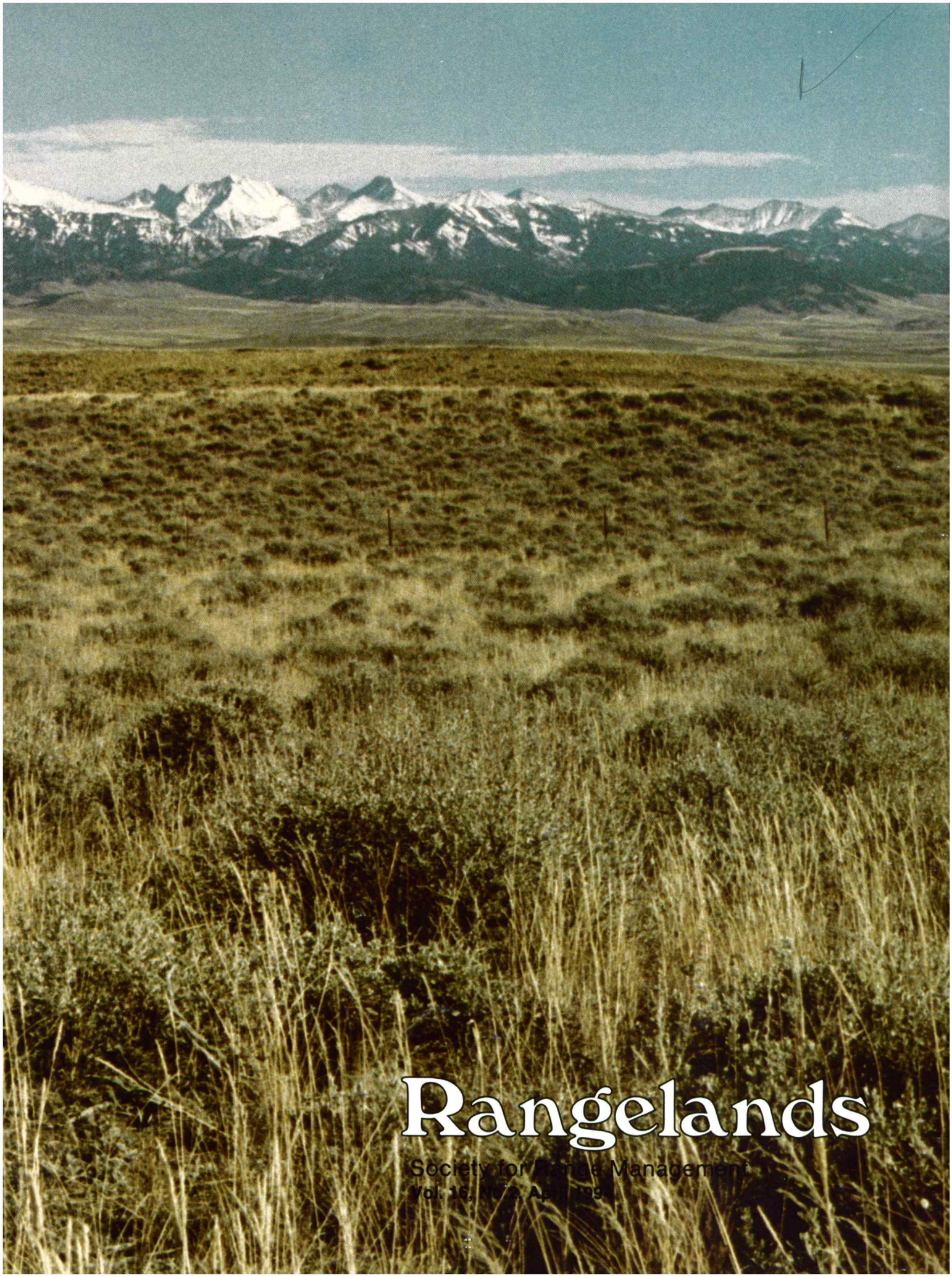

Society for Range Management
Vol. 16, No. 2, April 1994

Call for Volunteer Papers and Poster Abstracts
Annual Meeting, January 16–19, 1995
Phoenix, Arizona

ABSTRACTS AND TITLES DUE JUNE 1, 1994

The theme for the 1995 Annual Meeting will be Diversity: Land and People. For poster or contributed paper presentations, you may submit your abstract form and abstract either of two ways:

1) Send the information on the abstract form and your abstract on a DISKETTE with one paper copy for your abstract to Dr. William H. Miller or Dr. Gary L. Whysong, Program Co-Chair, School of Agribusiness and Environmental Resources, Arizona State University, Tempe, AZ 85287-3306. (Phone: 602-965-5567 Dr. Miller or 602-965-5586 Dr. Whysong).

OR

2) Send the information on the abstract form and your abstract via fax to Dr. William H. Miller @ 602-756-0629, Mon.–Fri. 8:00 a.m.–5:00 p.m. Pacific Standard Time.

Abstract is to include Title, Authors (including their affiliation and address) and Text, should be single-spaced and no longer than 250 words. Abstracts should include a statement of objectives, a brief description of methods, a concise presentation of the actual results, and a summary of conclusions. Please follow the format of the example given below. **Abstracts and titles are due June 1, 1994.** Authors will be notified by July 15, 1994 of acceptance or rejection.

If you send a diskette, either a 3.5″ or 5.25″ DOS-formatted diskette, either double or high density format is acceptable. Word or WordPerfect 5.1 is preferred, however ASCII files are acceptable. If you cannot use either of these word processing programs, please label the disk with your word processing program and version.

Traditional presentations will be 15 minutes total with 12 minutes for presentation and 3 minutes for questions. A 35 mm slide projector will be available. Posters will be on display for 1/2 day.

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11 Synecology
12 Plant-Soil Relations
13 Competition
14 Succession
15 Riparian
16 Nutrient Cycling
17 Rangeland Reference Areas

Ecophysiology

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21 Photosynthesis
22 Water Relations
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Rangelands

Volume 16, No. 2
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FEATURE ARTICLES

DEPARTMENTS

COVER PHOTO

"Montana sings," courtesy of Matt Ricketts, Livingston, Montana.

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The Trail Boss

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THE SOCIETY FOR RANGE MANAGEMENT, founded in 1948 as the *American Society of Range Management,* is a nonprofit association incorporated under the laws of the State of Wyoming. It is recognized exempt from Federal income tax, as a scientific and educational organization, under the provisions of Section 501(c)(3) of the Internal Revenue Code, and also is classed as a public foundation as described in Section 509(a)(2) of the Code. The name of the Society was changed in 1971 by amendment of the Articles of Incorporation.

The objectives for which the corporation is established are:

—to properly take care of the basic rangeland resources of soil, plants and water;

—to develop an understanding of range ecosystems and of the principles applicable to the management of range resources;

—to assist all who work with range resources to keep abreast of new findings and techniques in the science and art of range management;

—to improve the effectiveness of range management to obtain from range resources the products and values necessary for man's welfare;

—to create a public appreciation of the economic and social benefits to be obtained from the range environment;

—to promote professional development of its members.

Membership in the Society for Range Management is open to anyone engaged in or interested in any aspect of the study, management, or use of rangelands. Please contact the Executive Vice-President for details.

Rangelands serves as a forum for the presentation and discussion of facts, ideas, and philosophies pertaining to the study, management, and use of rangelands and their several resources. Accordingly, all material published herein is signed and reflects the individual views of the authors and is not necessarily an official position of the Society. Manuscripts from any source—nonmembers as well as members—are welcome and will be given every consideration by the editors. ***Rangelands*** is the nontechnical counterpart of the ***Journal of Range Management;*** therefore, manuscripts and news items submitted for publication in ***Rangelands*** should be in nontechnical nature and germane to the broad field of range management. Editorial comment by an individual is also welcome and, subject to acceptance by the editor, will be published as a "Viewpoint."

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Executive Vice-President's Report

In this job there is no single bench mark for measuring time. Does the year begin in October with membership renewal? Is it January 1 when the new fiscal year begins? Or is it marked by the completion of the annual winter meeting? It is all of the above, and it is important to monitor the ebb and flow of events associated with each.

Membership renewal for 1994 is on target. On the average, 84% of year-end membership is recorded by the end of February. The projected membership for 1994, based on this record, is 5,352. Mean membership for the past decade is 5,207, with a range of plus or minus 9% of the mean. Although there is considerable annual turnover, membership has remained very stable. I want to take this opportunity to remind you that SRM will move to an anniversary date membership beginning with renewals in 1995. Current members will have a once-in-a-lifetime opportunity to change their anniversary date if they desire, after which it will remain fixed.

SRM begins the new fiscal year (1994) with a new accounting system. Actually, it is the current version (4.0) of the same system (CA-BPI), but the differences are so great that it is, for all practical purposes, a new system. Also, the accountant that audited the records has recommended many changes in the chart of accounts and in the manner in which we organize our reports. It is like starting over again. The new reports will give a clearer representation of the Society's business—program by program, be more useful for management purposes, and be attainable on demand.

As a result of the audit and other internal management changes, SRM is now eligible for inclusion in the Combined Federal Campaign. We applied for admission in the 1994 fund drive.

And wasn't the 1994 meeting a great one! The Colorado Section deserves the credit for the planning and implementation, and Jack Bohning claims credit for bringing the good weather with him. Everything went so well there are plenty of accolades to go around. One thousand six hundred and sixteen registered, there were 55 with the Trade Show, and 340 students. Isn't it wonderful—over 20% of the attendance at annual meetings is students! I can't begin to report on the program accomplishments because I didn't get to attend many programs, but I will cover some of the business items.

The Society signed an agreement with Kessler Financial Services to provide an affinity Mastercard for SRM members. The card will carry the Society's name and logo and offer several advantages over some other cards. The Society receives a small royalty income from the use of the card, but I hope it provides an ever greater reward in terms of member service.

Another member service that the board approved and is on the horizon for the future is to provide the opportunity for members to use personal computers to search the *JRM* index electronically. This will require a file of the source material, authors, perhaps an abstract and the software to search the file. This can greatly enhance the search of subjects and authors in *JRM*.

The Finance Committee recommended and the Board of Directors approved the change from the Varityper to Desktop Publishing. They also approved a special fund drive to raise the money to purchase the equipment and software. This change has far-reaching impacts for moving the Society into the 21st century and providing an on-ramp to the information highway. It will also have significant short-term impacts on reducing publication costs and greatly expand publication flexibility. The fund drive will begin later this spring and your financial support will be required to achieve this goal.—**Bud Rumburg,** EVP, SRM

Recommendations from the 1993 Grazing Fee Study

E. Tom Bartlett, Larry W. Van Tassell, Neil R. Rimbey, and L. Allen Torell

Grazing fees on public lands have been an issue since before the Forest Service established grazing regulations in 1906. The Grazing Fee Task Group (Task Group) was formed in May of 1992 by the Bureau of Land Management (BLM) and USDA Forest Service (USFS) to evaluate the grazing fee issue on federal lands administered by the two agencies. The Task Group was part of the Incentive-Based Grazing Fee Task Force.

At the onset, the Task Group realized that no grazing fee system existed nor could one be devised that would satisfy all interested parties. Past grazing fee studies were reviewed and a background document prepared that provided the basis for future work. Procedures were developed to evaluate alternative methods of determining forage value and information was collected on grazing costs in Idaho, New Mexico, and Wyoming. Forage values were estimated, and compared to previous work and value estimates determined using market appraisal techniques. Various pricing area alternatives were tested. Finally, recommendations were made on how forage values should be determined and updated.

This paper gives the recommendations of the Task Group's efforts. The full report was completed in June 1993 (Bartlett et al. 1993). A summary of the full report is also available (Torell et al. 1993).

Objectives

The Task Group was given two directives: (1) recommend a method for establishing grazing fees, which includes a procedure for updating fees periodically, and (2) recommend pricing areas to use in establishing fees. The major task was to evaluate alternative methods that could be used to estimate the value of public land forage. Alternative pricing areas and appropriate methods for updating grazing fees were also examined.

The primary evaluation criterion for establishing grazing fees was that fees should be based on the economic value of the forage. This criterion requires that estimates of forage values be based on accepted methods and procedures. Valuation methods should consider differences in productivity and non-fee grazing costs. Grazing cost differences are also important when defining pricing areas.

Other criteria were considered in addition to the market value of forage. These included net payments to state and county governments, program cost recovery, administrative feasibility, maintaining market value over time, ability-to-pay, and productivity and ecological variations. The Task Group also considered shared use, community and industry stability, equity to livestock producers with and without federal permits, benefits to other uses of public lands, cultural and minority effects, and size of ranching operation. While considered, these factors were incorporated into other criteria or deleted as criteria in the study.

Limited studies in selected areas (Idaho, New Mexico, and Wyoming) were conducted for testing and evaluation of alternative fee systems and pricing areas. Forage valuation methods included a total cost comparison of the fee and non-fee costs of grazing private and public rangelands, a market appraisal of private leases, and the value of forage implied by public land grazing permits.

Recommendations

It is important to move forward on the grazing fee issue. The controversy surrounding the fee has disrupted the ranch real estate market; created uncertainty for ranchers, lenders, and rural communities in the West; occupied an inordinate amount of time by policy makers; and detracted from the management of public lands. A resolution of the grazing fee issue would lead to more stability within the livestock industry and dependent rural communities and would allow the BLM and USFS to concentrate on managing and improving rangeland resources.

Given the variability of results in this study, the Task Group had difficulty making an absolute recommendation concerning the appropriate method for determining forage value for both federal land agencies and for both sheep and cattle enterprises. Several of the methods

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Acknowledgments: The Grazing Fee Task Group included the four authors of this paper plus BLM appraisers Ron Appel, Tim Heisler and Gerald Stoebig and U.S. Forest Service economist John DeVilbiss. Advice was provided by Don Waite of the BLM Washington, D.C., office. We thank the other members of the Grazing Fee Task Group for the significant input they had in the study. Research associates Tom Bagwell of New Mexico State University, Paul Burgener of the University of Wyoming, and Juli Coen of the University of Idaho were instrumental in the collection and analysis of data. Dr. Morris Southward of New Mexico State University gave valuable advise on statistical analyses. We also thank the peer review panel, Drs. Thomas Quigley, Gerhard Rostvold, Norman Whittlesey, and John Workman, for their reviews and suggestions. K. Lynn Bennett provided the leadership that was invaluable to the Grazing Fee Task Group as well as the Incentive Based Grazing Fee Task Force. The Cooperative States Research Service of USDA is acknowledged for their assistance in funding.

examined produced comparable results for BLM cattle allotments, but results were inconsistent for USFS and sheep allotments. The following recommendations deal with alternative forage valuation methods, pricing areas, and ways of updating fees through time.

Recommendation: The grazing fee should be administratively or legislatively determined within the range of $3 to $5/AUM.

Each method examined for valuing public forage had limitations. It is futile to apply any method in an attempt to derive an absolute value for public forage. A comparison to the private forage market has been used historically to estimate the value of public land forage, and we originally thought the price comparison method had the greatest potential for updating public land grazing fees. This method requires the assumptions that (1) ranchers are profit maximizers, (2) alternatives to public land grazing are available, and (3) public and private leasing arrangements, terms, conditions, and rangeland quality are comparable, or adjustments for any differences can be made. The results of this study led us to conclude that private forage comparison methods fail to meet one or more of these assumptions. There are obviously many factors in addition to profit that enter into the decision to use public and private land. The complementary value of public and private resources and the personal utility from ranching as a way of life are obvious examples.

This recommendation relied heavily upon the permit value approach. Permit value is the only direct estimate of value for public land grazing that is determined in a competitive market. The total cost approach results for cattle on BLM allotments were also within the $3 to $5/AUM range. Increasing grazing fees theoretically reallocates permit value (or some portion of permit value) to federal land agencies, with the implication that it belongs there. The fairness of this reallocation has been and will continue to be a topic of discussion.

Recommendation: Any base forage value should be applied Westwide.

Our study results and the earlier 1966 grazing cost study indicated that there is no economic justification for setting different grazing fees based on geographic or ecological boundaries. To reiterate what was stated nearly 25 years ago by Houseman et al. (1968, p. 2), and reinforced from our study results:

> Differences among ranching areas, as shown by the data, were not large enough in relation to the wide variation that existed within areas to provide a basis for recommending differential base fees among ranching areas.

Recommendation: Any base grazing value should be updated annually with the forage value index.

Evaluation of the PRIA indices revealed that the previous year's Forage Value Index is the best predictor of private lease market changes. The Beef Cattle Price Index and Prices Paid Index have not helped explain short-term variation in forage value as envisioned when these indices were added to the current grazing fee formula. The Forage Value Index considers rancher's ability-to-pay because expected beef prices and production costs influence private lease rates when lessees and lessors negotiate a lease price.

A new base period would need to be set for the Forage Value Index. The period 1987 through 1991 is a recent 5-year period that could be used which includes values near the top and bottom of the beef price cycle.

The Task Group concurred with the suggestion made in the 1986 grazing fee study (USDA/USDI 1986) that the Forage Value Index be derived by weighting the individual state lease rates by the number of federal AUM's in the state rather than by the number of private lease observations. This would give a higher weighting to lease rates in those states with the most public lands. Adjustments in the weighting scheme would need to be made for those states that have an inadequate number of private leases from which to draw an adequate sample.

Recommendation: The BLM and USFS should investigate the potential of implementing a competitive bid system that would create a market for public land grazing.

Economists, appraisers, and politicians have never been able to resolve the grazing fee issue, nor can they be expected to completely resolve the issue in the future. A competitive market is really the only way to reveal public land grazing values, especially on an allotment-by-allotment basis. Without the benefits of such a market, current methods for valuing public land forage have many inadequacies, so much so that a defensible absolute value of public grazing cannot be determined. Thus, for the short-run, the Task Group recommends that no particular methodology be utilized to establish forage value.

This study and others have documented that the value of grazing public lands varies greatly between allotments. The costs associated with each allotment as well as the benefits derived are unique. To determine the actual market value of grazing public lands, a competitive market is necessary. Creating a market for public land grazing through a competitive bid system may accomplish this objective. A competitive bid approach for valuing public grazing was suggested thirty years ago by Gardner (1963) and was proposed by the Office of Management and Budget in the 1980's. However, competitive bidding was not explored and tested in this study and would require substantial examination before a recommendation to implement a competitive bidding process could be made.

Under a competitive bidding system, bids for public land forage would be for specific allotments; thus, the need for pricing areas would be eliminated. The length of each lease would need to be determined, but if a reasonably short time frame were used, it would not be necessary to index or update grazing fees with indices.

We recognize competitive bidding would require major changes in policy and that these would have to be addressed. Some of the major concerns about a competi-

tive bidding system include:

1. How to equitably reallocate value from current ranchers? Past grazing fee policy has contributed to the value of grazing permits and current ranchers have paid this cost. Some of the value for public land grazing has been capitalized into the value of public land ranches and is bought and sold in the ranch real estate market. A competitive bid would be expected to eliminate permit value because the tenure of the permit would be uncertain and higher grazing fees would be expected. Higher grazing fees, no matter how they are determined, should reduce or eliminate the value of grazing permits.
2. Should present permittees have the right to match the highest bid?
3. How to determine the terms and conditions of competitive leases? Specifically, items which will need to be addressed from a policy perspective include: duration of lease, provisions for minimum bids to cover administrative costs or handle small, scattered parcels, qualifying bidders, commensurate property requirements, common or group allotments, and control of range improvements by existing permit holders (e.g., watering facilities on the current permittee's deeded rangeland).

Further evaluation of the competitive bid option may show that this method is politically unacceptable, that it will not be cost effective, or that it will not work for many small, scattered land parcels.

It should be recognized that the cost of government administration does not determine or influence the value of the forage for productive uses. Comparisons should be made between any forage valuation method and government administration costs to strive for administrative efficiency in the management process.

Recommendation: Additional studies to define the market of public land forage using market price comparisons are not justified.

We do not feel additional studies to define the apparent market value of forage by state or geographic area are justified. The results of the 1966 and 1992 grazing cost surveys demonstrate that little additional insight would be gained about the value of public land forage; large variability precludes further refinement of regionalized values. More studies to estimate the impacts to ranchers from higher fees and other proposed policy changes are needed. This information would help policy makers better understand the consequences of changing land use policies.

Recent Developments

The report on the Incentive-Based Grazing Fee System was released by BLM Director on August 13, 1993. Prior to the publication of the Task Group's report, the Department of the Interior in cooperation with the Department of Agriculture released Rangeland Reform '94, which contained a grazing fee proposal of $4.28/AUM as well as other range and grazing policies. The western livestock industry, through the western Livestock Producers Alliance (WLPA), have also developed a new grazing fee formula.

In Rangeland Reform '94 the federal land agencies estimated the value of public land forage to be in the $3 to 5/AUM range. They calculated this value by indexing the Public Rangeland Improvement Act (PRIA) fee formula that is currently used to set federal grazing fees, and by using a 1983 appraisal of grazing values (USDA/USDI 1986). They pointed out that the study reported here found a similar range of values and offered this as support to the fee proposal in Rangeland Reform '94.

On August 27, 1993, we (the outside [University] authors of the Task Group report) submitted a comment letter to BLM to reiterate the following important points that were made in the study but not mentioned in Rangeland Reform '94. First, we agreed with the interpretation of BLM and USFS that the market value of public land forage is highly variable but in the range of $3 to 5/AUM. We pointed out, however, that our estimate of value relied heavily on what ranchers had paid in total to lease public land forage, including non-fee grazing costs and investments to buy the grazing permit. In most instances, a total cost comparison between private and public leases did not support the $3 to $5/AUM value. In fact, the total cost comparison for some USFS allotments and for all sheep allotments resulted in negative forage values even before the grazing permit investment was considered.

The grazing fee policy discussion in Rangeland Reform '94 did not mention the reallocation of permit that would be expected with higher grazing fees and altered land use policies. This was a major point in the Task Group's report and an issue that must be resolved as the grazing fee issue is further debated. The allocation of permit value is a key issue to be resolved in setting grazing fees. By proposing a base fee of $3.96/AUM, the implication is that the value of public land grazing permits belongs to the federal government and will be reallocated from ranchers to the government. It is important for those setting grazing fee policy, and the general public, to realize that a reallocation of wealth is expected as grazing fees increase.

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Drive an Historic Alberta Highway

Barry D. Irving

Dearest, I have tried to give you some idea of my life in this unique corner of the Great Lone Land. I hope I have not tired you. I expect in return a full account of your new life, which is so very different from mine, though no happier. My life may seem rough and bare, but there is something to compensate one for every hardship and trial. You must come and see me, though, for it is the spirit of the West that charms one, and I can't convey it to you, try as I may. It is a shy wild spirit and will not leave its native mountains and rolling prairies and, though I try to get it into my letters, I can't. I must warn you that if it once charms you, it becomes an obsession and one grows very lonely away from it. No Westerner who has felt its fascination ever is really content again in the conventional East.—(Inderwick 1884)

This is an excerpt from a letter written in the period around 1884 by a rancher's wife. The Inderwick ranch was located in the southern Alberta foothills. This short quotation captures the essence of early settlement life in Alberta, hardships with compensation.

The purpose of this paper is to provide perspective and insight into the settlement history of the region south of Edmonton, Alberta, Canada. To facilitate the discussion the reader will drive an historic highway that will take them from Lethbridge, west to Fort Macleod, and then north through Calgary and finally to Edmonton (Fig. 1). The geographic distance is about 600 km, while the historic distance is immense. This paper should not be construed in any way as being a complete history of the drive between Lethbridge and Edmonton, but simply as highlights of a bright and colorful past.

Lethbridge is a thriving prairie center with a fascinating history. Located just south of Lethbridge was one of the original sites of prairie commerce, Fort Whoopup. Originally Fort Hamilton, the name evolved to Fort Whoopup, after the dominant trade good, whiskey, was well established. Fort Whoopup was established in 1869 by "free American traders" by the name of John Healy and Alfred Hamilton. It soon became the trading center for all of southern Alberta. Fort Whoopup was a place for bad men, although that's not the story John Healy told Reverend John McDougall, who visited the Fort in 1874. Healy assured McDougall there were not bad men in Fort Whoopup. There were a few bad men that had come to the region, but they had been "stretched out" in various locations around the Fort. Healy went on to say bad men were simply not allowed in the region by the Fort Whoopup traders; there was no need for government intervention because the traders were taking care of any bad men that came to the Fort Whoopup region (Hamilton 1971). Of course, the traders were only successful in taking care of bad men themselves because they were worse than the men they were dispatching. Fort Whoopup was operated by bad men, and was the origin of a great deal of human suffering. An excellent replica of Fort Whoopup has been reconstructed in Lethbridge's Indian Battle Park.

Fig. 1. *Historical points between Lethbridge and Edmonton.*

Less than 45 minutes west of Lethbridge is the town of Fort Macleod. Fort Macleod was the first North West Mounted Police (NWMP) fort in western Canada. The NWMP was catapulted into existence in 1874. As early as 1870 reports of the whiskey trade being the ruination of the plains Indians moved the Canadian government to consider the establishment of a western police force. The

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Canadian Prime Minister, Sir John A. Macdonald, was known as "Old Tomorrow" because he always stalled important decisions, and at the time was stalling the establishment of a western police force. The federal government was still stalling when a group of white wolfers (men who lived by collecting bounties on wolves) slaughtered a band of Assiniboine Indians in the Cypress Hills (southeastern Alberta) in 1873. The public outcry and the obvious lawlessness of the western frontier resulted in the formation of the NWMP. In 1874, 300 NWMP headed west from Manitoba. The force was split into three divisions, one of which made its way to southern Alberta. The southern force enlisted the services of a local guide by the name of Jerry Potts.

Jerry Potts, whose mother was a member of the Blackfoot Confederacy and father a Scottish-American trader, was a godsend to the tired and travel-weary NWMP troupe. Potts had lived all his life on the plains and was an expert navigator and hunter. His escapades before and after his enlistment as a NWMP scout are legendary and his contribution to the success of the early force great (Dempsey 1966). His first job as a scout for the NWMP was to lead them to Fort Whoopup, which he said was unnecessary because the traders had fled when they learned of the large police force coming to southern Alberta. However, the commanding officers insisted, and Potts led them to Fort Whoopup, which the force found deserted. In the summer of 1874, the NWMP accomplished its first mission and closed the doors of one of the most notorious whiskey trading forts in western Canada.

Potts' next duty was to find the force a site on which to build a permanent fort. An island in the middle of the Oldman River was the chosen location. The fort was named after the first NWMP commander, Col. James F. Macleod. From its new home the NWMP systematically eliminated the whiskey trade from southern Alberta. The force won the respect of the indigenous people through level headed commanders who administered equal justice to all, regardless of skin color, with the help of Jerry Potts. This trust is perhaps best illustrated by the mutual respect (some call it friendship) that developed between Sitting Bull and Major James Morrow Walsh during the years the Sioux spent on Canadian soil after defeating Custer in the Battle of the Little Big Horn (MacEwan 1973). The trust between the NWMP and the Plains Indian tribes was tested many times, but the result was always a peaceful and negotiated solution. The conduct of the NWMP is a point of pride in the history of southern Alberta.

The historical trek from Fort Macleod to Calgary is highlighted by the beginnings of Alberta's ranching history. Ranching was southern Alberta's first agricultural industry. The NWMP brought a sizable herd of cattle to Alberta in 1874. The establishment of NWMP posts in southern Alberta provided a market, and a small cattle industry began to develop. Declining bison herds and the need to feed the "newest" Canadian citizens (i.e., the indigenous peoples) served to increase the demand for beef in the region. Thus a fledgling beef industry, at first slaughter animals and eventually breeding stock, developed in southern Alberta.

The foothills of the Rockies in south-western Alberta were attractive to those interested in ranching because of the rich native grass (that cured on the stem for winter feed), reliable rainfall, and a winter phenomenon known as a "chinook". Chinooks are a warm Pacific wind that blows over the mountains in winter and strips the foothills of snow cover, enabling year round grazing.

The notion of wintering cattle without supplement was first tested in 1877 by a former trader, Fred Kanouse, who turned 21 cows onto the range at Fort Macleod and collected 21 cows and 21 calves the following spring. Prior to 1881 cattle numbered about 9,000 head on the Alberta ranges (Kelly 1913). The total herd was divided amongst numerous stockmen, some of whom were former traders and NWMP. Improving beef markets, the signing of Treaty 7 (which gave land ownership to the federal government and confined the indigenous people to reservations), and favorable results from experiences of earlier ranching entrepreneurs led to speculation that ranching in southern Alberta could be big business.

Large scale ranching began in 1881, when the Government of Canada passed an Order-in-Council that allowed one individual or ranch company to lease 100,000 acres for one cent per acre per year. The Cochrane Ranch, located near present day Cochrane, west of Calgary, was the first "big lease". It was followed closely by the Northwest Cattle Company (Bar U). The Cochrane Ranch was the first of the big ranches, while the Bar U was arguably the most successful. Other ranchers of the era were the Walrond, Quorn, the 76, the Circle, Maunsell Brothers, and Cyprus Hills Cattle Company (Jameson 1987). There were others of course, but they are too numerous to mention here.

Two consistencies among all the big lease ranches appeared. First was the belief that putting up winter feed was not required in the chinook country and second was the interference from eastern stockholders that western ranch managers were subjected to. These two factors spelled disaster for the early Cochrane Ranch. The second herd of Cochrane Ranch cattle (numbering about 5,000 head) brought to Alberta in 1882 from Montana were caught in an early fall snow storm about 60 miles south of the Cochrane Ranch lease. Against local wisdom (which would have wintered the cattle where they were) the herders followed the eastern directors' orders and drove the herd on to the Cochrane lease. The cattle arrived on Cochrane Ranch lease exhausted and in poor condition, and were met with a severe winter and no winter feed. The cattle tried to drift to the snow free ranges east of the Cochrane lease but were hazed back (again under orders from the eastern directors). The losses tallied in 1883 were about 3,000 head (Jameson 1987, MacEwan 1975). Lack of winter feed would eventually affect all the big lease ranches, especially during the winter of 1886–87, when chinook winds did not free the

ranges from snow. When the winter was at its worst there were an estimated 40,000 starved horned critters within a 25-mile radius of Fort Macleod. The winter of 1906–07 (another long, cold, and snowy winter), combined with advancing settlement, and an unsympathetic government spelled the end of the big lease era of Alberta ranching. During the demise of the big lease ranches numerous smaller ranches became established. The smaller holdings were locally owned and managed (they didn't have to answer to distant directors) and there was a growing body of knowledge and experience that fostered success in the ranching industry. Perhaps the first lesson that successful operators learned was winter feed is cheap insurance when the chinooks fail to blow.

The final leg of the journey from Calgary to Edmonton follows a modern superhighway. The highway's course follows, almost exactly, the route of the old Calgary-Edmonton trail. The northern 2/3 of the trail was originally pioneered by the Rev. John McDougall and his trader brother David. The McDougalls are credited with bringing the first cattle to Alberta in 1864. In 1873 they hacked a trail, and drove the first herd of cattle, from Edmonton to a place called Lone Pine (near present-day Bowden) and then southwest to Morleyville (west of present day Calgary). In doing so they established the northern portion of the Calgary-Edmonton Trail (Belanger 1873).

The trail was a prominent trade route that saw bull trains from Fort Benton, Montana, replaced by the Red River Cart for the final leg from Calgary to Edmonton. The soils north of Calgary were softer than the prairie soils and could not support the weight of the bull trains. The Red River Cart was a two wheeled wagon that could be maneuvered around the numerous mud holes and river fords. The Trail entered a ten-year boom period after the Canadian Pacific Railway reached Calgary in 1883. A one-way fare from Calgary to Edmonton was $25 (about the same as bus fare today) with 4–5 days being an average trip. The trail passed Innisfail, the approximate location where Anthony Henday (who was the first white man to set foot in present day Alberta, the first to see the Canadian Rockies, and the first to winter amongst the Blackfoot Confederancy) wintered in 1754 (Alberta Report 1991). Farther north it crossed the Red Deer River (which was the approximate boundary between the farming country to the north and ranching country to the south) and went on to pass present day Wetaskiwin (an indigenous name meaning Peace Hills) named after a peace treaty that was signed between the Blackfoot and Cree nations.

River fords along the trail were numerous and treacherous. "Death rides a wet horse" was a common saying of the day. Floods associated with snow melt and heavy rains in the adjacent foothlls made traversing the Trail an adventure indeed. The railway, which gave the Trail its best years, was also the end of the trail a few years later. A railway spur from Calgary to Edmonton completed in 1891 spelled the end of the Calgary-Edmonton Trail. In contrast to the 4-day trip by the Trail, travelers could now board a train in Calgary and expect to be in Edmonton a mere 12 hours later.

The Calgary-Edmonton Trail remained unused until the advent of the automobile. In 1906, Mr. G. Corriveau and his son made the trip from Calgary to Edmonton by car in 11.5 hours. They managed to reach speeds of 40 MPH and at one point covered 20 miles in 34 minutes. That stretch proved to be expensive as the car used one gallon of gas per mile and burned one full gallon of oil in the 20 mile stretch (Belanger 1973). Today the Trail is a modern highway, complete with bridges and rest centers. Travel times between Calgary and Edmonton are under 3 hours, and gas mileage has improved somewhat. The existence of the Calgary-Edmonton Trail is commemorated in both cities (Calgary Trail in Edmonton and Edmonton Trail in Calgary). It is a fascinating piece of Alberta heritage.

At the end of our historic trek lies the city of Edmonton. Edmonton had a very different settlement history than the southern portion of Alberta. Edmonton was first established as Fort Edmonton in 1795 by the Hudson Bay Company. The Hudson Bay Company was a dominant force in the fur trade and Fort Edmonton was the trade center for the Company's northern operations. The North Saskatchewan River (which dissects present day Edmonton and flows almost straight east) was a fine transportation route that linked Fort Edmonton with Winnipeg, Hudson Bay, and the rest of eastern Canada and the world. Consequently, Fort Edmonton was situated well for trade goods from the east and furs from the west and north. Trade routes south of Edmonton were slow to develop, initially because of the dominance of the Blackfoot Confederacy (who were fierce warriors and too independent to need the white man's trade goods), and later because of the lawlessness of the whiskey trade. It wasn't until after the establishment of the NWMP that trade routes were developed between Edmonton and southern Alberta (Belanger 1975). Edmonton was an established community a full 100-years before settlement in southern Alberta began. Its harsher winter (Edmonton is outside the chinook belt) yet longer growing season led to the development of a farming-based agricultural sector as opposed to the ranching industry that developed farther south.

Today, Edmonton is the capital of Alberta. The Alberta Legislative Buildings are close to the original site of Fort Edmonton. Fort Edmonton Park, in the North Saskatchewan River Valley, was established as a replica of the early heritage of the development of Edmonton.

This completes the historic drive through south-central Alberta. Fur traders, indigenous peoples, missionaries, whiskey traders, lawmen, ranchers, and freighters were all a part of the early settlement history of Alberta.

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Alberta's Prairie Vegetation: Past and Present Use

Brian D. Olson

Alberta's prairie vegetation has gone through many changes. Glaciation, fire, climate, and bison grazing played important roles in its development before European settlement. Since European settlement, fire suppression, domestic crop production, and the elimination of migratory bison herds have altered Alberta's prairie ecology and changed much of the vegetation.

Vegetational Changes since Glaciation

During Alberta's early history after the last glaciation, coniferous forests dominated the landscape. Even the semiarid grasslands present in southern Alberta today were dominated by coniferous forest. After the glaciers fully retreated, dry weather along with natural wildfire created grasslands and expanded them northward. The amount of grassland expansion that occurred is uncertain. Some postulate that the grasslands of the Peace River region in northwestern Alberta joined up with those in central Alberta. These grasslands are currently separated by nearly 100 miles of boreal forest. As the dry period became less harsh, forests began invading back into the grasslands until the present equilibrium was reached.

Present Vegetation

With the present equilibrium, six vegetation regions occur on Alberta's prairies (Figures 1 to 6). They are the Dry Mixed Grass Prairie, the Mixed Grass Prairie, the Fescue Prairie, the Aspen Parkland, the Montane, and the Low Boreal Mixedwood. The Dry Mixed Grass Prairie is a Needle-Grama Grass complex of *Stipa comata, S. spartea,* and *Bouteloua gracilis.* The Mixed Grass Prairie is a Needle-Wheat Grass complex of *Stipa viridula, S. spartea, S. comata, Agropyron dasystachyum,* and *A. smithii.* Rough Fescue *(Festuca scabrella)*-Parry Oat Grass *(Danthonia parryi)* grasslands dominate the Fescue Prairie. The Aspen Parkland is a combination of Rough Fescue grasslands on upland sites and Trembling Aspen *(Populus tremuloides)* clones on moist sites. The dominant vegetation in the Montane is a combination of Lodgepole pine *(Pinus contorta)* and Douglas-fir *(Pseudotsuga menziesii)* forests. Dry sites in the Montane are occupied by Rough Fescue or June grass *(Koeleria macrantha)* grasslands, while moist sites are occupied by Balsam poplar *(Populus balsamifera)* or Willow (*Salix* spp.). Trembling

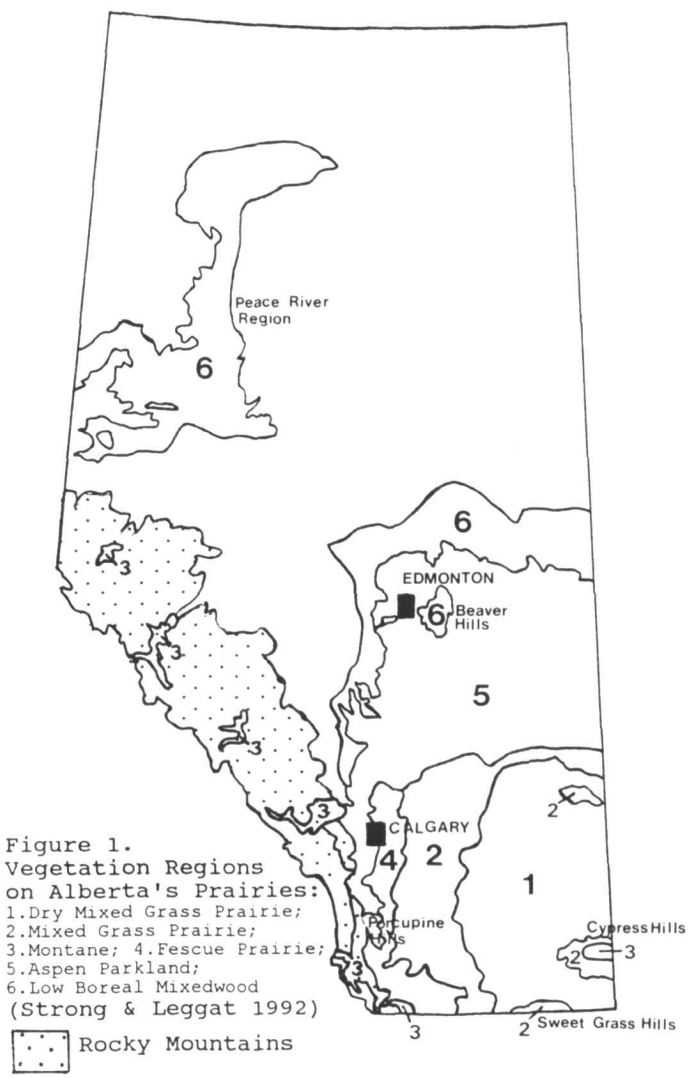

Figure 1.
Vegetation Regions on Alberta's Prairies:
1.Dry Mixed Grass Prairie;
2.Mixed Grass Prairie;
3.Montane; 4.Fescue Prairie;
5.Aspen Parkland;
6.Low Boreal Mixedwood
(Strong & Leggat 1992)

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Fig. 2. *Mixed Grass Prairie.*

Fig. 3. *Fescue Prairie*

Fig. 4. *Aspen Parkland*

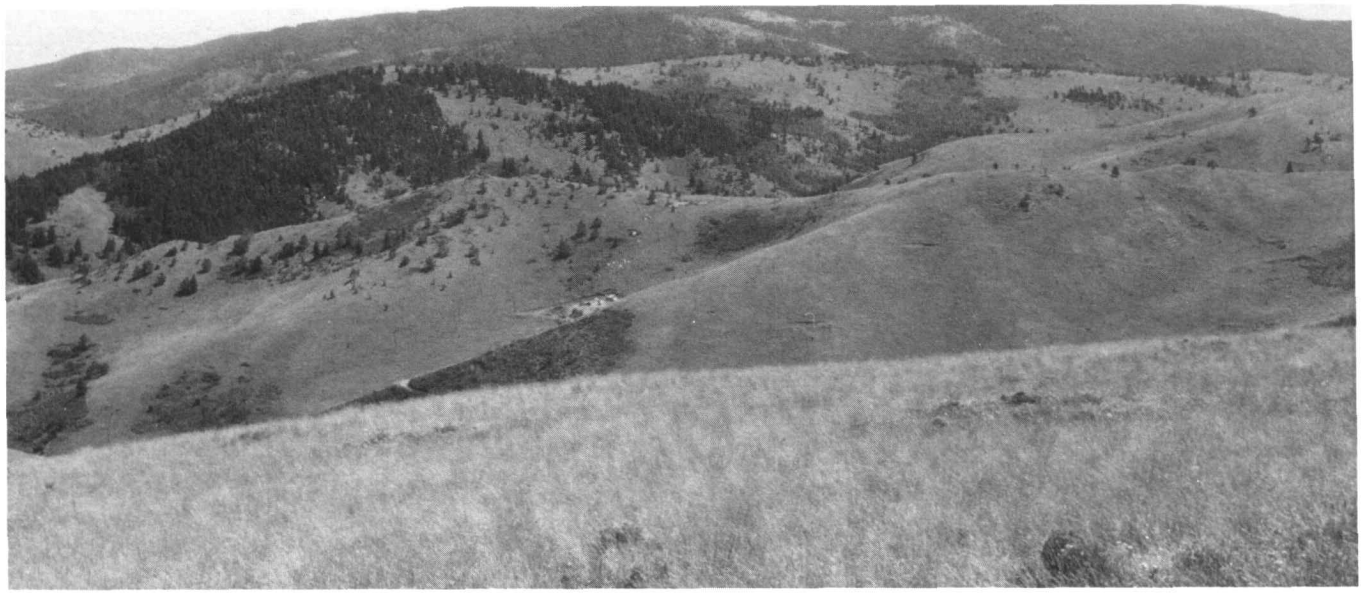

Fig. 5. *Montane*

Fig. 6. *Low Boreal Mixedwood.*

Table 1. Precipitation and temperature Alberta's prairies (Strong and Leggat 1992).

	Annual precip.	May–Aug. precip.	Ave. May–Aug. max. temp's	Extreme summer max. temp's
Dried mixed grass	272mm 10.7″	156mm 6.1″	23°–28°C 73°–82°F	35°C 95°F
Mixed gras	326mm 12.8″	176mm 6.8″	21°–24°C 70°–75°F	33°C 91°F
Fescue	445mm 17.5″	214mm 8.4″	19°–23°C 66°–73°F	31°C 88°F
Aspen Parkland	412mm 16.2″	259mm 10.2″	19°–22°C 64°–72°F	31°C 88°F
Montane	515mm 20.3″	210mm 8.3″	17°–20°C 62°–68°F	30°C 86°F
Low Boreal Mixedwood	380mm 15.0″	235mm 9.3″	19°–21°C 64°–70°F	30°C 86°F

Aspen stands dominate the Low Boreal Mixedwood with White Spruce *(Picea glauca)* occurring as a subdominant on some sites.

Influences of the Present Vegetation

Climate

There are three significant climatic influences on Alberta's prairies. They are Pacific moisture systems, thunderstorms, and chinooks.

Pacific moisture systems are low pressure weather systems that bring moisture inland from the Pacific Ocean. These systems supply most of the moisture received by Alberta's Prairies. Generally, most of the moisture in these systems is lost crossing the Rocky Mountains. Any remaining moisture is usually dropped shortly after they enter the prairies. The rainfall pattern exhibited by these moisture systems forms a moisture gradient of moist to dry from the Rocky Mountains eastward to the Dry Mixed Grass Prairie region (Table 1). The Aspen Parkland and the Low Boreal Mixedwood are exceptions to this moisture gradient because they receive moisture from other moisture systems known as thunderstorms.

Thunderstorms are rain showers that form when the air at ground level, that is warmed by daytime heating, rises and condenses by colliding with cooler air above it. This form of rain is most frequent in the Aspen Parkland and Low Boreal Mixedwood during July and August when daytime heating is at a maximum. Thunderstorms are important to the Aspen Parkland and Low Boreal Mixedwood because they supply the Trembling Aspen stands with needed moisture during the hottest summer months. The Aspen Parkland and Low Boreal Mixedwood have the highest amount of May–August precipitation on Alberta's prairies (Table 1). The Fescue Prairie also receives high amounts of May–August precipitation, but cannot sustain Trembling Aspen stands because thunderstorms are not frequent enough and because chinooks desiccate the Trembling Aspen stands.

Chinooks are hot, dry winter winds that come over the Rocky Mountains from the southwest. They are important because they warm the area and melt off the snow cover. Early ranching in Alberta was feasible because chinooks cleared the grasslands of snow so that they could be grazed year-round. Chinooks have most of their influence closer to the mountains in the Rough Fescue Prairie and Montane regions. As they move further out into the prairies they lose their warmth and often become bitter winds.

Fire

Before European settlement, wildfires controlled brush and forest expansion throughout Alberta's prairies. The importance of fire was especially significant in the Aspen Parkland and Low Boreal Mixedwood where it controlled the spread of Trembling Aspen. With fire, most of the Aspen Parkland was maintained as Rough Fescue grasslands. Palliser (1863) described the fire maintained Aspen Parkland as an area where, "the woods are very scanty and consist almost exclusively of aspen poplar, which form small groves and artificial-looking clumps that dot the rich pasture lands." Frequent fires were also important in maintaining a false parkland state of Trembling Aspen stands and Rough Fescue grasslands throughout the Low Boreal Mixedwood region. Proof of fire's role in this region is substantiated by early settlers who found burnt conifer trees in the soil while breaking treeless land (Dewar 1992).

After Alberta was settled, fires were suppressed and removed from the Aspen Parkland and Low Boreal Mixedwood regions. With fire suppression, Trembling Aspen stands have expanded, unchecked, into the fire maintained grasslands at a rate of 1% of the area per year. This has decreased the amount of forage produced in the Aspen Parkland and Low Boreal Mixedwood regions and has created many management problems.

Pre-Settlement Use

Before European settlement the main use of Alberta's central and southern prairie vegetation was year-round bison grazing. Large herds of bison utilized these prairies in a migratory pattern. During spring and early summer, bison moved throughout the Dry Mixed Grass and Mixed Grass regions. They chose to graze these areas at this time because the snow cover disappears earlier than in the other regions, which allowed succulent spring growth to occur earlier. Then, after the vegetation in the Dry Mixed Grass and Mixed Grass regions ripened and became unpalatable, the bison would move into the Fescue Prairie and Aspen Parkland regions. The grasslands in these two regions, which are mainly Rough Fescue grasslands, have the highest nutritional value after curing of any grassland region in Alberta. The Fescue Prairie and Aspen Parkland regions also tend to have more available water in the late summer and fall than the Mixed Grass regions do. During winter the bison also tended to stay in the Fescue Prairie and Aspen Parkland regions. They chose these regions because of the nutritious Rough Fescue forage and because frequent chinooks left the hills in the Fescue Prairie bare of snow. The bison also used the Montane and Low Boreal Mixedwood regions to some extent during the winter. Even after the snow cover was established, bison would stay in these regions because the tall, dense growth form of Rough Fescue was easy to reach by cratering through the snow.

Use After European Settlement

After European settlement, domestic crop production and livestock grazing became the main activities on Alberta's prairies. Through these activities Alberta's prairies have been significantly altered.

The most distinguishable changes have been caused by annual crop production. Most of the Aspen Parkland, Fescue Prairie, and Mixed Grass Prairie regions have been put into annual crop production in order to take advantage of their rich soils. Large areas of the Low Boreal Mixedwood and Dry Mixed Grass Prairie regions have also been put into annual crop production, despite

their poorer soils. More native vegetation might have remained in the Dry Mixed Grass Prairie if it had not been for the Homesteader Act which required settlers to cultivate half (80 acres) of their quarter section homesteads. Because of this Act, many areas that were not suitable for annual crop production were cultivated. Most of these areas have since been seeded back to the perennial forages.

Annual cropping is not the only reason why native grasslands have been plowed under. Domestic forage production for range rejuvenation, creating complementary grazing systems, and producing winter feed has caused many native grasslands to be cultivated. Range rejuvenation has been used to increase the production on rangelands choked by Trembling Aspen encroachment and on overgrazed rangelands. Seeding domestic forage has also been used when implementing grazing systems that mimic bison grazing patterns. Because of the past bison grazing patterns, each vegetation region is best suited to grazing at certain times during the grazing season. Therefore, domestic forages have been used to create spring, fall, or summer pastures that complement the proper use of the available native range. Producing winter feed is essential for livestock production in Alberta. With the frequent heavy snow falls that occur during the winter, grazing is impossible and providing stored forage for the livestock is essential.

Even though agricultural activity has significantly altered Alberta's prairies, many sites with native vegetation still exist. From these sites, and even from the sites that have intensive agricultural activity occurring on them, you can appreciate the beauty and productivity of Alberta's prairies. John Macoun (1882), an early prairie botanist, may have captured the splendour of Alberta best when he stated, "In all my wanderings, I never saw any spot equal in beauty...."

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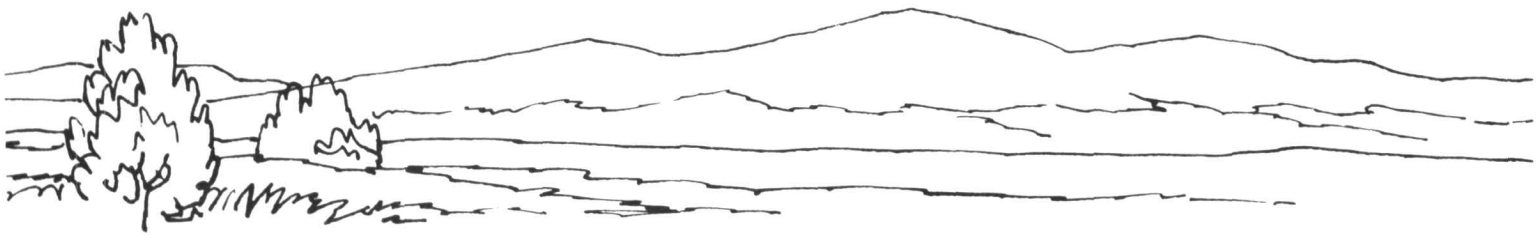

Free Market Policy for Public Land Grazing

Jerry L. Holechek and Karl Hess

There has been growing conflict between ranchers and environmentalists on the issue of livestock grazing on federal lands. We believe present government policies encourage rather than discourage adversarial confrontations. These conflicts waste scarce funds that could be better used in land management. In this paper we will identify what we believe to be problems with current federal rangeland policies and provide some suggestions for changes that might lead to greater management efficiency and equity between users.

Financial Aspects of Federal Land Grazing

At present more than 30,000 permittees graze cattle on federal lands (18,000 on Bureau of Land Management and 12,600 on Forest Service rangelands). This is about 2 percent of the nation's ranchers or approximately 7 percent of the ranchers in the 11 western states (Godfrey and Pope 1990). Bureau of Land Management and Forest Service rangelands provide forage for about 11.5 and 5.2 million animal unit months (AUM's), respectively, for a total of 16.7 million AUM's. This represents 1.39 million animal units (AU's) or 3.43% of the nation's beef cattle herd (40 million AU's). At an average fair market value of $80 per AUM, the total value of federal land grazing permits is roughly 1.36 billion dollars.

Although federal rangelands provide only a small part of total livestock forage requirements, they are seasonally important in the production process (Quigley and Bartlett 1990). Around 22% of the yearling cattle in the U.S. spend a portion of their lives on federal rangelands. Federal rangelands play an even bigger role in sheep production. They support about 20% of the nation's stock sheep from which about 21% of the nation's wool is shorn.

It is doubtful that discontinuation of federal land grazing would have much impact on the price of meat to the consumer. Increases in beef production on private lands in the Great Plains and Southeast would likely compensate for any reduction on federal lands in the West.

Discontinuation of federal land grazing would severely harm some local economies. Negative impacts on wildlife populations would be likely if private land holdings associated with federal land grazing are subsequently subdivided into ranchettes. Further, many water points on federal lands would no longer be maintained. Those watering points play a crucial role in supporting many wildlife populations.

Various economic reports indicate that net returns from federal land grazing presently average $80 per animal unit (USDA-ERS 1986, Torell and Word 1993). This does vary quite a bit with range type and size of ranch. Generally, desert ranches have lower returns ($60–80/AU) than those in the coniferous forest ($80–100/AU) or on prairie ranges ($100–120/AU). Small ranches (100–200 AU's) have averaged about $20–55 profit per AU while profits for medium sized (250–350 AU's) ranches have averaged about $80–90 per AU. On large ranches (over 350 AU's) profitability is better ($100–150/AU), but these operations represent only 12 percent of the total. Overall, during the last 5 years total annual net returns to federal land ranchers have been around 110 million dollars ($77 million on BLM lands; $33 million on Forest Service lands).

Perhaps the most interesting aspect of these numbers is that the BLM spent more on range management (89 million dollars) than ranchers collected in profits from BLM land grazing (77 million dollars) in 1992. In 1993 the Bureau of Land Management budget was slightly over a billion dollars, but only $100 million were used for operations related directly to range management. It collected around $22 million in grazing fees of which, by law, $11 million were given back to individual grazing districts for range betterment. In other words, not only is the grazing program running deeply in the red, but millions of dollars in annual savings could accrue to taxpayers if the federal government paid ranchers not to graze federal lands.

Although only 18% of the ranchers on federal land have permits over 200 animal units, they account for around 60% of federal land grazing pressure (Godfrey and Pope 1990). Approximately 10% of the grazing permittees on federal lands derive $20,000 or more annual income from federal land ranching, and could, therefore, be classified as full-time ranchers. Various reports indicate that annual net income per federal land grazing permittee is presently about $4,100. Studies from New Mexico, for example, suggest that ranches on federal lands smaller than 200 AU are marginally profitable at best and may entail net losses as great as $60 per AU in some years (Torell et al. 1990, Torell and Word 1993). If these numbers hold westwide, then more than half of all federal land ranches may be economically unsustainable.

The point here is that federal land ranching is more a way of life than a source of income or an essential component in meeting food needs in the United States. We are not challenging the validity or legitimacy of federal land

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grazing. However, we do believe its relative importance must be considered when conflicts occur with alternative uses, and if more cost-effective range management strategies are to be developed.

The Real Problem: Over-obligation of Grazing Privileges

In our opinion over-obligation of forage is the most serious problem on federal rangelands, even though the magnitude of the problem has been reduced over the past 30 years. Overstocking has been difficult to reduce because federal law and policy have encouraged ranchers to develop a vested interest in preserving livestock numbers rather than in conserving the land and forage base that sustain those numbers.

Although the government holds basic control over stocking rate decisions, and can penalize ranchers for exceeding or failing to meet authorized permit specifications, real-world factors erode the effectiveness of that control. Unlike private land ranchers whose long-term financial interest lies in sustaining the forage base, the interest of federal land ranchers lies in sustaining licensed numbers of livestock. Private land ranchers can reduce stocking without fear of diminishing their financial net worth but federal land ranchers jeopardize their permit value by voluntarily understocking their grazing allotments. This is not to say that many public land ranchers do not intentionally stock their allotments below permit specifications to sustain or improve the rangeland resource. But when they do, they often act in secrecy or pay grazing fees for the unused portion of their permit out of fear that their grazing privileges will be transferred to another rancher, or will be eventually taken from them to benefit wildlife or recreation. Under present BLM policy, if a permittee does not exercise his grazing privileges within two years, they can be transferred to another qualifying applicant.

Making matters worse, federal policies discourage ranchers from investing in the improvement of federal rangelands—improvements that might mitigate the problem of over-obligation of grazing privileges. The relative shortness of the federal lease period (10 years), prohibitions against rancher ownership of range improvements on federal lands (particularly Forest Service lands), and growing uncertainty regarding the security and profitability of private investment has created an environment adverse to rancher stewardship. Further, and more importantly, in the 1950's and 1960's massive range improvement projects involving brush control and seeding were often used to avoid stocking rate reductions on federal lands (Hess 1992). More recently, the National Environmental Policy Act of 1969 shifted emphasis from rangeland reclamation to environmental monitoring and grazing capacity adjustment on federal lands. We believe that both the monitoring and range improvement approaches are flawed.

Range Reclamation Projects

Many concerned individuals in the environmental community have questioned the massive range rehabilitation programs implemented by the Forest Service and the Bureau of Land Management in the 1950's and the 1960's (Wuerthner 1990, Jacobs 1991). In their view, these programs have rewarded ranchers for bad management. Further, they claim rangeland reclamation programs were often harmful to wildlife, and that costs were higher than benefits. The largest of these projects, the Vale Rangeland Rehabilitation Program, sheds light on these arguments. Our source of information for the following discussion is a report edited by Harold F. Heady (1988).

The Vale Program

Before 1963, the Vale District was characterized by severe degradation from over-obligation of grazing privileges. Livestock numbers were estimated to exceed grazing capacity by 40 percent. The majority of the allotments were both small and communal (shared by two or more ranchers). Low levels of private investment because of ranch size, unwillingness of permittees to invest in communal allotments out of fear of free-riders, and uncompromising protection of permitted livestock numbers explain why stocking remained too high and why range betterment was neglected.

When finally faced with the prospect of livestock reductions, ranchers, local politicians and the BLM joined forces to pressure Congress into funding massive range reclamation (1963 Vale Rangeland Rehabilitation Program). This federal program provided for widespread spraying, plowing and seeding of overgrazed rangeland along with fencing and water development all at tax payer expense. Between 1963 and 1985, a total of about 18 million dollars were spent on the Vale project. At the beginning of the program (1963) there were approximately 332 permittees, but by 1985 the number had dwindled to 184. Roughly $97,000 had been spent for every permittee remaining on the Vale District in 1985. In 1992 dollars (adjusted for inflation), this amounts to $56 million total or $304,348 per remaining permittee. About 750,000 acres were involved in the Vale project (119,000 seeded, 170,000 sprayed, 461,000 native range). Looking at it another way $24/acre actual and $75/acre inflation-adjusted 1992 dollars were spent on the project.

In terms of grazing capacity, the Vale project was considered to be capable of handling 285,000 AUM's in 1963, though the actual number on the area was 400,000 AUM's. In 1986 the estimated grazing capacity was near 485,000 AUM's but the actual number on the area remained at 400,000 AUM's. Seedings showed the best sustained grazing capacity increases while the sprayed areas had declined to about the same productivity as untreated range at the beginning of the program. It is of particular interest that average grazing capacity on untreated native rangeland increased about 40 percent between 1963 and 1986. This was attributed to reduced stocking, water development, fencing to facilitate grazing systems, sea-

son of use changes and more favorable precipitation patterns.

There was no definite trend in numbers of most wildlife species over the course of the Vale project. It does appear that pronghorn benefitted from water developments and crested wheatgrass seedings that included alfalfa. Sage grouse were declining on the area in 1986, but this could have been partially due to wildfires in the early 1980's. Riparian areas in 1986 generally were in fair or poor condition for fish and wildlife with the exception of those fenced off from livestock.

The bottom line on the Vale project is that the BLM created about 200,000 AUM's of forage at a cost of $90/AUM in absolute dollars or $280/AUM in 1992 inflation-adjusted dollars. This represents 3.5 times the present fair market value of BLM grazing permits in most areas ($80/AUM). Interestingly, there is uncertainty regarding whether the 200,000 additional AUM's created between 1963 and 1986 can be sustained over the next 30 years. After detailed economic analysis using several scenarios, it was concluded livestock benefits alone were not sufficient to justify the Vale project.

The option of destocking Vale program rangelands from 400,000 to 250,000 AUM's through government purchase of over-obligated grazing privileges from permittees apparently was never considered. Our estimates indicate that this could have been done at about 16 percent of the final cost of the program. Although long-term benefits of conservative stocking have never been evaluated on Oregon sagebrush ranges, research from other range types indicates they could be substantial from vegetation, livestock, financial and wildlife standpoints. The impressive improvement (35–40%) in grazing capacity on the untreated native range in the 1963–1986 period on the Vale project supports the destocking approach in conjunction with low cost management practices (fencing for grazing systems, water development, season of use changes).

In recent years there has been a widely held view that grazing management alone has low potential to increase forage production on arid rangelands dominated by brush (Westoby et al. 1989, Laycock 1991). Although we acknowledge such situations, we believe they are more the exception than the rule. We support this conclusion with broad long-term studies from the Chihuahuan desert (McCormick and Galt 1993), and Salt desert (Yorks et al. 1992), as well as the Vale project itself. These studies all show major increases in forage plants and improvement in range condition from grazing management alone over 30–40 year periods. Although these increases occurred slowly and non-linearly, low cost, low risk and high sustainability are advantages of the grazing management approach. In contrast, brush control and/or seeding involve high risk, high cost and are generally decaying assets after the first 10–15 years.

One aspect of the Vale program completely overlooked is opportunity cost. We hold the view that monetary resources are scarce. Public benefits realized from the Vale program (most of which accrued to 184 permittees) entailed public benefits lost to the rest of society—benefits that would have occurred had Vale project resources been allocated to ranches in other areas or, for that matter, to the retirement of the national debt.

Problems with the Monitoring Approach

Since the early 1970's the BLM and the Forest Service have emphasized the monitoring approach. After a five-year period of intensive monitoring, stocking rate adjustments are typically made depending on whether a definite downward or upward trend is observed in range condition. We have worked closely with both agency monitoring programs: Holechek during his 14 years with the Animal and Range Sciences Department at New Mexico State University (NMSU) and Hess during his 17 years with the New Mexico Department of Agriculture (NMDA).

It is our experience that the monitoring approach, *as a tool for grazing capacity adjustment on federal lands,* has been a costly failure. First, because the federal agencies must adhere to costly procedures and must meet standards of data collection and analysis that can withstand public scrutiny and challenge, the costs of monitoring frequently exceed the benefts. Second, the high costs of the monitoring approach frequently rule out data collection and data analysis that are rigorous enough to prove to the satisfaction of administrative and civil courts that authorized livestock numbers do in fact exceed carrying capacity. As a result, even when the federal agencies are able to identify allotments they believe to be overstocked, the lack of adequate data and the threat of rancher resistance often prevent them from implementing needed reductions in livestock numbers. At best, the federal agencies negotiate a minor reduction in stocking. At worst, the federal agencies back-off from stocking adjustments, choosing instead the economically questionable alternative of federally financed range improvements.

We do not argue with the importance of monitoring. After all, monitoring is the only tool we have to evaluate management and to improve it as needed. Instead, our argument is with a monitoring approach that exceeds economic rationale and that obscures the more important actions that are needed to make public land ranching economically and ecologically sustainable.

A Market Approach

Our conclusion is that public policy for dealing with over-obligation of grazing capacity on federal rangelands has been costly, adversarial, inefficient, and unfair. We believe that it has created disincentives rather than incentives for good land stewardship. The reader is referred to Anderson and Leal (1991) and Hess (1992) for a more detailed critique of federal grazing policy.

Our recommendation for reform of federal grazing policy is simple and straightforward. We ask that market forces be given greater leeway in the determination of how rangelands are used and how they might best be protected in the future. Basically, our reform plan centers

on two pivotal changes in public policy. First, holders of federal grazing allotments should have the option of converting to uses other than livestock grazing. Second, federal land users, not the general taxpayer, should shoulder the costs of land administration. Here are the general details of our market answer to the over-obligation of grazing privileges.

1. **Make allotment permits fully transferable and marketable.** Today, forage on federal lands is alloted to ranchers for only one lawful use—the pasturage of domestic livestock (primarily cattle and sheep). The laws and policies that mandate such use lie at the heart of the rancher-environmentalist conflict. Ranchers are perceived to have special privileges on federal lands that are denied to the non-ranching public. However, ranchers have no choice but to graze their allotted lands with livestock. Nonuse for the purpose of enhancing recreation, building big populations, or protecting biological diversity may be desirable to the public at large, but to the rancher it means the loss of income and the loss of perceived "forage rights."

By changing the laws and policies that restrict forage use to the production of livestock and by making grazing-allotment permits marketable to non-ranchers, we could remedy the major problems that plague federal grazing lands. First, the "forage rights" that ranchers defend would be tradeable on the open market and convertible to any number of uses. Ranchers currently holding grazing permits could diversify their operations by allocating forage to paying uses other than livestock. There is no reason why public policy could not accommodate ranchers who choose to use their allotted forage to improve riparian conditions, expand elk populations, or restore endangered species—and to do so while making money at the same time.

Environmentalists who want to make rangelands cattle free, or to simply reduce their numbers to more acceptable levels, could do so more quickly and less expensively than is now feasible by political or judicial means. By purchasing "forage rights" from ranchers on a willing buyer-willing seller basis, they could pursue their conservation goals peacefully and securely. Indeed, environmentalists might find the tool of conservation easements a more practical option on federal lands. Instead of purchasing all of a rancher's "forage rights," they might simply purchase the forage equivalent of a conservation easement along a critical riparian zone or in an upland site known for its critical habitat or unique environmental value.

Allotment permits could be acquired by states, cities and towns, particularly when erosion control, wildlife, or recreation values exceeded those of livestock. Agencies, private organizations and individuals seeking to protect endangered species such as the desert tortoise could buy allotment permits and apply the "forage rights" to species recovery. In fact, over-obligated grazing privileges could be purchased by almost any one—and done at a fraction of the cost that would otherwise be imposed on taxpayers for sophisticated monitoring and range improvement programs. Our estimates show that over-obligated livestock "forage rights" could be purchased for under $200 million. This sum is about 20% of the BLM budget and 4% of the Forest Service budget for 1993.

Letting market forces operate on public lands means that ranchers would have a way of responding to societal demand for more recreation and wildlife. It also means that non-ranchers would have the opportunity to assume direct responsibility for innovative changes in the use of federal lands. Environmental, recreational, and wildlife groups spend tens of millions of dollars each year fighting political and judicial battles to conserve and protect natural resources. We believe those dollars would better conserve and protect natural resources if spent on acquiring marketable "forage rights."

2. **Make allotment fees cover cost of administration.-** Enormous amounts of public resources have been expended on the grazing fee debate. We sympathize with the argument that grazing fees should be set at market value. However, the reality is that grazing fees on federal lands are set by political, not market, forces.

We believe that sound public policy should set its sights on making allotees, whether ranchers or environmentalists, shoulder the full costs of allotment administration. In proposing this, we are acutely aware that "covering the costs of administration" is a wide-open proposition. What is to ensure that administrative costs are not unduly high? Well, we believe there are two solutions. The federal agencies should allocate their resources to evaluating and approving allotment plans that are submitted by permit holders and to overseeing allottee compliance with the terms of those plans. Further, we believe budgetary incentives can be developed to encourage the federal agencies to streamline administration and to focus their efforts more on education and less on regulation.

3. **Establish user fees at market prices.** The BLM's historic bias toward livestock production and the Forest Service's marriage to below-cost timber sales tell much about the funding of all those agencies. Neither of the two agencies earns significant income from providing the recreational and wildlife services demanded by the general public. Rather, their budgets are based on Congressional appropriations. As a result, the BLM and the Forest Service are heavily influenced by partisan and pork-barrel politics. We believe that agency funding that is responsive to market rather than political forces would better serve both the environment and the general public.

Specifically, we call for the establishment of market-based user fees for all federal land amenities that have economic value. By pricing resources and land uses like wildlife and recreation, and by allowing the BLM and the Forest Service to retain the income, powerful incentives would emerge to compel those agencies to give the American people what they demand. Market forces would attain what politics could never obtain: the multifarious public interest.

One other advantage to user fees is evident. By pricing

formerly free resources, the federal agencies would be creating markets for activities and land uses other than livestock and domestic grazing. Ranchers, for example, would be able to assess the opportunity costs entailed in growing cattle versus some alternative recreational venture. Like the federal agencies, they would have strong incentives to use their allotted forage to meet public demand for non-ranching products.

Getting the public to accept user fees may not be difficult. Recreational use of public lands more than doubled between 1985 and 1990 based on USDI (1985, 1990) data. In many areas recreation is a much larger problem than poorly controlled livestock grazing. If a minimal two dollar fee was charged per day per season for public land recreational visits, federal revenue would run well over $200 million (per year). These fees would help balance supply and demand for recreation and would generate the income needed to help make the BLM and the Forest Service self-financing organizations.

4. **Reliance on incentives for land stewardship.** We firmly believe that the goals of land stewardship are best advanced when land users are accountable for their actions—when they alone shoulder the costs of what they do and reap the benefits of their good management. Under such conditions, monetary incentives would exist that encourage better management and penalize bad land practices. To this end, we call for several basic changes in public policy.

First, the term of allotment permits should be greatly extended. Extending the term of permits would provide the degree of certainty and stability needed for environmentalists and ranchers to implement wide-ranging land and wildlife improvement projects.

Second, all subsidies to allottees, such as the return of 50% of grazing fees for range betterment, should be discontinued. Historically, subsidies have tended to encourage bad land practices by bailing out land users who have neglected their lands or stubbornly stuck to bad land practices. Allottees who assume responsibility for the costs and benefits of land management are likely to steward their lands and seek out the best ideas and technologies.

Third, public policies and regulations that impede good stewardship should be eliminated. Specifically, current restrictions on the taking of grazing nonuse should be immediately expunged. Federal policies that encourage small allotments or favor community grazing should be reconsidered in light of the economics of ranching and the lessons of the tragedy of the commons.

Fourth, allottees, whether ranchers or environmentalists, must have assurances that investments in federal lands are protected and that the benefits derived from those investments can be captured and enjoyed by the responsible parties. This does not mean that a portion of benefits cannot or should not be allocated to the general public. It only means that stewardship should not be expected to sustain itself on goodwill alone. For people to invest of themselves over the long run, they must have access to the fruits of their labors.

5. **Bio-Diversity Fund to protect non-market resources.** We call for the creation of a biological diversity trust fund financed from user fees, administered at the local level, and available to all Americans through competitive grants. Not all resources on federal lands have an economic value. Biological diversity, for example, has no price tag and therefore cannot be stewarded effectively through market mechanisms. However, by taking a substantial proportion of users' fees that are generated through the market process, we can create a source of funding for critical federal land resources.

We believe the bio-diversity trust fund would round-out the program of market reforms outlined above. Such funds would empower ranchers and environmentalists alike to play a major role in the restoration and protection of federal lands. Environmentalists, for example, could use trust funds to buy out "forage rights" for site-specific protection of species and habitat. Likewise, ranchers could use trust funds to expedite species recovery and habitat restoration on their allotments or, for that matter, to pay land practices which have benefits not measurable in dollars and cents.

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1993 International Symposium on Grassland Resources, Huhehot, Peoples Republic of China

Michael R. Frisina

During mid-August 1993, grassland managers, research specialists, and scholars from around the world were enroute to Huhehot, capitol of the Inner Mongolian Autonomous Region, Peoples Republic of China. The purpose of their journey, and of mine, was to attend the International Symposium on Grassland Resources held August 16–18, 1993 in Huhehot.

The conference began on August 16th with 270 delegates representing 15 nations. In addition to China, international delegates represented Japan, Italy, India, Iran, Hungary, Australia, New Zealand, Britain, Canada, South Africa, Russia, Nepal, Mongolia, and the United States.

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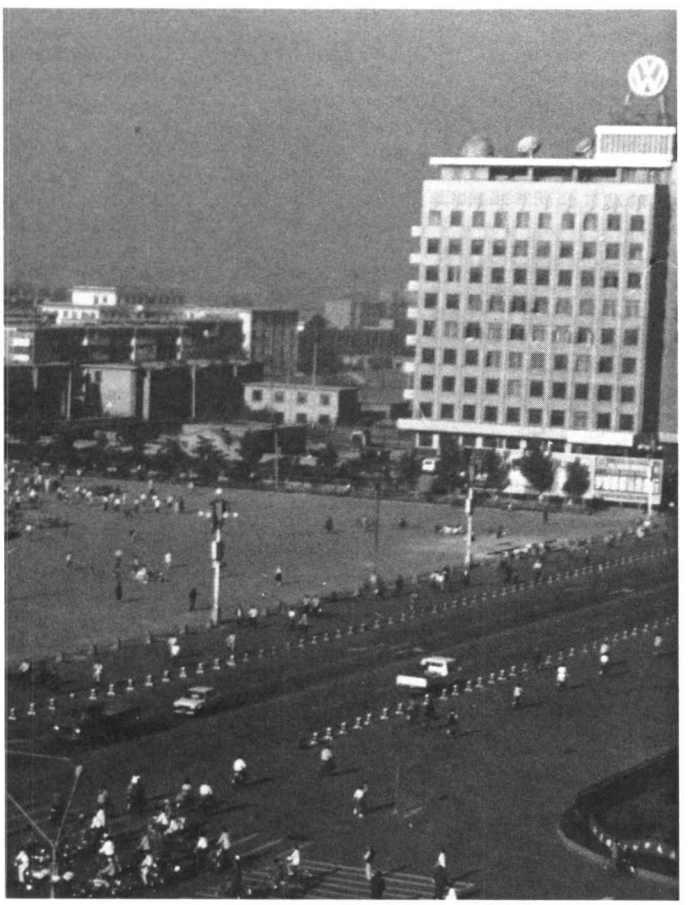


Huhehot, the green city, capital and center of commerce for the Inner Mongolian Autonomous Region.

There was much stimulating discussion and exchange of information. Presentations described management and research efforts to improve the world's grasslands. The focus was on grasslands degraded as a result of historical land uses such as continuous season-long livestock grazing. Improving native steppes to provide a winter livestock forage source, using animals to spread seed through inclusion in feed supplements, and applying rotational grazing strategies were among tropics discussed. Strategies to meet human needs while maintaining ecological integrity was a common thread tying presentations together. A peer-reviewed conference proceedings is in preparation and will be available in the near future as a reference for grassland managers.

During the conference our Chinese hosts provided tours of the College of Agriculture and Animal Husbandry, the Grassland Research Institute, and local historic cultural sites. Delegates were able to select from several post-conference tours to observe China's grasslands and management efforts first hand. Tour choices included the desert, meadow, and forest steppe grassland types.

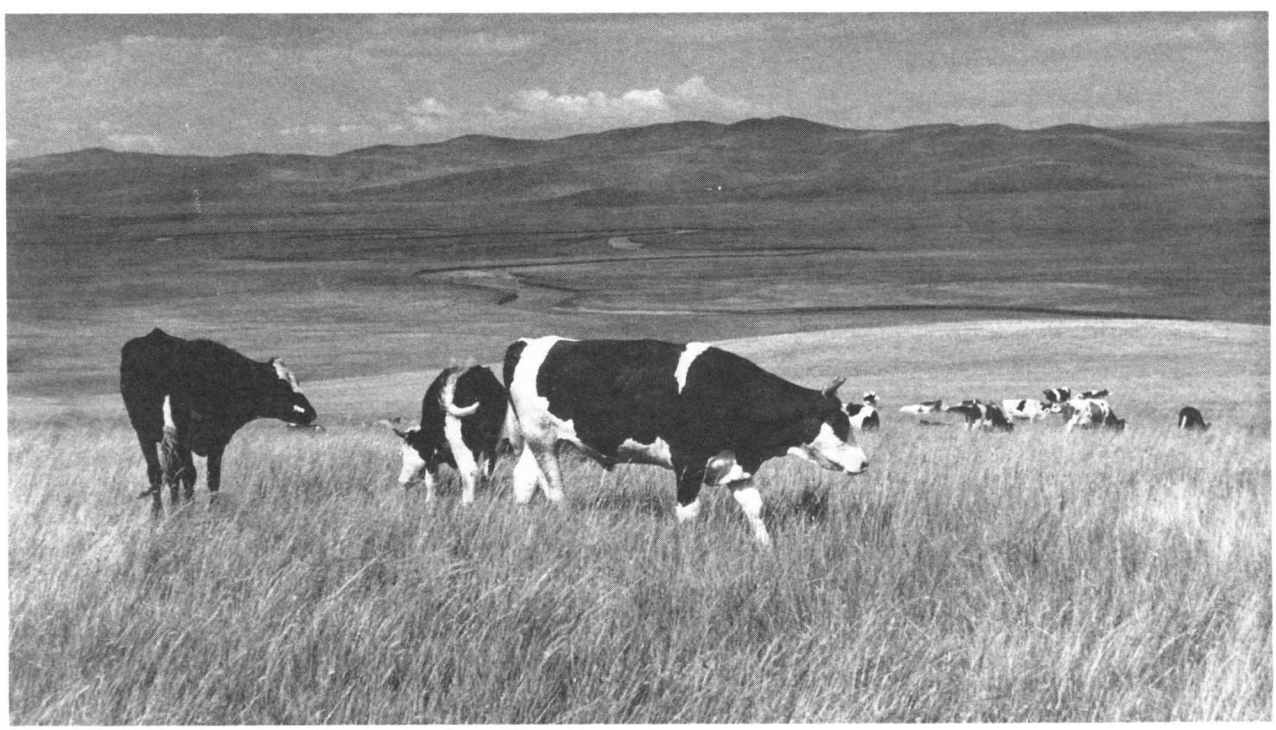
Huhehot was a particularly appropriate setting for this international gathering. The city is home to the prestigious Grassland Research Institute and Inner Mongolian College of Agriculture and Animal Husbandry. The Grassland Research Institute is famous throughout China for its work in the field of grassland management. The College of Animal Husbandry educates young Chinese professionals by providing bachelor and masters degree programs in the disciplines of animal husbandry and range management. Over 2,000 students attend this college. These institutions provide essential knowledge for compliance with the Chinese Rangeland Law. The Rangeland Law was enacted in 1985 making proper management of the nation's grasslands a matter of national statute.

Located on the Eurasian steppe, Huhehot (Green City), provided an ideal location for a symposium on grassland resources due to the city's long history of human utilization of grassland resources. The area has been inhabited by nomadic livestock herding cultures for many centuries. China is a world leader in management and utilization of grassland resources by necessity. With the need to maintain food resources for a population of over a billion people, China must intensively manage all agricultural

Professor Yun Jin Feng (2nd right) and College Dean Liu Defu (3rd right) hosting a conference tour of the Inner Mongolian College of Agriculture and Animal Husbandry. Author, Michael Frisina back row, left side.

resources. Similar to Europe, Western America, and other countries, historic demands on China's grasslands have resulted in deterioration due to excessive livestock grazing. In China about 21.25 million acres are negatively impacted. Also as in the west, China's land managers are working with stockmen to employ range management and agricultural practices to improve the productivity and ecological condition of the grasslands.

For me attending this conference offered both personal and professional rewards. . .the opportunity to renew friendships, to make new ones, and to become familiar with rural portions of the Eurasian steppe. The Peoples Republic of China is to be commended for the new openness experienced by the conference attendees and for their efforts to make management of the world's grasslands a cooperative global effort.



Cattle grazing on the Eurasian steppe.

Grassland Research Institute of the Chinese Academy of Agricultural Sciences

Established in 1963, this institution specializes in all phases of grassland scientific research, specifically research into the evaluation, utilization, cultivation and protection of China's grasslands. Research focuses on applied basic research, technological research, and technological development. The research effort and staff of 276 scientists are organized into the following nine divisions:

- Forage Germplasm Resources;
- Forage Breeding;
- Grassland Resources and Remote Sensing Applications;
- Fodder Crops Cultivation;
- Range Management;
- Animal Production;
- Grassland Protection and Mice Control;
- Grassland Machinery; and
- Analytical Testing Research.

In addition to the nine divisions, the Grassland Institute maintains two experimental farms totalling 1,630 acres and a Grassland Information Reference Center. The Institute houses the editorial department for the award winning Chinese periodical "Grasslands of China". In 1992 the Institute was expanded to include a laboratory of grassland ecology, which is open to cooperative research with foreign scientists.

Rangelands of the Kunlun Mountains in Western China

Daniel J. Miller and Donald J. Bedunah

The Kunlun Mountain Range of western China forms a unique rangeland ecosystem that has been used by pastoralists for thousands of years. These grazing lands are one of the most important pastoral areas of China and also provide habitat for numerous species of wildlife, including many endangered species. The fact that these rangelands continue to support viable pastoral cultures and thriving wildlife populations underlies the existence of a remarkably diverse and resilient grazing land ecosystem, of which little is known.

As part of a cooperative research program between the University of Montana and the Northwest Plateau Institute of Biology (a branch of the Chinese Academy of Science located in Xining, the capital of Qinghai Province), we travelled through the Kunlun Mountains to examine rangeland resources and wildlife during the summer of 1991. This paper is an overview of the rangelands, wildlife, livestock production, and pastoral cultures of this remote region of western China. We also discuss some of the changes that have taken place on the rangelands of the Kunlun Mountains in recent years, and the implications these changes have for development planning and conservation of rangeland resources.

Description and Location

The formidable Kunlun Mountains, the longest mountain system in Asia, stretches for almost 2,000 miles from the Pamirs in the west to Mount Amnye Machin in the east. The Kunlun Mountains define the northern edge of the Tibetan Plateau and separate it from the desert expanses of the Tarim and Qaidam Basins. The Tibetan Plateau extends for almost 1,000 miles from north to south in a series of wind-swept plateaus, extensive valleys and rugged mountain ranges with the Himalaya defining the southern border (Fig. 1A).

The Kunlun Mountains mark the northern boundary of one of the largest wilderness areas. Known in Tibetan as the *changtang,* which means "northern plains", this is the highest, most remote and inaccessible part of the Tibetan Plateau. The Changtang is an immense prairie landscape—a steppe environment of cold, arid grasslands and rugged mountain ranges. It is very difficult to comprehend the magnitude and wildness of this area, which is almost all above 14,000 feet. The Changtang is not an easy land: the winters are long and harsh with temperatures of -40° F and severe blizzards which may decimate livestock and wildlife. The summers are short with frequent hailstorms and snow flurries. Yearly precipitation varies from less than 4″ in the western desert regions to 20″ in the eastern mountains.

The Changtang is a roadless region of about 250,000 square miles, an area the combined size of Montana and

Fig. 1A. *Kunlun Mountains, Tibetan Plateau and Qinghai Province location in China.*

Fig. 1B. *Expanded view of Qinghai Province showing travel route and Wild Yak Valley.*

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Wyoming. It includes western Qinghai Province, the northern part of the Tibetan Autonomous Region and southern Xinjiang Autonomous Region. Only a few Westerners have managed to travel in the region and it is an area still largely unexplored. The rugged mountains, remote valleys, and vast steppes of the Kunlun Mountains are a naturalist's paradise. This region could be called the "Serengeti of Asia" for on these immense grasslands you still find large herds of numerous species of wild ungulates.

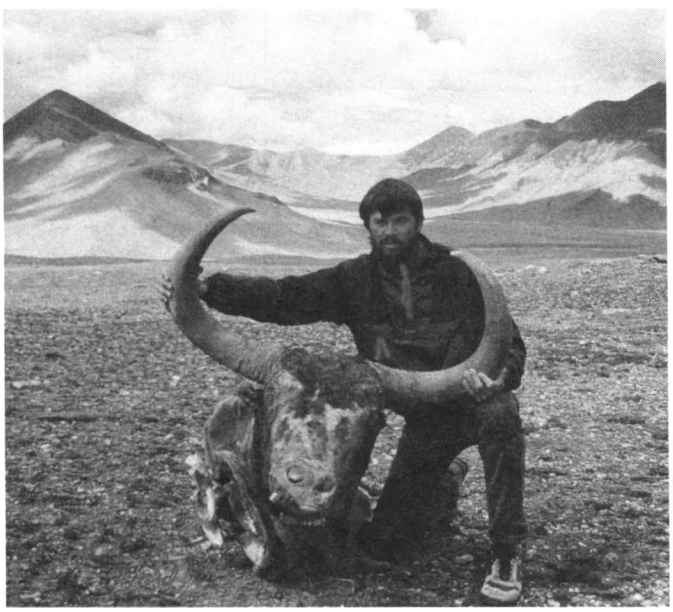
People

Nomadic pastoralists have existed on these rangelands for thousands of years, moving their herds of yaks, horses, and sheep in well-adapted patterns. Today, there is still a large diversity of peoples. Mongal herders, living in yurts, are found on the northern side of the Kunlun Mountains in the Qaidam Basin. Tibetan nomads, living in yak-hair tents, inhabit the rangelands in the east around Qinghai Lake and on the southern flanks of the Kunluns. Kazak tribesmen are found in the Kunlun Mountains in western Qinghai Province. The long-term interactions of people and livestock upon the Kunlun ecosystem are complex and poorly understood. Research to understand these impacts and effects is important for future management and conservation of the region.

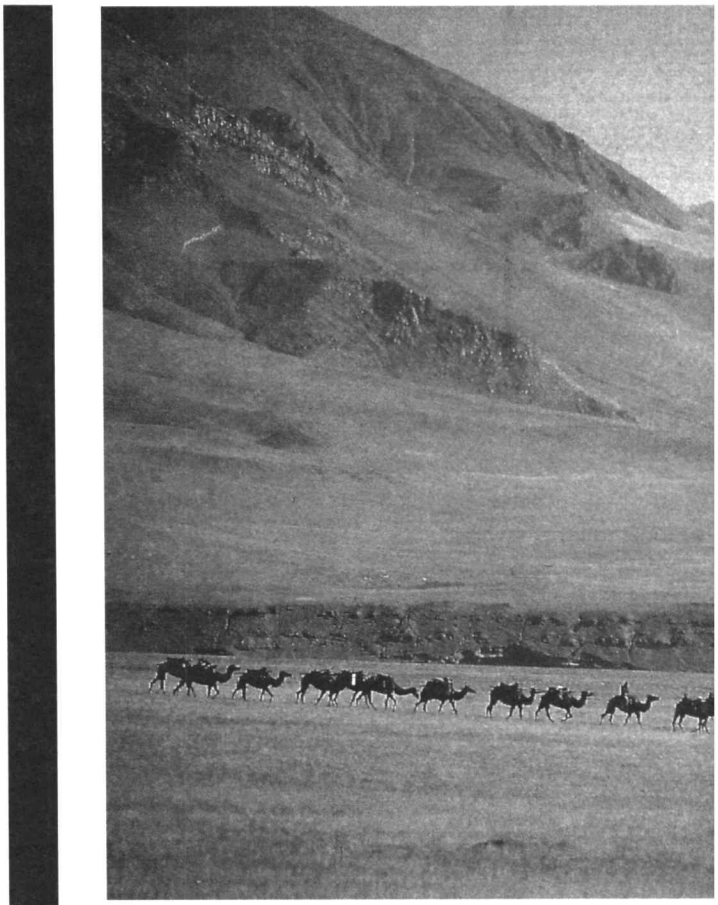
Grazing Lands and Livestock

The grazing lands of the eastern Kunlun Mountains are known as the best grasslands in Asia. Numerous explorers in the 19th and 20th centuries were astonished by the lush pastures and large numbers of wildlife and livestock they observed.

Leaving from Xining, we crossed the Sun and Moon Mountain Range and entered the grazing lands east of Qinghai Lake used by Tibetan nomads. On these rangelands at over 10,000 feet, bunches of tall splendid grass *(Achnatherum splendids)* were common along with *Orinus kokonorica* and a species of *Leymus.* Above the plains, on the slopes of the mountains, sedge meadows dominated by various species of *Kobresia,* provided good grazing for flocks of sheep. There were also shrublands of *Salix* and *Caragana jubata* on the mountain slopes.



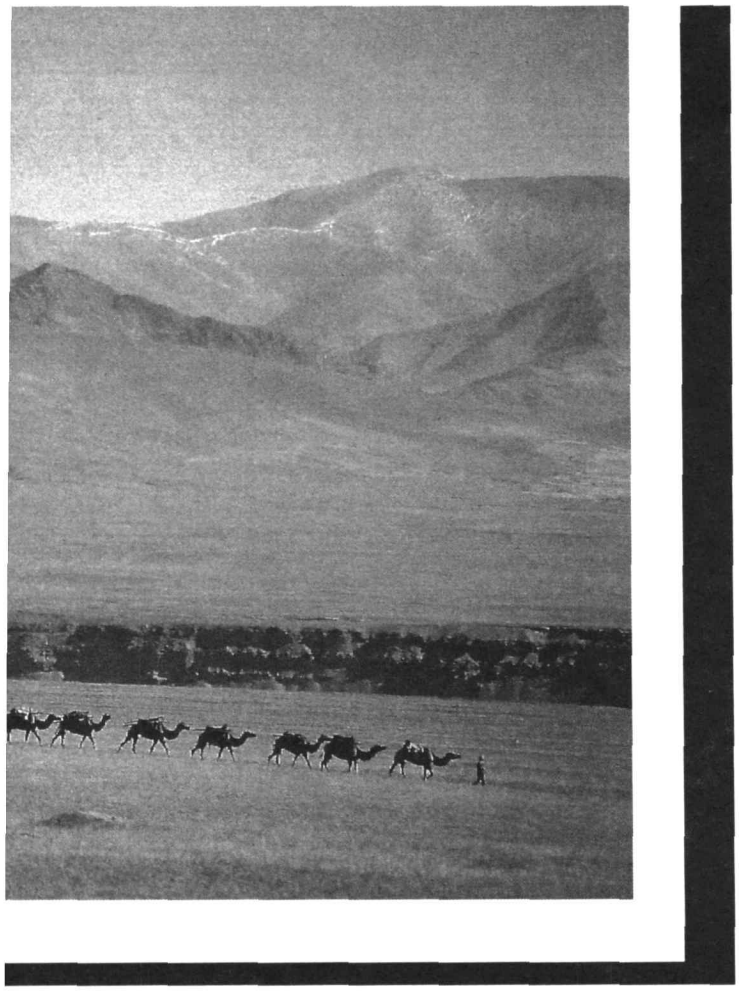
Beduna with head of wild yak.



Camel caravan, an important mode of transportation.

We were amazed at the concentrations of livestock on the western shore of Qinghai Lake. On these plains, there were thousands of sheep and yaks and we wondered how the land could support such livestock numbers. Many of the plants were well-utilized and there were signs of invader plants such as *Stellera chamejasne;* however, the vegetative composition of these ranges has evolved during centuries of livestock use to become dominated by grazing-resistant sedges, grasses, and forbs apparently allowing for a productive grazing disclimax.

Along the southern shore of Qinghai Lake, large areas of rangelands dominated by *Elymus nutans,* have been fenced for winter grazing. Tibetan herders have built permanent structures, usually in areas that were previously winter camp sites, and much of the grazing land is



now being divided into private pastures and given to the herders on long-term contracts. Herders in this area raise yaks, sheep, and horses, and in recent years livestock numbers have reportedly increased with improved access to markets and services. In the past, climatic factors such as severe winter storms and livestock disease epidemics served to regulate livestock numbers. Now, with improved veterinary care and greater access to forage during heavy snowfalls there may be danger of livestock numbers increasing beyond what the land can support.

West of Qinghai Lake the country becomes drier with mountain ranges supporting stands of juniper trees while the valleys are dominated by splendid grass. As we approached the desert basin near Caka Lake, a salt lake, the vegetation became desert-like and shrubs of the genera *Salsola, Kalidium, Reumaria, Sympegma* and *Ceratoides* became common. Mongol herders were utilizing these rangelands and this was where we first encountered the two-humped Bactrian camels which are commonly raised by herders in the desert areas of western China.

As we descended out of the mountains into the Qaidam Basin, the landscape became drier and large sand dunes were common. The Qaidam, north of the Kunlun Mountains, is a large desert basin at about 10,000 feet and is well known for its salt deposits. Vegetation is dominated by scattered shrubs of *Tamarix, Nitraria, Ephedra,* and *Haloxyon.* There are salt marshes dominated by *Phragmites communis* and a species of *Puccinella.* Rivers flowing north out of the Kunlun Mountains into the Qaidam Basin provide irrigation for fields of wheat and mustard. Large areas of the desert have been cultivated in recent decades and towns have established in these agricultural areas. Afforestation has been a major activity, and towns and irrigation canals are lined with rows of popular trees.

Recent dramatic increases in the human population in the Qaidam Basin, along with increased modernization and economic development, have increased the demand for livestock products. Livestock numbers are increasing in many of the remote and isolated mountainous regions. This trend will undoubtedly continue with severe implications for wildlife and their habitat if livestock numbers and range resources are not properly managed.

Wildlife

Numerous explorers in the late 19th century were awed by the wildlife of the Kunlun Mountains in northern Tibet. Prezevalsky, a Russian explorer, found wildlife abundant on the southern slopes of the Kunlun Mountains on his first trip to Tibet in 1872. He found wild yak the most numerous and estimated their numbers in the millions. Rockhill, an American consular officer in Beijing who learned to speak Tibetan, travelled across the Kunlun Mountains in the 1880's and wrote that the upper Yellow River "is the most wonderful hunting ground in Asia".

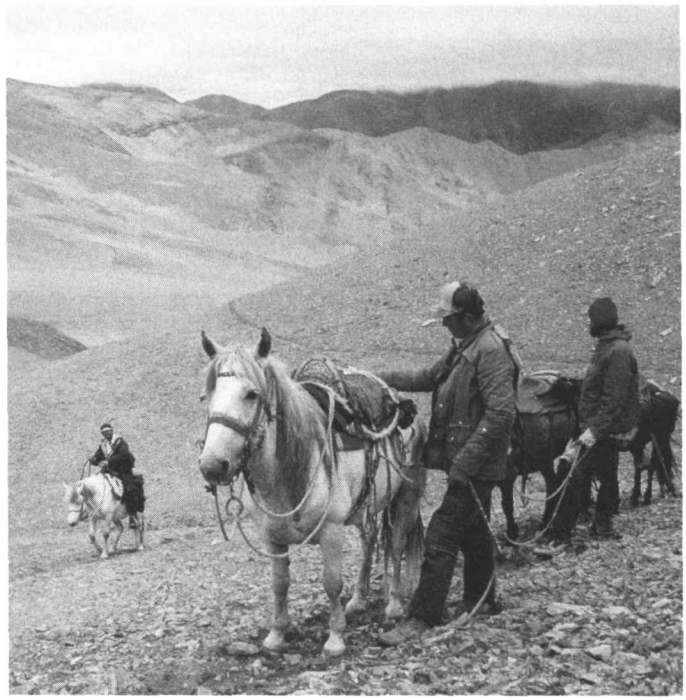
Tibetan gazelles in a stipa grassland.

One of the many uses of the yak.

In the 100 years since these men travelled across Tibet, wildlife populations have diminished drastically. The first roads built on the Tibetan Plateau in the 1950's allowed hunters and herders access to remote regions. During the Cultural Revoluton, extensive commercial meat hunting of large mammals took place which severely reduced wildlife numbers. Many wildlife species which once roamed throughout the Tibetan Plateau are now restricted to inaccessible areas.

Although unregulated hunting is now illegal in Tibet, poaching is still a significant threat to wildlife. Antelope, gazelle, and blue sheep are most heavily affected, but wild yak are also being killed. Poachers may travel for hundreds of miles into remote areas to kill large numbers of animals for meat, which is transported to towns and sold. Tibetan antelope are also being killed for their valuable cashmere-like wool. Traditional Chinese medicinal treatments also require various parts of wild animals. This unregulated hunting destroys a precious resource and needs to be strictly controlled.

Wild Yak Valley. Only a few years ago it was not generally known if wild yaks still existed on the Tibetan Plateau. It was thought that if they did exist, there were probably only a few remaining in isolated areas. The wild yak is the



One of the many exploration rides into the rugged Kunlun Mountains.

largest wild animal in Central Asia and are imposing in their power and their ability to charge when wounded. Yet, little is known about them and few Westerners have ever seen, let alone studied them.

One of the important refuges for wild yak on the Tibetan Plateau is Wild Yak Valley (Fig. 1B). The main valley, which runs east-west, is drained by the Kunlun River, which flows north into the Qaidam Basin. Mountains to the south of the valley rise to heights of 19,000 feet and the many glaciers provide melt-water for extensive, lush, sedge meadows on the mountain slopes. Large expanses of productive grasslands occur at the valley floor, an elevation of about 14,000 feet. North of the valley is a rugged mountain range with numerous peaks rising to 18,000 feet. These mountains are drier than the glacier-covered peaks to the south and conditions are more desert-like. Further to the west, the country broadens, becoming higher and colder with sparse vegetation typical of cold deserts.

Mongol and Kazak sheep and goat herders utilize the lower 30 miles of Wild Yak Valley during the summer. In the winter these herders move to grazing lands in the Qaidam Basin near the town of Golmud. However, Tibetan herders who spend the summer in higher elevation grazing lands to the south, come into Wild Yak Valley to winter their animals.

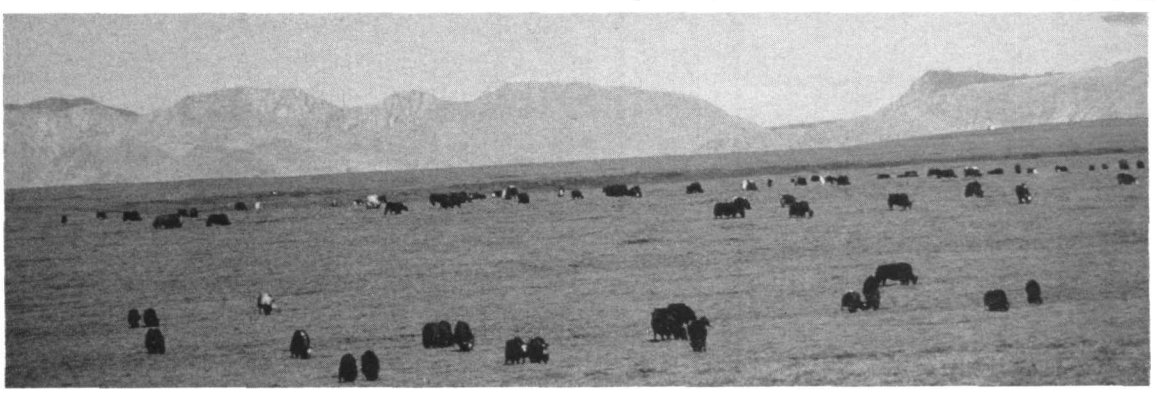
Livestock use occurs on the fertile riparian sedge meadows along the river and on river bench grasslands dominated by grasses such as *Stipa* sp., *Leymus* sp. and splendid grass. Shrublands of *Hippophae rhamnoides, Oxytropis aciphylla, Reumaria kashgarica* and *Ceratoides latens* are also encountered.

Further up the valley, grasslands along the main valley floor become more productive and are dominated by purple feathergrass, *Stipa purpurea.* Associated grasses are *Roegneria thoroldiana, Koeleria cristata, Poa poiphagrum, Leymus* sp. with forbs such as *Artemisia frigida, Potentilla bifurca,* and species of *Allium Astragalus* and *Oxytropis.*

On the mountain slopes, often sub-irrigated by snow and glacier-melt water, there are large areas of productive sedge meadows dominated by species of *Kobresia* and a variety of forbs. On broad ridges there are also cushion plant communities with species of *Myricaria, Rhodiola, Arenaria,* and *Androsace,* and the fragrant *Oxytropis falcata.*

Tibetan Nomad family.

On the south side of the main valley, in the drier side valleys, species composition in the grasslands changes to sedges such as *Carex moorcroftii* and *Kobresia robusta*



Wild yaks grazing.

more common in the sandy soil. The shrub, *Ceratoides compacta,* also becomes more widespread and *Potentilla fruticosa* is found in many valleys.

In Wild Yak Valley we counted over 1,000 wild yaks in a survey area of about 200 square miles, and saw some herds with up to 400 yaks. Wild yaks are certainly the most impressive animal in Tibet. To observe a large herd of wild yaks for hours in a spectacular alpine valley ringed with glacier-clad peaks is an unforgettable experience.

Wild Yak Valley is an exceptional sanctuary for wildlife. Besides wild yak there are large numbers of wild ass, Tibetan gazelle, Tibetan antelope, blue sheep, and argali (which is one of the largest species of wild sheep in the world). In addition there are white-lipped deer, lynx, wolves, marmots, pikas, Tibetan fox, red fox, snow leopard, and brown bear. The remarkable diversity of species in this little corner of the Tibetan Plateau is truly impressive. This is an area which has remained virtually unchanged for thousands of years.

Wild Yak Valley and Preserves in China

The establishment of protected areas in China first began in 1956, but it was not until 1983 that the 17,000 square miles Arjin Shan Reserve was established in southeastern Xinjiang Autonomous Region on the northern edge of the Tibetan Plateau. Encompassing the Kunlun Mountains, this protected area provides habitat for animals such as wild yak, wild ass and Tibetan antelope. In the northern Tibetan Autonomous Region, an area of 92,000 square miles has recently been designated as the Changtang Wildlife Reserve. This huge, largely uninhabited area is an important refuge for wildlife, especially wild yak and Tibetan antelope. Recommendations have also been made to extend the Changtang further west, an additional 20,000 square miles further west to include critical Tibetan antelope lambing and wild yak habitat.

These conservation efforts provide opportunities to protect the unique wildlife found in the Kunlun Mountains and need to be encouraged and supported. At the present time, there is no wildlife reserve in western Qinghai Province. The area south of the northern edge of the Kunlun Mountains and west of the Golmud-Lhasa Highway in Qinghai Province should be included in an expanded Changtan Reserve. This area would include the Wild Yak Valley, which contains exceptional biological diversity, as well as the unexplored Kokoshili Mountains and the headwaters of the Yangtze River. There are few wild places like this left in the world today.

Management Issues

This high-elevation range ecosystem, subjected to grazing for thousands of years, deserves special study and increased conservation efforts. Government agencies responsible for managing wildlife will require training and assistance to effectively protect, conserve, and manage the range and wildlife resources on the Tibetan Plateau. Wildlife and habitat inventories are needed to categorize fauna and flora and to identify key areas for special protection. Although most wild animals on the Tibetan Plateau are protected by law, wildlife protection officials have limited resources to control illegal hunting. Increased mineral exploration and access of remote areas have increased the threat of poaching. The potential of mineral extraction poses a potential new threat to wildlife and wildlife habitat.

It is becoming increasingly clear that conserving the biological diversity on the Tibetan Plateau will depend on the cooperation and support of the local pastoralists. The social and economic needs of the herders will have to be reconciled with management of the rangelands and conservation of wildlife if the Tibetan Plateau ecosystem is to be preserved. This will require involving local herders in the design of range-livestock development plans and wildlife conservation efforts, as well as their participation during the implementation of programs and as game guards.

Range managers and livestock planners will need to develop a broader view of range resource management to meet the future challenges facing these rangelands. The increased access and growing human population have increased demands for livestock and wildlife products. The increased access directly threatens wildlife through poaching while greater livestock numbers indirectly threaten wild ungulates by increasing competition for a limited forage resource. Wildlife and livestock grazing can be compatible, provided that proper multiple-use management is practiced. This can be achieved by controlling the number of livestock in a particular area, as well as the intensity and duration of grazing. To develop these management systems requires better understanding of forage requirements and optimal interactions between wildlife and livestock, as well as more information on pastoralists' production strategies and their goals. Such research could help development planners and pastoralists to integrate wildlife management with livestock production and manage the potential conflict between wildlife and livestock to best advantage.

Summary

The demise of the great herds of wildlife on the Tibetan Plateau in the last century is tragic. Fortunately, there are still vast areas where considerable herds of wild yak, wild ass, Tibetan antelope, and argali have survived. These rangelands are subjected to increasing pressure from growing livestock numbers as China modernizes and demands more livestock products. Significant rangeland degradation and wildlife habitat loss will likely occur if appropriate policies and sustainable use of the rangeland is not promoted. A loss of wildlife or of the unique pastoralist cultures utilizing these rangelands would be a tragic loss. This can be avoided if timely action is taken to assess resources and realistically appraise development alternatives for conserving and managing the Tibetan Plateau ecosystem in the face of growing threats from modernization. Such action requires a concerted effort by range specialists, conservationists, and development planners to bring about a development program sensitive to range and wildlife resources and the needs of local pastoralists of this unique Kunlun ecosystem.

National Public Attitudes toward Federal Rangeland Management

Mark W. Brunson and Brent S. Steel

Federal rangeland management and policy historically have been directed by a small circle of forage users, agency specialists, and Western members of Congress, with little scrutiny by the larger public (Dana and Fairfax 1980). However, concern about the environment has increased during the past quarter-century (Dunlap 1991), and this is reflected in growing public attention toward rangeland management and policy. Utilitarian, anthropocentric approaches to federal land management are less popular as the public and natural resource professionals increasingly embrace biocentric or holistic paradigms (Brown and Harris 1992). Environmental activists increasingly target public lands grazing for criticism (e.g., Rifkin 1992, Ferguson and Ferguson 1983). The long-simmering feud over grazing fees now makes headlines in Philadelphia as well as Denver.

This increase in public scrutiny and criticism has not gone unnoticed in the range profession. Appeals for a counter-response appear regularly in the pages of *Rangelands* (Bonham 1991, Tueller and Burkhardt 1993). Yet it's not entirely clear what the profession should be responding to. We do not know, for example, how closely the opinions of the general public match those of interest groups who tend to be the most vocal participants in natural resource debates. The lack of such knowledge greatly limits managers' ability to respond to Congressional initiatives or interest groups' criticism. Also, because attitudes about environmental management are related to knowledge about environmental conditions (Pierce et al. 1989), managers need to learn what the public knows about rangelands.

Unfortunately, little research has examined public knowledge or beliefs about rangelands. For example, since 1980 only one article examining attitudes of the general public has appeared in the *Journal of Range Management*, and it covered the narrow issue of coyote control (Arthur 1981). No studies have been published concerning general attitudes toward management of publicly owned rangelands in the United States. Without such research, federal range managers and policy-makers cannot gain a clear understanding of what Americans think about rangeland conditions and range management issues. To address this deficiency, we conducted a national public survey on federal rangelands in Spring 1993.

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Methods

Survey data were gathered by contacting 2,000 randomly selected households by telephone, using survey design and implementation criteria recommended by Dillman (1978). Interviews were completed with 1,360 adults. The 68% response rate was consistent with our previous mail and telephone surveys on environmental issues. Many of those who declined to respond said they had no opinion about rangelands or their management. Thus, results may emphasize the views of those who are most concerned about rangeland policy.

Survey questions encompassed: (1) attitudes toward management of federal rangelands; (2) knowledge about the environmental condition of federal rangelands; (3) confidence in organizations and institutions involved in range management; (4) relative influence that different rangeland constituencies should have on policy development and implementation; and (5) attributes of respondents that could influence beliefs, including their overall attitudes toward the relationship between society and the natural environment as well as demographic characteristics. Many of the questions were adapted from a recent study of attitudes about federal forest management in Oregon and nationwide (Shindler et al. 1993).

The primary attitude/belief measures were a series of questions asking people for their level of agreement with statements about rangelands and range management. Respondents were asked their views about "federal lands such as those managed by the Bureau of Land Management and the U.S. Forest Service." To further clarify the attitude object, a definition of rangelands was given. Choosing a definition was problematic, as there is still no universally accepted description of rangeland (Holechek et al. 1989). To ensure a valid telephone survey, the definition could be no more complex than a single phrase. The phrase we chose was: "places that have arid climates, where grassland or desert environments are *more common* than heavily forested ones."

Attitudes and Beliefs

Responses to questions measuring overall attitudes toward range management on federal lands are shown in Table 1. Generally speaking, Americans favor greater

Table 1. Attitudes toward federal range management policies.

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	(%)				
Livestock grazing should be banned on federal rangelands	11	10	45	18	16
More rangeland wilderness areas should be established	10	5	14	24	47
Livestock grazing should be permitted in rangeland wilderness areas	31	19	20	19	11
Greater protection should be given to fish such as salmon	6	8	10	28	48
More should be done to protect rare plant communities	9	4	12	24	51
Greater efforts should be given to protect wildlife	3	4	7	23	63
Endangered species laws should be set aside to preserve ranching jobs	45	20	17	10	10
Federal range policy should emphasize livestock grazing	19	24	32	11	14
Ranchers should pay more than they do now to graze livestock on federal rangelands	7	7	19	29	38
The economic vitality of local communities should receive highest priority when making rangeland decisions	16	25	22	15	23

protection for nonmarket rangeland resources and a shift away from commodity-oriented management. Respondents did not support the current policy allowing livestock grazing within wilderness areas, and they wanted to see more rangeland wilderness areas set aside. They favored giving greater protection to fisheries, wildlife, and rare plant communities, and disagreed that range management should emphasize livestock grazing. A particularly interesting finding concerned attitudes toward a total ban on livestock grazing on federal rangelands such as that espoused by the "Cattle Free in '93" movement. Respondents were slightly more likely to *support* a grazing ban than to oppose one, but nearly half of the sample was neutral toward that statement—much more than for any other question.

Several questions examined the extent to which range policies should protect ranching communities, with somewhat mixed results. Respondents opposed by more than a 3:1 margin a statement that endangered species laws should be set aside to preserve ranching jobs. A very large majority agreed with a statement that ranchers should pay more than they do now to graze livestock on federal rangelands. Yet when asked if management decisions should give highest priority to protecting the economic vitality of local communities, about half of those who had an opinion agreed with the statement. Nor was the public altogether insensitive to economic upheavals that may result from a grazing fee hike: When asked to choose among five statements about the grazing fee system (Table 2), they agreed by nearly a 3:1 margin that any increase in grazing fees should be phased in gradually so that ranchers have time to adjust to the new economic conditions.

A final attitude question asked respondents to make an overall choice between anthropocentric, holistic, and biocentric management paradigms. Sixty-five percent supported a multiple-benefits mode of management, "emphasizing a long-term sustainable balance between human and ecological concerns." Of the remaining third of respondents, twice as many people preferred a preservation mode ("emphasizing minimal alteration and interference in rangelands by humans") to an agricultural mode ("emphasizing the efficient production of forage to provide meat products for society").

Table 2. Preferences for a grazing fee policy.

	Percent
Livestock growers should be able to graze their animals on federal lands free of charge	10%
Livestock growers should continue to pay about what they currently pay to graze on federal land	14%
Grazing fees charged to livestock growers should be raised to fair market value, but the change should be gradual to let ranchers adjust to new economic conditions	40%
Grazing fees should be immediately raised to their fair market value	14%
Livestock growers should not be allowed to graze their animals on federal lands no matter how high the fee	22%

To measure public beliefs about the condition of federal rangelands, we asked respondents whether they agreed or disagreed with six statements about environmental quality (Table 3). These results showed a clear pattern of belief that America's public rangelands are in trouble, and that the situation is getting worse. The statements that were most likely to gain agreement referred to watershed issues: loss of riparian vegetation and declining water quality. The problem least likely to be perceived by respondents was that most federal rangelands are overgrazed by livestock. Yet even then, no more than a third disagreed with the statement. Regardless of whether or not respondents believed overgrazing is a widespread problem, they did not believe that overgrazing is less prevalent now than it was 50 years ago.

Confidence and Influence

Questions about public confidence in agencies and interest groups found greater trust given to environmental groups than to commodity groups or the bureaucracy (Figure 1). Of the three resource agencies having the greatest responsibility for range management, confidence was lowest in the Bureau of Land Management. While people were equally likely to have "a great deal" of confi-

Table 3. Beliefs about environmental conditions of federal rangelands.

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	(%)				
Most federal range is overgrazed by cattle and/or sheep	12	14	14	30	30
Soil erosion is only a minor problem on federal rangelands	30	33	13	13	10
Populations of most wildlife species on federal rangelands have remained constant or are increasing	44	30	14	8	4
The quality of water from federal rangelands has decreased markedly in the past 50 years	3	4	7	23	63
The extent of overgrazing on federal rangelands has decreased markedly in the past 50 years	34	31	18	9	8
Loss of streamside vegetation is a serious range problem	5	3	10	32	51

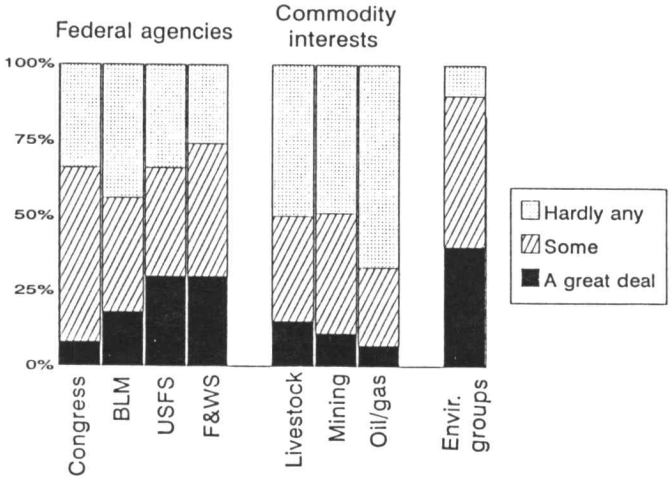

Fig. 1. *Confidence in rangeland agencies and constituency groups.*

dence in the Forest Service or U.S. Fish and Wildlife Service, they were more likely to have "hardly any" confidence in the Forest Service. Public confidence in the U.S. Congress was much lower, on a par with the oil, mining, and livestock industries. Of the latter three groups, confidence was lowest in the oil industry.

One finding that has particular relevance for range policy is the very low level of confidence expressed in the livestock industry. Half of the sample said they have "hardly any" confidence in the livestock industry, and only 15% had "a great deal" of confidence in stockgrowers. In comparison, 40% of the public had a great deal of confidence in environmental groups while only 11% had hardly any confidence in those groups. Clearly the livestock industry is not regarded any differently than any other big business in the minds of the general American public, even though ranchers themselves may see themselves as quite different than oil drillers, miners, or other extractive workers.

Respondents also were asked to rank seven broad public groups according to how much priority their needs should be given when decisions about federal rangelands are made (Figure 2). A low number indicates that federal managers should be more responsive to that group. As in the attitude portion of the survey, we found support for giving priority to the needs and desires of local affected communities. However, respondents made a clear distinction between local *communities* and local *industry*. The latter ranked below national public opinion and the natural resource agencies, and about the same as environmental groups. Respondents also made a distinction between local communities—those immediately affected—and public opinion within the affected states, suggesting that Americans see federal rangelands as a national resource for which western and eastern concerns should be given equal emphasis in management and policy. This is also consistent with our finding that global public opinion should receive the least weight in decisions about U.S. public lands.

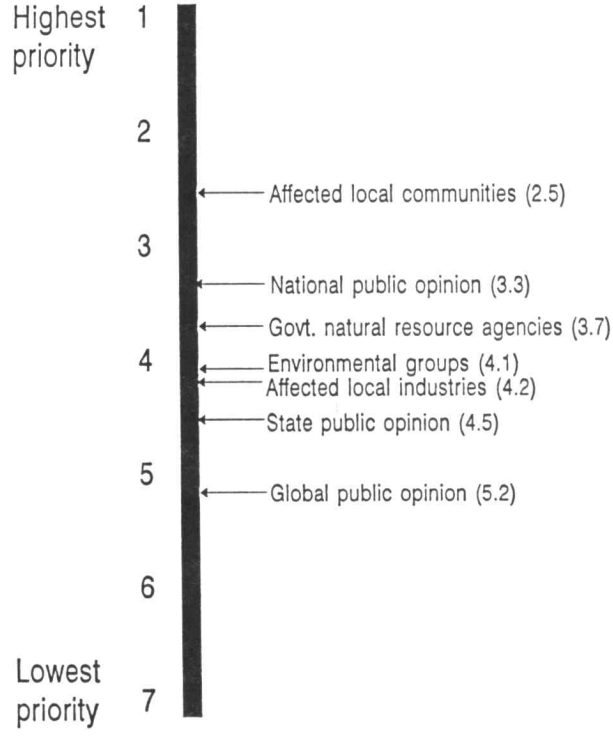

Fig. 2. Mean rankings, range policy priorities.

Profile of Respondents

The remainder of the questions on the survey offer insight into the public itself: Who are these people who feel this way about federal rangelands? Responses to a six-question environmental ethics scale (Steel et al. 1993) revealed a pattern of beliefs that could be called environ-

Table 4. General orientations toward the society-environment relationship.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Environmental Ethics scale:			(%)		
Plants and animals exist primarily for human use	31	22	13	14	20
Humankind was created to rule over the rest of nature	31	19	12	10	28
Humans have an ethical obligation to protect plant and animal species	6	1	4	23	67
Humans and nature can live together in productive harmony	4	2	9	22	64
The earth should have far fewer people on it	12	12	40	14	22
Wildlife, plants, and humans have equal rights to live and develop on the earth	10	11	7	23	49
Science and technology scale:					
Technology will find a way of solving the problem of shortages of natural resources	14	24	22	21	19
People would be better off if they lived without so much technology	18	24	22	19	17
Technical & scientific experts are usually biased	6	16	36	24	18

mentalist or biocentric (Table 4). More than 80% agreed with statements that "humans have an ethical obligation to protect plant and animal species" and that "humans and nature can live together in productive harmony." Two-thirds agreed with a statement that "wildlife, plants and humans have equal rights to live and develop on the earth," although fewer indicated *strong* agreement with such a strongly biocentric statement. Respondents tended to disagree that "plants and animals exist primarily for human use" and "humankind was created to rule over the rest of nature."

Further insight into the public's orientation toward resource management can be gained by examining responses to a three-item scale about science and technology (Table 4). The results show some ambivalence. Respondents were twice as likely to agree than to disagree with a statement that "technical and scientific experts are usually biased." About a third of the sample weren't sure whether such bias is prevalent. Respondents were about equally divided between those who believe technology can offer answers to natural resource problems and those who believe we'd be better off without so much technology.

Demographic data showed that the average respondent was in his or her early 50s, had attended at least "some college," and lived in a town of 25,000 or more people. Our previous studies (e.g., Shindler et al. 1993) yielded a nearly identical demographic profile, supporting our contention that our sample represented the "general public." Only a small minority of respondents (13%) belonged to an environmental group. Eleven percent said they or their family "depend on the farming or livestock industry" for their livelihood.

Implications for Range Managers

If only one message were to be drawn from this survey, it is that there is widespread public disapproval of current range policies, reflecting a growing disenchantment with commodity-focused management on public lands as well as a belief that range condition is deteriorating. The public is ambivalent about science and technology—and by extension, the government bureaucrats and resource professionals who seek technological solutions to resource management problems—and mistrustful of the motives of the industry groups that have long been active participants in the management of federal rangelands.

These results reflect a broad national trend toward increasing environmentalism (Dunlap 1991), seen here in responses to the environmental ethics scale as well as to specific questions about rangelands. The attitudes expressed here closely resemble those in a recent study of attitudes toward federal forest management (Shindler et al. 1993) except that neutral responses were much more common in the rangeland survey. Depending on the question, as many as 45% of our sample was unsure how they felt about rangeland issues, with the greatest amount of uncertainty coming when the question referred to a range-specific issue such as overgrazing or grazing fees.

The relatively large number of noncommittal responses is one reason why we believe public attitudes about federal rangeland management are shallow-rooted and vulnerable to strategies for inducing attitude change. The other reason is that the attitudes appear to be based on misconceptions about the overall state of range resources on federal lands. Professional range conservationists know that environmental conditions have steadily improved since the turn of the century, with the probable exception of riparian areas which until recently were treated as "sacrifice zones" (Holechek et al. 1989). However, the public believes rangelands are overgrazed, seriously eroding, losing riparian vegetation, and that conditions are getting worse instead of better. If Americans can be convinced that such problems are more isolated than widespread, and that conditions are improving, attitudes toward range management may improve. At the same time, they must believe that range managers value wildlife, aesthetics, and other amenity resources as highly as livestock, energy or mineral production. Commodity-focused management will not find favor with a public that strongly prefers multi-resource or biocentric approaches.

Before launching a broad program intended to "educate the public" and induce positive attitude change,

range groups should consider some of our other results. Access to information doesn't influence environmental attitudes by itself; it also matters where the information comes from (Steel et al. 1990). If the public is unsure about the credibility of the source of information it receives about rangelands, the information is less likely to influence beliefs about range conditions or attitudes toward range management.

For example, we found little public confidence in the livestock industry. Ranchers, like others who earn their living obtaining resources from public lands, may be seen as foxes who have been allowed for too long to guard the henhouse. Government-employed range professionals might make a more credible information source than the national cattlemen's or woolgrowers' groups, but here, too, some caution should be exercised. In a recent survey of SRM members (Banner et al. 1993), range professionals estimated that the public's view of their professional credibility was only half of what they thought it should be. Our survey did not measure credibility of professionals themselves, but we did find relatively low levels of confidence in the agencies that range professionals usually work for. Previous research has suggested that universities are viewed as somewhat more credible information sources than federal agencies (Steel et al. 1991). Therefore universities may be the best choice for leading a public awareness/education program for rangelands.

A further cautionary note should be sounded about the nature of the message the public hears about range management. An appeal that emphasizes technological advances may fall on deaf ears, given that half of the public believes society already relies too heavily on technology to solve natural resource problems. More successful appeals are likely to be those that address public preferences for multi-resource management, emphasize non-commodity resources, and acknowledge past mistakes (e.g., riparian management) while pointing to newer resource-friendly policies and practices. And of course, managers should truly follow those policies, use those practices, and emphasize those resources; the surest way to damage agency credibility is to be caught breaking a promise to the public.

Finally, we learned things about two rangeland issues of particular interest to the range profession today. Regarding grazing fees, we found strong public support for a fee increase. This widely held viewpoint undoubtedly influenced Clinton administration officials as they prepared their recent fee-hike proposal. As Workman (1988) points out, support for fee hikes is often associated with belief that low fees encourage overgrazing, even though the two issues have little to do with each other. Therefore it is quite possible that the high level of support for fee hikes is influenced by the widespread perception that federal rangelands are in decline. Yet it is well-known that Americans want to reduce the tax burdens associated with government services. Therefore it may be encouraging to grazing leaseholders that the public is willing to reduce the shock of a fee increase by phasing in a higher rate rather than imposing a sharp increase immediately.

The second key issue is the "Cattle Free" movement. We found some public support for a ban on livestock grazing on federal rangelands. However, there was also tremendous uncertainty about the appropriateness of a grazing ban, as nearly half of our sample were neutral on the issue. This is one issue where a strong public relations effort may truly affect public policy. Interest groups on all sides of the issue are likely to want to do so.

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Successional Theory and the Desired Plant Community Approach

Michael M. Borman and David A. Pyke

The Bureau of Land Management (BLM) has been considering use of a Desired Plant Community (DPC) approach as the basis for managing and evaluating BLM-administered lands. Concern has been raised that this approach may not be scientifically sound or that it may be inappropriately used by managers to justify unacceptable rangeland conditions. The BLM currently evaluates rangeland condition and trend based on the successional concept that plant communities progress toward a species composition similar to undisturbed communities if environmental conditions remain the same and if disturbance is reduced or eliminated. This successional concept was influenced greatly by successional theories developed by Frederick E. Clements in the early 1900s.

The Clementsian-based successional theory as a model for vegetation change is inconsistent with current ecological thought regarding succession on many rangelands. Smith (1988) and Laycock (1991) referenced a number of ecologists who have suggested that traditional theories of plant succession leading to a climatic climax are scientifically inadequate for semiarid and arid rangeland ecosystems. There is not yet an agreement as to an alternative theory that may be considered appropriate; however, theories involving multiple steady states and state-and-transition processes appear to be gaining acceptance.

The purpose of this paper is to briefly describe current concepts of vegetation dynamics in semiarid communities relative to traditional theory and to try to place the Desired Plant Community approach into the context of current theories. Knowledge gaps and the potential of this approach for vegetation management and evaluation will also be discussed.

Current Concepts: Vegetation Dynamics of Semiarid Communities

Forecasts of the likelihood that a site will successfully recover after a disturbance are based on models of vegetation dynamics for similar sites. Much of our current basis for judging rangeland dynamics is based on the theory, as described by Clements, that a successional trajectory will lead to a single stable plant community, climax or potential natural community, provided that severe disturbances are eliminated. This concept is widely taught and is presented in currently used textbooks of rangeland management (e.g., Stoddart et al. 1975, Heady 1975, Holechek et al. 1989).

The traditional rangeland dynamics model used in determining condition classes in the United States was developed by Dyksterhuis (1949, 1958), was based on the Clementsian successional theories, and was accepted by federal land management agencies in the late 1960s. This successional approach for defining rangeland condition classes was strongly criticized because it did not accurately reflect the health of grazed rangeland. For example, the species composition of shrub-steppe communities grazed by cattle declines in herbaceous plants as woody plants dominate the site. Once woody plants become dense, the elimination of livestock grazing will not be sufficient to allow herbaceous plants to fully recover to their previous levels in the community. On some sites, woody plants replace herbaceous plants regardless of the livestock grazing because suppression of fires allows the more competitive woody species to dominate. Because of several problems associated with inaccurate condition classes formulated from the traditional rangeland succession model, the Rangeland Inventory Standardization Committee (1983) recommended using a potential natural community (PNC) rather than climax as the basis for comparison. This approach compares current vegetation to the potential community the site can accommodate while considering past modifications of the site. Thus, a site may develop into one of many potential communities depending on the type and severity of the disturbance on the site. Yet, this approach retains the concept of a single steady state that the community will achieve if disturbances are eliminated. The Potential Natural Community approach currently is being used by several federal land management agencies, including the BLM, to describe rangeland condition.

Regardless of the traditional condition class approach chosen, both are strongly rooted in the Clementsian theory that succession is a predictable, linear, bi-directional process. In other words, succession progresses towards a climax or potential community if disturbances are eliminated and regresses from the climax or potential community if disturbances continue. The traditional rangeland succession model and the Potential Natural Com-

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munity model have largely been accepted for rangeland management because of the desire to find a single objective standard for assessing the impacts of grazing animals (Smith 1988).

Alternative theories of vegetation dynamics take an individual species approach to the development of communities based on the early work of Gleason (1926). These alternatives rely on the species' life-history, on the interactions among the individuals that constitute the population, and on the interactions between the individual and its environment. Disturbance becomes a part of the ecosystem and several stable communities have the potential to develop after disturbances are eliminated or reduced. The nature, frequency, and intensity of the disturbance differentially impact each plant species, therefore the community formed after a disturbance depends on the abilities of the species to survive the disturbance or to replace themselves through reproduction after the disturbance. The likelihood of a species surviving or replacing itself after a disturbance depends on the species germination characteristics, competitive ability, growth, phenology, and on its genetic variability and plasticity related to the myriad of environmental factors it may face. In short, forecasting the dynamics of a community following a disturbance requires the knowledge of the physiological and demographic responses of the individuals that constitute the interacting populations of species that form the community.

The individualistic approach to vegetation dynamics recognizes that more than one potential community can result following a disturbance. Acceptance of this idea has led to the recognition that multiple stable states or communities may exist for any given site (Holling 1973, May 1977, Walker et al. 1981). In a recent review of rangeland successional models, Westoby et al. (1989) outlined the limitations and exceptions to the traditional approach that have led them to advocate that many stable plant communities have the potential to exist on any given landscape. They have proposed an alternative state-and-transition model for describing rangelands and for applying management prescriptions. States are relatively stable assemblages of species that develop on a site depending on the timing, intensity, and severity of disturbances. Transitions, also referred to as thresholds (c.f., Friedel 1991), are actions that result in new states (communities) of species assemblages. Transitions are characterized by the following: (1) unpredictable natural events, such as fires or changing climatic conditions, or human-induced uses of the ecosystem, such as farming or grazing; and (2) changes in states are not reversible on a practicable management time scale without human intervention (e.g., artificial restoration).

The state-and-transition model appears to be appropriate for semiarid communities of North America (Laycock 1991), Australia, and South Africa (Westoby et al. 1989). This approach has been successfully applied to arid and semiarid rangelands where the interaction between different types of disturbance and climate can lead to alternative stable plant communities. Within the western United States, Laycock (1991) proposed a state-and-transition model for the sagebrush-steppe ecosystem that combines transitions resulting from grazing, fire, and climatic conditions that result in the development of six relatively stable communities.

The Desired Plant Community Concept

The philosophical concepts which form the basis of rangeland condition assessment are now in a period of considerable ferment and change. Rangelands often suffer degradation because of their relatively low production per unit area, some traditional management practices, and because of the erratic climatic influences which drive their biological productivity. It is very important to have objective methods to assess their productivity and the effectiveness of management applied to the lands (Foran et al. 1986).

The Society for Range Management formed a Task Group in 1989 on Unity in Concepts and Terminology which has recommended that objectives for multiple use management on rangelands be defined in terms of a Desired Plant Community (DPC) for each ecological site (Task Group on Unity in Concepts and Terminology 1991). These same recommendations are applicable to ecosystem management that is being advocated by the federal land management agencies in the USA. The recommendation was approved by the Board of Directors, Society for Range Management, in July 1991. Of the several plant communities that are capable of occupying an ecological site[1], the Desired Plant Community is defined as the one that has been identified through a management plan to best meet the plan's objectives for the site. It is selected to meet the needs and values of people who have legitimate interests in land management. The value of the concept is that the desired community is clearly defined in terms of human values, including economic and social considerations, and not in terms of a "pristine" condition which may or may not have existed at some arbitrary time in the past. Vegetation management status should be reported in terms of similarity to (i.e., condition) and trend toward or away from the selected community. The SRM Task Group recommended that the effectiveness of a vegetative community in protecting the site against accelerated erosion be assessed independently of the use of the site. This assessment should be called a Site Conservation Rating (SCR). The point at which an unacceptable level of erosion begins should be called the Site Conservation Threshold (SCT). Sites with erosion in excess of the threshold would be assigned a Site Conservation Rating of "unsustainable" or "unprotected" and those with lower rates of

[1]Ecological Site is defined as a kind of land with specific physical characteristics which differs from other kinds of land in its ability to produce distinctive kinds and amounts of vegetation and its response to management. The ecological site concept is and will remain a useful tool for assessing the productive capability of ecosystems. Ecological sites should be the basis for classification of rangelands for the purposes of inventory, assessment, and extrapolation of management practices.

erosion would be assigned a rating of "sustainable" or "protected." Any community with plant cover that is capable of maintaining lower erosion rates than the threshold would be a candidate for the Desired Plant Community at the site. The Desired Plant Community could include introduced plant species. Any plant community that results in erosion in excess of the threshold level is undesirable and should not be selected.

A site where erosion exceeds the threshold may, through management, improve and reach a satisfactory condition. However, if erosion remains in excess of the threshold long enough, presumably the site will lose a significant part of its former productivity and become, for practical purposes, a new ecological site. In that case, a new Site Conservation Threshold and new array of possible Desired Plant Communities must be defined.

It must be understood that Site Conservation Threshold has not yet been defined for any given site, with the exception of some preliminary work by the Soil Conservation Service in Arizona. It is at this time merely a proposal. We must learn how to define it and how to identify the parameters to measure or estimate it. The threshold, and the parameters used to measure it, would be specific to the ecological site. Initially, Site Conservation Ratings will be developed for communities on specific sites by individuals with sufficient experience at these sites and communities to know what community attributes offer protection against accelerated erosion.

Smith (1987) and others have recommended that rangeland managers take the responsibility to decide the type of vegetation which most closely meets management goals (including the fundamental goal of site protection) and use that vegetation type as their standard for condition (Smith 1988). In the Desired Plant Community approach, condition would be based on those attributes pertinent to projected uses of the land. Factors other than potentially narrowly defined management objectives should be considered. An example would be the potential for weeds, particularly noxious weeds, to invade a community that otherwise satisfies management objectives. Given more than one option, the community with the lower potential for noxious weed invasion would be selected.

A concern with the Desired Plant Community approach to rangeland monitoring is that it may lead to moving targets as the values of society and managers change over time. Another concern is that agencies may attempt to use the approach to coverup the lack of improved rangeland condition. However, rangeland condition and trend are interpretations of field data characterizing attributes of the plant/soil system. The monitoring data collected should provide a record of trends in these attributes even though the values placed on them may change over time (Smith 1988).

The Desired Plant Community approach appears to be compatible with the concepts of multiple steady states and state-and-transition models and should be seriously considered as a method for addressing multiple use and ecosystem management objectives. Basic and applied research will be needed to provide the theoretical basis for the principle of "sustainability" as is implied in the term "Site Conservation Threshold", and to develop practical procedures for application.

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Cattledrive 93: Cowboy Poetry: A New Method for Agriculture Extension

Judy Steves

During the week of July 18 to 24th (1993), I participated in the "Cattledrive 93" tourist event. There were over 400 participants (and 100 cattle) in the 90-km drive from Logan Lake to Kamloops. I rode along with the group as a representative from the BC Ministry of Forests, Kamloops District, to answer any questions the participants had on Integrated Resource Management and Range Management. The Cattledrive was considered an opportunity for us to show the general public the management occurring on their Crown rangelands.

Each participant received a handbook which included information about the ranches, range, recreation and logging activities, and heritage sites along the route. I was asked to submit a general range information section to the handbook. I wrote the usual little blurb but, upon reflection, thought how the average reader would be bored to tears. How can I present this valuable information in a format which the non-range-interested person would read? The idea hit me—A POEM! That was how I made my debut as a Cowboy Poet.

The poem was put in the handbook for each participant. Following past tradition, the Cattledrive started off with a Pioneer Banquet, to allow the "dudes" to mix and mingle with the "real cowboys." At this banquet, I recited my poem and dedicated it to the pioneers, "not only the oldtimers, but also those pioneer ranchers, with the energy, enthusiasm, and creativity to try new methods and adjust to the changing times."

Surprisingly, my poem received raving reviews. From then on Cattledrive participants recognized me, not as the Forestry Range Representative, but as "the lady who wrote the poem." Ranchers attending the Pioneer Banquet stated "the poem brought a lump to their throat and a tear to their eyes," hitting home during this period when the BC government is focussing on establishing Protected Areas, where traditional grazing tenures may be cancelled, and affected ranches may have a hard time staying in business.

The following evening the BC Cattleman's Association sponsored a talk by Fred King, a biologist from the States. He provided the "meat" which fleshed out the simple statements of my poem, driving home the message that, with proper management, education and research, livestock grazing works hand in hand with conservation goals. As he was a previous non-believer, he was very convincing.

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During the actual Cattledrive (4 days of riding and camping out under the stars), I talked to over 150 participants and noted the greater interest this year (compared to last year's drive) in resource issues, probably due to the growing emphasis of society on the environment and conservation.

The dust has now settled after the cattledrive; however, the messages presented at the cattledrive are still floating around. The poem has appeared in the *Kamloops Daily* news and has been recited on the "Spirit of the West" radio show on JC55 in Kamloops. My hope is that the poem may aid in enlightening the general public about range and ranching concerns and practices, and may aid in inspiring those few remaining ranchers with their "heads in the sand" to become "pioneers." We have all got to clean up our act, so that the environment and the ranching industry are not harmed.

The Long and Winding Trail

by Judy Steves

(A poem written for the Cattledrive 93 handbook for participants.)

"Easy...Easy..." "Git along thar now."
My saddle creaks as I follow the cow.
"A little frosty this morning'!" I say to Jake.
These days, the chill makes my old bones ache.
I reach in my pocket to pull out a chew,
contemplatin' the grasslands covered with dew.

"Come on old girls, time to move on.
Can't let you graze these grasslands too long.
We're headin' up, to the summer range,
high in the forests, it'll be a nice change,
from the heat of the sage and bunchgrass below.
So: onward old girls, it's time to go."

I settle in the saddle: the cows know the way
and Sam, my cowdog, will catch the odd stray.
I ponder the trail as we mosey along
Humming a tune from a sad country song.
My father's father once rode this same range
But now family history is threatened with change.

"Cattle free by 93" is the cry from the States.
I'm afeared this may be the cattleman's fate.
Seems the concern is environmental harm.
They want the cattle to stay on the farm.
I scratches my head and spits out some chew.
I don't understand: we're environmentalists too.

In the past, the valleys were overgrazed,
during the fur-trading and Gold Rush days.
Then ranches were settled and linked with Crown range.
We were here for long term, so grazing use changed.
During the last century the range has improved,
and management methods are improving too.

We manage our cattle with ecology in mind.
When we graze grass, we leave over half behind.
We move the cows from pasture to pasture,
so the plants stay healthy and recover after.
Lakes and wetlands need special care,
since the cattle tend to congregate there."

We practise "Integrated Resource Use",
workin' to avoid ecological abuse.
There's so many uses on our Crown land now,
we have to stay flexible in managing the cow.
There's loggers and miners and wildlife too,
hunters, naturalists, trail-bikers and you.

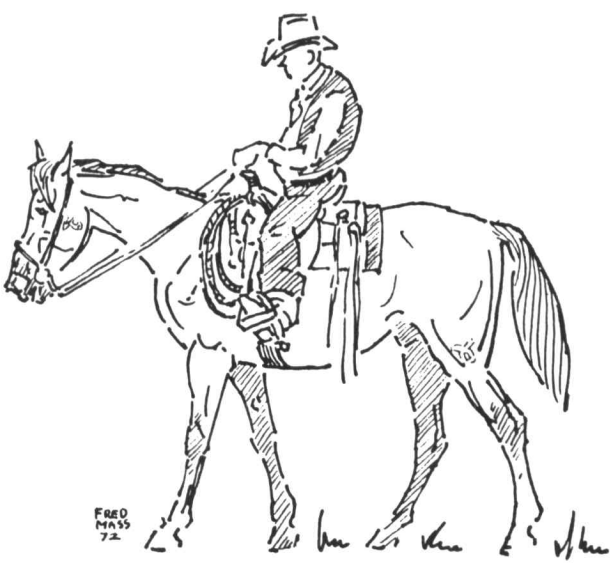
Where I used to ride once a week now I ride six:
Keepin' cows from hangin' in wetlands and criks,
Leavin' habitat for wildlife and the birds and the bees,
Movin' cows off clearcuts, so they won't step on lil' trees,
Shutting the gates that "The Public" didn't close,
and chasin' our cows through hillsides and meadows.

I smile as the cowherd spooks up a deer.
I've always liked wildlife, that's why I'm here.
The extra work, protectin' nature's OK,
but it sure is hard to make a buck these days
With high costs of management and government fees,
and the consumers who desire beef prices to freeze.

I shift in the saddle and look back down the trail.
It's a long way we've come, hopefully not to no avail.
Changin' our methods, when we learn nature' needs.
"Walkin' gently on the land", with no dirty deeds.
So my sons and daughters can take over the ranch,
in another 10 years after I've had my chance.

A point to ponder for the urban folk:
Without Crown range many ranches would go broke.
Many of these ranches would have to sell out,
to golf courses, developments, or 20-acre lots.
In many ways ranches protect the land base,
So wildlife and habitat don't get erased.

This poem is dedicated to the PIONEERS. Not only the "old-timers", but also those "pioneer" ranchers, who have the energy, enthusiasm and creativity to try new methods and adjust to the changing times.



Current Literature

This section has the objective of alerting SRM members and other readers of *Rangelands* to the availability of new, useful literature being published on applied range management. Readers are requested to suggest literature items—and preferably also contribute single copies for review—for including in this section in subsequent issues. Personal copies should be requested from the respective publisher or senior author (address shown in parentheses for each citation).

Agricultural Use and Extent of British Columbia Wetlands; by A.L. van Ryswyk, K. Broersma, and J.W. Hall; 1992; Agric. Can., Res. Br. Tech. Bul. 1992-3E; 130 p. (A.L. van Ryswyk, Agric. Can., Res. Sta., 3015 Ord Road, Kamloops, Br. Col. V2B 8A9) Summarizes British Columbia's wetland area in map and tabular form by area and elevation and discusses literature relating to its agricultural use.

Alfalfa Emergence Following Interseeding into Existing Alfalfa Stands; by R. Bortnem, A. Boe, and F. Einhellig; 1992; For. & Grassland Conf. 1992:6-10. (Plant Sci. Dept., S. Dak. State Univ., Brookings, S. Dak. 57007) Results of this South Dakota study suggested that germination and seedling emergence of alfalfa were not inhibited by an existing stand of old alfalfa.

Beef Cattle Report, 1994; by Univ. Neb.-Lincoln, Agric. Res. Div.; 1994; Neb. Agric. Res. Div. Misc. Pub. MP 61-A. 67 p. (Agric. Mailing Room, Univ. Neb., Lincoln, Neb. 68583) Includes reports on supplementation of nursing calves on Sandhills range, minerals in smooth brome and native grasses, microbial protein synthesis, dystocia in heifers, and other topics in beef cattle nutrition and management.

A Bibliography of Perennial Snakeweeds and Related Genera; by Kirk C. McDaniel and Charles Hart; 1993; N. Mex. Agric. Expt. Sta. Res. Rep. 681; 19 p. (Agric. Mailing Room, N. Mex. State Univ., Las Cruces, N. Mex. 88003) Publications are listed by the following categories: biological control, chemical control, ecology, fire control, forage, general, management, physiology and growth, taxonomy and floristics, and toxicology; includes an authors' index.

Chemical and Mechanical Control of False Hellebore *(Veratrum californicum)* in an Alpine Community; by Val Jo Anderson and Robert M. Thompson; 1993; USDA, For. Serv. Res. Paper INT-469; 6 p. (USDA, Intermtn. Res. Sta., 324 25th St., Ogden, Utah 84401) Glyphosate application as the sole treatment and rototilling or other mechanical treatment to dislodge rhizome network followed by reseeding were concluded to be the best alternatives for control of false hellebore.

Controlled Grazing on Annual Grassland Decreases Yellow Starthistle; by Craig D. Thomsen, William A. Williams, Marc Vaysieres, Fremont L. Bell, and Melvin R. George; 1993; Calif. Agric. 47(6):36-39. (ANR Pub., Univ. Calif., 6701 San Pablo, Oakland, Calif. 94608) Sheep grazing late spring and early summer resulted in large reductions of yellow starthistle on infested annual grasslands.

Compiled by John F. Vallentine, professor of range science (emeritus), 497 WIDB, Brigham Young University, Provo, Utah 84602

Economic Interpretation of Grazing Studies; by James Gerrish, Sara Marley, and Ronald Plains; 1992; For. & Grassland Conf. 1992:147-151. (Forage Systems Res. Center, Univ. Mo.-Columbia, R.R. #1 Box 80, Linneus, Mo. 64653) Discusses the problem of extrapolation of research data from individual grazing studies to producer scale operations and provides safeguards for developing economic interpretations.

Effect of Low Densities of Senescent Stems in Crested Wheatgrass on Plant Selection and Utilization by Beef Cattle; by David Ganskopp, Raymond Angell, and Jeff Rose; 1993; Appl. Anim. Beh. Sci. 38(3-4):227-233. (USDA-ARS, HC 71 4.51 Hwy 205, Burns, Ore 97720) Their study demonstrated that cattle select against crested wheatgrass plants even with few or only one dead stem remaining; provides recommendations for removing high levels of cured material from pasture to enhance grazing.

Evidence for the Promotion of Aboveground Grassland Production by Native Large Herbivores in Yellowstone National Park; by Douglas A. Frank and Samuel J. McNaughton; 1993; Oecologia 96(2):157-161. (Biol. Res. Lab., Syracuse Univ., Syracuse, N.Y. 13244-1220) Concluded that bison and elk grazing of nonforested sites in Yellowstone increased aboveground productivity of grazable vegetation by 47%; the authors suggested that stimulated forage production was due, in part, to the total impact resulting from the migratory behavior of the native ungulate grazers.

Factors Affecting Deer Diets and Nutrition; by Calvin L. Richardson; 1992 (reprint); Texas Agric. Ext. Leaflet 2393; 6 p. (Agric. Mailing Room, Texas A&M Univ., College Station, Tex. 77843) Provides a practical guide to the nutritional management of white-tailed deer in South Texas with emphasis on nutritional requirements, nutritional value of deer habitat and the availability of forage, and competition for available forage.

Fall Cultivation and Fertilization to Reduce Winterhardiness of Leafy Spurge *(Euphorbia esula);* by Rodney G. Lym and Calvin G. Messersmith; 1993; Weed Sci. 41(3):441-446. (Crop & Weed Sci. Dept., N. Dak. State Univ., Fargo, N. Dak. 58105) The main results of the study were: (1) cultivating leafy spurge twice each fall for 3 years provided complete control and (2) carbohydrate content was not a good indicator of winterhardiness.

Forage Dry Matter Intake of Polled Hereford Cows in Four Grazing Systems; by F.A. Martz, J.R. Gerrish, and R.E. Morrow; For. & Grassland Conf. 1992:45-50. (Forage Systems Res. Center, Univ. Mo., R.R. #1 Box 80, Linneus, Mo. 64653) Concluded that realistic dry matter intake values for beef cows and their nursing calves can be calculated from performance data collected under intensive grazing management; these values were found beneficial for estimating stocking rate and comparing intensive rotational grazing systems.

Fourwing Saltbush Seedling Survival Using Saline Irrigation; by J. Rafael Cavazos Doria and Earl F. Aldon; 1993; Arid Soil Res. & Rehab. 7(3):243-251. (Aldon: USDA, Rocky Mtn. Forest & Range Expt. Sta., 2205 Columbia SE, Albuquerque, N. Mex. 87106) Tested saline irrigation methods and the survival of establishing saltbush seedlings; also measured changes in seedling development as a result of irrigation.

Genetic and Phenotypic Factors Affecting Lamb Survival; by Subandriyo, Robert L. Blackwell, and Peter J. Burfening; 1993; Mon. AgRes. 10(2):37-41. (Agric. Mailing Room, Mon. State Univ., Bozeman, Mon. 59717) Concluded that although there is a possibility of improving lamb survival by selective breeding, altering the birth environment still offers the more practical approach.

Grazing Management of Native Grasslands. Handbook 1. Foothills Fescue Prairie; by W.D. Willms, B.W. Adams, and J.F. Dormaar; 1992; Agric. Can. Pub. 1883/E; 33 p. (Director, Agric. Can., Res. Sta., P.O. Box 3000 Main, Lethbridge, Alta. T1J 4B1) An application manual addressed to farmers and ranchers to better understand the characteristics and potential of native prairie; provides recommendations on the improvement and management of native fescue prairie in the northern Great Plains.

Leaf and Stem Traits and Herbage Quality of Multifoliate Alfalfa; by Nestor A. Juan, Craig C. Sheaffer, Donald K. Barnes, Douglas R. Swanson, and James H. Halgerson; 1993; Agron. J. 85(6):1121-1127. (Dept. Agron. & Plant Genetics, Univ. Minn., St. Paul, Minn. 55108) Conclusion of study: breeding to enhance leaf concentration has potential to increase herbage nutritive value and inake potential; but with multifoliate cultivars currently available, timing of harvest has a greater and more consistent influence on forage quality than does genetics.

Nutritional Management of Replacement Beef Heifers: A Review; by C.P. Bagley; J. Anim. Sci. 71(11):3155-3163. (North Miss. Res. & Ext. Center, Miss. State Univ., Verona, Miss. 38879) Develops systems of integrated forage-animal management to produce replacement heifers to calve initially at 2 years of age and at 12-month intervals thereafter.

Pinegrass: An Important Forage in Interior B.C.; by D.G. Stout and D.A. Quinton; 1986; Agric. Can., Res. Br. Tech. Bul. 1986-12E; 41 p. (Stout: Agric. Can., Res. Sta., 3015 Ord Road, Kamloops, Br. Col. V2B 8A9) Reviews pinegrass (*Calamagrostis rubescens* Buckl.) characteristics that relate to grazing and recommends grazing management practices to maintain and enhance pinegrass under grazing.

Quantitative Effects of Grazing on Vegetation and Soils over a Global Range of Environments; by D.G. Michunas and W.K. Lauenroth; 1993; Ecol. Mon. 63(4):327-366. (Range Sci. Dept., Colo. State Univ., Fort Collins, Colo. 80523) Provides a comprehensive analysis of worldwide data to quantitatively assess factors relating to differential sensitivities of ecosystems to grazing by large herbivores.

Rangeland Grasshopper Management; by Larry D. DeBrey, Michael J. Brewer, and Jeffrey A. Lockwood; 1993; Wyo. Agric. Expt. Sta. Bul. 980; 8 p. (Agric. Mailing Room, Univ. of Wyo., Laramie, Wyo. 82071) Discusses population ecology and destructive potential of grasshoppers, particularly in southeastern Wyoming, and provides management and control recommendations for alleviating the problems.

Seedling Growth Analysis of Russian Wildrye; by Paul G. Jefferson; 1993; Can. J. Plant Sci. 73(4):1009-1015. (Agric. Can., Res. Sta., P.O. Box 1030, Swift Current, Sask. S9H 3X2) A comparison of diploid and tetrapoloid seedling establishment leading to breeding recommendations for improved seedling vigor through improving tiller size.

Snakeweed Research Updates and Highlights; by Tracy M. Sterling and David C. Thompson (Eds.); 1993; N. Mex. Agric. Expt. Sta. Res. Rep. 674; 54 p. (Agric. Mailing Room, N. Mex. State Univ., Las Cruces, N. Mex. 88003) Contains summaries of research findings concerning the perennial snakeweeds, broom snakeweed and threadleaf snakeweed, in three general areas: ecology and physiology, management, and toxicology.

Supplemental Forage Management for East Texas White-Tailed Deer; by Billy J. Higginbotham and James C. Kroll; 1990; Texas Agric. Ext. Leaflet 2457; 6 p. (Agric. Mailing Room, Texas A&M Univ., College Station, Tex. 77843) Provides recommendations on developing and using supplemental food plots for enhancing the nutrition of white-tailed deer.

Techniques to Construct New Zealand Elk-Proof Fence; by Larry D. Bryant, Jack W. Thomas, and Mary M. Rowland; 1993; USDA, For. Serv. Gen. Tech. Rep. PNW-GTR-313; 17 p. (USDA, Pacific Northwest Res. Sta., 333 S.W. First Avenue, P.O. Box 3890, Portland, Ore. 97208-3890) Provides construction details and costs of constructing this elk-proof fence, and summarizes the experiences in using the fence at the Starkey Experimental Forest and Range in northeast Oregon.

Winter Survival of Grasses and Legumes in Subarctic Alaska as Related to Latitudinal Adaptation, Pre-winter Storage of Food Reserves, and Dry-Matter Concentration in Overwintering Tissues; by Leslie J. Klebesadel; 1993; Alaska Agric. & For. Expt. Sta. Bul. 94; 21 p. (Alaska Agric. & For. Expt. Sta., Univ. Alaska, Fairbanks, Alaska 99701) Results of a study to compare winter hardiness of various plant species and ecotypes and gain better understanding of pre-winter physiologic changes in plants associated with winter survival.

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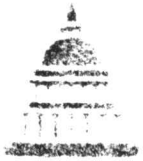
Utah State University
Washington State University



Capital Corral

Ray Housley
Washington Representative

Adolph Hitler never got on a horse.

The Ecological Society of America got its first-ever Executive Director and established its Washington, D.C., office as its National Headquarters April 1. Brian Keller, a marine ecologist, has a Ph.D. from Johns Hopkins, and has been involved in science administration as well as research. The new organization supplants the ESA Business Office at Tempe, Arizona, where Duncan Patten stepped down after managing the Society's business for many years. ESA has been recruiting to fill the Public Affairs post vacated when Marjorie Holland moved to the Environmental Protection Agency last fall.

The Sierra Club is mulling over a massive wilderness proposal, according to *Public Lands News*. The draft proposal, which was approved by the Sierra Club Board in November, would add major BLM and National Forest increments in Montana, Idaho, and Oregon, with unspecified "sweeping" administrative changes to protect ecosystems. Already in the hopper since last year is HR 2638, the Northern Rockies Ecosystem Protection Act, which would affect about 11.7 million acres in Idaho, Montana, Oregon, Washington, and Wyoming. Less ambitious bills also introduced in 1993 are HR 2473, a statewide RARE II bill for Montana, and HR 1570, an Idaho statewide RARE II measure. These involve 1.5 million acres and 1.25 million acres, respectively.

Rep. Tim Johnson (D-SD) is the new Chairman of the House Agriculture Subcommittee on the Environment, Credit and Rural Development, which has jurisdiction over water and soil conservation, small watershed program, and other matters. He succeeds Glenn English (D-OK) as a Very Important Congressman as far as the Soil Conservation Service is concerned. English resigned from Congress to take a private sector job earlier this year.

Just when it looked like USDA Reorganization was over the hump, reported out of a key House Ag Subcommittee with the SCS safely in one piece with some new strength and located in the Environment and Natural Resources unit, Sen. Richard Lugar (R-IN) got in the act just before scheduled markup in the Senate Ag Committee. He introduced an amendment to put SCS in the Farmers Service Agency, whereupon Chairman Pat Leahy (D-VT) postponed the markup and interest groups went into a frenzy of faxing and phoning. No predictions on this one—but you know the outcome if you've been reading the papers.

Rangeland Reform action got interesting about the first of March, as the scheduled release date (or one of 'em) slipped by. Instead of being "released", the proposed regulations were leaked. A good many members of Congress seemed to have copies, as did the *Washington Post* and apparently some environmental organizations. Even the *Capital Corral* had a pretty good idea of the contents! Again, efforts to influence the continuing process of change were cranked up as Interior Department public relations types predicted publication "about Mid-March". Nobody was holding their breath, however. Issues drawing the most attention were the local advisory committees we heard about at Colorado Springs, plus the troublesome "standards and guidelines" and a new crack at an incentive fee system. A *Washington Post* story made it sound like Secretary Babbit was making new friends while losing some others with the proposed changes; one enviro group was reportedly printing up "Babbit for Supreme Court" bumper stickers. We took the approach of offering helpful advice from the professional viewpoint, a source not particularly sought out during the process. No predictions. Read the papers.

Word from New Mexico is that Jim Baca, recently deposed as BLM Director, will contest Governor Bruce King for his job. Last year, he was in trouble with western governors; now he wants to be one?

Baca's successor at BLM, at least for now, is Mike Dombeck as Secretary Babbitt told us at Colorado Springs, implying he might be in the job for quite some time. It's likely the Secretary doesn't want to go through any confirmation processes that could give his critics a forum; that could mean Dr. Dombeck could remain as Acting Director through next fall, after which he could be appointed. Actually, Mike should have less trouble winning Senate confirmation than his predecessors. He has impressive professional credentials and varied experience as a resource manager. His Ph.D. is in fisheries biology, and he has worked for both the Forest Service and BLM. He came to Interior as a special assistant to former Director Cy Jamison, and made the transition to the new administration without a hitch.

Changing of the guard at the Forest Service continued as Gray Reynolds, Regional Forester in Ogden, Utah, was named Deputy Chief for the National Forest Service after Jim Overbay retired in February. Joan Comanor, Director of Land Management Planning, was selected early in the year to be Deputy Chief for State and Private Forestry, although formal appointment was unaccountably delayed. Comanor, a veteran of the grazing fee wars when she was at BLM, is immediate Past President of SRM's National Capital Section.

USDA Assistant Secretary Jim Lyons has okayed the idea of constituting a panel of scientists drawn from the scientific and profession societies to respond to the Department's scientific needs and provide ongoing counsel. Tom Franklin, Policy Director of the Wildlife

Society broached the idea as a means of helping enhance the quality and effectiveness of USDA Natural Resource programs.

At the NACD meeting in Phoenix, Jim Lyons laid out a charter for range management in the SCS and FS that bears quoting:

"First, ...USDA will accelerate the rate of correcting unsatisfactory conditions found in some National Forests and Grasslands.

"Second, rangeland will be managed in the context of ecosystem management.

"Third, emphasis on rangeland will be more visible in both the FS and SCS.

"Fourth, I expect a reinvestment in the professional range managers, who are responsible for on-the-ground management. This is an area that has suffered in the last decade.

"Fifth, I'm committed to improving joint assessment of rangeland and health among the SCS, FS and BLM for all the nation's rangelands.

"Sixth, I expect the FS and SCS to work more as partners. This will go beyond sharing data and terminology to include joint development of ecosystem management strategies, coordinated efforts in watershed-based planning and management strategies, and sharing resources and expertise on the ground.

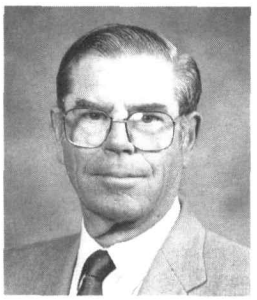
"And finally, I fully intend the SCS and FS will in turn work with a variety of partners including conservation groups, our agricultural constituency, state and federal agencies, professional groups and academia to improve understanding of rangelands and to strength their management for long-term sustainability."

SRM Awards

Presented at the Society's Annual Meeting in Colorado Springs, Colorado, on February 17, 1994.

Frederic G. Renner Award

The Frederic G. Renner Award is the highest award bestowed by the Society for Range Management. The award is named for one of SRM's founding fathers and second president.



John R. Hunter

John R. Hunter has devoted his entire professional career to range management as an educator and in service to the Society for Range Management. He has been committed to educating others, particularly related to natural resources. He is recognized among the best of educators and has received numerous teaching awards. He was the first recipient of the Range Science Education Council and Society for Range Management Undergraduate Teaching Award. Mr. Hunter not only prepares students with the necessary training needed to be a range professional, but he also prepares them for life.

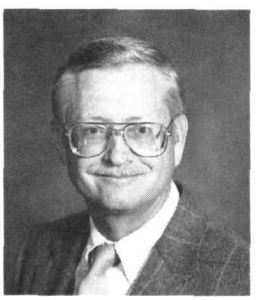
In addition to John's contributions as an educator, he has given devoted service to the Society for Range Management. He has served in many leadership roles including a Director of SRM and President and Director of the Texas Section SRM. John has a long-range vision for SRM and has worked tirelessly to lay a sound financial base for the organization. He has financed specific activities and underwritten others. He was responsible for establishing the Endowment Fund and has given exemplary service as chair and member of the Endowment Fund Board of Governors. He is always working to increase the fund. John was also responsible for initiating an endowment fund with the Texas Section. This fund has also grown and now provides funding for special activities in the Section.

Because of his strong interest in education of young people, he has personally endowed scholarships at Texas Tech University. In addition, he has solicited funds for other scholarships.

John Hunter is service oriented. All of his activities revolve around service to others. His service to SRM and to the range profession has been unending and unselfish. Service to SRM is his top priority. He wants SRM to be a strong organization professionally and financially. He has worked tirelessly to achieve these goals. He epitomizes the individual that the Frederic G. Renner Award was established to recognize.

W.R. Chapline Research Award

The W.R. Chapline Research Award was established in 1986 to provide recognition to members of SRM for exceptional accomplishments in research that result in improvement of rangeland resources.



Milton J. Trlica

Dr. Milton J. (Joe) Trlica has made many significant contributions to the profession of range management through his research in the areas of ecophysiology, plant ecology and effects of environmental stress on range plants. His research on grazing responses of range plants conducted over the past 20+ years has supplied much of the grazing response knowledge taught in range management courses throughout the world. His research in the area of defoliation effects on carbohydrate reserves of desert species is considered to be pioneering research in the ecophysiological study of range plants.

Dr. Trlica has also been very active in helping foreign countries develop range research programs. He was instrumental in helping establish the Kiboko Research Station in Kenya. This was an integral part of the development of a graduate program in range science at the University of Nairobi. Dr. Trlica has trained approximately 15 foreign graduate and post-doctoral students during his tenure at Colorado State University.

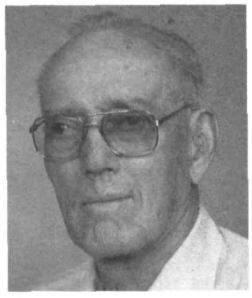
As a result of his work with students at Colorado State University, Dr. Trlica is responsible for much of our understanding of plant/water relations among semiarid range plants. His research involving competition and coexistence of C_4 grasses in the shortgrass prairie and the influence of competition on landscape pattern has provided new insight into the interactions of important range plants at various ecological scales. As a Fulbright Scholar, Dr. Trlica made additional advances in our understanding of plant/water relations among important range species in Kenya.

Through his research, Dr. Trlica has provided unique learning opportunities for many graduate students at Colorado State University. He encourages the students to publish their findings. More than half of the scientific articles published by Dr. Trlica have been co-authored with his students.

Dr. Trlica is recognized internationally for his research accomplishments and the range profession has made tremendous gains due to his efforts. He truly manifests the qualities of an outstanding range scientist and exemplifies the qualities the W.R. Chapline Research Award was established to recognize.

W.R. Chapline Land Stewardship Award

The W.R. Chapline Land Stewardship Award was created in 1986 to provide recognition to members of the Society for Range Management for exceptional accomplishments and contributions to the art and science of range management through specific rangeland entities.



Philip Robbins

Philip Robbins is a rare individual who is equally committed to sound resource management as he is to livestock production and profitability. He has given unselfishly of himself to many conservation endeavors over the years including soil stewardship activities, numerous field days and tours for several university range management classes. During his 25-year tenure as a director of the Trans-Pecos Soil and Water Conservation District, Philip was very active in promoting Soil Stewardship Week by arranging tours for local clergy.

His desire to educate youth on land stewardship has resulted in numerous groups of Boy Scouts, Sunday School classes and 4-H members visiting the ranch for their first exposure to livestock, ranching and conservation of soil, water and plant resources. He tries to instill within these individuals an appreciation for the precious resources that have been bestowed on us. Philip is now teaching first hand the next generation in his family about conservation and stewardship. His grandchildren are learning about resource management while actively participating in day-to-day ranch operations and working side-by-side with Philip. Philip and his close-knit family recognize they are entrusted as stewards of the land they use.

Although Philip is beyond normal retirement age, he has not grown old in his love for the land or his desire to spread the message of land stewardship. He is passing these qualities on to his family, neighboring ranchers, civic groups and young people so that they too will understand the importance of sustaining our renewable natural resources.

and conservation education for young people. He practices and teaches what the Society for Range Management preaches. He is a leading innovator in range management in the Trans-Pecos Region of Texas.

As a spokesman for land stewardship, Philip has been very active in educational activities. He has hosted several range tours, classes from the Total Ranch Management program, stocking rate workshops and tours

Outstanding Achievement

The Outstanding Achievement Award is presented to individuals for eminently noteworthy contributions in advancing the art and science of range management.

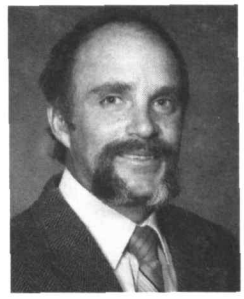
Linda A. Joyce

For the past decade, Dr. Linda A. Joyce has led the U.S. Forest Service's work in producing the recurring national range assessment called for in the Forest and Rangeland Renewable Resources Planning Act of 1974. The 1989 range assessment was based, for the first time, on a quantitative approach to projected supply and demand for range forage. Dr. Joyce was able to couple projected livestock numbers to demand for future grazed forages along with estimates of grazing land availability to predict forage supply through the year 2040.

Linda's research assignment is focused on the development of quantitative multi-resource analyses for use in national, regional and forest-level planning. This work has required a synthesis of forage production models with mathematical models used in forest planning.

Linda's contributions in landscape ecology have evolved around an innovative research concept that links quantitative ecology with economic modeling. Advances made by Linda and her colleagues have notable potential for providing mechanisms for management tools that can incorporate spacial dimensions to land management planning. Dr. Joyce has authored more than 30 refereed publications with 20 published during the past five years.

Linda has recently assumed a leadership role within the U.S. Forest Service on global warming research. Her efforts have concentrated on bridging ecological responses to the economic sector.

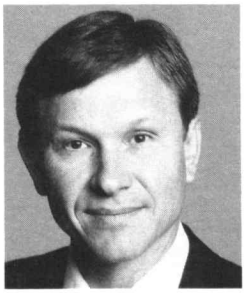


Frederick D. Provenza

Dr. Frederick D. Provenza in a relatively brief career, has conducted research that has produced 74 refereed journal articles. His research on how grazing animals select their food has management implications and is recognized and referenced by basic scientists in psychology and toxicology. Some of Dr. Provenza's current research is aimed at finding ways to prevent or avert animals from desirable foraging areas such as riparian zones.

In addition to his outstanding research programs, Fred has contributed as an outstanding teacher. He has received awards for his teaching excellence. Through innovative instructional methods, enthusiasm and genuine love of learning, he is able to turn on students in a variety of disciplines such as forestry, wildlife, sociology, landscape architecture, history and agricultural education. At the graduate level, Dr. Provenza's influence on the range profession will be returning benefits for many years to come. Students that have received graduate degrees under his guidance now hold influential positions in universities and research institutions in the United States and nine other countries.

Dr. Fred Provenza has successfully blended range ecology and livestock behavior with other areas of science such as behavior psychology, toxicology, neurology, ruminant nutrition and pharmacology. His research, teaching and service activities have made a significant contribution to the profession of range management.



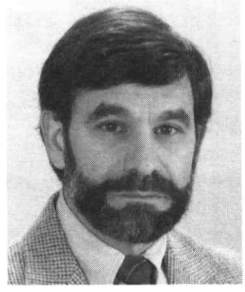
Barron S. Rector

Dr. Barron S. Rector is involved in a wide rray of activities across the state of Texas. 'hroughout all of these activities he is well ecognized for his untiring enthusiasm. Long fter others have tired of a topic, Dr. Rector an enthusiastically present it to any crowd. lis energy is truly infectious.

Barron's most effective contribution is iat of enlightening youth about range mangement. His efforts are paramount in rganizing and carrying out the Texas Sec- on SRM Youth Range Workshop each ear. The program is jammed packed with ands-on range management and leaderhip development. He has a gifted ability to nspire youth to learn. In addition, he serves s superintendent for a number of plant dentification and range evaluation contests t major stock shows and 4-H contests in exas. He uses each contest to teach range nanagement. He is considered the ultimate uthority in the eyes of thousands of Texas outh who have competed in contests or ompleted the rigors of the Youth Range Vorkshop.

Barron has devoted many hours during he past nine years to the SRM High School 'outh Forum program. He has been an nstrumental part of developing each year's rogram and chaperoning the delegates luring the SRM annual meeting. He works xtensively with the Texas delegates, assistng with preparation of their illustrated talks nd planning for the meeting. Much of this s volunteer time. The youth and their parnts marvel at his commitment and extra ffort he makes to insure each of them the est possible experience at the SRM meeting.

Dr. Barron S. Rector is always creatively romoting his chosen profession. He is a ne of a kind goodwill ambassador for the iscipline of range management and the ociety for Range Management.

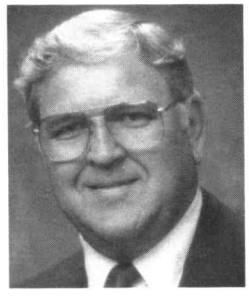


Edward F. Redente

Dr. Edward F. Redente is internationally recognized as a leader in the areas of rangeland reclamation and disturbed land ecology. He has excelled in all aspects of teaching, research and service since joining the range science faculty at Colorado State University in 1979. His research has dealt with long-term studies that stress the ecological aspects of mined land reclamation, secondary succession and restoration of disturbed rangeland communities. He has secured more than $5 million of funding from a variety of federal and state agencies and private industry for 16 research projects.

His research has lead to a diversified publication effort that includes 40 refereed journal articles and eight book chapters. Ed is a very dynamic and creative instructor. His classes in ecology and restoration of disturbed communities consistently are among the highest rated courses on the Colorado State University campus. He has received several teaching awards.

Ed has done an exemplary job of advising graduate students. His students are known for their hard work and timely contributions to the science of restoration ecology. He has encouraged his students to publish their research findings and has co-authored 22 journal articles with them. Dr. Edward F. Redente has made outstanding contributions to range science in the areas of teaching, research and service.



Phillip L. Sims

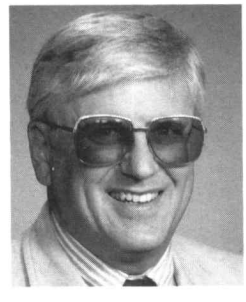
Dr. Phillip L. Sims has made significant contributions to the profession of range management through teaching, research, technology transfer and leadership. During his career, he has conducted research on plant materials, ecology of primary producers, grazing management and beef production, as well as provided research leadership in an administrative role.

His research has resulted in the publication of 127 research articles. His plant materials research included evaluation of over 60 native and introduced species in four major ecosystems in northwestern Colorado. This research was the basis for development of early guidelines for federal, state and private industry reclamation of oil shale mined lands.

Phil's research on primary producers established some of the basic relationships of the environment to the dynamics of primary producer, net primary production and turnover efficiency of energy capture and water use. His work on developmental morphology and growth characteristics of major grasses in the sandhill ranges in the central Great Plains led to an ecological basis for range management strategies.

Dr. Sims' research on grazing management and beef production has provided native range-complementary forage programs that result in greater production of beef when compared to use of native range alone.

The systems approach used by Dr. Sims to guide research has opened new horizons for range and range livestock research. He has excelled as a research leader at the Southern Plains Range Research Station at Woodward, Oklahoma.



Ronald E. Sosebee

Dr. Ronald E. Sosebee is known throughout southwest rangelands for his work with mesquite and other noxious range plants. The ranching community has recognized his efforts. Ranchers have established scholarships for range students at Texas Tech University because of the efforts of Ron Sosebee to improve rangeland of eastern New Mexico. His research on mesquite and broom snakeweed control has been widely acclaimed.

Ron's research on optimum time for her-

bicide application to achieve maximum control of noxious brush and weed species has had significant economic benefit to ranchers. The optimum time for herbicide application was based on his research on carbohydrate storage patterns for mesquite, broom snakeweed and silverleaf nightshade.

Dr. Sosebee's work on water relations of mesquite has led to identification of areas to be targeted for mesquite control to increase water for downstream users. Development of the Arid Land Seeder to improve success of range seedings resulted from his research on soil temperature limitations on survival of grass seedlings.

Currently Dr. Sosebee directs the research program at Texas Tech University on use of bio-solids for Trans-Pecos rangelands. These studies involve the critical analysis of use of municipal sludge application on desert rangelands.

Dr. Sosebee is an outstanding researcher. Some of his basic studies have translated into great economic returns for both farmers and ranchers.

Fellow Award

The Fellow Award is bestowed upon members of SRM in recognition of exceptional service to the Society and its programs.

C. Rex Cleary

C. Rex Cleary spent six consecutive years in SRM leadership on the Board of Directors and as President. He retired from his career as District Manager in the Bureau of Land Management (BLM) so he might devote essentially full time to SRM.

During his presidency, he established the Executive Committee to the Board to meet several times a year to handle Society business more efficiently. The executive committee process also helps SRM Sections to play a greater role in Society activities because the Advisory Council chair is a member of the committee. He moved to establish stronger relationships with various organizations including professional societies and range user groups. These changes came about because of Rex's outstanding leadership skills and his insight and initiative to improve SRM.

Since his retirement from BLM, Rex has devoted considerable time and effort to promoting Coordinated Resource Management on behalf of SRM. He has conducted training sessions in CRM for various groups. He also served as chair of the CRM Committee. This activity helps promote on-the-ground range management and settles disputes between user and interest groups.

Rex Cleary's devoted service to the Society for Range Management has helped to promote the art and science of range management and to help SRM move forward with progressive approaches and innovations to make it an even better organization.

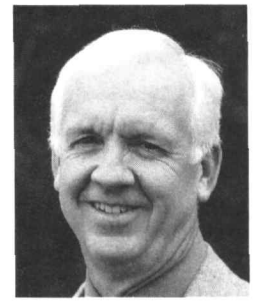
Harold Goetz

Dr. Harold Goetz has had and continues to have an outstanding career in the profession of range management. His service to and contributions for the Society for Range Management have truly been exceptional. In North Dakota, he served on numerous committees and as Secretary/Treasurer and President of the North Dakota Section. In Colorado, Dr. Goetz has served on the Board of Directors and as President of the Colorado Section. He also serves on committees at the Section level and is always a participant at Section meetings and tours.

Harold has been the primary individual responsible for the leadership that the Society for Range Management has taken in the Conservation Reserve Program. He was responsible for the program of the CRP symposium sponsored by the Colorado Section. He served as chair of the SRM Task Force on CRP for two years. During his tenure as chair, the Society for Range Management was looked to for technical expertise regarding the CRP. He was called numerous times to represent the SRM at national policy meetings and to testify before the Congress of the United States. His leadership and dedication to service has enabled the Society for Range Management to be recognized as an important participant in conservation policy within the United States.

Additionally, Harold served as chair of the SRM Accreditation Committee. He has served on many other SRM committees and continues to be one of the most active members in the Colorado Section. He is currently co-chair of the Program Committee for the 1994 SRM annual meeting.

Dr. Harold Goetz is a recognized leader in range education and conservation. His efforts have helped the Society gain recognition as the leader in rangeland conservation.

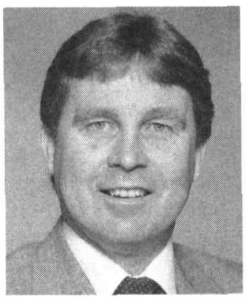


James R. "Jim" Johnson

Dr. James R. "Jim" Johnson is dedicated to the art and science of range management. As a member of SRM since 1964, he has worked tirelessly in promoting the ideals of the Society. He has served on numerous SRM committees, moderated many technical sessions and symposia and is always willing to assist the Society when called upon.

As a very active member of the South Dakota Section for 23 years, he has served as chair for almost all of the Section's committees as well as a Director and Section President. Jim is largely responsible for the South Dakota's Section's outstanding youth activities program. Under his guidance, a youth range camp and rangeland days program have prospered. He initiated a scholarship fund with a youth activities endowment. He coaches and escorts FFA and 4-H judging teams to competitions throughout the state and country. The results of these efforts have paid off in increasing enrollments in the state's collegiate range program and ultimately in having better trained range managers on the land.

Jim Johnson has fostered the use of the Coordinated Resource Management process in the state and has served as chair of the SRM CRM Committee. His working relations with the various state federal and private resource groups has improved the overall management of South Dakota's natural resources.



Steven S. Waller

Dr. Steven S. Waller has made significant contributions to the Society for Range Management during his 19 years of membership. He has provided extraordinary leadership at both the parent and Section level of SRM. He was one of the original associate editors of the *Journal of Range Management*. He drafted the first style manual which was adopted by the Society with little modification. Much of his leadership has focused on getting people to work together. His unselfish behind the scenes effectiveness has been an asset for the University of Nebraska, the Society for Range Management and the range profession.

Steve has chaired many Nebraska Section committees and has served as president of the Section. He has served SRM through membership on several committees including the annual meeting committee and summer meeting committee. He co-chaired the Graduate Education/Research subcommittee of the Future of Range Management Education Task Force.

Steve Waller has made exemplary contributions to the range profession, Society for Range Management and to people's lives. In addition to being a highly respected teacher at the University of Nebraska, his strong leadership has helped to make the Nebraska Section larger and stronger. He is considered an excellent role model for range scientists.

Larry D. White

Larry D. White has been recognized for his professional contributions to range management. In addition to these contributions, Larry has found time to provide exceptional service to the Society for Range Management.

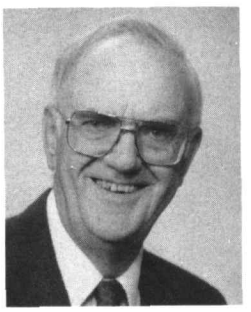
Larry's service to the Society began with his activities in Florida. He has served on 12 Southern and Texas Section committees and 9 SRM committees and task groups. He chaired 10 of these. He initiated formation of the Florida Section when he was President of the Southern Section. Larry has served in other significant leadership roles in the Southern and Texas Sections including Secretary-Treasurer and Newsletter Editor for the Southern Section and Director of the Texas Section.

Larry approaches service to SRM in the same manner he approaches job activities. He is not satisfied to just do what is required. When Larry serves on a committee, he is very active. He is innovative and will readily express his ideas during committee meetings and activities. Larry will accept and complete work. He has currently taken on the challenge of developing a conference on private land rights and responsibilities that will be sponsored by the Texas Section.

Larry White has made significant contributions to range management and has significantly served the Society for Range Management because he has innovative ideas, does his homework, works out plans of action and gets things done. He is a thinker, a doer, a tireless worker and a professional range man of the best kind. His service to the Society has been truly outstanding.

Sustained Lifetime Achievement Award

The Sustained Lifetime Achievement Award was created in 1991. It is designed to recognize long-term contributions to the art and science of range management and to the Society for Range Management.



H. Russell Boe

H. Russell Boe devoted his career to helping others achieve sustainable land use management. Even in retirement, he continues in this endeavor as a Soil Conservation Service volunteer. His efforts have been instrumental in carrying proper range management principles to the small tracts of the upper Midwest.

Russ has been a member of the Society for Range Management for 30 years. He is a co-founder and charter member of the North Central Section. He prepared the constitution and bylaws for the Section.

Russ has been active in SRM activities. He served on the SRM summer meeting committee and organized a special edition of *Rangelands* regarding range management in Minnesota.

Because of the importance of pasture management, Russ worked with a local Extension agent to organize the Northeast Minnesota Forage and Grassland Council. Through his efforts, the Council and the dairy and beef producers have come a long way in recognizing, promoting and implementing improved pasture management.

Russ continues to be active. He recently served as president of the North Central Section and was chair of the Section awards committee in 1993. Russ has made a long-term contribution to both the Society for Range Management and to the science of range management.

Charles S. Fisher

Charles S. Fisher has given sustained support, dedication and unselfish commitment to the Society for Range Management and rangelands for over 40 years. He has served as President of the Nevada Section and on many Section and SRM committees. Charlie's work with Nevada Section fund raising and youth programs is probably unequaled in the Society. His efforts to encourage public awareness and help wild horses and burros thrive under good multi-use management have been enduring, sound and highly effective.

Charlie Fisher has been a strong supporter of both the Pacific Northwest and Nevada Section youth range camps for over four decades. He has been a counselor, cook, dishwasher, fund raiser, historian, recruiter, camp tender and storyteller. His efforts have helped more than 1,000 youth in their early to middle teens gain a better understanding of range, wildlife, forest and watershed management. Many of these campers are now resource professionals in responsible positions as land managers, ranchers, and academic professionals.

Charlie helped establish and raise money for the Robertson-Fleming Range Scholarship fund sponsored by the Nevada Section. Over 25 University of Nevada, Reno graduates have been assisted with the scholarship. His fund raising activities have been used to provide financial support for high school and university students to participate in SRM youth activities during annual meetings.

Charlie has been unrelenting in his efforts to encourage good horse and habitat management, not only in Nevada, but wherever wild horses are found. He has been in constant touch with state and federal legislators as well as agency leaders concerning the wild horse plight. He is recognized for his many publications and personal presentations urging population control and rangeland protection from overuse.

Outstanding Young Range Professional Award

The Outstanding Young Range Professional Award was inaugurated by SRM in 1988 to recognize the promise and potential of our younger members. The nominee must have been less than 35 years old on January 1, 1994.

Elena Shaw reflects the qualities that personify the Outstanding Young Range Professional Award. She has served the Society for Range Management and the Idaho Section in various offices and committees. She has been president of the Idaho Section as well as president of the Section's Southern Chapter.

Elena has worked with university students to get them involved in Section activities. She also initiated the student endowment to be used as a scholarship for a range student at the University of Idaho. She organized numerous fund raisers to benefit the endowment. During her tenure as Southern Chapter president, the membership developed into an active group that promoted progressive resource management. Elena, with the help of other SRM members, initiated and organized environmental awareness field days sponsored by SRM at local fairs and other resource functions. This and other educational efforts for local elementary schools reached over 400 students in the fourth and fifth grades each year. She is also an instructor for the annual Natural Resource Workshop held for students in grades seven and eight.

In addition to her contributions through SRM activities, Elena contributes to range management through her employment with the Bureau of Land Management as a range conservationist. She was instrumental in settling many unsolved grazing issues between the BLM and local ranchers. While doing this, she gained the respect of the ranching, environmental and other publics because of her knowledge, fairness and attitude. Elena initiated agreements that resulted in improvement in both the upland and riparian areas under her responsibility. One riparian area has become a showcase of improvement. Elena is sure to be a continuing positive influence in rangeland management.

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