which to draw. Thus, public services in these counties were underfunded or non-existent, unfairly penalizing their citizenry. This general suggestion has become the Payment in Lieu of Taxes program administered by the BLM. The annual disbursements under this program are approximately \$100 million, all of which goes to the relevant county governments.

Advisory Boards and Councils

Perhaps the most important mandate of the FLPMA was the creation of grazing advisory boards (GAB) and district advisory councils (DAC). At least one GAD and DAC were created in every BLM district or National Forest overseeing more than five-hundred thousand acres of lands subject to commercial livestock grazing. Each GAB was composed of a maximum of fifteen popularly elected "livestock representatives who [were] lessees or permittees in the area." DACs were open to district representatives from more diverse backgrounds. For both, term limitations and the number of boards created was left to the Secretary of the relevant government agency. The functions of the GABs were twofold: first, they could advise the district office on implementation of AMPs, and second, they were responsible for administering the range betterment funds provided by the federal government. In essence, this meant that the twenty-five percent of the grazing fee receipts which was distributed to the regional federal offices was actually disbursed by the ranchers themselves for the purpose of improvement, rehabilitation, and protection of range resources. This did not violate the Sustained-Yield Multiple Use Act because it in no way forbade the establishment of multiple use boards in the same districts by the respective Secretaries (U.S. Code—Legislative History 1976). Although any multiple use board would need a significant number of representatives from the livestock industry, the inclusion in the administrative process of a total of "twice as many livestock representatives as wildlife representatives [was justified] because of the great variety and detail of livestock operations on the Federal lands" (U.S. Code—Legislative history 1976). Such a pro-livestock viewpoint has characterized the federal regulatory bodies and Congressional opinion ever since 1934, and it had not changed by 1976. After the expiration of the statutory provision for the maintenance of grazing advisory boards on December 31, 1985, it was extended indefinitely by the executive order of President

Reagan, and only recently ended by President Clinton and Secretary of Interior Babbitt. The DACs serve in a purely advisory capacity and have little substantive input with regard to administration of public lands.

Conclusion

The FLPMA was a second, more zealous attempt to make government policy work on western ranches. Unlike its predecessor, the Taylor Act, the true goal of FLPMA was nothing more than to stabilize, both fiscally and ecologically, western ranches to protect the regional economy. Although pro-environmental sentiment was undoubtedly higher among Americans in 1976 than in 1934, Congress was more intent on expanding its command-and-control management and subsidization of western ranches than on salvaging a wasting environment. While inserting provisions for AMPs to satisfy clamoring environmentalists, the more important parts of the Act, as assessed in retrospect, were those creating influential and industry-biased advisory committees and shifting the grazing fee to a "fair market value" system that compensated ranchers for their own abuses and shortcomings. As it turned out, not even these changes were sufficient to shore up the public-land ranching establishment for long.

Public Rangelands Improvement Act of 1978

To make concern for the ailing western ranchers and ranges more explicit, Congress passed the Public Rangelands Improvement Act (PRIA) in 1978, only two years after FLPMA. Despite the short intervening period, many substantive changes were made in PRIA. Some were probably responses to FLPMA changes, while others relate to the poor economic and weather conditions that were hurting the livestock industry at the time. In the findings section of PRIA, Congress vigorously reaffirmed its commitment to the scientific management doctrines of the turn-of-the century conservationists. After asserting that rangeland conditions were in a sorry state, PRIA optimistically noted that "the above-mentioned conditions can be addressed and corrected by an intensive public rangelands maintenance, management, and improvement program involving significant increases in levels of rangeland management and improvement funding for multiple use values." This attitude was reflected well in the Act itself.

Land Management

For the first time, PRIA required the Departments of Agriculture and Interior to establish and maintain a complete, centralized inventory of range condition records and trends. This requirement was designed both to facilitate future assessments of rangeland trends for review by policy-makers and to enable the enactment of the incentive program described later. PRIA also reaffirmed grazing as the primary desired use of federal grasslands. Unless the Secretary (of Interior) or FLPMA regulations warranted scale-backs or termination of livestock grazing, the Act states that grazing should continue at the certified levels with the management goal of simultaneously improving the status of the rangelands.

PRIA also expanded the reach of federal grazing policy to include five more western states than either the Taylor Act or FLPMA: Kansas, North and South Dakota, Oklahoma, and Nebraska. The motivation for that addition is unclear, since there are almost no significant federal grazing lands in those states.

Range Improvements

To fulfill PRIA's intent, greatly increased funding for range improvements were deemed necessary. Thus, Congress ordered the appropriation of an additional \$15 million per year between 1980 and 1982 to the BLM budget. Between 1983 and 1986, the amount provided was not to be less than that authorized in 1982, and from 1987-1999, the BLM annual budget could be no less than \$5 million more than that in fiscal year 1986. When summed across the 20 year period, these spending increases total \$365 million. All of these funds were "to be in addition to any range, wildlife, and soil and water management moneys which have been requested by the Secretary" and in addition to the fifty percent of grazing fee receipts which, under FLPMA, are dedicated to range improvements. It was further mandated that no less than eighty percent of these special funds had to be dedicated to on-the-ground rehabilitation and improvement efforts, and no more than fifteen percent could be used to "hire and train such experienced and qualified personnel as are necessary to implement...the land use plans." In other words, Congress wanted to see almost all of the money remain in the hands of established ranchers and the ranch community's banks and retail suppliers rather than hiring or training outsiders. In many ways, this portion of the bill more resembled a bailout than a revitalization. The precise destination of the funds was left to the Secretary, the grazing boards and advisory councils, and other interests. Priority was to be given to direct cooperative agreements with range users rather than outside contractors. Barring the prediction of significant impact on the quality of the human environment, PRIA also certifies construction of range improvements after only an environmental assessment record has been drafted for the project, rather than the EIS required under NEPA for those projects which impact the human environment.

Fees

A major change announced in PRIA was the full reversion back to the 1966 base price of \$1.23 per AUM in calculating grazing fees. This decision directly contradicted the results of the study ordered by FLPMA and completed in 1977, which suggested that the 1966 base price was an underestimate. According to the official answering Congressional questions about PRIA (U.S. Code—Legislative History 1978), the new data was not used expressly because "that shift would have resulted in additional fee increases."

PRIA also changed the formula for computing the grazing fee. The new scaling factor became: Forage Value Index plus Combined Index divided by 100. It was claimed that this formula adjusts the average private-land lease rate in accordance with the cost differences between raising cattle on public versus private land. According to the same official quoted above, this "fair market value" fee system does not give public-land ranchers a market edge over private-land producers because it does not incorporate "an ability to pay concept which violates the basic principles governing private use of public resources," as various other proposed fee systems would have done (U.S. Code—Legislative History 1978). How any formula which included the Combined Index could be viewed as circumventing the free market violations of an ability to pay concept is dubious. After all, PRIA's scaling factor, like that enforced by FLPMA, adjusts to fluctuations in both beef prices and production costs. These adjustments were intended to "prevent economic disruption and harm to the western livestock industry...[by] reflecting annual changes in the costs of production" (U.S. Code—Laws 1978), and so they seem inextricably linked to the Congressional desire not to charge higher fees than the industry could afford. As further evidence of consideration for ranchers' ability to pay, PRIA capped the maximum change from the preceding year's rates at twenty-five percent to control against radical changes in the grazing fee.

Examining the consequences of low grazing fees, Congress realized that the annual contribution to the range improvement fund initiated by the Taylor Act and altered by FLPMA could drop below ten million dollars if less than twenty million dollars in grazing fees was collected in any one year. With this in mind, they amended the FLPMA language to say that whichever was greater, ten million dollars or fifty percent of grazing receipts, would be returned to ranchers in the form of the range improvement fund. Yet again, Congress was cowed by the western ranch lobby.

Experimental Stewardship Program

The only genuinely new program introduced in PRIA was the experimental stewardship program (ESP). The Secretaries of Agriculture and Interior were authorized to implement a small-scale, experimental program in a few representative areas that would investigate

the effects of rewarding ranchers whose public rangelands improve in condition. The program was meant as a probe only, and a possible reward system was suggested. If the land was assessed to be in better condition at the conclusion of the lease than at the beginning, then fully half of the annual grazing fees paid would be returned directly to the rancher for range improvements on that allotment. Although this may have been very attractive to some ranchers, the single-decade time scale involved is probably too brief to observe permanent changes in the land's productivity due to grazing practices. In addition, those ranchers most likely to accomplish such a task would probably not need major range improvements in the first place. The proposed incentive system was unmistakably flawed, in that it tacitly links increased anthropogenic range improvements with improving ecological conditions on the range when, in fact, this relationship is probably the reverse. For instance, if both range improvements were made and plant community health increased, the assessed range carrying capacity would almost certainly rise, leading to more grazing pressure. Even most federal reports claim that reductions, rather than increases, in grazing pressure lead to improved range conditions (e.g. GAO 1988b), so this plan might effectively restart the entire cycle of range-degradation as a reward for proper management.

Conclusion

PRIA was the last addition to federal grazing policy prior to Bill Clinton's arrival in the White House. Even at that time, there was a perceptible sense of anxiety about the future viability of the public-land grazing industry underlying the language of the range improvements section. It was not enough to make sure that grazing fees were sufficiently low that even the smallest ranches could afford them; Congress also guaranteed that, regardless of industry shrinkage or further reductions in grazing fees, federal dollars for range improvements would continue to flow independent of fee receipts. Contrary to the optimistic tone of PRIA's findings section, where matters were still seen as "address[able] and correct[able]," the funding floor for range improvements betrayed the emerging pessimism of the bill's authors. Perhaps it was becoming clear, even to the western Congressmen who spearheaded each successive change in federal policy towards grazing on public lands, that the winds of change had turned against them. PRIA was to be the last stand for regulations that stated commitment to multiple use of public lands yet absolutely restricted control and sustained use to ranchers. Increasingly powerful lobbies from recreational groups, ranging from hikers and bird watchers to four-wheel-drive clubs and trout fisherman, were overtaking the grazing interests in the eyes of previously ambivalent eastern Congressmen. Besides, easterners have always looked askance at private use of federal lands in the west, being unable to identify with dependence upon federal lands due to the near exclusivity of private ownership in the east (Wilkinson 1992).

Changing attitudes have not been restricted to the east, either. In the west, tourism has replaced the livestock industry in terms of economic importance to many states (e.g. Wyoming; Sullivan pers. comm.). Furthermore, much of the Pacific seaboard and select

locations in the Great Basin have been urbanized, fueling the demand for recreation in the nearby mountains and streams. Finally, private-land cattle producers, both in the west and, more importantly in the midwest and south, have registered their unhappiness with growing federal subsidies to their public-land counterparts in the west. In order to safeguard future subsidization of western ranchers, PRIA granted them twenty years of heightened federal support for range improvements. This may have been a fatalistic, last-ditch effort to make command-and-control management work. Western Congressmen realized that they would have little choice but to reform the entire system if the range continued to deteriorate despite hundreds of millions of dollars in improvements and special incentive programs.

Present Grazing Policies

Now that we are familiar with the history behind federal efforts to protect both the western ranching industry and the western range, we are prepared to examine the current enforcement measures and their consequences. I will discuss present policies and procedures in relation to current range conditions because they are so inextricably linked. For instance, it is difficult to interpret range condition assessments without first understanding the policy framework which mandates the use of particular indices. Likewise, understanding the reasons that guide grazing policies, such as subsidization of range improvements, necessitates in-depth knowledge of riparian conditions. For this reason, both current policies and range conditions will be considered simultaneously, where appropriate, in this section. I have grouped them into the several categories discussed below. Many other important categories also exist, such as water rights and consumption, but only those exclusive to grazing will be considered here.

In addition to presenting the relevant statistics, I will attempt to elucidate the value questions underlying the grazing debate. Any worthwhile discussion of grazing policy must discuss the assumption that grazing is a good and proper use of the land, for this view has been an unchallenged presupposition of federal policy for too long. A peremptory discussion of this topic cannot be expected, but it merits far more inquiry than it has received, and so it will be covered here.

Range conditions

The condition of public lands is one key index used to ascertain the proper degree of government restriction on public-land grazing. Two categories of range quality indices are used: the overall range quality (e.g. poor, fair, good, or excellent) and the range quality trend over some time interval (e.g. improving, unchanged, or decreasing). Each

has important implications. Overall quality, which samples only a single point in time, is an assessment of the absolute state of rangelands: they are either good or bad, they need improvement or they do not. When the majority of public ranges are in good condition, most concerned citizens will be satisfied with the government's administration of the lands. Conversely, management change is called for when a critical percentage of public lands are classed as poor. In either case, the next obvious question is an interpretational one: what does knowing the status of our lands at the moment that the surveyor was there really tell us? The second category of measures solves this problem, indicating whether range health is actually improving or being further degraded. This index is derivative in nature, indicating only the direction of change but not the initial or final state. If conditions worsen on a significant proportion of the range, then an alarm cry is broadcast to interested parties; otherwise, contentment reigns. Of course, the two indices interact and complement one another, and both are important to policy makers. No one will be happy with static quality trends on land deemed to be in poor health, and decreasing range status on uniformly excellent land is certainly cause for concern. Similarly, which statistic is presented to the public depends upon the presenter's motives.

Unfortunately, few people question the methodology for computing either type of measurement or the degree of reliability associated with these summary indices. Do all rangelands tend towards states of excellence, or do they gravitate toward the mean? The evaluation of range health is based on a comparison of present plant community composition to that which would naturally exist on a given piece of land. A 76-100 percent similarity to the natural plant community is rated as excellent; 51-75 as good; 26-50 as fair; and 0-25 percent similarity as poor (GAO 1988b). There are several clear problems with this approach. Expectations are based upon expertise, and FLPMA explicitly states that few records document range health or community composition in the past. Furthermore, existing documentation is will likely be incomplete and patchy, introducing the possibility of both true probabilistic sampling error and the temptation to selectively accept certain historical records as accurate or faulty. The second shortcoming of this approach is that the natural plant assemblage will inevitably differ between regions and even fairly small areas. If one tailors the expected "natural" community to each grazing allotment, it is difficult to judge what exactly is natural because so few areas will be in their natural state and the number of pertinent historical records will be severely limited. Yet when the expected community composition is standardized across very large areas, the significance of individual assessments will vary in proportion to the similarity between the model community and one being assessed. These differences may be very great, or virtually unrecognizable. Although the government has resolved this study design quandary to its satisfaction, I could find no documentation of what standards have been chosen or why.

There have also been suggestions that the basis of comparison is grassland communities in Nebraska and Kansas, which discriminates against shrubs and trees present on western grasslands (Loper, in Committee on Energy and Natural Resources 1992). These shrubs are the preferred forage for certain wild ungulates (e.g. sage brush for elk; Hansen, in Committee on Energy and Natural Resources 1992), which means that the range condition criteria pertain to the suitability of the range for cattle only, excluding native

grazers from consideration. Exotic grasses pose yet another problem for range condition indices, for they are often seeded on rangelands, where their resilience to heavy grazing or fire allows them to do well. Comparing such areas to a natural community will necessarily yield a negative assessment, although ecological conditions may or may not be correspondingly poor (Stelljes and Senft 1994). Further, even if the functioning of range landscape is impaired by exotic species, there may not be any recourse available for ranch managers attempting to restore the original species composition, depending on the resilience of the introduced species. In this case, the evaluations of range integrity or health may be indefinitely depressed without bearing any relationship to landscape-level ecological processes such as nutrient cycling and energy flow (Noss and Cooperrider 1994).

Neither the Forest Service nor the BLM has leased all of its lands in recent years ([Figure 7](#) and [Figure 2](#), respectively), so these figures almost certainly include land which has been rested from grazing (Wyoming BLM 1992). In addition, fully half of the public land included by the Forest Service in its grazing allotments is not "suitable" for grazing (fifty of one-hundred million acres; Committee on Natural Resources 1994), so neglecting that sort of information may inflate the range condition, and thus stocking capacity, estimates produced by the agencies.

Even within BLM and Forest Service, the GAO (1988b) found significant disagreement between the official agency reports and the opinions of the men and women who monitor federal lands ([Table 4](#)). For instance, despite agency estimates that conditions on less than seven percent of rangelands were unknown in 1986, individual range managers believed that approximately one quarter of their region had not been evaluated. It should also be noted that, for both the Forest Service and especially the BLM, Congressional generosity creates perverse incentives that encourage the agencies to present an image of languishing ranges being rescued by agency managers. As PRIA demonstrated, Congress will reward any signs of improvement by enlarging agency budgets.

Under the assumption that AUM quotas are slight underestimates in most cases, several economists have even suggested that increasing expenditures to adequately document true range conditions and grazer carrying capacity would benefit both ranchers, who could run more livestock, and management agencies, which could raise more revenues from grazing fees (Rafsnider et al. 1987). Presumably these benefits would be sustained over the long term. Though the assumptions of range under-utilization at present and sustainability are difficult to defend, even if they are not supported by the facts there would still be long-term economic and ecological benefits from improved estimates of range health and grazing capacity.

Range improvements

Range improvements on public lands, traditionally thought of as the way for limited precipitation and forage to be stretched, have been well funded by Congress since 1934. Ostensibly, they can increase the grazer carrying capacity of the range while minimizing damage to the natural community. However, when used inefficiently, range improvements will do little to ameliorate rangeland conditions. Unfortunately, mismanagement of range improvement moneys is the rule rather than the exception. Rather than targeting over-grazed allotments when distributing improvement funds, the GAO (1988b) found that "considerable range improvement funding went to projects on allotments with low livestock grazing usage and to allotments with stable to improving range conditions, while projects on heavily grazed allotments with declining range conditions went unfunded" ([Table 5](#)).

It seems self-evident that those areas with the most intense usage and poorest health should be given priority over all others when range improvement funds are granted, since these improvements are intended to ameliorate range conditions. However, care must be taken in drafting regulations to encourage this sort of funding criterion, because it reduces the incentives for ranchers to self-regulate their effects on the range. By establishing a clear mechanism for externalizing the costs of over-grazing, the problem could easily become worse. Giving priority for improvement funds to ranchers whose management practices have already failed to prevent ecological damage to the range would both remove a major deterrent to over-grazing, namely the decreased carrying capacity of the land, and fail to encourage adequate rancher-initiated recovery efforts following overgrazing. Eventually, the entire management system might be compromised, and the ecological integrity of public rangelands would be irreparably damaged.

The range of projects to which range improvement funds are dedicated is also questionable. In FLPMA, Congress directed federal agencies to expend the range betterment funds derived from refunding grazing fees on furtherance of multiple use goals. In other words, the funds were to support all forms of range improvement, from livestock fences to replanting riparian areas, from sagebrush suppression to wildlife habitat. However, over ninety percent of the documented expenses have been targeted explicitly at the ranching industry (GAO 1988b). Thus, the permittees receive almost all the benefits provided by the fund; grazing fees are collected from and recycled back into the ranchers' pockets.

Livestock density and grazing season

All three pieces of major legislation governing grazing on federal land have stated that the Secretary of the Interior must dictate the number of animals (or AUMS) and seasonal timing of grazing on public lands. Oddly enough, despite the consistent conclusion found by independent reviewers (e.g. the GAO), environmentalists, and most ecologists that

federal lands are over-grazed (but see Savory 1988), there have been no formal examinations of the formula applied by the BLM and Forest Service. Nor has this formula been made available in the literature distributed by those agencies. Both sides seem content to argue that the formula is right or wrong without referring to its contents, or perhaps even without having seen it.

Regardless, political motivations make it unlikely that the formula will significantly change the allowable AUMs on an allotment even with a decrease in the assessed range capacity. The ranch finance system, and rural western communities in general, relies on the regulatory stability which has been the hallmark of American public resource policy. If any one rancher was forced to reduce his or her stock by twenty percent, this would almost certainly spell doom for the ranch, both by decreasing its value as collateral for operating loans and by narrowing its profit margin. Not surprisingly, in a GAO (1988b) survey of BLM and Forest Service range managers, the most often cited impediment to reducing livestock densities on overgrazed public lands were, in decreasing order of importance: insufficient data, outside political climate, agency political climate, and permittee resistance. The same survey showed that the managers felt that twenty-one percent of Forest Service and eighteen percent of BLM lands are currently overstocked (GAO 1988b). Apparently, it is politically infeasible for a BLM or Forest Service officer to order stocking reductions even when it is understood that they are needed.

Furthermore, evaluations of range carrying capacity are often severely outdated, weakening the case that managers can make for reducing stock densities. The GAO (1988b) asked range managers from both agencies how recently they had assessed the carrying capacity of grazing allotments, and particularly those which they knew to be overstocked. In both cases, the over-stocked allotments were less likely to have been evaluated recently than average ([Table 6](#)). The same managers also estimated that range conditions were declining on overstocked land more frequently than on properly stocked lands ([Figure 3](#)). Without possessing up-to-date appraisals of sustainable grazing capacities of their allotments, it is impossible for range managers or ranchers to legitimately govern livestock densities. In 1991, another GAO report indicated that the Forest Service had still not improved its monitoring program for overstocked and degrading allotments, and this appears unlikely to change due to a thirty percent reduction in management staff during the preceding decade.

The timing of grazing has been claimed by some to affect range conditions even more than livestock density (e.g. Savory 1988), although the scale at which timing becomes important is disputed (e.g. Haines 1986). Regardless of this controversy, almost all present-day ranchers agree that cattle must be moved between pastures sometimes to avoid denuding the land and to enhance livestock growth rates. Often, public leases, which are usually in the uplands above lower elevation private base ranches, are used only as summer forage or to produce hay for the winter (e.g. Petera, in Committee on Energy and Natural Resources 1992). This may require drilling a well or pumping water from lowland sources to the highlands as a "range improvement" (J. Horning, pers. comm.), but it is perceived as an efficient rotation system. It is unclear whether this sort of seasonal use results from government regulation, rancher choice, or an agreement

between the two parties, but the practice is very widespread. While Savory's Holistic Resource Management Approach suggests that intensive management and pasture changes every one to four days is necessary for sustainable ranching, most ranchers follow a less intensive schedule based roughly on the change of seasons (e.g. Bokdam and de Vries 1992).

There is also the question of wildlife impact upon the range and its compatibility with cattle and sheep grazing. Particularly when range improvements such predator removal, fencing, and construction of upland water supplies are made, large ungulates (e.g. antelope, deer, elk, moose) may reach high densities and consume considerable amounts of forage (Palm, in Committee on Energy and Natural Resources 1992). [Table 7](#) shows the burgeoning of many of these animals' populations on BLM land in Wyoming. As these populations continue to grow, they may begin to compete with livestock for food. Thus, the effects on range condition of grazing by domestic animals may be exacerbated. I have seen no reference to the inclusion of wild animals in the calculations of range carrying capacity, and I presume that their presence has not been taken into account.

Increasing the suitability of public rangelands for their natural inhabitants has been a BLM goal for decades (Wyoming BLM 1992), but the magnitude of the recent increases has taken government managers by surprise, and solutions have not yet been proposed. For the less well studied taxa on western lands, there is no real consensus about the effects of grazing. While some areas have endured heavy grazing with little apparent change in biodiversity, others have been greatly impoverished (Cooperrider 1991). Unfortunately, the long-term research efforts needed to clarify the degree of biodiversity loss on western rangelands are unlikely to materialize under the current funding climate and agency hierarchies.

Experimental stewardship program

PRIA created the Experimental Stewardship Program (ESP) to encourage the development and use of innovative ranching methods that minimize impact on the range. However, by 1988, ten years after PRIA went into effect, there were only sixteen ESP projects initiated. The GAO (1988b) reviewed these efforts, finding that relatively little data had been collected by the BLM or Forest Service to document the effects of the new methods, and thus few conclusions could be drawn. It was also concluded that significantly more money was devoted to range improvements on the relevant allotments, but that the innovative qualities of the ESP projects was lacking. The only real impact of the program, according to the GAO, was that communication between range managers and ranchers was heightened.

Riparian habitat degradation

Environmental organizations have targeted riparian rehabilitation and protection as a key initiative in western conservation. Because so many plants and animals rely on the scattered streams and rivers of the west, their health is vital to maintaining biodiversity. For example, many western fish, particularly salmonids, are dependent upon cool water temperatures and clean substrates to survive and reproduce, and so these fish species, usually the top predators in the aquatic communities, may be extirpated by stream degradation. This threat has inspired several fishing interest groups, notably Trout Unlimited and the American Fisheries Society (Armour et al. 1991), to join forces with more general environmental groups to lobby for riparian protections; alliances between members of these organizations might otherwise be rare. Their consensus had been that riparian deterioration is a vicious cycle with potentially disastrous consequences for both terrestrial and aquatic communities, and thus must be alleviated immediately (Kauffman and Krueger 1984).

Although federal agencies have come to recognize the special importance of protection riparian areas, degradation continues wherever specific measures have not been funded and pursued. The GAO (1988a) noted that the BLM, Forest Service, and Fish and Wildlife Service had all reduced their staffing of riparian projects during the 1970's and 80's, so the capability of these agencies to respond to the problem, despite their rhetoric, was greatly diminished. In addition, the GAO (1988a) reported that many BLM employees felt that their efforts to improve riparian conditions would be undercut by the upper management in response to rancher complaints against livestock enclosures and other remedial tools. Even though the President's proposed BLM budget for 1995 included special funds for riparian management (BLM 1994b), action is never taken until riparian zones have already been irrefutably damaged, due primarily to shortage of federal will and manpower (GAO 1988a).

Despite these gloomy reviews of the plight of western riparian areas, most streamside plant communities studied have recovered relatively quickly after being protected from grazing (reviewed in Fleischman 1994). Even the streams and their biota appear to recover well (reviewed in Kauffman and Krueger 1984). Likewise, the GAO optimistically reported that when federal efforts were undertaken, that they seemed to work quite well (GAO 1988a). No technological shortcomings were found, merely lack of resolution in tackling complex problems with riparian habitats when rancher or agency support was lacking.

Subsidies

At present, livestock grazing is directly subsidized in several ways. First, federal rangeland managers spend much of their time on programs that benefit a single user group: public-land ranchers. This is in strict violation of the multiple-use policy sketchily presented in FLPMA. Livestock and their effects dominate the western landscape, significantly inhibiting the pursuit of other activities such as fishing, hunting, hiking, photography, and conservation. A case-in-point was given by Strassman (1987), who

conducted the only in-depth study of U.S. Fish and Wildlife Service management of National Wildlife Refuges (NWR) ever done. Her work was particularly important for two reasons. First, the NWRs are unique within the federal land system because they are the only areas where wildlife conservation has legislated priority over all other land uses. For that reason, they play a crucial role in federal conservation efforts. Second, one would expect the NWRs to be the most pristine, well-managed lands in the federal system because of their intended use for wildlife preservation. Thus, they should serve as a good measuring stick against which ecological management of other public lands could be judged. If the lands reserved by Congress for conservation purposes are in good condition, then there is hope for those on which more detrimental uses are permitted.

Strassman (1987) found that fifty percent of refuge funds and fifty-five percent of staff time were dedicated to the grazing and haying which take place on the 123 refuges allowing one or both of these activities on a fee basis. In addition, forty-one percent more AUMs of grazing occurred on refuge lands than were reported in fiscal year 1980. Court orders were necessary to protect wildlife habitat in some refuges, and the required EIS's have recommended drastic reduction or elimination of grazing. Despite these injunctions, grazing continued on most NWRs, and plans for its expansion were even announced by the director of the Fish and Wildlife Service in 1983. One can only wonder how strong conservation measures governing the NWRs would have to be in order to prevent this sort of abuse, and Strassman's (1987) work suggests just how entrenched grazing interests may be on lands where grazing has been declared the primary use. Her study is also indicative of the degree to which grazing is subsidized by providing management assistance to ranchers, even when it is subordinate to other purposes.

The second major category of subsidy is the direct return of grazing fees to the ranching community. As mandated by the Taylor Grazing Act and FLPMA, half of grazing receipts are disbursed to the Grazing Advisory Boards, where they may be used for almost anything that improves the range, whether for wildlife, water quality, or grazing purposes. For instance, in late 1992, a Nevada GAB had an excess of \$290,000. State law permitted the expenditure of these funds for emergencies, so the Board distributed \$200,000 directly to the district's ranchers to ameliorate that year's drought. That action was taken only after the Board's narrow rejection of a proposal to use the money to sue the federal government over a property rights issue which concerned the local ranchers (Committee on Natural Resources 1994). In 1994, a total of \$14.5 million was poured into range improvements under this section of FLPMA, and of the expenditures documented, ninety percent were dedicated to grazing-related causes (Committee on Natural Resources 1994).

If one examines the 1995 BLM budget request, many other appropriations are directly related to grazing management (see [Table 8](#)). These range from suppression of wild horse and burro populations (which compete with livestock for forage) to threatened and endangered species management (many of these species are endangered or threatened because of grazing and accompanying land management practices; Fleischman 1994). In fiscal terms, the support of grazing enterprises in the west is disastrous and unjustifiable. The total expense of BLM and Forest Service grazing programs has been estimated by

Hess and Holechek (1995) as approximately two-hundred million dollars annually, and I calculate the total BLM deficit to be over \$300 million (see [Table 9](#)). The cost of grazing programs alone is ten to twenty percent more than the combined net profits of public-land ranchers. For every two dollars of rancher income from grazing on public lands, the government will spend three dollars on grazing administration (Hess 1996).

A final category of subsidy regards sub-leasing of public property for grazing operations controlled by someone other than the original permittee. If this were done on a break-even basis by family ranchers trying to ease their way out of or into the business, few critics would be aroused. However, there are often significant profits to the original lessee, profits that must be interpreted as resulting from government subsidization of grazing fees. Sub-leasing constitutes one of the BLM's most problematic and controversial policies, and for that reason it is strictly forbidden by the Forest Service (Committee on Natural Resources 1994). In essence, it is a loop-hole allowing ranchers to circumvent the requirement of ownership of adjacent private base property prior to receiving a federal grazing permit. If an individual owns a base ranch but does not need to use the adjacent federal lands, he or she may still be granted a grazing permit for them. From there, three sub-leasing scenarios are possible: the base property may be sub-leased and the grazing permit granted to the lessee; the original lessee's livestock and permit may be leased; or both the livestock and base property can be sub-leased. Base property sub-leases are the most common, and are easily monitored, while those involving only livestock are much more difficult to recognize. In addition, a single individual sometimes secures multiple livestock sub-leases—up to twenty-seven in one known case (GAO 1986a)!

In one form or another, sub-leasing is quite popular, comprising fourteen percent of the leases in the eight districts examined by the GAO (1986a). The Interior Department banned sub-leasing in 1985 due to pressure from environmentalists (Klyza 1996), but the practice continues even now because the wording of the rule only requires that the original permittee have control over both the livestock and the base property, where control is defined as "being responsible for...the base property and/or the livestock" (BLM 1993). For the original permittees, sub-leasing can be a profitable endeavor; based on the rates paid per AUM by sub-lessees of public lands and lessees of comparable private lands, BLM and the Forest Service estimated that the fair market value for federal land—the value which FLPMA directs federal agencies to charge—ranged from \$5.90 to \$7.60 per AUM in 1986. The price paid by the original permittee in those cases was \$1.35 per AUM (cited in GAO 1986a). However, although this was not mentioned in the GAO report, these profit margins may be deceptively large, since sub-lessees often pay for "improved" public lands with various additional services, such as water improvements, fence maintenance, or even use of a ranch-house (Sullivan, pers. comm.).

From a utilitarian federal government's viewpoint, another important aspect of sub-leasing is the nature of the sub-lessees. If individuals are engaging in these deals, then the entire affair becomes much less execrable than if most sub-lessees are large, faceless corporations. It is one thing to subsidize the efforts of western ranchers who feed both the American people and the images of the rugged American; federal funds spread

throughout western communities, directly benefiting average Americans. It is quite another matter to provide the same degree of subsidization to large corporations controlling expansive ranches and funneling the profits elsewhere, primarily benefiting distant stockholders and executives. Large corporations bring a set of interests to the table—short-term profits and investment liquidity—which cannot be reconciled with those of other groups, such as environmentalists or small ranchers, and which do not profit most citizens. The GAO (1986a) investigated the identities of the sub-lessees in eight grazing districts, and discovered that fourteen percent were relatives of the original permittee and another thirty-two percent involved corporations. They note that some of these corporations may actually be small cooperatives or an extended family which have taken corporate status for other purposes, but others fit the "large corporation" stereotype.

The Ranchers

Who, we might reasonably ask, benefits from such intense government subsidization? In response to a Congressional request for this information, the GAO (1986b) conducted a study of BLM ranchers to profile the size of the average public-land rancher. Forty-seven percent of federal permit holders have fewer than one-hundred cattle, while thirty-eight percent have between one-hundred and five-hundred, and the remaining fifteen percent run more than five-hundred head ([Figure 4](#)). Not surprisingly, this means that the larger permit holders, while fewer in number, have a high proportion of the total AUMs granted (fifty-eight percent; [Figure 5](#)). As [Table 10](#) illustrates, the GAO (1986b) also found that corporations control a disproportionate percentage of the AUMs available (29.2%), given the small number of corporate permit holders (10.8% of total). While some of these corporations are simply groups of individuals or families who have collectively been granted corporate status for tax or other purposes, there are also demonstrated cases where more traditional large corporations (e.g. Metropolitan Life) or non-traditional ranchers (e.g. David Packard and William Hewlett) hold a public-land grazing permit, or often several permits. In such cases, the reality of the federal grazing permit system is not at all in accordance with the intent of the Taylor Act or PRIA. After all, the initial motivation for requiring a local base ranch was to create profitable opportunities for homesteaders, to the exclusion of large, foreign cattle barons and corporations. It might legitimately be argued that the very fact that large corporations are involved in the federal grazing system is symptomatic of the government's over-sweetening the opportunities.

There are also significant differences in the solvency of large versus small livestock producers, according to a study done in New Mexico (Torell et al. 1993). That work indicates that ranches with fewer than two-hundred cattle are not profitable. If this hypothesis is true for the entire west, then more than forty-seven percent of ranches are sustained only by government subsidy, using the figures given by the GAO (1986b; [Figure 4](#)). In a 1992 GAO report cited by Hess and Holechek (1995), over two-thirds of western ranches were found to have fewer than eighty cattle, again implying that their profitability is marginal at best. Eastman and Gray (1987) suggest one important reason for this observation. In their study of New Mexico community (or cooperative) ranches,

they concluded that many of the operations were motivated more by pleasure, tradition, and perceived security than by profit ([Table 11](#)). Despite these differences in interest, the land belonging to commercial ventures, which maintained larger herds of cattle, was less heavily grazed than that of small scale ranchers. They also found significantly higher calving rates on commercial ranches as compared to smaller ones. Like the other researchers, they concluded that small scale cattle ranching is economically irrational, but note that many westerns prioritize other concerns over finances. Thus, one motivation for the sub-leasing practices described earlier may be to allow the owner to keep his or her ranch while minimizing the day-to-day obligations of this ownership, heedless of profit.

Grazing fees

The single most divisive issue in the recent debates over the legitimacy of using public lands for private grazing has been the formula for and annual changes in the grazing fee per AUM charged to ranchers with federal leases. After fluctuating during the last decade (see [Figure 6](#)), the 1996 grazing fee is back at \$1.35 per AUM, the minimum price set by the 1986 presidential extension of the PRIA formula. This represents a twenty-six cent decrease from the 1995 grazing fee due to low beef cattle prices and rising costs of production (Polk 1996). From another point of view, it represents a twelve cent increase over the grazing fee in 1966 (the derivation of that fee is discussed in [Table 12](#)), and there has been no attempt to adjust for inflation. By either interpretation, it is unfair and naïve to calculate the value of a commodity (forage) based solely on the costs and benefits of producing the end product which it requires, particularly when the entire valuation scheme uses a thirty year old reference point.

Yet this is precisely what the PRIA formula does. In order to integrate the market forces into the analysis, it also gives some weight to the cost of using private lands, but clearly this is outweighed by the price of beef and costs of production. For example, the BLM and Forest Service (cited in GAO 1986a) found that the 1985 grazing fee underestimated the market value of the federal grazing privileges by a factor of at least four (\$1.23 as compared to \$5.90-7.60). The grazing fee, then and now, was at its minimum allowable level due to low beef prices, and ranchers allege that the reduced grazing fees are necessary for the survival of marginal cattle ranchers (Myers 1995). Over the years, consistent concessions to the public-land ranch lobby has yielded significant savings to this group relative to those who use only private lands, and those savings have engendered the ill sentiments which some private-land ranchers bear towards those with federal permits. If this apparent disparity is real, there is reason for the taxpayers to complain as much as anyone, for the source of support for all the infrastructure and management underlying grazing on public lands is the taxes paid by all Americans. Hess and Wald (1996) also suggest that a key reason behind the plunge in beef prices has been domestic over-supply, so that in the long run the entire industry would benefit if the most marginal ranches were closed and their contribution to the overall supply left unfilled.

Knowing the degree of subsidization would certainly bother many taxpayers, and ever since the rise in concern over the federal budget deficit in the Reagan years, it has drawn considerable attention from the fiscally conservative so-called "deficit-hawks" (Klyza 1996). This influential group of economists, and the mindset they have propagated, have made strange bedfellows for environmentalists, the other key interest group lobbying for grazing fee increases, but valuable ones nonetheless. On many occasions, only the power of western Congressmen chairing natural resources committees has stemmed the pressure from the environmental and deficit-reduction lobbies to raise grazing fees (reviewed in Klyza 1996).

A common claim made by these Congressmen and the ranchers they represent is that the non-fee costs of grazing on public land equalize the total costs per AUM of grazing across federal, state, and private lands. Non-fee costs are primarily range improvements like water supplies and fencing, but other costs such as sage-brush removal, seeding, transportation, and food supplements are also included. Ranchers claim that since both the carrying capacity of the land and the growth rates of the cattle vary with land quality, that the lower quality federal lands are less valuable than privately held ranches or even state property. Cows eat approximately eight-hundred pounds of forage per month (Wilkinson 1992), and not all vegetation is created equal when used as cattle fodder. Thus, they argue, it is entirely legitimate to charge much less for high maintenance federal lands than for private pastures where labor and upkeep costs are minimal and the fodder is more nourishing. Ranchers and academics from agricultural schools have consistently rallied in support of this economic balance, claiming that the actual cost of grazing leases on private lands (\$8-9.00 fee plus \$7.50 non-fee equals \$15.50-16.50) is almost identical to that on federal property (\$1.92 fee plus \$14.70 non-fee equals \$16.62) (Guerry citing Dr. Rimbey of the Univ. of Idaho, in Committee on Energy and Natural Resources 1992). They declare that, since the inclusive fee, rather than simply the AUM grazing fee, is the effective cost of ranching on public lands, there is actually no subsidization but rather an equitable market for grazing privileges. Thus, grazing fees for state lands, which range from \$2.50 to \$11.50 (Pritchett, in Committee on Energy and Natural Resources 1992), or occasionally higher, are said to be the middle ground in this competitive market, both in terms of fee levels and maintenance provided.

Few, if any, outside analysts and conservationists agree with this assessment. While the GAO and others did conclude that there were additional non-fee costs entailed in grazing on federal land as compared to private property, "such differences are insufficient to account for the discrepancy between federal and...private lands fees" (summarized in Committee on Natural Resources 1994). They say that there remains a substantial subsidy underlying the political depression of grazing fees, and that the government and taxpayers do not receive the "far market value" for the use of federal lands, as mandated in FLPMA. As indicators, grazing fees on both state and private lands are cited as reflecting the market price—and thus the true costs of grazing on federal land.

Notwithstanding the debate over the accurate evaluation of market value for grazing privileges, there remains an insurmountable obstacle to any analysis of the market for livestock grazing: there is no true market. Since the first imposition of grazing fees by the

Forest Service in 1905, there has been no true market for western forage. Elementary principles of economics affirm that when the price of some significant proportion of the goods available becomes fixed or otherwise regulated in a predictable manner, that the market must conform to this pricing structure given commensurability of the goods. Ranchers have tried to argue that public land grazing is not tantamount to private land grazing, but there is little reason to believe that the differences are really very great (GAO 1991, cited in Committee on Natural Resources 1994). Thus, if, as is commonly argued, the government has fixed the price of grazing on public lands somewhere below market value, then the invisible hand becomes frozen in place, a finger on the pulse of the western politics to determine when the grazing fee can be inched towards its true market value. This basic rule of economics has escaped most of those who controvert endlessly about the fairness of the grazing fee. If the government were to abolish its formula today and allow the market to take over, it would probably become apparent that grazing on well-groomed private lands has been devalued by the artificially low price of public land grazing.

This raises a second point about the interface between government and economics: the government cannot negotiate the way the market can. According to Sullivan (pers. comm.), one of the failures of recent grazing fee increase proposals was that they overtly proposed to raise the grazing fee by a factor of four or more, yet their authors' true goals were far lower. He points out that the government has an obligation to set policy in a fair manner the first time around, unlike the market, which by its very nature fluctuates in response to each new piece of information. Because of the breadth of effects that federal policy has upon the American economy and people, it cannot afford to negotiate in this way, but must stand firm behind what it believes are equitable solutions. The grazing fee was born of the desire for economic stability in the west, and maintenance of stability is, perhaps, the strongest argument for retaining the system. The current system undoubtedly needs permanent reform in order to become an effective management tool and to lighten the burden on the taxpayers, but there remains the question of whether ranchers provide a service which should be subsidized, and if so, at what level.

The system by which ranchers pay their federal grazing permits is a key barrier to pursuing conservationist aims on public lands. Permits are accompanied by AUM quotas, and ranchers must use and pay for the number of AUMs authorized or else face losing their permits by BLM rules. This is particularly true for lands rated as good or excellent; federal rules leave little room for "under-utilization" of healthy pasture. Since the permissible number of AUMs is capitalized into the purchase price of the adjoining private property that the rancher owns, the high loan payments encourage the public-land ranchers to use as many AUMs as they are allowed (Hess and Holechek 1995). In fact, the incorporation of the value of grazing allotments into the market value of private lands has been a chief culprit inviting the sustained, maximal use of federal lands. That is one reason why ranchers become so agitated when grazing reductions are discussed; in their capacity as private landowners, they are effectively paying for an exclusive grazing easement on the adjacent lands, rather than a privilege to be earned and maintained with care.

Usage requirements

Despite the multiple use language of FLPMA, a major shortcoming of the current range management system is its restriction of the acceptable uses for federal range. Permits are only granted to applicants who agree to use the land for the purposes designated in the land use plan for the rangeland, which are defined as BLM or Forest Service lands "on which there is domestic livestock grazing or which...[are] suitable for...grazing" (PRIA: U.S. Code—Laws 1978). When applied by federal range managers, this language grants lease rights exclusively to livestock producers (Horning, pers. comm.), thus eliminating the possibility that conservationists may secure federal permits. This is a major strike against both market forces and conservation efforts on western rangelands. By limiting the pool of acceptable lessees to just ranchers, the market, and thus grazing fees, is suppressed by artificially low demand for the product: range use. At the same time, there are fewer opportunities for non-governmental conservation efforts to contribute to maintaining healthy western ecosystems.

Furthermore, no more than two years of rest, or non-use, is allowed on public rangelands without special permission (Rait, in Committee on Energy and Natural Resources 1992). This eliminates the opportunity for ranchers to modify the supply of cattle coming from public lands, because they risk losing their permits unless they avail themselves of their full grazing privileges. In contradiction to both market incentives and conservationist inclinations, they must maintain the maximum allowable herd size on their leased public lands, leaving little rest time for the range and complicating the protection of sensitive areas. Not only does this restrict environmental protection, but it robs the ranchers themselves of the ability to manage their livestock in a responsible, prudent manner, going against the most fundamental principles of autonomy enshrined in western tradition.

Values and Benefits

There are two fundamental value questions that are typically downplayed or even ignored during discussions of grazing policy in the west. The first regards whether or not livestock grazing is rationally justified in the west. Both ecology and economy are relevant to this issue, and both will be discussed in detail. The second issue is the degree to which less-tangible benefits should be taken into account. For instance, does the symbolic value of the western public-land rancher outweigh that of the desert tortoise or other species whose existence is jeopardized by grazing in the west?

From an ecological standpoint, the answer to the first question is a resounding "no" for much of the western range currently grazed by cattle and sheep. There is fairly good evidence that large grazers, bison in particular, did not naturally graze in the Great Basin,

the expanse of arid and semi-arid savanna between the Rocky and the Sierra/Cascade mountain ranges (reviewed in Menke and Bradford 1992). Instead, only small browsers such as antelope inhabited this region, and their feeding style, browsing on select portions of select plants, creates a radically different sort of herbivory pressure on range vegetation than that of grazers like cattle and bison, which consume most or all of the above-ground growth from select plants. While most ecologists agree that bison were not a significant influence on the evolution of Great Basin ranges, they are divided as to the possible consequences of cattle grazing in that region. Many believe that unleashing these large ungulates on plant communities that did not evolve to deal with that sort of herbivory has been and will remain very damaging to Great Basin rangelands. The predicted and observed harmful effects range from loss of plant species and community diversity (Cooperrider 1991), to significant climatic affects. For instance, heightened soil exposure from severe over-grazing in Mexico has drastically increased air temperature (+ 4° C) and reduced cloud formation speed (50 to 177 percent) over large regions along the Mexico-Arizona border (Friedman 1989). These factors, combined with the reduced capacity of exposed soils to absorb and retain water, can change ecosystem function indefinitely and launch a vicious cycle of degradation.

However, others maintain that ranges are actually healthier when grazed, regardless of their evolutionary ecology. This assertion is based on the theories of holistic resource management (see Solutions section), herbivore optimization, and overcompensation, which suggest that grazing of any sort is good or even necessary for some plants to grow and reproduce efficiently. It has been demonstrated for various species that flower production and fruit set are increased in grazed plants relative to ungrazed ones (e.g. *Ipomopsis aggregata*; Paige 1992). Some models and experiments also indicate that soil nitrogen and organic carbon availability are higher on grazed lands than those protected from grazing (Holland et al. 1992, Stelljes and Senft 1994, Senft 1996). In total, this work has been interpreted as indicating that all grazing is unequivocally beneficial to all rangelands (e.g. Savory 1988, McNaughton 1993). This generalization is hotly contested by many other researchers, who believe that the benefits of grazing are specific to species, not communities, ecosystems, or regions (Noy-Meir 1993). For instance, Bock et al. (1984) have shown that birds prefer to use areas which have been grazed over those which have not, while rodents fare better when protected from grazing. With regard to the arid and semi-arid Great Basin of the American west, several authors believe that theoretical constructs such as herbivore optimization are inappropriate (Bartolome 1993) or insignificant (Painter and Belsky 1993; Patten 1993).

Aside from this debate, there is strong evidence that ignoring natural cycles of drought or fire can lead to poor management decisions on western rangelands. History shows that livestock managers and markets are unresponsive to these landscape-level forces; like every one else, ranchers need a steady annual income that is minimally affected by the vagaries of natural catastrophes. Similarly, the Americans people have come to rely on beef as a food source, and it would be unwise for the industry to allow the supply to drop severely if at all possible. Thus, it is unlikely that the lands on which cattle are raised will be allowed to spend a year or more recovering from a draught or fire before grazing is resumed. In an attempt to circumvent these risks altogether, the industry has successfully

convinced Congress to provide millions of dollars for both fire suppression and water improvements. The former safeguards against losing livestock in wildfires, while funding periodic controlled burning to facilitate foraging for cattle and sheep, and to maintain the ecological role played by western grassfires. Water improvements increase the carrying capacity of the range during all years, buffering the herds against stochastic western water supplies. In these ways, ranchers and federal managers protect the supply of beef produced on western lands, but with little regard for the state of the environment.

The ecological affect of suppressing fire and ignoring drought are great. Under natural conditions, drought has direct effects on the plant community by decreasing the available water supply and increasing the likelihood of wildfire. In addition, the density of large ungulates is reduced by both fire and drought, giving rise to indirect effects of drought on range vegetation (Frank and McNaughton 1992). Thus, there is a natural balance between forage conditions and forager density; after recovering from drought and/or fire, rangelands can support rebounding grazer populations without suffering long-term damage, whereas if grazers were to return too quickly, they might prolong the recovery process. The important fact is that herbivory is reduced after fire or drought, which minimizes the damage done by grazing as the vegetation returns. In turn, native herbivores may prefer to consume the regrowth in areas which have been recently burned (Vinton et al. 1993), so reducing or eliminating the action of fire on the range may significantly reduce its carrying capacity.

Overall, it appears that any form of large-scale grazing practices administered by humans would jeopardize the long-term health of the range ecosystem (Fleischner 1994). Even if some of the problems associated with present management practices were alleviated, the fact remains that raising cattle or sheep in high densities across very large portions of the west, particularly in the Great Basin, necessarily brings about significant and unavoidable changes in the range ecosystem. The arid and semi-arid western rangelands are not well suited to grazing, and the management practices that bring western ranching closer to being an economically self-sufficient practice further degrade the range as habitat for the native flora and fauna. In particular, fencing, constant water supplies, and predator removal are probably necessary to ensure that marginal western ranches can support the sparse but nonetheless significant human communities which have been built around them. Of course, livestock grazing certainly benefits some native species even while doing harm to others. For example, sheep can be an important range management tool to reduce fire hazard or enhance habitat for certain types of wildlife (Menke and Bradford 1992). However, on the whole, grazing on western public lands is believed to have been ecologically dangerous, if not disastrous. As Briske (1993) reminds those enwrapped in ecological theory, the goal of western ranching must be sustainability.

To return to the original question, there are also economic costs and benefits associated with grazing in the west. First, there is the direct costs of grazing. These were addressed in the earlier discussion of ranch subsidization and grazing fees, with the conclusion that western ranching is economically reliant upon the federal government and thus the American taxpayers. Second, there are the indirect costs of allowing livestock to continue grazing on western public lands. These indirect costs are of two major sorts: the

devaluation of the range due to ecological degradation, and the opportunity costs of using western public lands for grazing rather than the myriad other purposes for which they are desirable. Range deterioration has been adequately covered earlier, but I have avoided discussing the demand for non-grazing uses up until this point.

The impetus for passing the Multiple Use-Sustained Yield Act of 1960 was to cater to the swelling ranks of hikers and bikers, campers and fishermen. The same language was integral to FLPMA in 1976. The growth in outdoor recreational interest has not subsided in the interim, but has continued to grow. Thus, outdoor enthusiasts have come to realize that for every extra grazing allotment leased to a rancher by the federal government, an endangered trout may be extirpated from a favorite stream, or a fence may be built across a hiking trail, or the number of cattle spending time in a National Wilderness may finally exceed the number of human visitors. These realizations have been bitter for many Americans, and it now appears that American society values the right to ride or hunt on certain public lands more than the beef and mutton which is produced on them (BLM 1993). Likewise, western private lands are becoming more valuable for thirty acre ranchette vacation homes than as bases from which to use the surrounding public lands (Hebert 1996). Until and unless the market for federal land usage permits is opened to non-grazing users, it is difficult to definitively say that public lands are more valuable as places for Americans to recreate than as sources of beef. However, at least for certain areas, this seems to be the case based on comparisons of the market price for good elk hunting or bird-watching opportunities as compared to grazing (Forest Guardians 1995).

We must now consider the direct benefits of ranching in the west. Less than 3.5 percent of American beef is produced using western public lands (Hess and Wald 1996), so curtailing cattle grazing on them would have only a small impact on the beef market. Western sheep, on the other hand, account for as much as thirty-seven percent of the national crop, supplying over half of the fine wool produced in the U.S. (Magagna, in Committee on Energy and Natural Resources 1992). Industry representatives say that it would not be possible for private lands to replace the sheep production from public lands, but I have seen no corroboration of this statement from independent sources. In addition to the meat products coming from western lands, there are also the 27,000 ranchers and their families who rely on public lands for their livelihood (Hess and Holechek 1995). Were it not for ranching, these people would have trouble making a living on their parcel(s) of private land; some are solely dependent upon ranching for income, although many others have at least one other significant source of income. Thus, we must take into account the fate of these westerners as we ponder the merits of public-land ranching in the west.

The indirect benefits of public-land ranching in the west far outnumber the direct ones. As intended when the Taylor Grazing Act was passed, stable communities, each with their own cadre of lawyers, doctors, and businessmen, have emerged across the west. Once money enters the western economy through the ranchers and other natural resource users (coming either from the sale of products or government funding), it remains there, circulating within the communities and states. The fixed demand for certain materials on ranches creates a stable, small retail industry, while the bankers rely on income from

annual operating expenses loans to local ranchers (Rolston, in Committee on Energy and Natural Resources 1992). Despite the fact that ranching has slid behind tourism and other industries in calculated economic importance to most western states (Sullivan, pers. comm.), it is still a major source of employment, and more than anything else, accounts for the scattered distribution of residents in those states. If public land ranching was reduced or abandoned, there would be major repercussions for western states and their economic viability.

With the understanding that western ranching: 1) has been and will always be ecologically damaging to much of the western range; 2) requires large government subsidies if it is to continue at its present size; 3) at least in some areas, does not represent the land use most desired by the American people; 4) produces very little beef, a very important food source, and a large fraction of the sheep grown in the U.S., a relatively unimportant source of food and fiber; and 5) is an important pillar of the state and local economies in many western states, we must now turn to our second question. Giving due consideration to the costs and benefits of public-land ranching, is sustaining the practice sufficiently valuable to our society that we should accept its ecological (range degradation) and economic (subsidies of some sort) costs in return for its perpetuation? In order to answer this question, one last issue must be taken up. One of the most fundamental values in preserving western public-land ranching lies in protecting the culture which has evolved along with it. Outside the U.S., a prominent concept of what it means to be an American involves chaps, boots, and a cowboy hat. There can be no question that our cultural identity would be impoverished by the loss of the American cowboy, even if our rangelands would benefit. To many Americans, this sense of identity, of what it is to be an American, matters more than the end destination of their tax dollars or the status of public property which they will never see.

When the time to decide the future of western ranching arrives, we can be certain that this fact will be weighted heavily in the final analysis. The deficit hawks may vote against the intensive subsidization of ranching on public lands, the environmentalists may esteem the ecological integrity of western lands above all else, and the rural western communities may throw their weight behind maintaining the status quo, but the decision made by the remainder, the vast majority of Americans, will turn on how well the above issues have been discussed and understood, and how much more they value the American cowboy than the ecological integrity of the Great Basin.

The Solutions

Many approaches have been or could be taken to amend the problems with federal grazing policy. The following is a partial review of those approaches taken thus far, and my further suggestions and critiques.

Holistic Resource Management

Like environmentalists, advocates of the Holistic Resource Management (HRM) approach founded by longtime cattle manager Allan Savory (1988) contend that the present management techniques are doing long-term damage to the range. HRM is grounded upon three principles, and the first is that grazing is a good for grasslands and savannas. In qualifying this statement, Savory (1988) distinguishes between grazing and over-grazing. The former is the consumption of a mouthful of grass or other vegetation, which removes most of the vertical growth from the plant but leaves the root system intact. This enhances plant growth during the growing season, as mentioned in the earlier discussion of the theories of overcompensation and herbivore maximization, and removes dead, fibrous material during the non-growing season. Over-grazing is when a single plant is grazed multiple times during the growth season. This is positive from the grazer's point of view, because fresh new growth has more protein and less fiber than older growth. However, it requires the plant to use of root resources, often sacrificing entire roots, in order to regrow for a second time. According to Savory (1988), grazing is both sustainable and beneficial to the range, while over-grazing—which results from current land management practices—is detrimental to both plants and the ecosystem in which they grow.

The second principle of HRM is that over-grazing can be avoided by herbivore herding. Savory (1988) says that native large grazers were naturally prone to predation, and thus formed herds that were closely packed and constantly moving. Under present, predator-free conditions, domestic ungulates are careful not to step on plants, with the result that the soil between plants becomes compressed and the plants themselves are untrampled. However, when nervous due to the presence of predators, cattle move much less deliberately, stepping on grass clumps and kicking up dust. This acts to spread seeds, encourage lateral growth, eliminate dead tissue, recycle nutrients by pounding them into the ground rather than letting them wash away, and decrease erosion by packing the soil more uniformly and accumulating detritus on the ground to prevent runoff and encourage nutrient cycling. HRM holds that these benefits of natural herding can be achieved without predators by simply reducing the pasture available to a herd or increasing the cattle density in a larger area.

In order to increase herbivore densities on the range without producing over-grazing, HRM invokes its third principle: using grass conditions as an indicator of when to move the herd between pastures. Savory (1988) and others (e.g. Paige 1992) have shown that removing a plant's regrowth after an initial loss from herbivory during the same growing season can significantly reduce the plant's fitness by lowering fruit set and requiring nutrients and energy to be reallocated from the roots to above-ground growth, thereby reducing the plant's root network and resilience to adverse environmental conditions. Thus, HRM dictates that cattle not graze any one patch or pasture more than once in the

growing season and once in the non-growing season; this maximizes range health and the cattle fitness because each small area is thoroughly grazed but then left to recover. To accomplish this goal, HRM managers must divide their property into a large number of paddocks and then move their herd between paddocks as soon as the forage in availability drops below a certain critical level. The high densities and constant movement (one to four days per paddock) ensure that the range is exposed to tightly bunched herds in the same way that native nomadic herbivores might move through an area, intensively grazing on the available forage but then moving along quickly. By rapidly driving the herd from place to place on a large range, HRM attempts to spread the same or more grazing pressure more equitably over a wide area. Cattle are often reluctant to move any farther than necessary to find a mouthful of grass; they do not disperse freely, but rather cluster with the effect of over-grazing small patches (Roath and Krueger 1982). As Savory (1988) puts it, most ranges are (locally) "over-grazed and under-stocked," because he believes that both vegetation and cattle benefit from rapid movement and intensive grazing.

At the level of an individual ranch, Savory (1988) promises both larger herd sizes and higher growth rates of individual animals. He claims that the plant community will remain largely unchanged, or perhaps even gain species relative to a no grazing state. Erosion is minimized by reducing range runoff; the trampled vegetation and evenly compacted soil create better water absorption and impede overland water movement. From a landscape perspective, HRM enthusiasts allege that the range deteriorates when either over-grazed or protected from grazing, but that HRM-style management results in a healthy ecosystem. Finally, from a public policy viewpoint, HRM is more labor intensive than long-rotation management styles, and so it might be a good candidate to help reduce the ebb of jobs in the ranching industry. If more cowboys were to work on fewer ranches, the total land area being grazed would be reduced and range degradation reversed. These virtues might come at the cost of ranch uniqueness, but at least both the cowboys and the range would remain. Overall, HRM is appealing for many reasons, and has been adopted on several large ranches. The results have varied from place to place, and Savory and his HRM institute claim that its only failures have been when it was incorrectly implemented. Where successful, it has improved cattle production and range conditions as promised (Andrea ???, pers. comm.).

Savory (1988) also explains his attitudes towards alternative range management strategies and criticisms of grazing. With regard to the propriety of grazing in the Great Basin, Savory admits the strength of the evidence indicating that large grazers (i.e. buffalo) never lived there, but he points out that there were other smaller species (e.g. antelope) which might have been important herbivores. More important, he claims that HRM works regardless of the natural history of the grassland, because all grasslands respond well to grazing when it is properly managed.

He also declares that the range health resulting from HRM practices surpasses that created by both burning and protection from herbivory. Setting or even allowing fires is bad policy, he says, because it removes all the dead vegetation without deriving much benefit from it in the form of food or erosion barriers. While it is true that new growth

following burning is more nutritious and palatable for cows, he points out that the same regrowth results from using methods like intensive grazing (Savory 1988). In the case of range non-use, Savory acknowledges that the land may look better initially (after one to three years) because of release from overgrazing, but says that there is no nutrient recycling, soil processing, growth of new plants, or seasonal regeneration of established plants in the ensuing years due to buildup of dead material and high runoff. These changes have profound long-term (ten or more years) effects which he claims are amply demonstrated in poor conditions in reserves around the world.

HRM appears to be a great step forward, if only for introducing new ideas into a static managerial mindset. It remains to be seen what impact it may have on future management plans, but any resultant changes will most likely be driven by market competition between those ranchers who follow its tenets and those who do not. It would be impractical to mandate its adoption because the funds required to monitor implementation of such a labor-intensive method would exceed the benefits of agency oversight. Instead, HRM will remain in the background until and unless economics prove its merit.

Rangeland Reform '94

Grazing reform was probably on Bill Clinton's mind when he chose Bruce Babbitt as his Secretary of the Department of the Interior. Babbitt, a former governor of Arizona, grew up on the ranch his family has owned for generations, and he has a deep appreciation for many of the problems with the federal land management system in the west. His chief activity during Clinton's first term was an attempt to reform the BLM and Forest Service's grazing policies. Familiar with the mistrust of big government shared by most westerners, he convened Grazing Town Hall Meetings during the spring and summer of 1993 throughout the affected portions of the west. The purpose of the meetings was both to solicit comments about what did and did not need change from the viewpoint of the people affected, and to present Babbitt's initial ideas for possible improvements to the federal system for feedback. The approach was a success; by including westerners in the process, Babbitt earned greater acceptance for the federal government's role in shaping the future of the west.

However, with the August 1993 publication of Babbitt's preliminary proposal, entitled Rangeland Reform '94, public-land ranchers became furious. After returning to Washington and considering the needs of the federal government, such as the budget deficit, multiple-use, and curtailing range degradation, Babbitt had ignored many of the criteria for an acceptable proposal given by ranchers (Sullivan, pers. comm.). Despite this outcry, Babbitt has pursued many of the reforms outlined in Rangeland Reform '94. One aspect of the program that signified the degree to which its intent was at odds with earlier range management programs was its requirement that a full EIS be drawn up prior to its

adoption. Congress had explicitly excluded earlier range legislation from NEPA requirements, which would certainly have demanded full investigations of their environmental impacts.

In essence, Babbitt's efforts are no more than minor modifications of the present system. In fact, many of the principles embraced in Rangeland Reform '94 are simply enforceable restatements of the requirements as laid out in FLPMA and PRIA (Hess and Holechek 1995). Its over-arching goal is true reform, but its chosen methods are incremental and require only minor changes. Below, some of the other key sections of Rangeland Reform '94 are reviewed.

Ecosystem Management

Ecosystem management is one of the key concepts introduced by Babbitt, and is the rubric under which, he claims, all of his proposed amendments fall. Ecosystem management entails taking a holistic view of federal lands as complex systems in which each identifiable component is dependent upon and influences other parts. It requires that these linkages be taken into account by policy makers and on-the-ground managers alike. For instance, neotropical migrant birds and the various native strains of salmonids will, for the first time, be included in long-term management plans (BLM 1994). Another important connotation, previously missing in grazing legislation, is that people are part of the range ecosystem too, rather than external consumers of its productivity. It remains to be seen whether Babbitt and future Secretaries will integrate the meaning of ecosystem management into the actual workings of the BLM. Past Secretaries have delayed vital changes by hollowly using the language of sustained yield and multiple use to stymie critics, and ecosystem management has great potential to create the same illusion of progress.

Sub-leasing

Rangeland Reform '94 basically maintains the status quo with regard to sub-leasing of federal lands. It would continue the prohibition on sub-leasing as defined earlier, but would allow either base property leases or management leases. In the former case, the base property and the grazing privileges associated with it are leased to an interested rancher. The latter refers to sub-leasing only the grazing rights as long as the sub-lessee controls the livestock. As discussed earlier, both types of sub-leasing are already rampant, so the regulated types of sub-leasing would not change due to Rangeland Reform '94.

What would change is that the federal government would begin taxing the sub-lessor's income from the deals. If the base-property is sub-leased, the tax rate would be twenty percent of any fees beyond the federal AUM fee paid by the original lessee. In the case of

a management sub-lease, the same tax rate would rise to fifty percent, and if both categories of lease occurred simultaneously it would be seventy percent. These tax strategies are intended to "ensure that the public receives a fair return from use of public forage" (BLM 1993), as demanded by FLMPA and PRIA. However, their enforcement would be very difficult; the range managers interviewed by the GAO (1986a) uniformly believed that they were not aware of all management sub-leases because they were not required to be reported. At this tax rate, there would be significant incentive to avoid exposing the terms of a sub-lease because it effectively penalizes ranchers for trying to increase their profitability at the expense of the American taxpayers. However, it has been and will continue to be a difficult battle for Babbitt and others who would like to limit the extent to which grazing privileges are owned by ranchers. Taxing sub-lease income is portrayed as a strike at the heart of the western rancher by the industry, and has yet to be accepted without great protest (Sullivan, pers. comm.).

Authorized uses

In a small step towards conservation of public rangelands, Babbitt chose to expand the list of permissible uses of public lands to include conservation non-use for up to ten consecutive years. No longer would ranchers be censured for acting responsibly to rest all or part of their allotments, nor would annual re-application be required. In addition, if non-use became necessary due to financial hardship, it could be granted annually for up to three consecutive years. This would allow ranchers to reduce production and rest their lands when prices of materials rise temporarily or the profit margin from product sales becomes too low; in short, it would introduce one major aspect of the free market.

Hess and Holechek (1995) believe that this reform would not seriously encourage conservation efforts by ranchers. They argue that current non-use levels (fifteen to twenty-two percent) already reflect market demands, and that there is no evidence that "substantiate[s] claims that prevailing fees invite excess livestock." I disagree for several reasons. First, there is no reasonable basis for the conclusion that current non-use levels represent every rancher who would like to rest his or her allotment if given the chance. More likely, present patterns indicate past ranch failures, not voluntary non-use by persevering ranchers. Babbitt's proposed changes would allow the latter group to better care for their public lands by removing grazing pressures in accordance with ecological interests. This crucial opportunity has always been denied to public land ranchers, and it may go far to encourage good stewardship. Second, and equally important, Rangeland Reform '94 would endow ranchers with the right to heed market forces when they make their land use decisions. It would finally bring public-land ranchers into line with the rules of supply and demand by allowing them to adjust the supply of cattle produced on public lands. Of course, there are no guarantees that Babbitt's expansion of the authorized uses for federal allotments would produce these results, but at least he is willing to test the idea.

Rancher conduct

Another accomplishment of Rangeland Reform '94 would be to assign rancher conduct greater weight in the permit renewal and new permit processes. If the rancher in question has a history of knowingly violating the terms of a federal lease in any way, he or she could be denied new grazing rights. The violations considered under this rule would also include breaking any federal or state statutes concerning the environment, and lease renewal would be influenced by past performance. Furthermore, anyone whose permit has been canceled due to violations of federal grazing regulations would be ineligible to receive any other federal grazing permits for three years.

When Babbitt released Rangeland Reform '94, these sections drew some of the strongest protest. It was perceived as opening the door for ungrounded and uncontested discrimination by permit granting agencies against anyone who has ever done anything wrong (Sullivan, pers. comm.). While much of this stir was over-reaction, it is true that the language of the proposal was open ended as to the discretion granted to the managers overseeing the permit process.

Advisory boards

Babbitt proposed to eliminate all present advisory boards and councils, consolidating their purposes and creating regional Resource Advisory Councils to fill them. These new councils would comprise representatives from the local or state governments, elected local or state officials, scientists, and interest groups of all sorts. Their power would be advisory only; they would not be empowered to make actual range management decisions. All members of these councils would be appointed by the Secretary of Interior, but nominations would be accepted.

As Hess and Holechek (1995) point out, this switch from one set of advisory councils to another is unlikely to change any aspect of grazing policy except that the Grazing Advisory Boards would no longer be there to administer the funds reimbursed to the ranchers from their grazing fees. All other advisory board functions appear the same. Recognizing that there is a delicate balance between enabling local interests to influence federal policy in their area while ensuring that national interests will have priority, Babbitt has maintained the status quo, grazing advisory boards, for lack of a better idea.

Range improvements

Three major changes in the rules governing range improvements have been made in Rangeland Reform '94. First, the FLPMA limitations on the categories of range improvement expenses eligible for federal support are broadened to include all aspects of planning and executing suitable projects. This will facilitate proper consideration of

ecological consequences prior to construction of range improvements, which has often been neglected due to chronic funding shortages.

The second change is that all permanent range improvements on federal lands become public property after their construction. Upon expiration of the permit, the government must purchase these improvements from the lessee, after which they will remain public property. This too met with rancher protest, but it is very reasonable that the federal government should own all structures on federal lands, regardless of who built them. Both of these amendments are designed to safeguard the quality of the public range while allowing ranchers to modify that range as necessary for their purposes, and the ranching industry had little to say about the changes (Sullivan, pers. comm.).

However, the third modification of current range improvement laws drew much objection from ranchers. Babbitt proposed that full water rights for all water produced or retained by range improvements be held by the federal government. This would reverse the policy established in the 1980s by the BLM, which granted ranchers exclusive rights to water collected by range improvements. That policy directly conflicts with various state laws and is counter to principles of multiple use, so Babbitt felt that the change was entirely justified (BLM 1993). Because water is a key factor limiting range productivity and cattle production in the west, ranchers have decried the loss of their water rights as much as any other measure proposed by Babbitt (Sullivan, pers. comm.).

Grazing fees

Babbitt's final amendment to federal grazing policy was to radically increase the grazing fee for using public lands. He proposed both that the formula used to calculate the fee be changed, and that the base value inputted into the formula be raised. The new formula was to be the base fee times a forage value index, a weighted estimate of the average grazing fee on private lands. This new fee was designed to reflect fluctuations in the market price of grazing rather than the costs of production, and thus to better meet the demands of FLPMA by charging the true value of public-land grazing.

The new base fee, \$3.96, would be the average of two time-corrected comparisons of public land fees to private land fees from 1966 (\$3.25) and 1983 (\$4.68). These fees represent the value of federal ranges when compared to the poorest private lands; in certain regions, grazing, even on federal lands, is worth three times as much (Committee on Natural Resource 1993). The maximum change from year to year was capped at twenty-five percent to assure industry stability, and the shift from the present fee formula to the new one was to occur over three years. Of course, public-land ranchers have complained about the increases, claiming that they cannot afford them (e.g. Committee on Natural Resources 1993). However, only the most marginal ranches would be jeopardized by the fee increases, since grazing fees are only three to eight percent of the operating expenses for a typical ranch (Committee on Natural Resources 1994). In fact, most ranchers can afford to absorb higher grazing fees without any trouble; their protest

is based more on ideology and fear than on economics (Sullivan, pers. comm.). Despite this fact, by August of 1944, Babbitt had removed the grazing fee changes from his proposal (Mackey 1996).

Hess' Open Market and Regional Committees

Like Allan Savory, Karl Hess has proposed a unique solution to the problems with managing western rangelands, but Hess' solution is targeted more at politics than ecology, and stems more from history than field observation. Hess (1992, 1996) and his colleagues (Hess and Holechek 1995, Hess and Wald 1996) perceive the problems with western grazing as deriving from a long-standing federal policy of land-use socialism, in which western public lands (i.e. the capital and means of production) are exploited by ranchers (i.e. the proletariat) to the benefit of western communities, states, and the federal government (i.e. the state). Under this system of public ownership and private utilization, advantage is given to those users who optimize their personal profit by maximizing both the rate of production from public lands and the degree to which they can externalize the costs of production. Internalized benefits take the form of range improvements paid for with federal dollars under FLPMA and PRIA, low grazing fees, and exclusive rights to range use, while the externalized costs include opportunity costs incurred by non-ranching users due to single-use policies, expenses of raising livestock on arid lands (e.g. range improvements), and ecological degradation of rangelands. In combination, the two give rise to profitable public-land ranches where they might not otherwise exist, and insulate the ranching industry from market economics. To amend this situation, Hess proposes numerous changes, several of which are discussed here.

Hess and his colleagues believe that the first step in reforming western grazing practices is to introduce open market forces to the industry. This can only be accomplished by eliminating the fiscal deficit that has long characterized grazing efforts on western public lands. In this interest, they advocate completely ending all federally subsidized range improvements, leaving the maintenance of the range and cattle to the professionals in the industry. Only by making the livestock industry bear its own economic weight will it become apparent exactly how financially responsible it is to raise cattle and sheep in the west.

A second key element in opening the western cattle industry to competition would be to eliminate single-use criteria for permit issuance. The current system, established by FLPMA and PRIA, gives a virtual monopoly on public lands to ranchers. This excludes a large and vital portion of the true market for western lands—recreational and conservation interests—from engaging in the permit process, and thus artificially suppresses grazing fees by ignoring the opportunity costs of grazing. In addition, non-use is strongly discouraged, making this legitimate land use a liability rather than a useful tool for range management or maximizing revenues.

Rather than recalculating grazing fees to embrace the market value of using western public lands, Hess and his colleagues propose holding them at their present low levels in fairness to those whose private property values incorporate the present low cost of public land usage. They argue that it is the permit system and kickback subsidies that are misguided, not the concept of charging a usage fee for public lands. By centralizing control of public lands and introducing a common currency, AUMs, the federal government removes the incentive for proper management from even the regional bodies such as state agencies and rancher organizations. Under the permit system, the landlord, the federal government, grants the tenant, the ranchers, lease only of AUMs, not of the land or any of its fundamental characteristics. AUMs are the property that ranchers pay for, whether they are used or not, and they are the only aspect of the land which they can ever control. Consequently, permits are valuable on the resale market (i.e. sub-leasing) and are capitalized into the value of associated private lands, effectively making them a property right to be coveted by the lessee. "Since stewarding and conserving authorized numbers is best done by lobbying, the political carrying capacity of public lands almost always takes precedence over their biological carrying capacity" (Hess and Holechek 1995), resulting in a degraded environment with no respite in sight.

In place of the centralized permit system, they envision small regional boards comprising representatives from all interested parties and providing all permittees with voting rights. Environmentalists, ranchers, fisherman and bankers would all have a place at the table, and the boards would have great, if not total, control over both land use and sale of public lands in the relevant region. Funds from the federal government would be phased out fairly rapidly, with the boards taking their place in assessment and collection of grazing fees. In order to distribute the cost of maintaining and administering federal lands across all involved parties, the boards would collect fees both for special use, long-term permits (e.g. conservation or grazing leases lasting twenty-five years) and for general use permits (e.g. recreation) for citizens at large.

Control over the sale of federal lands and the granting of special use permits would be governed by the paying users within the area overseen by the board. All potential users would have equal bidding rights for special use permits, with the permit being awarded to the highest bidder. These special use permits could then be sub-leased to other users, pending approval by the board. The lengthened permit duration is designed to combat the myopia that plagues present public-land use by strengthening the bond between permittees and their allotments, yet ensuring their freedom to change their plans as necessary by sub-leasing. The limitations on livestock density could be lifted, according to Hess and Holechek (1995), because ranchers would realize the connection between over-grazing their lands and poor long-term returns on their investment. Thus, low cattle densities would be encouraged, as would protection of sensitive areas, such as riparian zones, within allotments.

By limiting federal control over use of public lands, or even divesting the councils of federal influence entirely, Hess believes that the users of public lands will gain a long-term interest in the health of the land. Linking landscape ecology so directly to regional politics has many obvious dangers as well as numerous benefits, but Hess attempts to

control against monopolization of power on regional boards by granting voting privilege to any and all holders of either permit type. By diversifying the boards' constituency and removing the geographical limitations on permit eligibility, all interests can be voiced and acted upon. However, that right would only be granted to those paying for usage rights of some sort. In other words, Hess simultaneously increases the financial burden on both conservationists and consumptive users, while removing it from the non-using general taxpayer. Making environmentalists pay their share of the costs to supervise the use (or non-use) of federal lands is a subject rarely breached, and Hess' proposal is reasonable in theory. All beneficiaries are granted limited power to influence the future of their common lands, and in return they pay a reasonable fee.

Hess' libertarian ideas will no doubt continue to be touted by many westerners as the key to the future of western land-use policy. However, formidable barriers to their implementation still exist, the foremost being the comfortable dependency of westerners on federal subsidies that Hess (1996) himself has so cogently elaborated. The myth of cowboy self-reliance is an integral part of the western self-image, but whether it is anything more than theoretical self-deception is nonetheless in doubt (Hess 1992, 1996). Legislating the creation of autonomous regional user groups would require broad support from everyone in the west, and Hess has done little to explain why, in practice, his ideas should be embraced by any special interest groups other than environmentalists, fiscal conservatives, and stalwart libertarians. Nor has he played out the probable consequences of such a shift for any of the groups involved. Without substantial subsidization from either Hess' regional user groups or the federal government, it is dubious whether ranching on already degraded western public lands would be economically viable.

Non-use/Conservation Permits

A major step forward for both conservation and market interests would be the opening of the allotment permits system to non-grazing users. For instance, it is easy to imagine a system whereby environmental organizations purchase the land use privileges around the perimeter of a national park or other protected area to enhance the conservation potential of the park. This could mitigate the habitat island effect which has produced so much concern among conservation biologists (Cooperrider 1991), while also providing income to the federal government with minimal monitoring requirements. Areas ringing already protected tracts might not be the only ones made eligible for non-use status—sensitive watersheds or other patches could be adequately protected from the damaging effects of grazing without seriously reducing the extent of rangelands available for grazing uses.

From a fiscal point of view, such a policy could save the federal government money by reducing maintenance and monitoring duties while safeguarding many of the same areas that require the most federal surveillance under the present system. This shift would also re-introduce market competition for usage rights, depending on the requirements for

bidding. If the present system of flat usage fees based on some estimation of range carrying capacity was retained, and priority was still granted to nearby landowners, then the little would change over most of the range. Conservation and other uses would only be possible if a base property was purchased by the interested group, and this would probably be disincentive enough to dissuade most potential non-grazing lessees from pursuing the issue on any but the most sensitive or valuable lands. However, if permit privileges were not automatically granted to nearby land owners or the fee system was opened to market competition, there might be greater effects on western ranchers. Either would grant recreational users and environmentalists full access to the federal land permit system, mobilizing funds collected from large numbers of individuals to outbid ranchers with more limited resources. From an absolute open-market viewpoint this would be acceptable, but it would certainly draw ire from the ranching community.

The third possibility, that both the base property requirement and fixed fee market are dropped, would probably result in widespread displacement of public-land ranchers. In their stead, other users, capable of paying higher prices for the recreation or conservation value of land use privileges, might become the dominant lessees of public lands. According to most analysts (e.g. Hess and Holechek 1995), the current value of western federal lands for non-grazing uses is higher than that for grazing, indicating an unsatisfied demand among sportsmen and conservationists for such opportunities at the current price. However, such major changes in the permit system for federal lands are politically untenable at the present time, despite their predicted benefits in the form of greater fee revenues and lower maintenance costs for the federal government.

Private land values would also be bolstered by a reinvigorated the market for grazing permits if the permit regulations were loosened and the base property requirement retained. One of the classic arguments for retaining the linkage between ownership of a base property and priority in the awarding of grazing permits has been that the use of adjacent federal lands has been incorporated into property values: ranches with neighboring federal rangelands are worth more than those without (Hess and Holechek 1995). If the acceptable uses for federal permits encompassed conservation and other activities, the influx of potential investors would drive market prices for private properties higher. At the same time, federal leases would become more valuable, and the government could bring in more income from fee receipts. This would finally satisfy the mandate of FLPMA, while creating direct benefits for the federal government and windfall profits for ranchers interested in selling their land or getting loans.

The administration of state lands for grazing and other uses provides an instructive example of the benefits which can come about from a competitive bidding system for issuing permits. The western states which have held on to the lands granted to them by the federal government upon annexation now use the funds derived from leasing those lands to support public services like the education system. By state law, the boards that evaluate permit bids must maximize the revenues for the state treasury, so the highest bidder will be awarded the permit as long as the proposed land use is sustainable. Because of the political balance in most of these states, many permit decisions have followed the mandate of revenue maximization while favoring present users—mostly

ranchers—by giving them the opportunity to match the high bid. In practice, this has meant that conservation organizations, even if locally based, have been denied permits to use state lands for conservation interests, which would require removing domestic grazers from the land. Even when conservationists' initial bids for a particular allotment have doubled those of the competing ranchers, the ranchers have almost always maintained their dominance by matching these bids (Forest Guardians 1996).

This system allows the market to define permit values, but it does not allow the market to determine the category of land use; it gives perpetual advantage to the current users, who are almost all farmers and ranchers. Furthermore, the unlikelihood of winning a permit to use state lands reduces the incentive for interested parties to even enter a bid, thus interfering with the market itself (Thunberg 1996). In 1980 in Oklahoma, the state Supreme Court forced the elimination of the prior-user preference system and advertisement of all available permits, resulting in a doubling of the funds collected for schools in that state (Forest Guardians 1996). However, other state courts have ruled that the right is discretionary rather than legislated, and thus cannot be banned (Thunberg 1996).

Clearly, it is in the states' interest to further reduce impediments to open market competition for land use permits (Thunberg 1996), but they have progressed further towards this goal than the federal government has. For instance, a regional environmental center recently bid upon a grazing permit in the Emigrant Wilderness area of California, doubling the permit value assessed by the Forest Service for grazing (i.e. carrying capacity multiplied by the AUM fee). Its bid was denied solely on the basis of prior user precedent (Hamilton 1995). This sort of self-defeating policy has been a prime target for environmental organizations and fiscal conservatives as they attempt to influence future legislation. One large national environmental group, The Nature Conservancy, has had some success in securing federal grazing permits for conservation uses, but they have had to maintain some cattle on their lands in order to minimize the controversy surrounding their permits. In these cases, conservation-inclined federal land managers have been instrumental in arranging for the leases (Horning, pers. comm.).

Most proposals to open rangeland use to non-ranchers presume that public lands would benefit from being relieved of grazing pressure. However, this remains a questionable assumption (Bock et al. 1984). While some areas have definitely benefited from decades of protection from grazing (e.g. Utah canyons, Cottam and Evans 1945), other have shown little change (e.g. Blydenstein et al. 1957) or even long-term degradation (reviewed in Savory 1988). An appropriate and feasible test of the response of western rangelands to livestock removal would be to create large study exclosures like those proposed by Bock et al. (1993) in many parts of the west. They propose that twenty percent of each allotment be designated as a permanent experimental control in which livestock would be fenced out. This would allow evaluation of the true effects of grazing, while also facilitating valid comparisons between various management methods (e.g. seeding, short-duration rotations, watering) and absolute protection from domestic grazers. Long-term monitoring of range condition under these various management regimes and regions could be used as part of a larger effort to determine whether

eliminating or reducing grazing pressure would improve range health, as well as providing information about the geographic variation in ecosystem response to grazing (Bock et al. 1993).

Their suggestions and others like them have not been heeded by federal management agencies or ranchers (C.E. Bock, pers. comm.), but one major modification might make the idea of exclosures more palatable to both ranchers and land managers. To minimize rancher protest, the study could take place on entire allotments designated for grazing but that are not presently being used for the purpose either because they have been authorized for non-use or have not been leased at all. There is an abundance of such allotments (Figure 7; Hess and Holechek 1995), and they are well distributed geographically (Figure 8 and Figure 9), so this use would be minimally controversial. Such a system would yield the same benefits as that proposed by Bock et al. (1993), or perhaps even more due to the increased size of the exclosures or reserves, without drawing the anger of current user groups by directly affecting their members.

It has become clear that only by encouraging studies that have little short-term impact on ranchers will environmentalists be able to evaluate the effects of grazing on a large geographic scale and produce incontrovertible evidence of the ecological consequences of grazing. Even disregarding the results of ecological studies, accepting non-use or conservation use as acceptable purposes for federal lands would likely yield significant economic benefits, and should be pursued by environmental groups and government agencies alike.

Conclusion

The Taylor Grazing Act was produced in simple ignorance of the complexity of western ecosystems. Its sole purpose was to bring use of public lands under federal control with the goal of improving range condition. During the ensuing decades, public rangelands remained in poor condition and powerful industry groups were formed to defend the interests of public-land ranchers. Concomitantly, outdoor recreation became a favorite American pastime, and with it came legislation requiring that federal lands be available for all reasonable uses. Finally, a more enlightened scientific and public understanding of ecology was mobilized in the environmental movement. The interests of these three groups were often at odds, and a legislative showdown was unavoidable.

The industrial lobby won out. It was the naïve perception of the intricacies of raising millennia-old lines of domestic animals in relation to maintaining the simpler, native forms of life that produced FLPMA and PRIA. The environmental lobby had not yet reached the scale or sophistication which characterize its present-day efforts, and the livestock industry successfully persuaded Congress of the extreme need for a secure,

indeed ironclad, future for cattle production on western public lands. These bills reaffirmed the value of the command-and-control methods established by the Taylor Act, and elaborated upon these policies to the satisfaction of the stockmen. Scientific management still ruled the range.

We now live with the legacy of more than seventy years of centralized, heavily regulated livestock production in the west, and it is not a pretty sight by most accounts. Almost all aquatic habitats have been severely degraded, while the terrestrial communities have been altered by sustained abuse from large herbivores of a sort that may never have set foot on them before (Fleishner 1994). The loss of biodiversity, plant and animal, has drawn sharp criticism from environmental groups, who have become concerned about the long-term damage to the range as well as its present degenerate state. Recreational demand for public lands has also continued to rise. The rough lands ignored by homesteaders are now seen as ideal places for urban dwellers to engage the natural world. Fishermen demand wild strains of trout, mountain bikers leave trails across the desert, and rock climbers search for untamed peaks to scale.

A fourth interest group has also arrived on the grazing policy scene since the passage of FLMPA and PRIA. The deficit hawks, seeking to reduce the federal budget deficit by making all (or most) beneficiaries of federal largesse pull their own weight for the first time, have chosen the government's land management deficit as a prime target for reduction, and so have entered the fray in favor of raising fees and eliminating subsidies. They also favor opening the land use arena to non-consumptive user groups in hopes that the market competition might increase revenues for the federal government.

Several alternative strategies have emerged from the recent debates over grazing policy and the role of the federal government in land management. Four have been reviewed in this paper, each of which stems from a different perspective on grazing policy. Holistic resource management is an encompassing interpretation of ecology can guide the optimization of livestock production. It suggests management principles only at the level of the individual of the individual ranch, and thus could be accommodated in either the present policy framework or a much revised system. Regardless, its prospects will depend upon further ecological research and the advocacy of management agencies themselves.

The conservation use or non-use initiatives spearheaded by environmental groups and concerned ranchers take a more limited approach, seeking to find ways to protect range health more-or-less within the current policy environment. Many of these groups also seek to introduce broader reforms, but they see an opportunity to pursue a conservation agenda with only minor changes to agency guidelines for public land permits and use. In the short term, this effort holds much promise, particularly its proponents can gain allegiances within the ranching community.

Babbitt's Rangeland Reform '94 is little more than a traditional expansion of command-and-control agriculture. Although claiming to be guided by ecosystem-level principles, it focuses almost exclusively on making important incremental changes to the present system of administering federal lands. It emphasizes the traditional centralized regulatory

bodies, maintains subsidies, and does nothing to diversify the activities on public lands, prompting criticism from all four major interest groups. Despite its shortcomings, Babbitt's plan has reinvigorated the debate over federal land management, and thus has filled one important need even while failing to bring true reform to federal policy.

Hess' libertarian vision of the way western lands should be managed is the least likely of the four to see use in the near term. However, his penetrating analysis of the history and ecology of the western range have given him a unique viewpoint that will certainly gain many converts. In acknowledging that the western tradition of autonomy is nothing but a specious myth, he at once sheds layers of problems that have plagued reform efforts in the west for decades. Only when and if ranchers recognize that their present livelihood depends as much on taxpayer support as their own hard work will they be able to understand why change is necessary. By the traditional way of thinking, public lands are basically the property of those who use them for livestock, and so ranchers have obliged to protect the health of their ranges only if it suits their own needs. Further, they can easily externalize the costs of range degradation by receiving federal subsidies to purchase food and water for their herds. As Hess (1996) cogently argues, ranchers and bureaucrats must both realize that they are borrowing lands that do not belong to them but to the American people, to whom they have an obligation to conserve western public lands. He proposes to radically shift the burden of management from the federal government to the user groups themselves, and with it the costs and benefits of using or even owning that land. This Jeffersonian vision is untenable in the current political climate, but the necessity of such radical changes may become clear in the coming years.

Hess and Wald point out that most ranchers are not avowed earth-bashers, but simply people who want to carry on the traditions of western ranching (1996). This raises an issue that is only rarely discussed in the literature on range reform yet underlies much of the public discussion on the subject. In a strong sense, ranching is a public land management service performed, at some cost, for the taxpayers by western ranchers, who have developed a lifestyle compatible with their employment over the last century. If western-public land ranching is seriously reduced, who will provide the management services currently performed by ranchers, and what will become of the unique way of life that ranchers maintain? The question of range management is still debated in ecological circles, but most would agree that the western range will be fine without cattle or sheep. As much as ranchers desire to picture themselves otherwise, ranching in the west is both destructive and unnecessary to fill the American plate. Even under Hess' grand vision of the west as a patchwork of autonomous management regions, it is still unlikely that the market for beef, mutton, and wool will sustain the cattleman's culture. The question, then, is whether we value that portion of the American dream and the American existence enough to continue to sacrifice our natural heritage, the western range, and a few of our tax dollars to preserve it. If so, perhaps Rangeland Reform '94 is what we are looking for; if not, Hess's plan may be the most humane way of laying western public-land ranching to rest.

Acknowledgments

This paper would not have been possible without the assistance of John Horning, Carl Bock, Andrea Johnson, Mark Muro, and especially Michael Sullivan. I am also grateful to Dan Perlman and Glenn Adelson, leaders of Harvard's Conservation and Biodiversity course, for their lenience in over-looking strict due dates, their editorial expertise, and their friendship.

References

- Armour, C.L., D.A. Duff, and W. Elmore. 1991. The effects of livestock grazing on riparian and stream ecosystems. *Fisheries* (?): 7-11.
- Abruzzi, W.S. 1995. The social and ecological consequences of early cattle ranching in the Little Colorado River Basin. *Human Ecology* 23: 75-98.
- Bartolome, J.W. 1993. Application of herbivore optimization theory to rangelands in the western United States. *Ecological Applications* 3: 27-29.
- Blydenstein, J., Hungerford, C.R., Day, G.I., and R.R. Humphrey. 1957. Effect of domestic livestock exclusion on vegetation in the Sonoran desert. *Ecology* 38: 522-526.
- Bock, C.E., Bock, J.H., Kenney, W.R., and V.M. Hawthorne. 1984. Responses of birds, rodents, and vegetation to livestock exclusion in a semidesert grassland site. *J. Range Management* 37: 239-242.
- Bock, C.E., Bock, J.H., and H.M. Smith. 1993. Proposal for a system of federal livestock enclosures on public rangelands in the Western United States. *Cons. Biol.* 7: 731-733.
- Bokdam, J. and M.F.W. de Vries. 1992. Forage quality as a limiting factor for cattle grazing in isolated Dutch nature reserves. *Cons. Bio.* 6: 399-408.

Briske, D.D. 1993. Grazing optimization: a plea for a balanced perspective. *Ecological Applications* 3: 24-26.

Bureau of Land Management. 1992. *The new BLM: 1989-1992*. U.S. Dept. of the Interior, Bureau of Land Management.

Bureau of Land Management. 1994a. *Ecosystem management in the BLM: from concept to commitment*. U.S. Government Printing Office: 1994 - 573-183/84015 Region No. 8.

Bureau of Land Management. 1994b. *The President's proposed FY 1995 Budget request for the BLM: An Overview*. U.S. Dept. of the Interior, Bureau of Land Management.

Bureau of Land Management. 1995. *Public rewards from public lands*. U.S. Dept. of Interior - BLM. Doc.1995-676-924/25131.

Committee on Energy and Natural Resources. 1992. *Grazing management and grazing fee issues*. Subcommittee on Public Lands, National Parks and Forests, Committee on Energy and Natural Resources, U.S. Senate. S. Hrg. 102-912.

Committee on Natural Resources. 1993. *Grazing management reform*. Subcommittee on National Parks, Forests, and Public Lands, Committee on Natural Resources, U.S. House of Representatives. SN 103-23.

Committee on Natural Resources. 1994. *Taking from the taxpayer: public subsidies for natural resource development*. Subcommittee on oversight and investigations, Committee on Natural Resources, U.S. House of Representatives. Committee Print No. 8.

Cooperrider, A. 1991. *Conservation of biodiversity on western rangelands*. In: Hudson, W.E. (Ed.). *Landscape linkages and biodiversity*. Washington, D.C.: Island.

Cottam, W.P., and F.R. Evans. 1945. *A comparative study of the vegetation of grazed and ungrazed canyons of the Wasatch Range, Utah*. *Ecology* 26:171-181.

Cubbage, F.W., O'Laughlin, J., and C.S. Bullock III. 1993. *Forest resource policy*. New York: Wiley.

Eastman, C. and J.R. Gray. 1987. *Community grazing: practice and potential in New Mexico*. Albuquerque: Univ. of New Mexico.

Fleischner, T.L. 1994. Ecological costs of livestock grazing in western North America. *Cons. Biol.* 8: 629-644.

Forest Guardians. 1995. Economic backbone or boondoggle? Information sheet from the Forest Guardians. Santa Fe, NM.

Forest Guardians. 1996. A first! Enviros win land lease. In: Horning, J. (Ed.). *Forest Guardians Frontline Fax Report* 60: Oct. 17.

Francis, J.G. and R. Ganzel. 1984. Introduction. In: Francis, J.G. and R. Ganzel (Eds.). *Western public lands: the management of natural resources in a time of declining federalism*. Totowa, NJ: Rowman and Allenheld.

Frank, D.A., and S.J. McNaughton. 1992. The ecology of plants, large mammalian herbivores, and drought in Yellowstone National Park. *Ecology* 73: 2043-58.

Franklin, K.E. 1986. Ailing rangelands. *American Forests* (May): 51.

Freidman, R. 1989. Grazing cattle can change the local climate. *New Scientist* (2 Sept.): 30.

General Accounting Office. 1986a. Rangeland management: Grazing lease arrangements of bureau of land management permittees. May 1986.

General Accounting Office. 1986b. Rangeland management: Profiles of federal grazing program permittees. August 1986.

General Accounting Office. 1988a. Public rangelands: some riparian areas restored but widespread improvement will be slow. June 1988.

General Accounting Office, 1988b. Rangeland management: more emphasis needed on declining and overstocked grazing allotments. June 1988.

General Accounting Office. 1991. Rangeland management: Forest Service not performing needed monitoring of grazing allotments. May 1991.

Haines, L. 1986. Whose home is the range? *American Forests* (May): 22-51.

Hamilton, J. 1995. Beauty and the beasts. *Sierra* 80(1): 28-30.

Hebert, H.J. 1996. Ranchers get squeezed by growth. In: *The Casper Star Tribune*: 25 Nov., 1996.

- Hess, K., Jr. 1992. Visions upon the land: man and nature on the western range. Washington, D.C.: Island.
- Hess, K., Jr. 1996. Wising up to the wise use movement. In: Brick, P.D. and R.M. Cawley (Eds.). A wolf in the garden: the land rights movement and the new environmental debate. Lanham, MD: Rowman and Littlefield.
- Hess, K., Jr., and J.L. Holechek. 1995. Beyond the grazing fee: an agenda for rangeland reform. Cato Institute, Policy Analysis No. 234.
- Hess, K., Jr., and J. Wald. 1996. Eating the land away. *Amicus* (winter): 12-13.
- Holland, E.A., Parton, W.J., Detling, J.K., and D.L. Coppock. 1992. Physiological responses of plant populations to herbivory and their consequences for ecosystem nutrient flow. *Am. Nat.* 140: 685-706.
- Jordan, R.N. 1994. Trees and people: forestland ecosystems and our future. Washington, D.C.: Regnery.
- Kauffman, J.B. and W.C. Krueger. 1984. Livestock impacts on riparian ecosystems and streamside management implications: a review. *J. Range Management* 37: 430-438.
- Klyza, C.M. 1996. Who controls public lands? Chapel Hill: Univ. of North Carolina Press.
- Lambert, C. 1996. Cycle clash: 1980s versus 1990s. National Cattleman's Beef Association: http://www.ncanet.org/market_watch/cycle.html.
- Mackey, M. 1996. Wyoming stock growers and the Taylor Grazing Act. *J. of the West* 35: 18-25.
- McNaughton, S.J. 1993. Grasses and grazers, science, and management. *Ecological Applications* 3: 17-20.
- Menke, J., and G.E. Bradford. 1992. Rangelands. *Agriculture, Ecosystems, and Environment* 42: 141-163.
- Myers, B. 1995. Livestock Grazing Act critical for western ranchers. National Cattleman's Association press release: http://www.ncanet.org/press_releases/nr_plc.html.
- Noss, R.F., and A.Y. Cooperrider. 1994. Saving nature's legacy: protecting and restoring biodiversity. Washington, D.C.: Island.

- Noy-Meir, I. 1993. Compensating growth of grazed plants and its relevance to the use of rangelands. *Ecological Applications* 3: 32-34.
- Paige, K.N. 1992. Overcompensation in response to mammalian herbivory: from mutualistic to antagonistic interactions. *Ecology* 73: 2076-2085.
- Painter, E.L., and A.J. Belsky. 1993. Application of herbivore optimization theory to rangelands of the western United States. *Ecological Applications* 3: 2-9.
- Patten, D.T. 1993. Herbivore optimization and overcompensation: does native herbivory on western rangelands support these theories? *Ecological Applications* 3: 35-36.
- Polk, A. 1996. Grazing fees announced.
<http://www.fs.fed.us/forum/graznews.html>.
- Rafsnider, G.T., Skold, M.D., and R.K. Sampath. 1987. Range survey costs sharing and the efficiency of rangeland use. *Land Economics* 63: 92-101.
- Roath, L.R. and W.C. Krueger. 1982. Cattle grazing influence on a mountain riparian zone. *J. of Range Management* 35: 100-103.
- Savory, A. 1988. *Holistic Resource Management*. Cvelo, CA: Island.
- Senft, D. 1996. Soil condition best after grazing. *Agricultural Research* 44: 22.
- Stelljes, K.B., and D. Senft. 1994. Science at home on the range. *Agricultural Research* 42: 4-8.
- Strassmann, B.I. 1987. Effects of cattle grazing and haying on wildlife conservation at National Wildlife Refuges in the United States. *Environmental Management* 11: 35-44.
- Szaro, R.C. and C.F. Pase. 1983. Short-term changes in a cottonwood-ash-willow association on a grazed and an ungrazed portion of Little Ash Creek in central Arizona. *J. Range Management* 36: 382-384.
- Thunberg, K.W. 1996. New Mexico state land office agricultural leasing procedures—a violation of law and trust? Unpublished paper written for a course in Wildlife Law.

Torell, L.A., et al. 1993. Range Livestock Cost and Return Estimates for New Mexico, 1991. New Mexico Agricultural Experiment Station, Las Cruces, Research Paper, 1993. Quoted in: Hess, K., Jr., and J.L. Holechek. 1995. Beyond the grazing fee: an agenda for rangeland reform. Cato Institute, Policy Analysis No. 234.

United States Forest Service. 1996. Grazing statistical summary 1995. U.S. Dept. of Agriculture, Forest Service, Range Management Staff.

U.S. Congress. 1934. Taylor grazing act. U.S. Congressional and administrative news—Laws. Ch. 865.

U.S. Congress. 1976. Federal land policy and management act of 1976. U.S. Congressional and administrative news—Laws. 90 Stat. 2743.

U.S. Congress. 1976. Federal land policy and management act of 1976. U.S. Congressional and administrative news—Legislative history. p. 4069.

U.S. Congress. 1978. Public rangelands improvement act of 1978. U.S. Congressional and administrative news—Laws. 92 Stat. 1803

U.S. Congress. 1978. Public rangelands improvement act of 1978. U.S. Congressional and administrative news—Legislative history. p. 4069.

Vinton, M.A., Hartnett, D.C., Finck, E.J., and J.M. Briggs. 1993. Interactive effects of fire, bison (*Bison bison*) grazing and plant community composition in tallgrass prairie. Am. Midl. Nat. 129: 10-18.

Wyoming BLM. 1992. State of the public range in Wyoming--1992. U.S. Dept. of Interior, Bureau of Land Management, Wyoming State Office

Table 1

Distribution of ownership of public property by agency. Source: Cabbage et al. 1993.

	Department	Agency	Millions of Acres
Federal			
	Dept. of Agriculture		201.9
		Forest Service	190.8
	Dept. of Interior		432.4
		Bur. of Indian Affairs	2.7
		Bur. of Land Management	266.3
		Bur. of Reclamation	5.7
		Fish and Wildlife Service	83.4
		National Park Service	74.2
	Dept. of Defense		26.0
		Army Corps of Engineers	5.5
	Other		1.9

Total Federal			662.2
State and Local			155.0
Total Government			817.2
Total Area of the United States			2316.0

Table 2

Range condition trends on BLM lands. Source: Wyoming BLM 1992.

Year		% Improving	% Static	% Declining
1974		13	69	18
1991		18	70	12

Table 3

Condition of BLM rangelands since passage of the Taylor Grazing Act. Sources: Council on Environmental Quality, Environmental Quality 1984, cited in Klyza 1996; and Wyoming BLM 1992.

Year	Excellent	Good	Fair	Poor

1936	1.5	14.3	47.9	36.3
1966	2.2	16.7	51.6	29.5
1975	2	15	50	33
1984	5	31	42	18
1990	6	31	53 (good + excellent)	

Table 4

Difference in estimated range condition and trends given in a 1986 BLM report and a 1987 Forest Service report, and by surveys of agency range managers. Source: GAO 1988b.

		BLM			Forest Service		
		Report		Managers		Report	Managers
Condition	Excellent	4		6		15	14
	Good	30		23		31	22
	Fair	41		31		39	30
	Poor	18		12		15	11
	Unknown	7		28		0	23
Trend	Improving	15		20		44	30
	Stable	64		47		42	49
	Declining	14		7		14	9
	Unknown	7		26		0	12

Table 5

Estimated relationship between the distribution of range improvement funds and the degree of grazing pressure from a survey of range managers. Source: GAO 1988b.

Allotment type	BLM		Forest Service	
	% of allotments	% of costs	% of allotments	% of costs
Understocked	32	41	23	36
Properly stocked	42	32	48	48
Overstocked	18	20	21	14
Unknown	8	7	8	3

Table 6

Range managers' estimates of when range carrying capacity was last assessed for their allotments. Source: GAO 1988b.

Last Assessment	Percent of Allotments			
	BLM		Forest Service	
	All	Overstocked	All	Overstocked
0 to 9 years	55	49	57	53
10 to 20 years	11	11	23	21
Over 20 years	30	37	14	21

No response	4		3		6		5
-------------	---	--	---	--	---	--	---

Table 7

Changing population sizes of native herbivores in Wyoming. Source: Wyoming BLM 1992.

						% Increase in 28 years
Species		1962	1973	1984	1990	
Antelope		97000	101700	157000	226722	133
Deer		87500	135250	214800	246465	181
Elk		12600	24225	30400	35015	178
Bighorn		320	1020	1200	1221	281
Moose		390	1790	2000	2481	536

Table 8

President Clinton's 1995 BLM Budget Request. Source: BLM 1994b.
(* designates costs potentially related to grazing policies)

Category	New	Million Dollars
Sustaining Resource Values		286.1
	Upland Resources (\$93.9 M)*	
	Forest Resources (\$74 M)	

	Riparian and Aquatic Resources (\$20.7 M)*	
	Threatened and Endangered Species (\$31 M)*	
	Recreation Resources (\$30 M)	
	Cultural Resources (\$12 M)	
	Wilderness Management (\$13.4 M)*	
	Resource Plans and Analysis (\$10.9 M)*	
Sustaining Economic, Social, and Physical Uses		230.2
	Realty and Ownership Management (\$75.3 M)*	
	Fluid Minerals Management (\$54.3 M)	
	Solid Minerals Management (\$14.1 M)	
	Wild Horse and Burro Care and Placement (\$8.2 M)*	
	Facilities Maintenance (\$48.3 M)*	
	Natural Resources Law Enforcement (\$10.2 M)*	
	Hazardous Materials Management (\$18.2 M)	
	Recreation Operations (Fees) (\$1.5 M)	
Workforce and Organizational Support		124.8
	Administrative Support (\$46.7	

	M)*	
	Fixed Costs (\$59.5 M)*	
	Information Resources Management (\$18.6 M)*	
Construction*		6.6
Automated Land and Mineral Records System (ALMRS)*		69.4
Mining Law Administration (From Fees)		27.7
Fire Appropriations		138.9
	Wildfire Management (\$63.3 M)*	
	Wildland Fire Operations (\$75.6 M)*	
Other Appropriations		126.3
	Central HAZMAT Account (\$1.0 M)	
	Land Acquisition (\$21.2 M)	
	Payments in Lieu of Taxes (\$104.1 M)*	
Various Miscellaneous Funds		28.5
	Range Improvements (\$10.4 M)*	
	Service Charges, Deposits, and Forfeitures (\$8.9 M)*	
	Trust Funds (\$9.2 M)*	
TOTAL BLM Budget Request		1200 (1038.5 shown above)

Table 9

FY1994 income and expenditures from BLM-managed lands. Source: BLM 1995.

Federal Collections from BLM-Managed Lands and Minerals:		
Category		Amount
Grazing Fees		18,817,000
Recreation and Use Fees		2,062,000
Miscellaneous Receipts		10,591,000
Sale of Land and Materials		79,371,000
Mining Claim Holding Fees		31,404,000
National Grasslands		1,709,000
Mineral Royalties, Rents, and Bonuses		1,129,376,000
TOTAL		1,273,330,000
Direct BLM Financial Transfers:		
Category		Amount
Payment in Lieu of Taxes		99,333,000
Grazing Fees		3,245,000
Proceeds of Sales		780,000
National Grasslands		537,000
Nevada Land Sales		288,000
Oregon and California Grant Lands		97,642,000

Coos Bay Wagon Road Grant Lands		625,000
Mineral Royalties, Rents, and Bonuses		523,183,000
TOTAL		(725,633,000)
BLM Investments:		
Category		Amount
Management of Lands and Resources		599,860,000
Land Acquisition		12,122,000
Range Improvements		10,025,000
Construction and Access		10,467,000
Fire Management/Firefighting		233,817,000
Service Charges, Deposits, and Forfeitures		9,690,000
TOTAL		(875,981,000)
GRAND TOTAL		(328,284,000)

Table 10

**Percent of permittees of each category and the AUMs controlled by that category.
Source: GAO 1986b.**

	% of Total Permittees	% of AUMs

Individuals	76.2	57.9
Corporations	10.8	29.2
Partnerships	8.5	6.5
Others	4.5	6.4

Table 11

Values held by small scale community ranchers versus larger commercial ones.
 Source: Eastman, C., Harper, W.H. and B. Gomez. 1980. Full-time versus part-time farming. Cited in: Eastman and Gray 1987.

Goals	Rank	
	Small-Scale (<100 head)	Commercial (>100 head)
Quality of life	1	2
Avoid being forced out	2	3
Increase net worth	3	5
Avoid high losses	4	4
Make profit	5	1

Table 12

Summary of the public and private costs per AUM for grazing in the western states.
 Adapted from: U.S. Code--Legislative History 1978.

		Cattle		Sheep
--	--	---------------	--	--------------

	Total non-fee costs	3.28		2.75		4.53		3.89
	Private lease rate	(1.26)		1.79		(1.13)		1.77
	Total Costs	4.54		4.54		5.66		5.66
	Pubic-private difference		1.26				1.13	
	Weighted average				1.23			

Figure 2

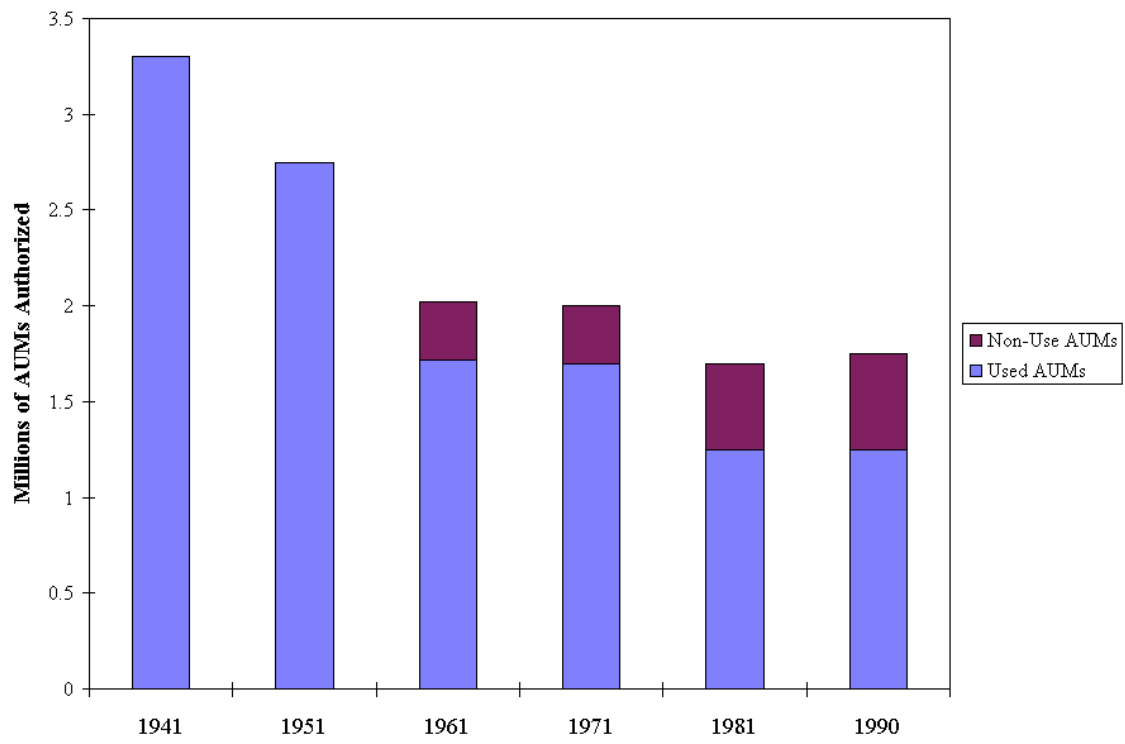


Figure 3 Range managers' estimates of the proportion of overstocked and other allotments which are in declining condition. Source: GAO 1988b.

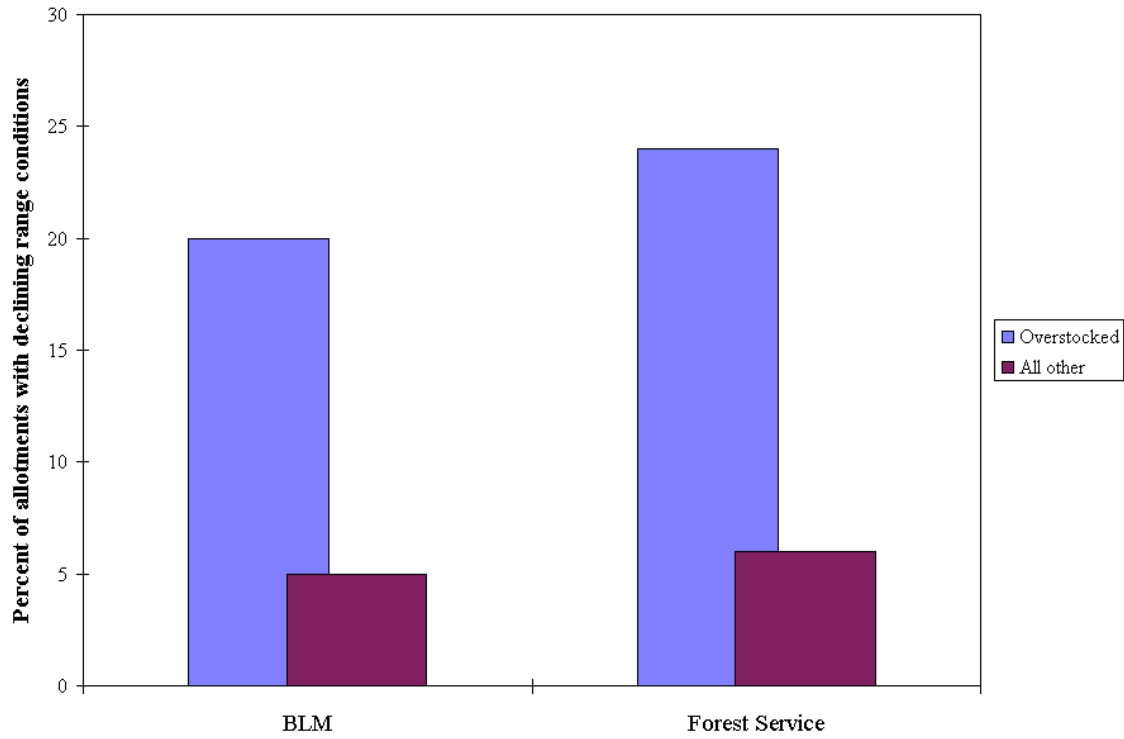


Figure 4 The percentage of BLM permit holders with herds of three different sizes.
Source: GAO 1986.

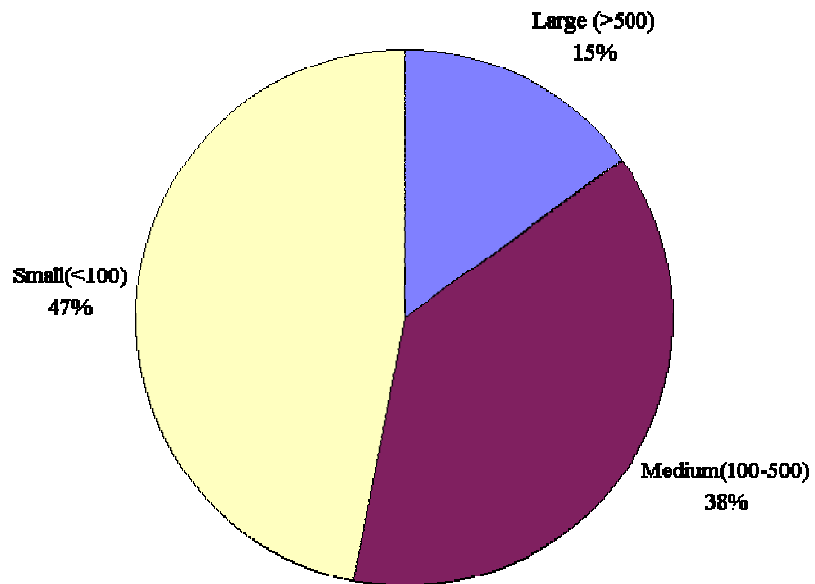


Figure 5 The number of BLM AUMs leased to permittees with three sizes of herd.
Source: GAO 1986b.

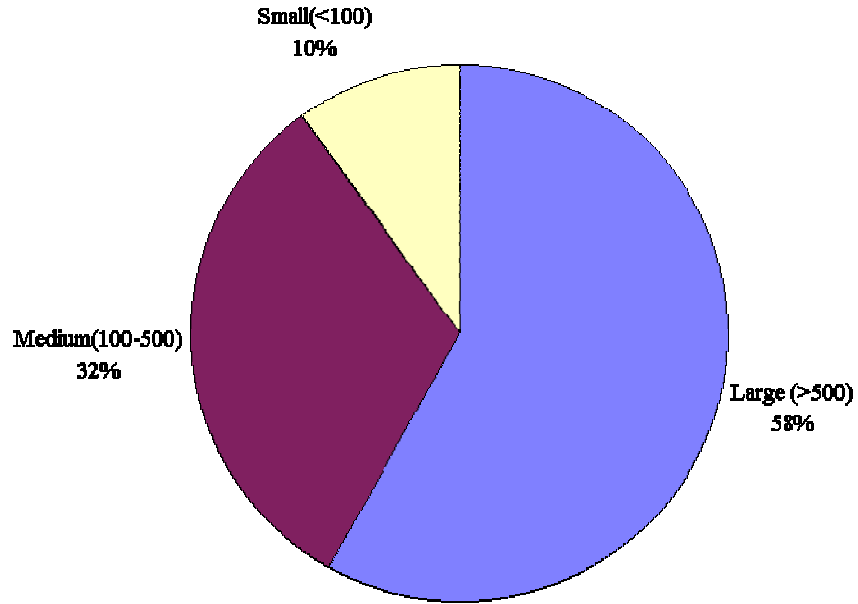


Figure 6 Long-term changes in grazing fees on BLM and Forest Service lands, without adjustment for inflation. Source: Adapted from Klyza 1996; Polk 1996.

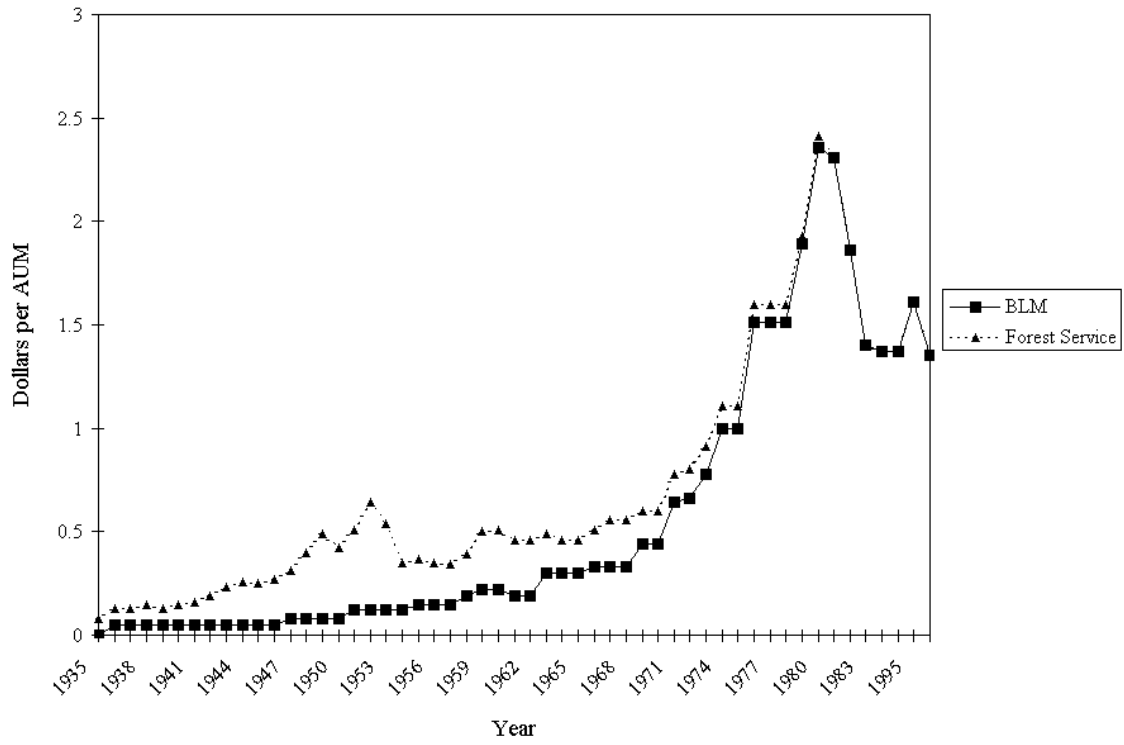


Figure 7 Permitted and Paid AUMs on Forest Service Property Nationwide. Source: United States Forest Service 1996.

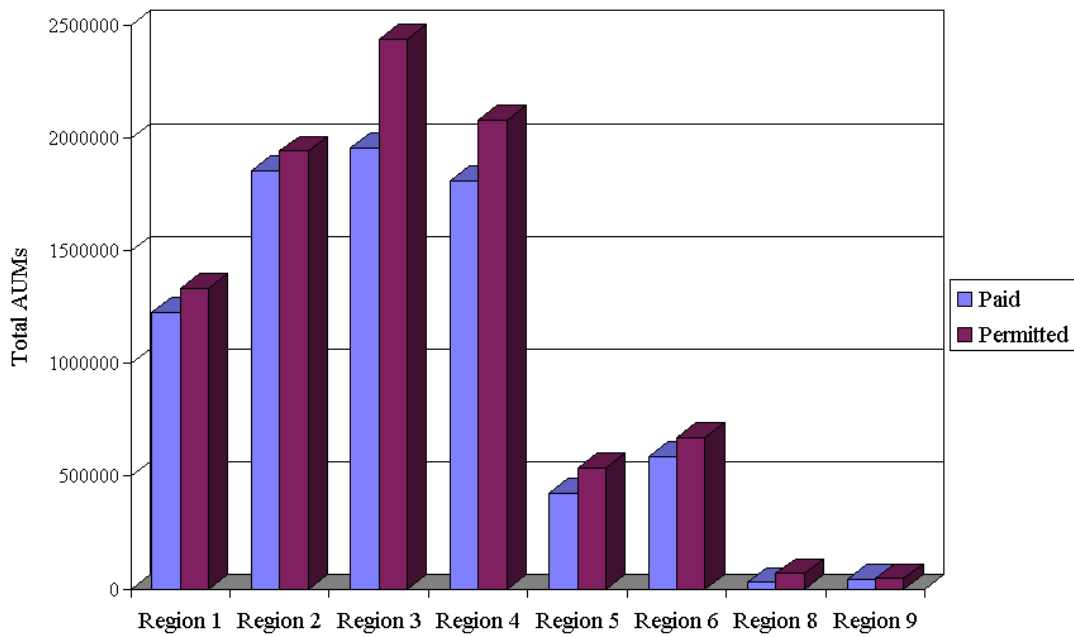


Figure 7b

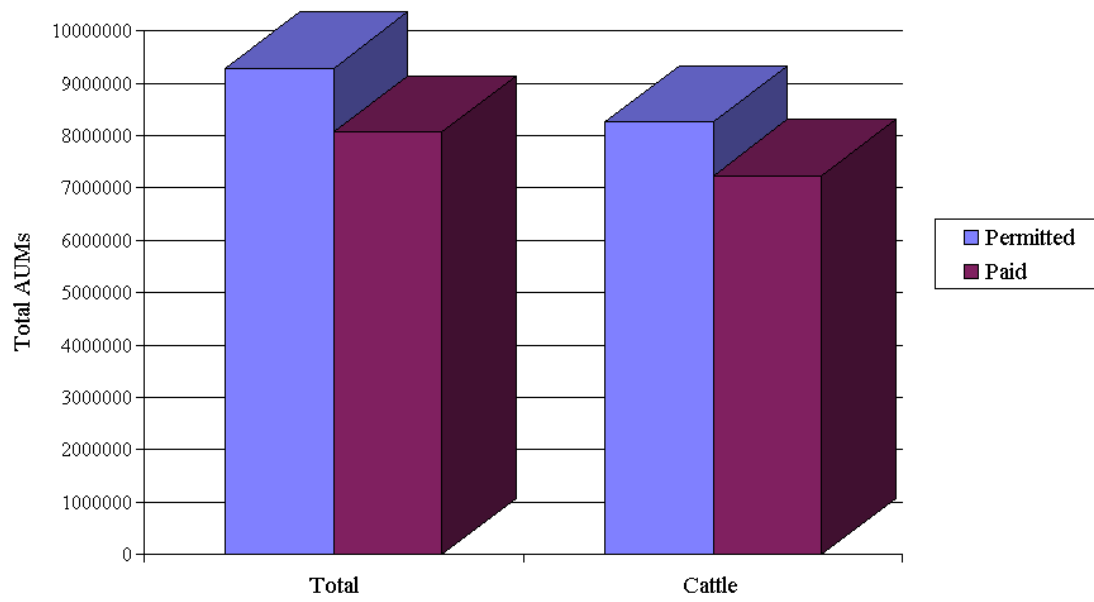


Figure 8 Distribution of Forest Service AUMs, both available and purchased, by region. The nine regions listed encompass all forty-eight continental states. Source: United States Forest Service 1996.

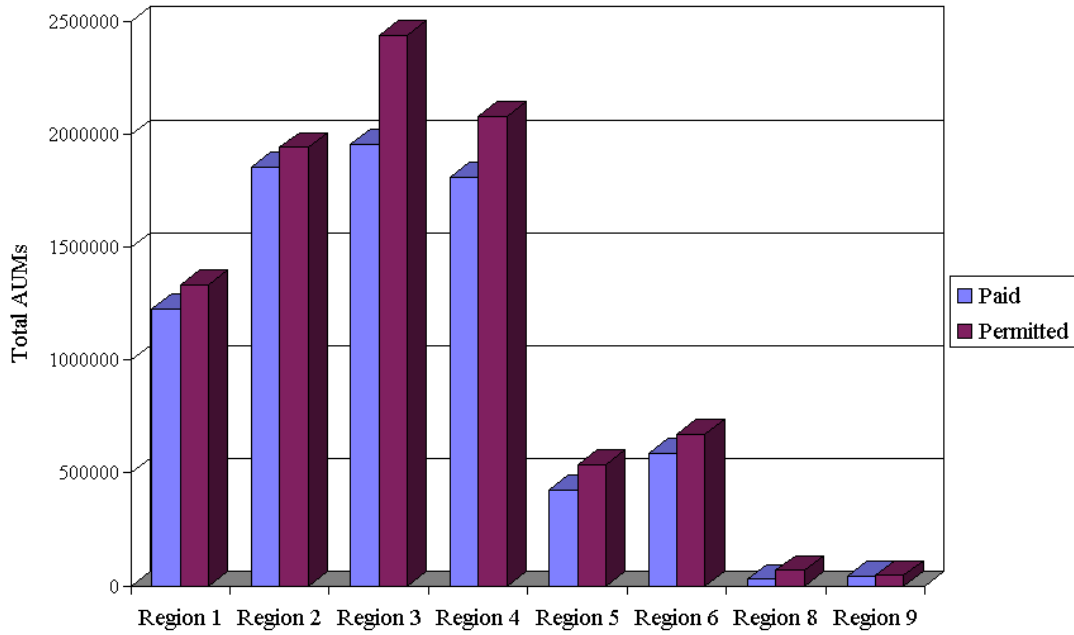


Figure 8b.

