Richard M. Hansen

Rangelands

Society for Range Management

Volume 1, No. 4
August 1979

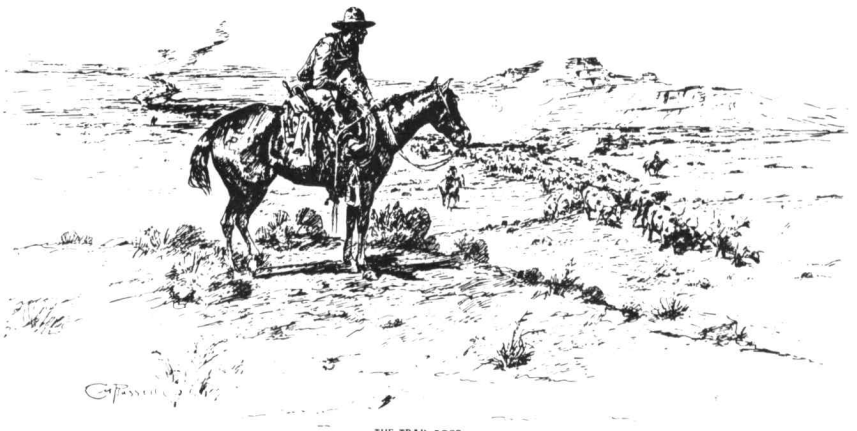
Wolf Plants – P 156

Individual Sustaining Members 1979

The following members are recognized, with sincere appreciation, for their voluntary financial support of the Society for Range Management for the 1979 membership year.

David K. Akers
Clarence E. Almen
Mrs. Darwin Anderson
E. Wm. Anderson
John L. Artz
A.P. Atkins
Joe Bill Averitt
John G. Babbitt
Arthur W. Bailey
Dan W. Baird
Thomas E. Bedell
Ralph M. Bell
J.R. Bentley
Lloyd L. Bernhard
Lester J. Berry
Charles P. Birkemeyer
Harold H. Biswell
D. Morris Blaylock
John W. Bohning
L.F. Bredemeier
Robert D. Brown
L.T. Burcham
Donald F. Burzlaff
Frank E. Busby, Jr.
Roche D. Bush
Ross E. Butler
Thomas Wm. Caldwell
R.S. Campbell
Arturo Jimenez Castellanos
W.R. Chapline
Ralph Christensen
John P. Chuey
Russell C. Cline
John G. Clouston
Sam H. Coleman
Howard Collier, Jr.
Charles R. Collins
Paul Conrardy
Harry N. Cornwell
Eugene H. Cronin
A.R. Cross
Jack R. Cutshall
Orville L. Daniels
Victor Manuel de Cid N.
Reginald M. DeNio
Lynn Drawe
Don A. Duncan
Don D. Dwyer
E.J. Dyksterhuis
Tom Eaman
Jeanne W. Edwards
John Ehrenreich
Sherman Ewing
Jack M. Fletcher
Clarence L. Forsling
William A. Fortune
Daniel G. Freed
John D. Freeman
Carlos Frick
Leroy Friebel, Jr.
Neil C. Frischknecht
Fred M. Fulstone Jr.
Dillard H. Gates
Guy H. Goen
Harold Goetz
Jim B. Grumbles
Nevin Guderian
Keith S. Guenther
John A. Hafterson
Newton Hake
Georgie G. Hamilton
Reed and Dave Hamilton
Earl E. Hardie
Bert Hargrave
H.J. Hargrave
William J. Harvey
Frank A. Hayes
Daniel S. Healy
Andrew W. Heard, Jr.
Donald W. Hedrick
Clare Hendee
Douglas E. Henriques
Carlton H. Herbel
C.E. Hitch
John R. Hook
August L. Hormay
Mrs. W.R. Howse
John F. Hughes
R.R. Humphrey
William D. Hurst
R.B. Hutchinson III
S. Wesley Hyatt
Franklin R. Jensen
Kendall L. Johnson
Alex Johnston
Fred A. Johnston
Earl N. Jones
Rolf B. Jorgensen
Harold Josendal
Clifton Kaderli
Wayne Kessler
Floyd E. Kinsinger
Charles R. Knight
Larry A. Koontz
Royal B. Laird
Earl W. Lathrop
Joe B. Lee
Maxwell T. Lieurance
Lyman G. Linger
Richard V. Loper
Ted D. Maack
Joseph Machovez
Norman H. Macleod
Fred Mass
William L. Mathews
James Frederick McClinton
Wayne G. McCully
Charles E. McGlothlin
Cyrus M. McKell
Jay Dee McKendrick
E.A. McKinnon
J.L. McKinnon
William N. McLachlan
Donald W. Messer
H.H. Metzger
Merle P. Meyer
Jack R. Miller
Howard L. Morton
Melvin S. Morris
Clyle A. Novak
James T. O'Rourke
Jesus Pacheco
Howard B. Passey
Henry A. Pearson
J.F. Pechanec
Donald T. Pendleton
Manuel Casas Perez
Frank Philip
Floyd W. Pond
Charles E. Poulton
Frederick J. Pratt
J. Boyd Price
Allen D. Propst
Bobby J. Ragsdale
Harold M. Ratcliff
Charles E. Reed
Elbert H. Reid
Don R. Richardson
Laurence E. Riordan
Jack H. Royle
Shirley Rugg
John W. Russell
Charles M. Schumacher
J.L. Schuster
Donald J. Siebert
Gail Sharp
Clyde Sherrieb
Thomas N. Shiflet
Charles E. Shipp
Henry F. Shirtcliff
R.K. (Bill) Siddoway
David A. Smith
Sylvester Smoliak
James Stubbendieck
J.W. Swan
Robert D. Swenson
Robert G. Swick
Vernon E. Sylvester
Stephen Terry
Clair E. Terrill
Vern L. Thompson
David P. Tidwell
John S. Tixier
Jaroslay Toman
Oswaldo Travieso
Robert B. Turner
George Vensel
William J. Waldrip
Alfred H. Walker
C.H. Wasser
George E. Weaver
Larry D. White
Warren C. Whitman
Jimmy R. Wilkins
Robert E. Williams
John P. Workman
Robert A. Wroe
Joseph Zylinski

SOCIETY FOR RANGE MANAGEMENT



THE TRAIL BOSS

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 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; and

—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 Secretary for details.

Contribution Policy

The Society for Range Management may accept donations of real and/or personal property, subject to limitations imposed by State and Federal Law. All donations shall be subject to control by the Board of Directors and their discretion in utilization and application of said donations. However, consideration may be given to the donor's wishes concerning which particular fund account and/or accounts the contribution would be applied.

We recommend that donor consult Tax Advisors in regard to any tax consideration that may result from any donation. Donations may be made by bequests, legacies, devises or transfers from private individuals, partnerships, corporations, foundations, sections, organizations, estates and trusts or a memorial fund established as an expression of remembrance to members of real and/or personal property. Donations may be sent to the Society for Range Management, Executive Secretary, 2760 West Fifth Avenue, Denver, Colorado 80204.

Rangelands serves as a forum for the presentation and discussion of facts, ideas, and philosophies pertaining to rangelands and their resources, uses, study, management and practices. Accordingly, all material published herein 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 of a nontechnical nature and germane to the broad field of range management. Editorial comment by an individual is always welcome and subject to acceptance by the editor, will be published as a "Viewpoint."

RANGELANDS

(ISSN-0190-0528)

Published bimonthly – February, April, June, August, October, December – by the **Society for Range Management**
2760 West Fifth Ave.
Denver, Colorado 80204

INDIVIDUAL SUBSCRIPTION is by membership in the Society for Range Management.

LIBRARY or other INSTITUTIONAL SUBSCRIPTIONS, on a calendar year basis, are $15.00 post paid to all countries. Payments from outside the United States should be remitted in US dollars by international money order or draft on a New York bank.

CHANGE OF ADDRESS notices should be sent to the Managing Editor, 2760 W. 5th Ave., Denver, CO 80204, no later than the first day of the month of issue. Copies lost due to change of address cannot be replaced unless adequate notice is given. To assure uninterrupted service, provide your local postmaster with a Change of Address Order (POD Form 3575), indicating thereon to guarantee forwarding postage for second-class mail.

BUSINESS CORRESPONDENCE, concerning subscriptions, advertising, back issues, and related matters, should be addressed to the Managing Editor, 2760 W. 5th Ave., Denver, CO 80204.

EDITORIAL CORRESPONDENCE, concerning manuscripts or other edited matters, should be addressed to the Editor at 316 Whitney, Prescott, AZ 86301.

Second class postage paid at Denver, Colo.

TABLE OF CONTENTS: Vol. 1, No. 4, August 1979

FEATURE ARTICLES:

INTEREST AREAS:

COVER: Young pronghorn photographed by Jim Yoakum.

Something Is Eating More Grass Than Our Livestock

B. Austin Haws

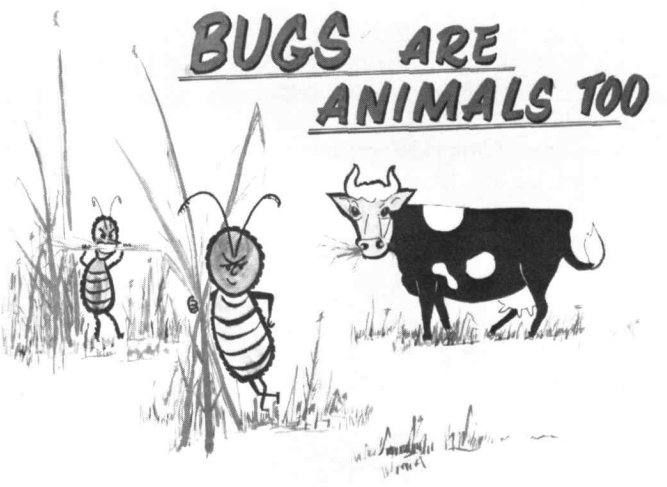
It is almost certain that in the future the term *Integrated Interdisciplinary Pest Management* or (IIPM) will become as familiar as the term *rest rotation* in the vocabulary of range grass users. In IIPM the goal is to identify all parts of the range system that are detrimental or beneficial to the range and to determine what the manipulation of any component of the system does to any other part of the system. For example, letting grass grow a year without grazing is fine for the grass, but it is also "fine" for the insects who use the time to "multiply and replenish the earth." One reason we're in big trouble in range at present is that many of our present policies and practices have not considered what would happen to the rest of the "pieces" in our ranges if we did something that affects another part. Economic management principles come from IIPM facts.

Since relatively little is known about the interrelationships of grazing and weeds, diseases, nematodes, etc., it is to be hoped we shall have more to report about these in the future, and can today discuss insects[1] that have had some intensive study the past 8 years in several places.

Recent studies suggest that there are more than 700 species of insects inhabiting the grasses. Systematic studies of insects in range grasses will undoubtedly reveal hundreds of other species present in various grasses in different areas of the United States and in other ranges of the world. At present perhaps no other single action has the potential of increasing the quantity, quality and longevity of grasses more than a thorough knowledge of the insect pests and their management or control in range grasses.

Here are a few major facts about insects that should be helpful to range grass users:

Insects are animals. They have hearts, breathing systems, blood circulating systems, digestive systems, reproductive systems, muscles, and the basic parts found in most animals. Livestock men know that their animals have preferences in the plants they eat. So do insects. Livestock men know their animals require feeding and care, if they suffer from injury and diseases, flies, predators, and parasites. So do insects. Livestock men know that some conditions favor the good health and development of their livestock. The same is true for insects. They have their diseases and their predators and their parasites and their favorite diets.



Bugs are animals too. *In our ranges these tiny animals have an enormous impact. Some of them hatch in or near melting snow water. They feed actively at 22° F. Some of them are feeding on above or below ground grass parts the entire season. Range management should consider the life cycles and seasonal cycles of insects and guide us in developing range management practices and principles.*

Of the large number of insects that are known in the world, approximately 1,000,000 or more, only a small number of this million (some say one-tenth of one percent) are considered detrimental to man in the sense that they carry agents of disease, or eat his crops, or compete with him for food or materials. Most insects in the world are beneficial. They help decay plant and animal organic material. They pollinate many plants. They produce wax and dyes and many other products. If we consider insects as just small wildlife then we can see how unthinkable it is that we should go into a range ecosystem and wantonly destroy every kind of insect present, any more than we should go into a beautiful forest and wantonly destroy every animal in the forest or in the grass ranges.

In considering solutions to problems with insects in range, how wise it would be to learn from the mistakes of the past that were made in studies of insects related to cotton, alfalfa, and other crops. We need to have the money and time necessary to study the insects in our range ecosystem and know what their interrelationships are to all the plants and grasses and animals and to plan our policies and our range management and practices in such a way that the beneficial insects would be preserved. Then

The author, professor of entomology in the Department of Biology, Utah State University, Logan, is specializing in injurious and beneficial insects on ranges. Recently he has been a member of a ten-man interdisciplinary range research group working in integrated interdisciplinary pest management for range grasses.

Editor's Note: The author and others are finding it difficult convincing funding agencies of the need for insect research on rangelands. That is too bad because insects are truly eating a lot of forage. Professor Haws has a five-minute synchronized slide presentation available for loan to state and federal agencies, range groups, and others to help sort out range problems and solutions. Ask to borrow it.

[1] In this article we will use the term "insects" to include mites, nematodes and other small insect-like animals that technically are not insects.

through proper management and, hopefully, through minimum use of chemicals those detrimental insects that reduce the yields and quantity and quality of our ranges could be reduced or eliminated. Someone said, "It seems that we seldom have enough money and human resources to do things right the first time, but we usually seem to get money and help to do things over again." The statement describes well the present status of Integrated Interdisciplinary Pest Management for our ranges.

Many ranchers, however, will not need to wait for statistics and scientific data to tell them what insects are doing to their ranching operations. A group of Utahns told their Governor in 1972 that when black grass bugs hit their ranges their cattle weight gains were reduced 66% and that the bugs were driving them out of business.

Individuals and agencies who have spent millions clearing land, renovating and improving their range grasses must be asking, "Where did these insects come from and how did so many of them develop?" As we examine the native grasses surrounding our introduced grasses, we find that many of the insects that are destroying the native grasses and introduced grasses appear to be native and to have come from surrounding areas.

Some insects migrate and are carried thousands of miles by wind from Mexico, and other states, and Canada. We are constantly finding new insect species in our states that previously were not there. They may be transported by human beings in their land and air vehicles as well as by forces of nature.

From long experience, specialists in ecology have found that in monocultures the systems of checks and balances that keep certain plants and animals within population limits may be destroyed. This is true in the case of some insects. Certain ones have adapted rapidly to the monocultures while their predators and parasites have been left back in the undisturbed areas. Many methods of planting grasses and systems of grazing and rest rotation also favor insect development.

A few range insects have been studied at Utah State University. These include the black grass bug *Labops hesperius* which lays its eggs mostly in the lower parts of the dead grass stems and sometimes parts of other plants. When grass is grazed high, these eggs are not disturbed and are able to develop to their full biotic potential. As a consequence, if large numbers of insects are present in range grasses, the principle of rest rotation does not "work." Since they are animals, these insects continue to "graze" day and night when plants are supposed to be "resting." Thus, under certain kinds of management we find insects develop to "outbreak" proportions.

Our present impression is that when we have an adequate knowledge of range insects, we can expect some major revolutions in range and livestock management. However, discovering how much individual insects eat, what damage they do to the plants, (vegetative growth, storage root reserves, longevity of plants, nutritional quality, seed and seed germination, etc.) is a long process that we have barely begun.

Insects are a part of the ecosystem. *There are hundreds of different kinds of beneficial and injurious insects in our ranges. We can ignore them, but they are not ignoring us. The beneficial ones help decay organic matter, pollinate the plants, and many of them are predators or parasites on injurious insects. The injurious ones damage all plant parts. We need to know what range management practices do to both the good and the bad insects.*

Rest rotation. *Are grasses* really *resting if insects are feeding on the roots and above-ground parts? An example of a range management improvement practice that may not really be improving ranges is rest rotation. If injurious insects are present in a range, the plants are not really resting or storing reserves if insects are destroying the leaves and roots of the plants.*

An interdisciplinary range research group has been working about a year at USU to get information needed for new principles upon which to base recommendations for range and livestock management. The disciplines involved to date include insect and range physiologists, animal nutritionists, climatologists, entomologists, economists, and soils specialists. We still need to include such vital links in the research chain as specialists in grass diseases, nematology, and wildlife.

It takes as long, or longer, to feed an insect in an experiment as it does to feed one calf, and it costs just about as much. The researcher has to get down on his knees and find out what an insect is eating and what it is not eating, where it is having the young and how long it takes for them to develop. It not only takes a long time, it is a disgraceful working position. In fact, my son went to the field and saw what I do, he told his mother I don't work at all! But someone is going to have to do away with personal pride and prejudice to get the needed information.

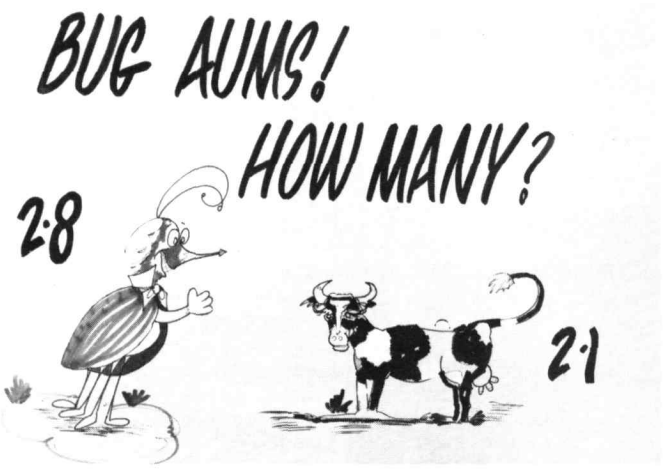
Those of us working in range need to "get on the ball" and get the money and the researchers we need to bring information about our valuable grass crops up to date. If we do, everyone–

government agencies, ranchers and the consumer—is going to benefit.

What Might be Some of the Benefits of IIPM?

1. *Facts about the real potential production, quality, and longevity of grasses.* Few people working with grass ranges have ever seen a bug-free range—without worms, nematodes, and insects chewing on the roots, inside and outside the stems, leaves, flowers, buds and seeds—and measured these potentials.

2. *Criteria to guide range conservationists and others who evaluate grazing potential.* They will not then do as one conservationist, a graduate student, did. Stationed on a range the entire year, he observed that insects attacked the grass early, as soon as the snow melted. The insects continued to feed on the grass by the thousands until late fall through a very dry season. Rains finally came in the fall and the grass utilized its last remaining root reserves to put up a stand of grass. At that point in the season the conservationist came in, observed the grass, and assigned a large number of cattle to the allotment. The season of grazing on that range was complete, "from spring to fall"! Information about insect populations and their damage will let conservationists know what the true grazing history has been and will enable them to assign AUM allotments correctly. We need to know the seasonal and life history of range insects and how these cycles mesh with the seasonal and life cycles and behaviours of grasses and wildlife so that whatever we do in management will not be detrimental to beneficial animals, but will be restrictive to the "pests." Again, this research is going to take a lot of time and money.



Black grass bug, Labops hesperius. *Utah data indicate these insects and their relatives, when present in relatively low numbers, consumed more grass than livestock. These insects are common pests of range grasses, in at least 12 states from Minnesota and the Dakotas to California.*

3. *New grasses with resistance to insects, nematodes, and disease.* This is a long way from reality. If the breeders began today, it would take 3–15 years to find, identify, and multiply some new grasses that are not only adaptable and palatable, but resistant to insects, nematodes, and disease. Genetic pools of grasses are available but they have not yet been studied for their physical or chemical qualities as related to "resistance." If a farmer plants a wheat and it turns out to be susceptible to smut, he can choose a resistant variety next year. This is not true with grasses. Once grass is planted it is expected plants will stay a long time. If we plant a variety susceptible to disease, insects, and nematodes, we've got trouble for a long time.

The problem of pest adaptation to resistant varieties also will need study because this problem on grasses is more serious than it is on grains. It will take years of hard work to screen the present gene pool of grasses against the major injurious "pests" found in range grasses and to develop varieties that are palatable, adaptable, and resistant, but the research must be done.

4. *Modification in uses of grasses.* We need to change our thinking about uses of grasses along highways and freeways, revegetation of mining sites, rights of way, water conservation plantings, watersheds, etc. There is no doubt that these grasses have beautified the highways and served some purposes well; but, many of these seedings are unmanaged, continuous incubators for injurious insects and weeds, besides being a tremendous waste of energy materials (also feeds). There are approximately 45 acres of grasses per mile along some of our big freeways. How many people could be fed if this grass could be harvested? Not all freeways are infested with insects, but many that are pass through native and introduced ranges and crops. There is evidence already that insects move from the freeways onto the crops. Losses resulting from these migrations have not been fully determined. We need to do what we can to get rid of "insect freeways."

We are looking to the future and at new problems as they develop and these are some that will need our attention. In the future those who are importing and testing new range plants and grasses for mining revegetation, water conservation and other uses, should make sure that their studies include screening of these plants for local insect pests and diseases and other possible problems.

5. *New guiding principles and facts about grazing.* No one grazing system is applicable to all ranges and all conditions. Grazing half the grass and leaving half, from the insect point of view, must bring great joy to the bug camp. It leaves most of their eggs in the stem of grass untouched so they can carry on their activities almost uninhibited and with plenty of food for young and old.

Periodic Drastic Grazing. *Some ranchers have used combinations of livestock for periodic drastic grazing to remove all grassable materials containing insect eggs when grasses were not growing, and have solved their problems with insects.*

It is well known that different animals have different grazing behaviors. It may be necessary to consider drastically different grazing methods to destroy bug eggs, where such a practice is in harmony with good grass management. Some ranchers who have flat ranges, have done away with the injurious insect problems through periodic, drastic grazing when grasses were

not growing. It may not be necessary to have continuous grazing programs designed to remove all insect eggs. Such a procedure may be necessary only periodically. Many insects recover slowly once their populations are reduced. New infestations may take many years to develop.

6. *Organization of interdisciplinary research teams working closely with users of range grasses.* (IIPM Interdisciplinary Integrated Pest Management). We should look forward to the development of teams who are specialized in their knowledge of grasses, wildlife, insects, etc., to assist those who at present have the tremendous responsibility of recommending grass uses and management so that we will not give one "treatment" to solve all the problems associated with needs for grasses. Such teams might work with road construction crews, mining establishments, and others to plant grasses or other range plants that would be adaptable and at the same time avoid some of the problems that might develop in the future.

If we are objectively looking at range problems and their solution, those of us who are teachers have to ask ourselves honest questions about our present course content. If we want to develop administrators and technicians who anticipate and solve some of our range problems, we have to do more interdisciplinary teaching. We need to see that our students at least have enough "thinking blocks" to enable them to beware of problems that their decisions or actions may bring about and to further their communication with other disciplines.

There is not enough time for everyone to be a specialist in everything. One alternative is teamwork (IIPM). There are few substitutes for the experience ranchers and other uses of range have. They need to be included as part of the team. They may not always know "*why*" things are happening, but they usually know "what's" happening and can contribute valuable ideas to the researcher.

Research people in our educational institutions and Federal agencies need to determine the impact insects, disease, nematodes, weeds, and wildlife have on our ranges and their interrelationships with other components and management and on their policies and recommendations. For example, policies that specify "No Grazing" may be disastrous in the long run.

There's an old Spanish saying that, "It's harder to change an idea than move the cemetery." We have a lot of ideas to be changed in range and changing may take a long time. There is enough to do to keep many of us busy so let's get the people and money needed to do our research in range right the first time instead of having to do it over later. ●

Book Review:

Economic Impacts of *Lapos hesperius* on the Production of High Quality Range Grasses

This final report by the Utah Agricultural Experiment Station was presented to the Four Corners Regional Commission in August, 1978. It points out that the primary range consumers are insects, livestock, and wildlife.

This 8½ by 11-inch paperback book tells recent research results about the common black grass bug, which is so detrimental to range grasses in many western states. It contains 269 pages, 122 photographs, and numerous tables, charts, and graphs. In addition, it makes specific references to 133 pieces of literature.

The report is written in easy to read and understand language and should prove very useful as an interesting dissertation as well as good to have in the library for range managers, ranchers, technicians, and scientists. It is very well done.

It presents, in an interesting manner, research results of an interdisciplinary research group formed to obtain basic information and explore management alternatives of integrated pest management for range grasses.

The facts and information was compiled by B. Austin Haws, Project Coordinator, from the original reports prepared by the principal investigators:

William A. Brindley, Entomologist/Toxicologist
William F. Campbell, Plant Scientist/Electron Microscopist
Terrence F. Glover, Economist
B. Austin Haws, Range Entomologist
John C. Malechek, Range Nutrionist
Cyrus M. McKell, Range Physiologist
Gene W. Miller, Plant Biochemist
Raymond W. Miller, Soil Scientist
E. Arlo Richardson, Climatologist
David J. Schimpf, Ecophysiologist
Herman H. Wiebe, Botanist

For further information about securing a copy of the book, or to borrow a 5-minute slide/tape on the subject of range insects contact *Professor Haws, Biology Department, UMC 53, Utah State University, Logan, Utah 84322.*

The Knapweeds: Their Economics and Biological Control in the Western States, U.S.A.

D.M. Maddox

Editor's Note: We have two interesting articles in this issue on the troublesome knapweeds. Before we could publish the one by D.M. Maddox of California we received another from R.M. Strang of British Columbia. They are both worthy of publication. The first tells about biological control whle the second discusses the weeds in general. Purpose of the articles is to bring about greater public awareness to eliminate unintentional and avoidable spread of the undesirable knapweed pest.

Introduction

Diffuse and spotted knapweed, *Centaurea diffusa* Lam. and *Centaurea maculosa* Lam., are rapidly becoming the most economically important rangeland weeds in the Pacific Northwest. Diffuse knapweed is estimated to infest 756,000 acres in Washington, 750,000 in Oregon, and 73,000 acres in Idaho; spotted knapweed infests about 2,000,000 acres in Montana and 80,000 acres in both Idaho and Washington. Together they infest a conservatively estimated 3,659,000 acres in the four states. There is a strong suspicion that both weeds were introduced to North America in alfalfa seed, either from Asia Minor–Turkmenistan (an area where both diffuse knapweed and alfalfa are native), or with hybrid alfalfa seed from Germany.

Although treatment with picloram will control these weeds, the cost is often prohibitive, the chemical may have undesirable side effects, and the stability of the material is such that it may harm economically important crops. Monetary losses due to these knapweeds are sufficiently high to warrant serious attention.

Current research shows that biological control is a viable option that poses no threat to the environment and promises long-term self-perpetuating impact on the weeds. This method is particularly suitable for controlling weeds on lands that are extensive and/or of low economic value, such as those infested by the knapweeds. A fly and a moth that attack the seeds and two insects that attack the crown of the knapweeds are prospective control candidates. There is a real need for "Action Committees" of concerned individuals to deal with weed problems on rangelands.

Economic Benefits versus Losses

Benefits. All plants serve some useful function in nature though it may sometimes be contrary to the interests of mankind. Both diffuse and spotted knapweeds establish very rapidly in available habitats and are valuable pioneer species. Spotted knapweed is considered a biennial, sometimes perennial plant, while diffuse knapweed behaves either as an annual, biennial, or short-lived perennial. The rosettes of both species produce a useful plant cover on barren soil, thus preventing soil erosion. The flowers reportedly provide substantial pollen and nectar for bees, and the seeds may provide some sustenance for birds and rodents.

Losses. Substances in the stems and leaves of knapweed prevent the growth of other plants, with the result that knapweed tends to form solid stands. This growth habit is a serious problem for the rancher because knapweed plants have little nutritive value and high fibre content. High levels of consumption of either diffuse or spotted knapweeds can cause toxic symptoms, especially in horses.

The dollar loss caused by knapweeds on western rangeland can be considerable. In northeastern Oregon the carrying capacity on good knapweed-free rangeland is estimated to be about 0.27 Animal Unit Months per acre (or 3.75 acres per Animal Unit Month) (AUM) for the 8-month grazing season. The income from such rangeland is estimated to average $7.50 per AUM with a range of $5 to $10. On similar rangeland that is infested with knapweed, the carrying capacity is about 0.16 AUMs per acre. This 0.11 AUM difference represents a loss of about $0.80 per acre for the grazing season. The total loss represented by the 750,000 acres of knapweed-infested rangeland is $600,000 annually.

Other losses caused by knapweeds include increased maintenance costs (to repair fences when knapweeds break off, tumble, and pile up against them) and decreased market value of the land. For example, in Oregon, where the land is taxed on its income producing ability, knapweed infestations decrease both market value and production value. In many cases the market value of such land is $40 to $60 per acre, but when the same land is infested by knapweed it may be appraised as low as $3 to $4 per acre.

Chemical Control: Cost and Effect

What is the cost of chemical control and how effective is it? A quarter pound of picloram per acre will effectively control both diffuse and spotted knapweed. However, the applied cost of $15 per acre is prohibitive, especially since knapweed infestations occur extensively on land of low economic value. Theoretically, if

The author is a research entomologist, Biological Control of Weeds Laboratory, Science and Education Administration-Federal Research, United States Department of Agriculture, 1050 San Pablo Avenue, Albany, California 94706.

the estimated acreage infested by both species (3,659,000 acres) was treated with picloram, it would cost $54 million. Other limiting factors to the use of picloram are (1) It is extremely stable and so is a potential danger to cultivated crops, even after it passes through a cow's digestive tract; (2) Treatment of infestations that are adjacent to water would not be permitted; and (3) Retreatment is still necessary at periodic intervals. Less expensive herbicides such as 2,4-D may be used, but repeated treatment would be necessary to gain acceptable levels of control. In fact, any chemical treatments of such an extensive acreage is unlikely, because of the formidable cost factor.

Biological Control of Knapweeds

Biological control is control of an undesirable weed or other pest by using its natural enemies (e.g., insects, mites, and pathogens). In their native environments most higher plants have natural enemies that feed on their roots, stems, leaves, and floral parts. When these plants are taken to a new environment, free of their natural enemies, they may become abundant and weedy.

Several steps are necessary in achieving biological control of weeds. First, there is exploration for natural enemies in the native areas of the target weed. Candidate enemies uncovered by exploration must then be tested to determine their food plant preferences. If they are host specific, they may be approved for introduction into the problem areas. Subsequent successful establishment and increase then depends on variables such as host plant quality, favorable climate, synchronization with the host plant, and the absence of parasites.

In the case of knapweeds, the exploration was done by Dr. H. Zwolfer at the Commonwealth Institute of Biological Control Laboratory in Switzerland on behalf of Agriculture Canada. He found a complex of natural enemies but focused his attention on the fly *Urophora affinis* which attacks the seeds of the knapweeds. Releases of the fly were begun by Canada in 1970.

The initial effort to use *U. affinis* against diffuse and spotted knapweeds in the western United States was made in the summer of 1973. Seed heads of spotted knapweed containing

Female Urophora affinis *resting on diffuse knapweed bud. Arrow indicates long, terminal ovipositor for depositing eggs.*

Developing larva of Urophora affinis *in partially opened gall in seed head. End of gall has been removed to show the larva. The larva passes the winter inside the gall.*

developing flies were collected from the Rhine Valley in France during November 1972 by the USDA Biological Control of Weeds Laboratory at Rome, Italy. The flies were shipped to the USDA Biological Control of Weeds Laboratory at Albany, California. The first releases in the western states were made in 1973, when about 1,000 flies were released on spotted knapweed in the Bitterroot Valley near Corvallis, Montana, and about 1,600 flies on diffuse knapweed near Heppner, Oregon. Subsequent releases of more than 22,000 flies were made in the states of Montana, Oregon, Idaho, Washington, and California over the last 5 years.

The female seed fly lays her eggs in the small knapweed buds with a long ovipositor (see photograph). The newly hatched worm-like larva soon forms a woody structure called a "gall" in which it develops. The result is that the nutrient resources of the plant are diverted into gall formation and as a consequence fewer heads are developed. The larva overwinters inside the flower head and completes its development and emerges as an adult the next season when new buds appear on the host plant. Usually only one generation of flies is produced annually.

To date the fly has become established at all sites where it has been released, and although it is dispersing slowly from the release areas, the populations are still low. At the release site, Okanogan County, Washington, nearly 2 galls per seed head have been found. Collection and redistribution of flies to new areas should be delayed until the population has increased.

Future Plants for Biological Control

Because of the immensity of the knapweed problem and the potential of these weeds to spread, research plans include finding, testing, and introducing additional natural enemies. Two root-boring insects, one a beetle and one a moth, are being considered, plus a moth that also attacks the seeds. The root beetle and seed moth have already been released in Canada. Also, a stem gall fly has been reported on diffuse knapweed in the U.S.S.R., along with a plant pathogen, *Puccinia* sp. (rust), which can be damaging.

It has been estimated that the direct cost studying and introducing several weed-feeding insects for biological control may run $1-1.2 million and take about 11.5-12.5 scientist years. However, if biological control could reduce the knapweed infested acreage by 50%, these costs would be recovered manifold in just a few years.

References

Andres, L.A. 1976a. The economics of biological control of weeds. Aquatic Botany, 3:111-23.

Andres, L.A. 1977b. The biological control of weeds. p 153-76 *In:* Integrated Control of Weeds, J.D. Fryer and S. Matsunaka (Eds.) Univ. of Tokyo Press, Tokyo.

Englert, W.D. 1974. Revision der Gattung *Metzneria* Zeller (Lepidoptera: Gelechiidae) mit Beitragen zur Biologie der Arten. Z. Ang. Entomol. 75:381-421.

Watson, A.K., and Renney, A.J. 1974. The biology of Canadian weeds, *Centaurea diffusa* and *C. maculosa*. Can J. Plant Sci. 54:687-701.

Zwolfer, H. 1970. Investigations on the host-specificity of *Urophora affinis* Frlfld. (Diptera, Trypetidae) Prog. Rep. Commonw. Inst. Biol. Control No. 25. 28 p.

Knapweeds: British Columbia's Undesirable Aliens

R.M. Strang, K.M. Lindsay, R.S. Price

Introduction

Knapweeds were introduced into Canada from their native Eurasia in shipments of alfalfa seed about the turn of the century. Since growing conditions in the dry interior of British Columbia are very suitable for them, they are spreading vigorously, so vigorously that they pose a major threat to the rangelands and ranching industry of the Province.

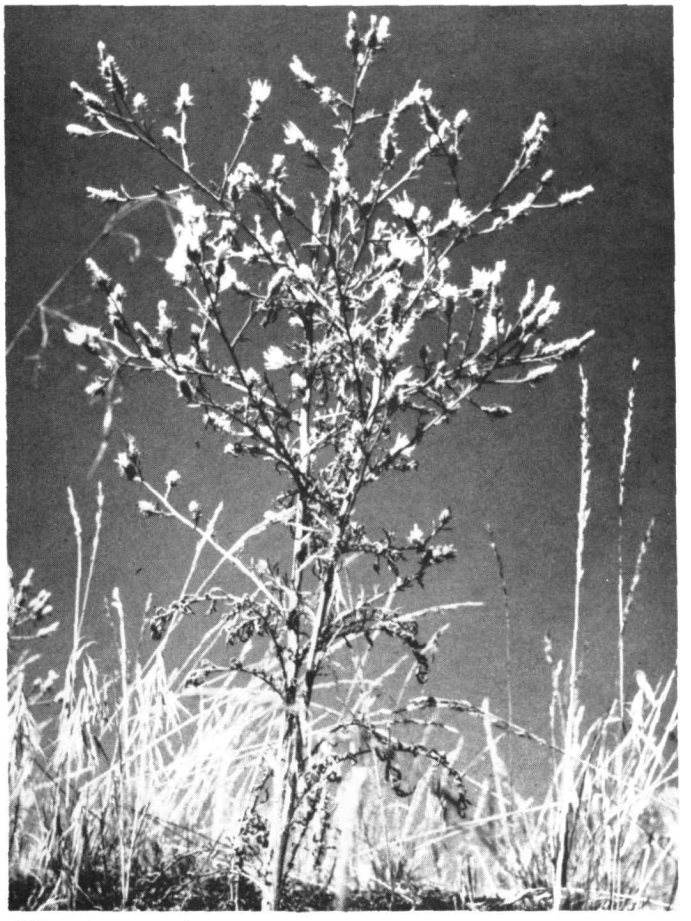
It has been estimated (Harris and Cranston 1979) that knapweed infestation is now causing annual losses of range production worth $900,000; that it is increasing at about 10% a year in B.C.; and that 10,000 ha are susceptible to invasion in Western Canada. Parts of the U.S., especially Montana, are also seriously affected.

Location

Interior British Columbia is a steeply dissected, rolling peneplain lying between the Coast Mountains to the west and the Columbia/Rockies chain to the east. The northern limits of the ranching area, at about Lat. 55°N, are the Skeena and Omenica Highlands. Lying in the rain shadow of the coastal mountains, the area is dry and fairly hot, with availability of soil moisture limiting growth, but local climate is strongly affected by elevation and aspect. Precipitation may be as low as 20 cm annually and frost-free days range from 180 to 110. Soils are chernozemic in the valley bottoms changing up-slope to luvisols or brunisols. Bluebunch wheatgrass is the climax dominant in the valley bottom grasslands; above this one finds open ponderosa pine/-bunchgrass forest and, still higher or further north, Douglas-fir/pinegrass. These climax communities have been much changed by heavy grazing, logging and burning. They now constitute the ranching area of the Province, providing some 800,000 AUM's of grazing each year.

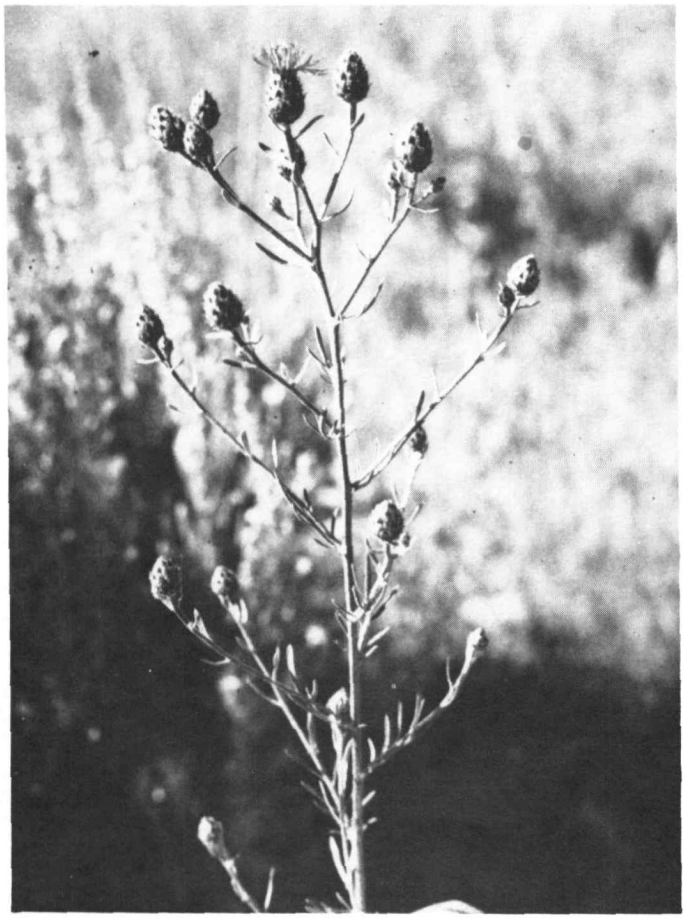
Plant Characteristics

The knapweeds are members of the Centaureinae subtribe in the Compositae, the sun-flower family. Diffuse knapweed (*Centaurea diffusa* L.), usually a biennial, grows rapidly in its second summer from an overwintering rosette form to a stalk about 80 cm with 70–80 white or occasionally purple flowerheads on each plant. Since 10–15 seeds are produced in each flowerhead, up to 1,000 seeds can develop on a single plant (Fig. 1). Spotted knapweed (*C. maculosa* L.) too, is mostly biennial but pro-



Diffuse knapweed

The authors are associate professor (rangeland ecology) and senior forestry undergraduates, Faculty of Forestry, University of British Columbia Vancouver V6T 1W5.



Spotted knapweed

duces only half as many seeds—25–30 on each of 15–20 purple flowerheads (Fig. 2). Russian knapweed (*C. repens* L.) has also been introduced, but it is a relatively insignificant pest (Watson and Renney 1974). A fourth species, black knapweed (*C. nigra* L.), has also been noted but it is very limited in its distribution.

Knapweeds are pioneer species, taking hold quickly and thriving on disturbed dry sites but only rarely on burned areas. Diffuse knapweed is spread most commonly when the mature plant dies, breaks off at the rootstock, and is blown or carried away, to shed seed and give rise to a new population where the dry plant comes to rest. Individual seeds can easily become attached to passing animals and thus transported. Spotted knapweed, which grows in cooler, more moist sites than the diffuse species, spreads, less dramatically, by flicking its dry seeds, called achenes, up to 1 m from the parent plant. It is also spread by birds, small mammals, and ants.

Spread and Competition

Spotted knapweed was recorded from Victoria in 1893 by the botanist and explorer Macoun. In 1907 it was reported in Klitekat County, Washington, and by 1930 it was known in B.C. at Pritchard and Lytton (Renney 1959). Within 20 years knapweeds were widespread in the Okanogan (sic) and were spreading in the Grand Forks and Cranbrook/Kimberley areas. By 1952 it was estimated (Watson and Renney 1974) that there were about 100 ha of diffuse and 120 ha of spotted knapweed in the Thompson and Nicola River catchments. These areas had increased to 26,000 and 3,400 ha respectively by 1974. Now, knapweeds are present as far north and west as Prince George and Tatlayoko Lakes. Harris and Cranston (1979) estimate that almost 11 million ha in western Canada have a soil and climatic environment into which knapweeds could easily spread and flourish if they are not controlled.

Animals only occasionally eat young plants and they avoid mature specimens, which are harsh and spiny. Thus, since it is not grazed, knapweed spreads at the expense of forage species. It has also been established (Fletcher 1961; Fletcher and Renney 1963) that once knapweeds have grown in a soil, that soil will for some time not support other species, amongst them at least one grass, barley. This inhibitory effect, called allelopathy, appears to be a second factor which contributes to reduction of forage production once knapweed has become established. Competition for available soil moisture probably also reduces forage yields.

Good bluebunch wheatgrass range in the Kamloops area of B.C. has an average annual production of up to 1,000 kg/ha when in excellent condition. When knapweeds are present, the yield may drop to as little as one tenth of this, or only 60 kg available forage per ha. Because of past mismanagement, not many ranges are in excellent condition; nevertheless, the loss of of forage is substantial. Harris and Cranston (1979) put the average loss at $12/ha and the potential annual loss to B.C. and its ranching industry at $13 million if knapweeds spread to their limits.

Containment and Control

A two-pronged response has developed to this very serious problem. The first is a containment program, begun in 1969, to

Knapweed attached to a pickup truck.

limit the spread of knapweeds while a control program, the second "prong", is being developed.

Containment is being sought by spraying with the persistent herbicide Tordon 22K on the periphery of infested zones. Spread is mostly along roads and trails and so spraying is done from four-wheel drive pick-up trucks. There is also some roadside spraying within infested areas so as to reduce the likelihood of knapweed plants or seeds being picked up and transported out of the infested areas.

No satisfactory cultural control except irrigation has emerged, indeed cultivation can provide an ideal invasion site, and so hopes for eventual continuing control are centered on biological agents. Knapweeds are introduced plants and some of their success can be attributed to the absence of natural enemies. Biological control possibilities in B.C. are much the same as those described by Maddox in his companion article, and thirteen releases of the four likely agents of control which he discusses had been made by 1960. Their progress is being carefully monitored.

An important addition to the containment and control program is the development of greater and more widespread public awareness of knapweed, its characteristics, and the processes of its spread. Man's activities, most notably the inadvertent spread of mature knapweed plants on logging trucks, off-road vehicles, and trail bikes (Fig. 3) have contributed greatly to the spread of knapweed. Invasion pathways develop quickly as off-road vehicles scuff up the rangeland surfaces and, with dried plants being carried hither and yon, seed is never far from these sites. Not enough has yet been done to inform the general public or to stimulate people to take simple precautions such as checking their vehicles before leaving a weed-infested area. It was only last year, (1978) for example, that the problem was explained to the B.C. Outdoor Recreation Council and a warning written for their Newsletter. Now there are two annotated slide shows, for lay and professional audiences, but more copies are needed for general distribution. Forceful steps by all agencies concerned are needed to engender public awareness and interest.

Summary

From the time of their introduction about 1900 until now, the knapweeds, *Centaurea* spp., have spread vigorously to occupy at least 30,000 ha and to be present throughout the rangelands of interior B.C.

Reduction of forage production in the presence of knapweed is considerable, up to 90% in some instances, and so control measures are urgently required.

While a biological control program using natural predators introduced from the knapweed's home habitat is being developed, a chemical containment program is in force in an effort to limit spread until biological control is effective. Picloram or Tordon 22K is being sprayed in peripheral areas of infestation to restrict further extension of areas of infestation. Allied to this chemical treatment, a program to generate better public understanding of the problem, its implications, and the role of the public in minimizing spread of knapweed is needed.

References

Fletcher, R.A. 1961. A growth inhibitor found in *Centaurea* spp. M.Sc. Thesis. Dep. Plant Science, Univ. British Columbia.

Fletcher, R.A., and A.J. Renney. 1963. A growth inhibitor found in *Centaurea* spp. Can. J. Plant Sci. 43:475-481.

Harris, P. and R. Cranston. 1979. An economic evaluation of control methods for diffuse and knapweed in western Canada. *In Press.*

Renney, A.J. 1959. *Centaurea* spp. infestations in British Columbia. *Proc. Joint meeting, N. Central Weed Control Conf.* 16 and W. Canada Weed Control Conf. 10:18-19.

Watson, A.K., and A.J. Renney. 1974. The biology of Canadian weeds, *Centaurea* diffusa and *C. maculosa*. Can. J. Plant Sci. 54:687-701.

More Notes on Sleepygrass

Marcia Hamann Wolfe

In the mountains of northeastern New Mexico, sleepygrass (*Stipa robusta*) is very common, especially in the pinyon/juniper and ponderosa pine zones. At Vermejo Park and surrounding areas it grows particularly thick along roadsides, ditches, and rocky alluvial flats which are usually dry. In a recent article in the *Rangeman's Journal* on sleepygrass, Sears (August 1977) suggested that this grass did not invade overgrazed pastures. However, this does not appear to be the case in the Southern Rocky Mountains of northeastern New Mexico. Here sleepygrass is often seen to invade overgrazed parks, meadows, and pastures. E.O. Wooton, who collected plants at Vermejo Park, reported sleepygrass invasions in overgrazed meadows of northeastern New Mexico in the early 1900's (Wooton and Standley 1915).

The thickest invasions may be found along roadsides, fences, and ditches as Sears (1977) indicated. Heavy invasions are also found in abandoned fields or disturbed pastures as shown in Figure 1.

Widespread invasions can also be found along the uplands of valley bottoms in blue grama (*Bouteloua gracilis*) communities. Figure 2 depicts such an invasion in an overgrazed blue grama community above the Vermejo River at an elevation near 7,600 feet.

A third, more unusual type of invasion is illustrated by Figure 3. This is the beginning of an invasion of sleepygrass in an Arizona fescue (*Festuca arizonica*)/mountain muhly (*Muhlenbergia montana*) bunchgrass community in the open forest vegetation type of the ponderosa pine zone similar to that described by Smith (1967). This particular invasion is at an elevation near 9,000 feet, almost 1,000 feet above the majority of sleepygrass populations. This native pasture has been heavily grazed and damaged by cattle, horses, and wildlife, especially in the past.

The author was resident botanist on the Vermejo Park.

About the Park: Vermejo Park, 494,000 acres, is located in northeastern New Mexico, near Raton, and has been operated as a guest and cattle ranch since 1902. It is part of the original Maxwell Land Grant of 1841, a land grant from the Mexican government to the Maxwell family.

The ranch and facilities were purchased in 1973 by Pennzoil Company, a firm whose principal investments are in land and natural resources and which has been involved in significant cattle, agriculture, and timber operations. In addition to guest and cattle operations, trained wildlife management and naturalist personnel are hired who are dedicated to conservation and development of the Park.

Editor's Note: This is a reply to the Paul Sears article on sleepygrass that occurred in August, 1977, issue of *Rangeman's Journal.*

The cover of Arizona fescue as determined by ocular estimation, has been reduced by 75% compared to a nearby fenced pasture which has been grazed lightly by cattle and wildlife. Pocket gophers present in this pasture have also disturbed the site by burying plants and exposing bare soil.

A complexity of factors undoubtedly produces the conditions which allow invasions of sleepygrass into native pastures and range. Severe overgrazing in the past may have killed vegetation, which makes space available for the invasion of pioneer species and less palatable plants. Although heavy use may compact the soil, hoof action also loosens the soil, which may aid germination and establishment of sleepygrass. In the particular invasions of the Arizona fescue community described above, the soil loosened by pocket gophers may also have been a factor contributing to the establishment of sleepygrass. Once grazing pressure is reduced, sleepygrass is unable to compete with climax species (Gay and Dwyer 1970).

Undoubtedly these invasions of sleepygrass in northeastern New Mexico affect the useful productivity of range and pasture lands. With the present implementation of improved range and wildlife management practices, a reduction in cover of this species should be seen in the invaded communities at Vermejo Park.

Literature Cited

Gay, Charles W., and Don D. Dwyer. 1970. New Mexico range plants. Extension Service Circular 374. 85 p.

Sears, Paul B. 1977. Sleepygrass. Rangeman's Journal 4:67-68.

Smith, Dwight R. 1967. Effects of cattle grazing on a ponderosa pine-bunchgrass range in Colorado. US Dep. Agr. Tech. Bull. 1371. 60 p.

Wooton, E.O. and Paul C. Standley. 1915. Contributions from the United States National Herbarium. Flora of New Mexico. Vol. 19 794 p.

Keeping Track of Weed Research By Computer

Garry Bowes, Jim Hunter, and G.K. Honey

In trying to keep up with the growing volume of research data on weed control, we found that a computer system provides more information in much less space and with considerably less man time than the conventional method of handwritten reports. Further, a computer system provides the researcher with the opportunity to retrieve any information he needs and to do so quickly.

During the last 30 years, weed researchers with industry, universities, and governments, all members of the Canada Weed Committee, have provided reports of their work each year in the C.W.C. Research Report. Essentially the reports contained information on crop tolerance and weed control efficiency. In recent years the volume of such reports has grown tremendously. For example, the 1974 Research Report contained 446 pages. By 1977 the size had increased to two volumes and 709 pages. So the time was right to explore the use of a computer for collecting and printing a master copy of the Research Report.

Until 1974 each abstract on a weed control experiment in Western Canada was written in narrative form. Each year the Canada Weed Committee sent instructions to weed workers on the form and factors to be included in the abstract. However, the size of the reports was increasing at an alarming rate and still much important information was missing.

In 1974 we began work on designing a standardized form that could handle all the pertinent information: basically a set of questions with a specific space for the answers. This information could then be keypunched onto a magnetic tape and the computer then would rearrange the information into a standardized printout of the report.

We found that 51 factors accounted for 95% of the information. So we designed a Data Input Sheet with space for 58 factors. These factors were divided into three different categories. Category one contained information on plot size size, temperature, precipitation, title, author; general information about the experiment. Category two contained factors directly related to the herbicide treatments, such as rates, volume, pressure, weed stage, and crop stage. Category three contained factors related to the results, such as sample size, date of sampling, yield, and so on. Each category had one page only.

Information is entered on the Data Input Sheets in three different ways. Some information can be entered directly, such as the variety name of the crop. For 14 other units of information we use code numbers to avoid confusion. For example, a herbicide can be named by a company code number, or by a common name, or by a trade name. We used a code number and standardized the herbicide names by using only the common names. In only one case did we use a combination of code numbers and actual direct entry and that was for describing the stage of the crop or weed. The number of leaves was entered directly, but we used codes for the flower and fruit stage. In all cases we standardized the information for any one factor. For example, all crop yields are reported as "g/m^2". (grams per square meter).

Here is how the system works:

Each year the worker completes one set of three Data Input Sheets for each experiment and sends them to the computer unit at a central location. The information is keypunched and fed into the computer. The computer organizes the data and prints the report, written in brief form (crop, spring wheat) and reduces the space by 40%.

So in effect a lot more information goes on the standard 8½ × 11'' sheet. Each line contains 108 characters, enough to cover herbicide treatment, crop tolerance and weed control.

The second phase will focus on a data retrieval system, which we call "data comparisons." For example, a program will be set up so the computer can scan all available data on barban used at 0.56 kg/ha, including crop yields. When this combination occurs in an abstract the computer will remember. With the proper instructions the computer will scan all entries and print out the average yield from the specific rate. The instructions will contain one qualification: The entry must contain information on a corresponding check plot and so the average values from the check plots will be printed out as well.

Another important feature of Data Comparisons will be the selection of factors that affect crop tolerance and weed control. For example, temperature will be one of 25 such factors. The researcher will be able to select one of the three temperature ranges: less than a specified temperature, between two specified temperatures and over a specified temperature.

Programming the retrieval system this way greatly increases the accuracy of the information and reduces the ambiguity of data comparisons. ●

Bowes and Hunter are research scientists with Agriculture Canada, Research Station, Regina, Saskatchewan, S4P 3A2. G.K. Honey was information officer with Agriculture Canada, Regina, Sask., now with Agriculture Canada, Research Station, Lethbridge, Alberta, T1J 4B1.

This paper was given (with slides) at the 31st Annual SRM meeting in San Antonio, Texas.

Author's Note: The computer system collects weed control information from experiments with annual crops and annual weeds. It will handle data from perennial weeds but treats each experiment on a yearly basis. Range weeds are not on the system at present but could be added.

Managing Rangelands for Pronghorns

James D. Yoakum

Today the American pronghorn antelope (*Antilocapra americana*) inhabits many historic ranges occupied during the early 1800's. The antelope's pristine numbers, however, have been greatly reduced. These native big game animals were on the verge of extirpation by the year 1900 but have experienced a 1,500% increase during the past 50 years. Pronghorns inhabit western rangelands from northern Mexico, up through all the western states of the United States, and into the southern short grasslands of south-central Canada. They coexist with domestic livestock now just as they did with the American buffalo (*Bison bison*) for centuries prior to the arrival of European man.

The objective of this article is to identify recommended range management practices to maintain or improve forage, water, and range conditions in accordance with the habitat requirements of the American pronghorn antelope.

Native Rangelands

Native rangelands which have developed over eons into natural vegetative communities and remain in good ecological condition today should be maintained in good condition. This is especially important to historical antelope ranges, which possess vegetal characteristics favoring antelope habitat requirements.

It is postulated that pronghorns thrive best on ranges in a subclimax vegetative condition. Such conditions were created in the past by (1) wildfires caused by lightning, and (2) seasonal grazing by herbivores such as bison, elk, and deer. The vegetative community, in constant change, in turn produced a variety of mixed forage classes of grasses, forbs, and shrubs.

Vegetation Type Conversions

Extensive areas of dominant (more than 30%) big sagebrush (*Artemesia tridentata*) are often low density ranges for antelope. This is especially true where the brush is 76 cm or higher. Such areas can be treated to decrease sagebrush quality and height thereby creating desirable antelope habitat. One of the major objectives of brush control is to decrease shrubs which are competing with grasses and forbs. Two points should be considered in such treatments: (1) it is best to plan projects not too large in size (preferably less than 405 ha); (2) the project should maintain around 5 to 10% shrub cover.

Brush control is frequently accomplished by mechanical practices such as plowing or chaining. Plowing with large brushland plows often kills native plants, especially highly preferred forbs. Chaining, accomplished by two large tractors pulling a heavy anchor chain between them, does not kill as many shrubs and is less damaging to native grasses and forbs.

Chemical spraying is another commonly practiced shrub control technique. The spray can be largely plant specific thereby controlling sagebrush and not harming native grasses and most forbs. The practice can favor antelope ranges with low sagebrush but leaves tall dead shrubs on big sagebrush treated areas.

Prescribed burning has been used to date in only limited cases to improve antelope ranges. This practice has many natural characteristics favorable to improving ranges for antelope. When properly accomplished, prescribed burning can decrease domin-

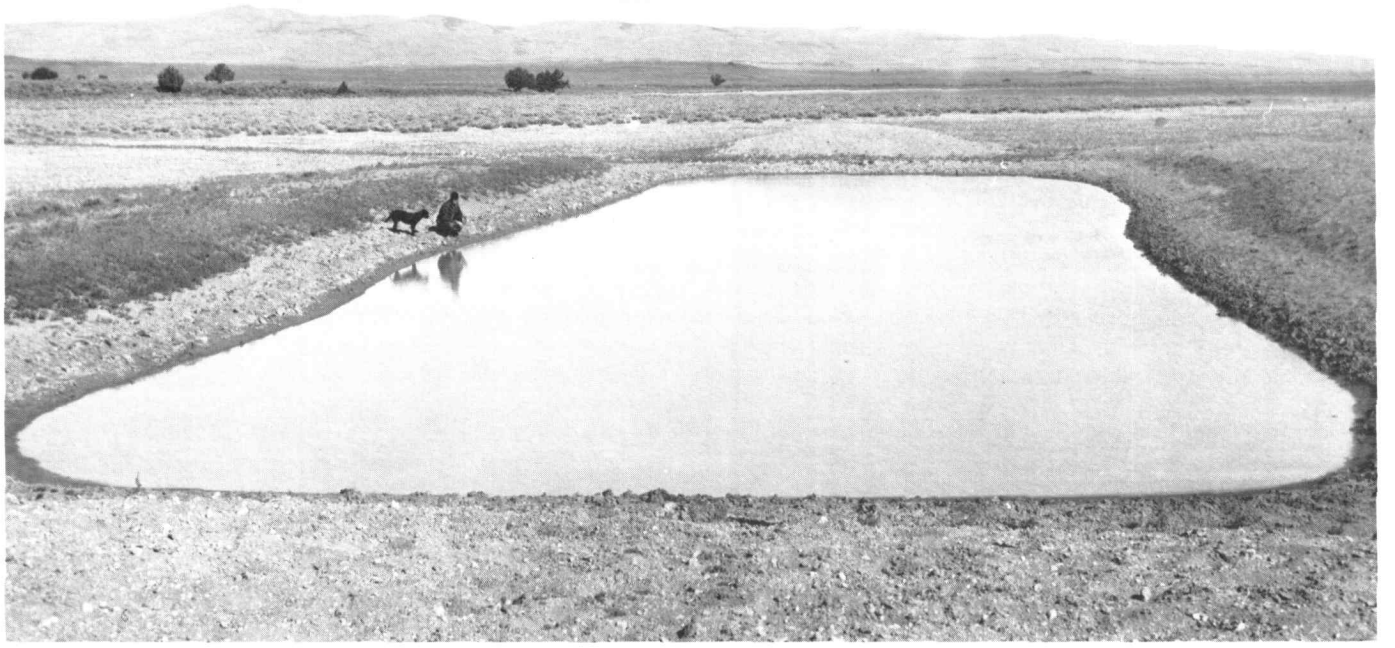
An adult doe antelope jumps through an "antelope pass" structure built in a range fence near Casper, Wyoming. (Photo by Ray Mapston)

The author is wildlife management biologist, Bureau Land Management, Reno, Nev.

This is a condensed version of a paper presented at the first International Rangeland Congress held in Denver, Colorado, 1978.

Editor's Note:

1 cm equals .3937 inches	1 inch equals 2.54 cm
1 ha equals 2.471 acres	1 acre equals 0.405 hectare
1 l t equals 1.0567 quarts	1 quart equals .94625 liter
1 kg equals 2.2046 pounds	1 pound equals .454 kilogram



Large open "dugout" water catchment pits, as portrayed above, have been highly used by antelope as well as livestock near Lakeview, Oregon (Photo by Jim Yoakum)

ant shrubs and create a more natural mixed community of grasses, forbs and shrubs.

Antelope ranges having insufficient native plants for natural reproduction can be seeded. Past seeding ventures have often resulted in monocultures of exotic grasses. These seedings are of limited value to pronghorns other than as a decrease in shrub quality and height. However, mixture seedings containing legumes have proven highly beneficial to pronghorns. Such seedings are optimized when there are a number of native species included. A good rule of thumb is a minimum of 6 species each of grasses, forbs, and shrubs.

Introduction of dryland Nomad variety alfalfa (*Medicago sativa*) has been one of the most successful techniques carried out on antelope ranges in southeastern Oregon. In excess of 22,700 ha involving 36 separate seedings have been planted to date. The alfalfa was generally aerially seeded onto plowed sagebrush ranges following drilling to adapted grasses and shrubs. Recent analysis of the seedings disclosed that the majority have maintained alfalfa composition at a level of 10% of the vegetation present over a 6-year or longer period. The seedings have increased the forb composition from a 2% in untreated areas to 7% in seeded areas. During the August 1976 antelope census, more antelope does with fawns were observed in grass and forb seedings than on adjacent shrub-dominant rangelands.

Water Management

Measurements of water consumption by antelope on the shrubgrass steppes of Wyoming showed daily water consumption rates per antelope varied from .34 liter per day in May to 4.5 liter per day in August. Total monthly precipitation, evaporation, succulent vegetation, nursing does, mean temperature, and average maximum temperature had marked effects on the average daily water consumption rates. A close relationship was observed between antelope and water distribution in the state. Ninety-five percent of 12,000 antelope counted by air were within a 6-km radius of water.

Antelope have been observed using every type of water source available: springs, creeks, rivers, lakes, and reservoirs (Figure 2), stock water developments, galvanized troughs fed by windmills, and troughs filled by springs. They did not appear to avoid any manmade water device developed for livestock.

The installation of precipitation catchment facilities (guzzlers) on ranges lacking proper water distribution have been successful for these animals. Such water developments are relatively maintenance free, not expensive, and serve a variety of wildlife and domestic livestock.

Livestock Fences

Fences have been a serious problem to antelope survival in many areas. The root of the problem is that antelope have adapted survival patterns based upon the ability to move freely from areas of deep snows or inadequate forage and water. When these natural movements are curtailed or restricted, the result has been disastrous. Then too, there exist today areas fenced with woven-wire that completely denies use of rangelands by antelope. This factor contributes to the production of fewer antelope at a time when the public is requesting both livestock and wildlife production on public lands. Recommendations from antelope-fence studies state that when fence construction is necessary, the following specifications are best for antelope welfare:

1. Net-wire fences are generally barriers; therefore, their construction on antelope ranges is discouraged.
2. Barbed wire fences should be constructed to the following specifications:
   a. bottom wire at least 41 cm from the ground.
   b. next wire up 25 cm.
   c. next wire up 25 cm, comprising a total of 91 cm height from ground.
   d. bottom wire should be smooth wire, for antelope generally go under fences, barbless wire minimizes physical injuries.
   e. no stays between posts, as this provides for a less tight fence allowing easier antelope passage.
   f. important antelope travelled pathways, migration routes, etc.,

should allow for low height, lay down panels, or pass structures.

g. Fenced areas should be kept as large as possible, thereby providing an opportunity for antelope to obtain all the basic habitat requirements.

"Antelope Passes" have been used in some areas to facilitate antelope movement through fences. These devices are essentially miniature cattle guards 122 cm wide rather than the standard 312 cm structures; vehicles cannot cross them and neither can domestic animals. Such Passes are placed at locations characteristically used by the animals, with corners of fence lines a favorite location for the installation of this type of device. When properly placed, passes help facilitate antelope movement but are a second choice to properly constructed fencing.

Discussion

Habitat improvements specifically designed to improve range conditions for pronghorns are few and have had possibly only a minor affect on antelope populations. However, many range improvements constructed for other purposes have had some major affects, both advantageous and deleterious, on antelope. This entire subject is now well documented in reports or publications but more information is becoming available and warrants discussion at this time.

Fences constructed to control livestock or delineate highway rights-of-way have been repeatedly reported as a serious mortality factor to antelope. Such reports are substantiated from the open grasslands of Wyoming to the semiarid regions of Texas. The deleterious affect of both direct entanglement mortality and the much greater factor of entrapment and restricting migrational movements for survival are well documented. This does not mean that all fences are problems to antelope everywhere, but the evidence is substantial that fences are a serious mortality problem to certain antelope herds on a regional basis.

It is also known that proper fence construction planning to include designs allowing more free antelope movement would do much to enhance antelope welfare. All managers responsible for planning and constructing fences on ranges where wildlife values are of importance would do well to consider the tried and tested fence designs which allow access by antelope. Just how beneficial vegetative type conversions or water developments have been to pronghorns is a matter not quantitatively reported to date. However, this subject is becoming increasingly apparent as more cases become known. There are two recent cases that substantiate well the values of multiple range imrovements for the benefit of antelope.

At a Antelope States Workshop, held in Casper, Wyoming, R.M. Kerr reported on the interrelationships of antelope to habitat for the Tres Piedras herd in north central New Mexico. This area underwent extensive vegetative type conversions, fence construction, and water developments primarily for livestock but with proper considerations for antelope habitat requirements. The results within 3 years recorded a 130% (from 300 to 750) increase in the antelope population.

The second case of a large-scale range rehabilitation program affecting antelope numbers is the Vale project in southeastern Oregon. The project encompasses 100-by 180 km of primarily sagebrush-grassland steppe rangelands. During an 11-year period, approximately $10 million was spent on the following range improvements: 205,000 ha brush control; 108,000 ha seedings; 3,330 km fence construction; 1,600 water developments, and 741 km of pipelines. The adjacent rangelands in Oregon, Idaho, and Nevada underwent only minor range improvements during this 11-year period.

Now, 3 years following completion of the Vale project, it has been substantiated that the antelope population has increased 100% (from 1,000 to 2,000) while at the same time antelope in surrounding adjacent rangelands have remained relatively static. The evidence is circumstantial, but it is indicative that properly implemented large-scale vegetative manipulation projects combined with water developments can be highly beneficial to wild free-roaming antelope herds.

References

Heady, H.F., and J. Bartolome. 1977. The Vale Rangeland Rehabilitation Program: The desert repaired in southeastern Oregon. USFS. Portland, Ore. Resources Bull. PNW-70. 139 p.

Kerr, R.M. 1969. A discussion of the woven-wire fence antelope situation on BLM lands in New Mexico. Antelope State Workshop Proc. 3:22-26.

Kindschy, R.R. 1974. Preliminary report on nomad alfalfa seedings. US BLM, Vale, Ore. 19 p.

Spillett, J.J., J.B. Low, and D. Sill. 1967. Livestock fences—how they influence pronghorn antelope movements. Utah State Univ. Exp. Sta. Bull. 79 p.

Range Management for Quality Wildlife

Wayne Hamilton

I'm like a lot of professional rangemen, I suspect, in that I enjoy hunting as a favorite pastime. It's quite natural for me to think of wildlife as a product of the range resource, and to cast an eye toward range management as it relates to the product yield. All hunters, however, don't automatically share this association of range with the wildlife it produces. We need the understanding of these people and the support that could be generated from their interest for a multitude of range-related problems. The American hunting public makes up a sizable block of folks!

As with all other renewable natural resources, management has a great impact on the ability of rangeland to produce sustained yields of desirable products, and wildlife is no exception. In fact, these animals are very often a reflection of the condition of the range, since it relates so directly to their specific needs.

It has been stated that nutrition, or the lack of adequate nutrition, is the number one problem of the Texas deer herd. The ability of the range to supply satisfactory nutritional levels is a concern to deer hunters. While genetic limitations certainly influence ultimate deer size and antler growth, even the "best" genes can't produce a trophy buck if nutrition is inadequate.

Some people feel they can feed deer nutritional requirements "out of a sack." A look at the deer in areas where corn feeding has been a standard practice for many years tells us we can build body fat, but not necessarily bone (antlers) and muscles. The protein level of corn, if we look at this nutrient, will not meet requirements of deer for maximum development. While reportedly there are now available on the market deer feeds with sufficient protein and that deer will eat, what about the cost and distribution of such products, and utilization by enough deer in sufficient quantities?

Protein for Quality Deer

In many instances, properly managed rangeland could produce the required protein levels for deer. Some of the biggest whitetails in the state come from areas where little or no feeding of deer is done by ranchers. Range plants *can* furnish the nutritional levels required for big-bodied, big-antlered deer. Keep in mind that the nutrition from the range was all that was available to the old mossbacks of yesteryear, and quality deer were once produced in areas that now support only small, nutritionally deprived deer herds. High quality native range plants not only provide better nutrition, but they are the most economical and efficient form available. Whether or not they are present on the range and *in sufficient quantity to do the job* may be a different story.

Range plants occur in three basic groups; grasses, forbs, and shrubs (with cacti being considered a part of the shrub group). The first and last categories are obvious ones, but the word *forb* is sometimes confusing. Even today, a lot of people tend to think of rangeland forbs simply as "weeds," overlooking the contribution they make to range nutrition.

Wildlife and livestock find forbs very attractive grazing plants and often select them over grass when they are available, particularly in certain stages of growth. In some instances, forbs are present on the range when grass availability and quality are very low. Deer are known to rely heavily on them to increase the nutrient content of their diet, but cattle, although primarily grass eaters, also search out these plants and use them readily. Heavy grazing with cattle and particularly sheep may prove detrimental

Guayacan **(Porlieria angustifolia) *is an evergreen shrub species consistently browsed by deer in south Texas. Photo courtesy C.J. Scifres.***

The author is lecturer, Range Science Department, Texas A&M University, College Station 77843.

Note: protein analyses of vegetation used in the article were furnished by Dr. J.E. Huston and B. Rector, Texas Agricultural Experiment Station, San Angelo.

to deer in the competition for forbs on the same range.

Forbs Source of Protein

Deer have a protein requirement of between 13 and 16%, or nearly double that of a cow. Forbs are often the best source of protein on the range, and particularly during critical time periods when the nutritive value of grasses and shrubs is low. The cool season forb plantago, a common plant on much of our deer range, contained over 19% crude protein in February, and over 10% from late December until late May. Orange zexmenia and sweet gaillardia, two forbs which, because of their selection by livestock and wildlife decrease on the range with heavy grazing, contained 18% protein in late March of the same year. It is obvious that forbs are a significant nutritional contributor on the range during the late winter season when bred does are developing fawns and bucks are replacing antlers. In fact, on many ranges, forbs may be the only vegetation providing even body maintenance requirements for brief periods.

Deer also rely on browse in their diet from the woody shrubs and cacti on the range. The nutritional value of these woody plants provides a clue to their selection by deer. Since grasses are low on the preference list and seldom provide adequate protein levels, and forbs are often short-lived or nonexistent during dry periods, shrubs provide a stabilizing influence on diet quality. Cacti, for example, are often utilized heavily by deer in South Texas during droughts and in late winter months.

Elbow bush is a prime browse species in the Edwards Plateau and Rio Grande Plains. Samples of leaves and twigs taken in March contained over 20% crude protein. Live oak, catclaw acacia, shin oak, algerita, guajillo, and other common species often provide protein levels of 20% or higher during March and April. These plants develop new growth from moisture supplies deep in the soil profile, while many grasses and annual forbs are dependent upon current rainfall to initiate growth.

Since these range plants are native species, why don't we have high levels of nutrition in our deer herds? The answer to this question is obviously complex. There are many reasons for inadequate nutrition on range, and often several operate in combination to confound the issue.

Competition Is Critical Influence

Perhaps the most critical influence on the availability of satisfactory deer nutrition on the range is *competition.* This competition may come in several forms. It may be competition between domestic livestock and deer, or may reflect deer vs. deer in high populations. It may also be competition between types of vegetation on the same range.

Livestock are known to select diets that are usually on a higher nutritional plane than a composite sample of the range plants. This simply means that they pick and choose plants and plant parts. High quality forbs are oftentimes high on the selection list of livestock and are grazed heavily. This can mean a lower quality diet available to deer at critical times.

The effects of deer vs. deer in competition for range nutrition is obvious. At the turn of the century, deer numbers in the nation were estimated at an all time low of about 50,000 whitetail and mule deer out of the original population of about 50,000,000 thought to inhabit North America at the time of arrival of European man. Since the early 1900's, numbers have rebuilt to densities considered to be all-time highs in some parts of the nation. Earlier in the century, fewer deer meant greater diet selection from existing vegetation, assuming livestock competition to be equal. Many of us have seen the apparent correlation between increasing deer numbers and decreasing deer size and condition on the range.

Competition among kinds of vegetation can simply mean that monocultures, or areas supporting a single plant species, may support fewer deer than where a balance of vegetation types exists. Range dominated entirely by brush can be a disadvantage to deer. Woody plants can become "overmature," that is, the young twigs may be inaccessible to deer for browse and the plants may support a low proportion of nutritious plant parts. Research showed that an old stand of decadent mixed-chaparral brush produced only 13 to 106 pounds of browse per acre yearly. After fall or early spring burns, this same area produced 750 to 2,750 pounds of browse per acre. There is a vast difference in amount of foodstuff produced that is also *accessible* following manipulations of the old brush stands. Other studies have shown four to five-fold increases in deer densities on burned as opposed to unburned adjoining chaparral. Not only had forage production been increased but the new production was also more nutritious.

A shrub that is a desirable browse species may become undesirable if a major portion of its growth is woody. Thickening of woody plant stands can also decrease forb and grass production. Just having a great many woody "browse" plants on the range is not necessarily the answer to good deer nutrition. Even such devoted browsers as goats prefer leaves and tender twigs and prefer to consume relatively little tough, woody growth. Manipulation of woody plants by burning, roller chopping, shredding, chaining, or with other brush control practices decreases the proportion of woody to succulent growth on these plants and increases acceptability by grazing animals. Many woody plants are basal sprouters, producing more palatable and more nu-

Angora goats browsing high up on live oak trees. Photo courtesy of Leo Merrill.

Chaining of over-mature, dense brush stands in southwest Texas. Photo courtesy of C.J. Scifres.

tritious forage that is well within reach of animals following top-growth removal.

On Texas ranges that support vegetation communities with all three plant categories, shrubs, grasses, and forbs, the key to good deer nutrition rests with maintaining a proper balance of plants and animals. We must remember that the rancher has to make the resource pay, and that livestock operations which depend primarily on grass must continue at economic levels. But, hunting income is often very significant and combination livestock/wildlife operations provide more flexibility—an important consideration when livestock prices are low.

It Can Be Done

Can we have good livestock range and provide deer nutritional needs from the same area? Following are examples where attention is given to wildlife needs in range improvement programs.

The system of rotating grazing livestock through a series of pastures in one herd is getting attention by Texas ranchers. It is called "short duration grazing" and is designed to provide short grazing periods (perhaps 7 to 21 days) followed by longer rest periods between grazing uses. A 14 day graze-140 day rest system would require 11 pastures.

The value of some type of rotational grazing system to wildlife using the same area is clear. Deer have access to the resting pastures and get the advantage of "first pick" on forbs and key browse species. Competition is limited to only a portion of the total area in the system at any one time.

Another example of concern shown for wildlife habitat would be the familiar strips or block designs left in brush during mechanical brush control operations. The enhancement of deer habitat by increasing the area of edge effect is well known. Also important is the need to leave untreated strips when herbicides are applied to rangeland. Forbs, both annual and perennial, are particularly susceptible to the conventional herbicides used for range brush control. While the chemicals do not prevent eventual recovery of these plants, they can be effectively removed from the range for an entire season or longer. Research at two locations in south Texas has shown that from 70 to 80% of a pasture can be treated with herbicides without lasting detrimental effects to deer population or condition. However, consideration for the kind and amount of the key forage species produced by individual range sites would be important in each area to be treated. The size of the treated area in relation to the overall size of the ranch and its remaining resources is also an important concern.

Year-round grazing of the same pasture by livestock, known as continuous use, is still a widely practiced method of grazing in Texas. Even at moderate stocking rates, the livestock are able to select the preferred plants on the whole area. This puts the pressure on high quality, preferred forbs, as well as the better browse and grass species. When forage supplies run short because of drought, or simply due to excessive livestock numbers, the situation becomes critical very quickly for deer.

The rancher has the option of deciding on a goal for his range vegetation and then managing to attain this goal. If he wants to emphasize wildlife production, those plant species which are primary plants for wildlife can be identified and protected in his management plans. Conversely, the rancher has the right to manage for increase of a particular plant category on his range with substantial or even drastic reductions in the others. For example, ranchers may decide to take large areas out of brush and establish them to grass—often a single species of grass. Root plowing and seeding to an introduced grass may also reduce forb production after 1 or 2 years of above-average yield.

Fortunately for hunters, landowners cannot economically disregard wildlife in most cases and are anxious to protect the range for multipurpose use. This is being done by many of today's ranchers. Such management does not normally mean "no brush control" or "no grazing by livestock." It means an understanding of the range resource, and setting short and long range objectives, identification of the key forage plants for all animal users, development of a plan to provide for animal needs in keeping with objectives, and application of practices in accordance with the plan.

Hunters can become involved in some of the problems of good range management both by their support and participation. For example, population control of the deer herd by removal of excess does is often an area where they can help. A better general understanding of the synergistic role of range and wildlife management to meet their needs could bring together a whole new support for our efforts. ●

The Status of Exotic Big Game in Texas

Gregory L. Butts

The stocking of exotic big game animals in Texas by private landowners has been a common practice in many parts of the State. Exotics were released in an effort to provide the paying hunter with additional species to hunt and for aesthetic reasons. One release of aoudad sheep in the Palo Duro Canyon of the Texas Panhandle in 1957 and 1958 by the Texas Parks and Wildlife Department represents the only State-sponsored stocking of exotic big game. These sheep are listed as big game animals in some Panhandle counties and harvest is regulated by Departmental seasons and bag limits in those counties. Certain restrictions have also been placed on the harvest of axis deer in Bexar and Kendall Counties at the request of local landowners and County Commissioners Courts. In the remainder of the state, exotic large game animals are not regulated by the Texas Parks and Wildlife Department. This enables ranchers and landowners to allow exotic hunting as a year-round sport.

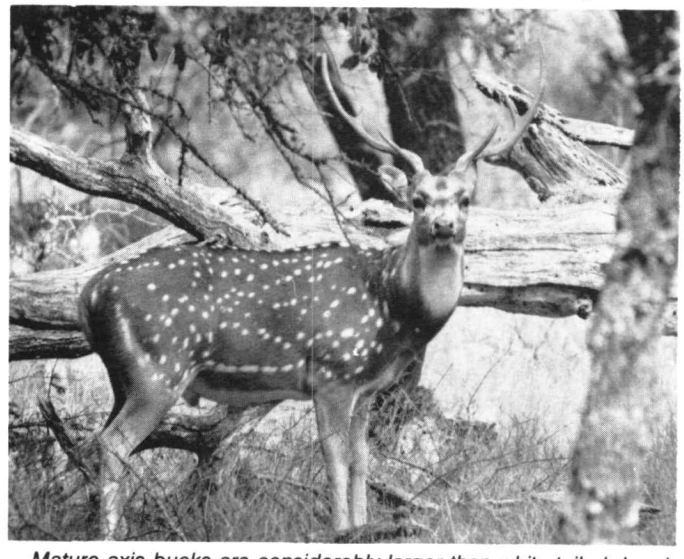
The first known stocking of exotics in Texas was in 1930 and involved nilgai antelope (Jackson 1964). Since that time, exotic populations have grown rapidly both in numbers and species. The exotic game situation in Texas is unique in that more species of animals in greater numbers have been released here than in any other place in North America (Ramsey 1969).

Since 1963 periodic censuses of privately owned exotics have been conducted. The most recent was conducted in 1974. Landowners and managers known to have such animals on their land were contacted and interviewed by Texas Parks and Wildlife Department biologists and technicians in all 254 counties in the State. Data gathered in this interviews consisted of numbers and species of exotics, total ranch acreage, acreage accessible to exotics, and acreage under deer-proof fences.

Based on a 1963 statewide census, 13 species of exotics were reported totaling approximately 13,000 animals (Jackson 1964). In 1966, the total population was estimated at 30,000 individuals (Ramsey 1968). In 1969 this estimate was revised to some 37,000 animals involving 26 species. The 1971 census results indicated 35 species of exotic game totaling 45,691 animals (Young 1973).

Currently 39 species of exotic large game totaling 57,278 animals are found in the state. Seven of these species represent over 95% of the present exotic game population. The 1974 total population estimate for these seven major exotics was 55,953 animals. This included 19,518 axis deer, 15,254 mouflon-barbados sheep, 7,339 blackbuck antelope, 4,483 fallow deer, 3,531 aoudad sheep, 3,042 sika deer, and 2,786 nilgai antelope. The 1974 census showed 316 ranches comprising 4,488,753 acres with exotics.

Axis deer (*Axis axis*), nilgai antelope (*Boselaphus tragocamelus*), and blackbuck antelope (*Antilope cervicapra*) are native to India. Mouflon-barbados sheep (*Ovis* sp.) originated in



Mature axis bucks are considerably larger than white-tailed deer in Central Texas. Axis deer are native to India, Nepal, and Ceylon.

Sika deer, native to the southern half of eastern Asia, Japan and Formosa, are similar in size to Central Texas white-tailed deer.

The author is a wildlife biologist, Texas Parks and Wildlife Department, Hunt, Tex.

This article is a contribution of Federal Aid Project W-76-R.

Sardinia and Corsica. Very few pure-blood mouflon are found in Texas. The majority are crossbred with barbados or other domestic sheep. The fallow deer (*Dama dama*) is European in origin. Aoudads (*Ammotragus lervia*) are a wild sheep from northern Africa. The native range of the sika deer (*Cervus nippon*) covers a limited area within the southern half of eastern Asia.

The Edwards Plateau and the South Texas Plains are the areas which have the majority of exotic animals. These two regions are also important in regards to white-tailed deer management and livestock operations. The Edwards Plateau has been described as the most important deer range in Texas from the standpoint of land area, deer numbers, hunting pressure, deer harvested and economic return to landowners (Thomas, Teer, and Walker 1964). South Texas ranks second in overall importance and consistently produces more trophy type white-tailed deer than any other region in the state. At present the Edwards Plateau is overpopulated with white-tailed deer due to an inadequate harvest of anterless deer. Die-offs are common. Habitat in the Plateau is generally in poor condition as a result of overgrazing by goats, sheep, cattle and deer as evidenced by browse lines found on woody vegetation in many range areas.

The increasing exotic population presents another threat to survival and management of the white-tailed deer which have already been replaced by exotics on some game ranches. The possibility exists that this displacement could also occur in extensive areas where exotic movement is not restricted by deer-proof fencing. Free-ranging populations of axis, sika, and fallow deer are known to exist. These populations originated, in most instances, when introduced animals escaped from ranches with deer-proof fencing. Once these animals escape the confines of a high fence they become defficult to census and nearly impossible to control. Even on large, high-fenced ranches with adequate cover, control of sika and axis deer would be extremely difficult. The statewide survey, for the most part, does not reflect these free-ranging exotics.

Axis and sika deer have become well established in traditional white-tailed deer habitat and axis deer have been reported to dominate white-tailed deer at supplemental feeding sites. They have been observed chasing them from small oat fields (Fuchs 1976). Feldhamer and Chapman (1978) attributed the decline in white-tailed deer on Maryland's eastern shore to an increasing sika deer population. In parts of the Edwards Plateau, including localized areas of Kerr, Edwards, Real, Bandera, and Kendall counties, it is not uncommon to see axis and sika deer along highway rights-of-way much the same as white-tailed deer are observed. In these localized areas exotic deer are competing with the white-tailed deer for food and will reach the point of reducing survival and density of this native wildlife resource. Food habit studies of axis, sika and fallow deer, conducted on the Kerr Wildlife Management Area in the Edwards Plateau showed that these exotic species preferred browse and forbs when available and competed directly with white-tailed deer for these items. As preferred foods become less abundant, axis, sika, and fallow deer shift their diet to grasses. This ability to shift diets and their diversity of food habits enables these exotics to survive and maintain good body condition during white-tailed deer stress periods due to drought, overpopulation, and overgrazed ranges.

Range managers should be aware of the impact these exotic animals are having on native white-tailed deer. Depending upon the season and available forages, axis, sika, or fallow deer can become as severe a competitor with livestock as they are with white-tailed deer.

Literature Cited

Feldhamer, G.A., and J.A. Chapman. 1978. Sika deer and white-tailed deer on Maryland's eastern shore. Wildl. Soc. Bull. 6(3):155-157.

Fuchs, E.R. 1976. Behavior patterns of axis deer in Texas. MS Thesis, Texas A&M Univ., College Station. 177 p.

***Jackson*, A.W. 1964.** *Texotics. Texas Game and Fish.* April: 7-11.

Ramsey, C.W. 1968. State view of governmental and private programs of introduction of exotic animals. Symposium, Introduction of Exotic Animals. Texas A&M Univ., College Station. p. 9-10.

Ramsey, C.W. 1969. Texotics. Texas Parks and Wildl. Dep. Bull. 49:1-46.

Thomas, J.W., J.G. Teer, and E.A. Walker. 1964. Mobility and home range of white-tailed deer on the Edwards Plateau in Texas. J. Wildl. Manage. 28(3):463-472.

Young, E.L. Jr. 1973. Exotics. Texas Parks and Wildl. 31(8):2-8.

Part II

Fertilization of Northern Great Plains Rangelands: A Review

Paul E. Nyren

Grazing Season

Lengthening the grazing season on our native ranges is an important factor in getting the maximum feed production and utilization. While introduced grasses such as crested wheatgrass and Russian wildrye (*Elymus junceus*) have been very instrumental in lengthening the time animals can remain on grass, many ranch operations do not have or cannot afford the land to seed these "tame grasses." Goetz (6) in southwest North Dakota found that the application of 67 and 100 lb N per acre maintained the protein level of blue grama at or near the 10% level until September. On a Manning silt loam site, the 100 lb N per acre treatment showed an increase of 1.5 months of forage above 10% protein when compared to the check plots. Fertilization of native range has shown the ability to hasten the "turn out" date in the spring. Lorenz and Rogler (11) found that the yield of native range receiving 40 lb N per acre averaged 100 lb per acre on May 15, while range receiving fertilizer did not reach this level until June 1. Southeast Alberta ranges fertilized with medium to high rates of nitrogen and nitrogen plus phosphorus became green 7 to 10 days earlier in the spring and remained green longer in the fall. (Johnson et al. 8).

Species Composition

Much of the increase in production and earlier range readiness found in the studies mentioned above can be attributed to an increase in high producing cool-season grasses. When N fertilizer is placed within the range ecosystem, those plants which begin their growth early are able to make use of these added nutrients. Plants occurring in adequate numbers, gain a distinct advantage. The increased growth uses up a larger portion of the water stored within the soil and roots are more vigorous, thus occupying a larger portion of the soil. Top growth is more rapid and if not grazed shades the slower developing warm-season plants a distinct competitive edge when given added nitrogen fertilizer. Many investigators (1) (3) (5) (10) (16) (17) (18) throughout the Northern Great Plains have reported species composition changes brought about by N fertilization.

While there are distinct advantages to having more forage production earlier, there are reasons for not wanting to convert a native range completely to cool-season species. Western wheatgrass is a very aggressive cool-season grass in the Northern Great Plains, which often grows in association with blue grama, a less productive warm-season grass. The growth habits of these two species are such that total forage production is greater when they are growing in association than when either of them is grown alone. While western wheatgrass is an early producer, blue grama makes its growth later, furnishing green forage for the grazing animals during July and August. Thus it is desirable to maintain a mixture of these two species in order to obtain maximum dry matter production from the mixed prairie and to provide desirable forage for the grazing animal. Lorenz and Rogler (10) found that with 80 and 160 lb of N per acre, blue grama vigor was drastically reduced, but at the 40 lb rate, only a slight decrease in its basal cover was observed. This may explain why 30 to 40 lb N per acre gave the most efficient returns in studies on similar range sites.

Another more serious problem can occur on areas where cool-season weeds are present. The same competitive advantage afforded the desirable cool-season grasses is also given to these undesirable weeds. In areas where the weedy annual bromes have invaded native range, N fertilization can greatly aid in the increase of these weeds. Wilson, Harris, and Gates (23) found that fertilization of a cheatgrass (*Bromus tectorum*)-bluebunch wheatgrass (*Agropyron spicatum*) range greatly increased the cheatgrass at the expense of the perennial bunchgrass.

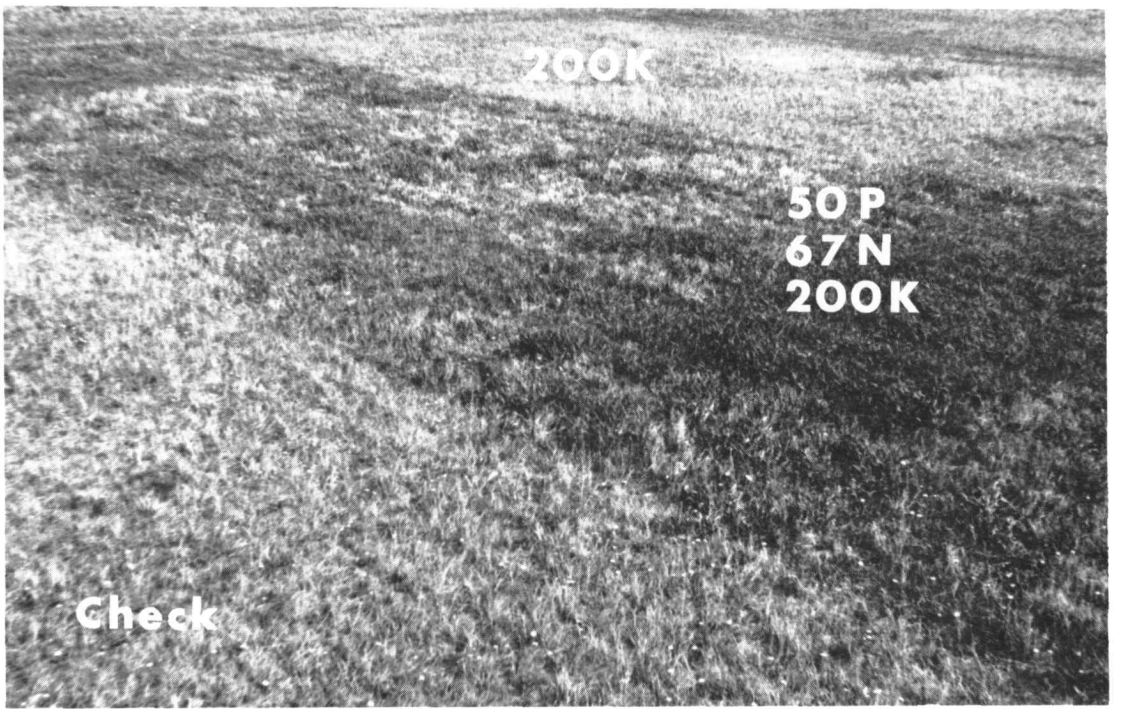
Improving Overgrazed Range

Fertilization of overgrazed or poor condition range can be instrumental in bringing about permanent range rehabilitation. Addition of N to a range ecosystem can cause a change in the species composition. Species which are most palatable and accessible to the animals will be depleted first on poor condition range. In many cases there are the early season grasses which will rapidly respond to nitrogen fertilizer if a few plants remain. Recovery will be much slower if the desirable plants are completely eliminated from the range because they will have to start from seed and their seedlings will have to compete with the less desirable plants which now occupy the site. In the latter case nitrogen fertilizer may slow recovery by increasing the competition from existing plants.

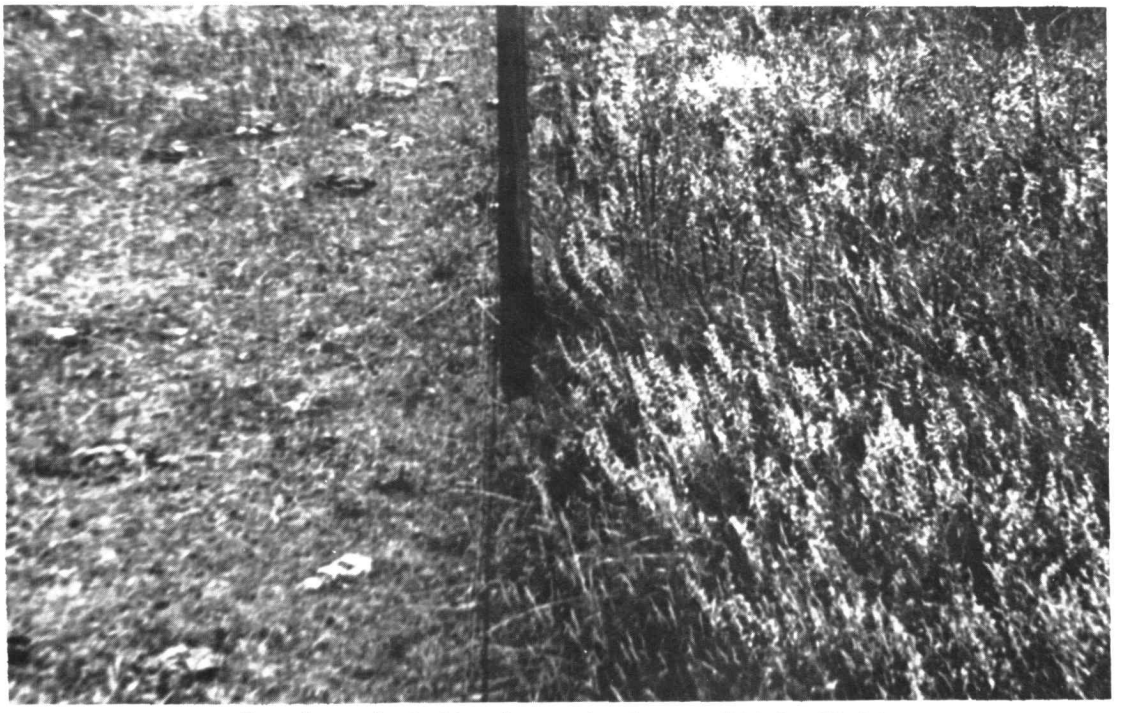
On an overgrazed range near Mandan, N.D., Rogler and Lorenz (16) found that 2 years of fertilization with 90 lb N per acre did more to improve range condition and production than 6 years of complete isolation from grazing. Cosper et al. (3) in eastern Wyoming found that a single application of nitrogen fertilizer to a deteriorated range site changed the botanical composition from predominantly forbs and shortgrasses to one of western wheatgrass and short grasses.

On overgrazed ranges where the invasion of weeds has occurred, the addition of a herbicide treatment with fertilizer application can speed recovery by removing the competition of the weeds. Nichols and McMurphy (13) found that applications of N and 2,4,-D to a depleted range site in western South Dakota significantly increased the percent frequency and production of perennial grass. They found that the combination treatments were more effective than either 2,4,-D or fertilization alone.

The author is a botanist, North Dakota Agricultural Experiment Station, Dickinson.



A portion of the fertility plots at the Dickinson Experiment Station showing the more rapid spring growth of the plot receiving 50P+67N+ 200K.



Fenceline contrast – A heavily grazed pasture was divided and the left rested for 11 years. The right was grazed each year but given annual application of 40 lb. N. per acre. Photo by Larry Marrow.

The discussion up to this point has been primarily concerned with nitrogen fertilizers. While this is the nutrient most limiting to plant growth on rangelands in the Northern Great Plains, the role of phosphorus (P) should not be overlooked.

Under normal circumstances, the response of native range to applications of P is small or nonexistent. However, when large amounts of N are applied, the increased growth of the vegetation can cause an increased demand for P. When small amounts of N are applied annually for a number of years, responses to P have been reported. Lorenz and Roger (12) found in an 8-year study that P alone did not produce significant yield increases. When 80 lb N per acre was applied with 18 lb P per acre, no added response was observed the first 2 years. In the following 6 years of the study, however, the 80N + 18P treatment did yield significantly more forage than 80 lb of N alone. The authors also found that the plots receiving 80N + 18P yielded significantly more than did the plots which received 160N.

Summary

Fertilization of Northern Great Plains ranges can increase forage production several times. While high rates generally give the greatest yield increases, low to medium rates have been shown by most researchers to give more efficient returns. Moderate rates of fertilizer has been shown to improve the condition of overgrazed range more economically than revegetation or protection from grazing. Increases in crude protein and total digestible nutrients are also obtained with applications of N.

Spring and fall applications have been shown to increase cool-season grasses. Much of the added production from fertilization of Northern Great Plains ranges is due to this increase in high producing cool-season species. Late spring applications of nitrogen fertilizer are best on warm-season grasses because at this time, the cool-season plants have made some of their growth and are less able to take advantage of the added N.

Palatability and utilization are also improved by nitrogen fertilization. Research has shown that the distribution of range livestock can be improved by fertilizing low use areas. The number of "wolf" plants is decreased due to better utilization of the more palatable forage.

Phosphorus fertilization can also improve forage yields. While not as limiting as N, it has been shown that when large amounts of N are applied, the addition of P can further improve yields. If small amounts of N are applied to ranges over a period of years, P can become limiting to growth.

Ammonium nitrate is by far the most widely used source of N in range fertilization. Urea is a lower cost form of N, but because of its volatility cannot be broadcast without the danger of some loss. Fertilization of our rangelands is a management tool, and because it is a tool it must be used wisely in order to be effective. No one management tool can be expected to solve our problems. They must be integrated in the total management program in such a way as to maximize the benefit of each one. Each manager must make the decision where, when, and to what extent to use each of these tools under his circumstances in order to receive the maximum benefits. The disadvantages of cost, increase in cool-season weeds, and the decrease in warm-season grasses must be weighed against the advantages of increasing forage quality, lengthening the grazing season, increased palatability, increases in high producing cool-season grasses, better plant vigor, and more efficient use of soil moisture by larger healthier roots.

Literature Cited

1. **Choriki, R.T. 1968.** Sometimes fertilizer can improve range. Montana Farmer-Stockmen. March 7, 73-75.
2. **Cook, C. Wayne, 1965.** Plant and livestock responses to fertilized rangelands. Utah Agr. Exp. Sta. Bull. 455.
3. **Cosper, H.R., J.R. Thomas, and A.Y. Alsayegh. 1967.** Fertilization and its effect on range improvement in the Northern Great Plains. J. Range Manage. 20: 216-222.
4. **Dee, Richard F., and Thadis W. Box. 1967.** Commercial fertilizers influence crude protein content of four mixed prairie grasses. J. Range Manage. 20: 96-99.
5. **Goetz, Harold. 1969.** Composition and yields of native grassland sites fertilized at different rates of nitrogen. J. Range Manage. 22: 384-390.
6. **Goetz, Harold. 1975.** Effect of site and fertilization on protein content of native grass. J. Range Manage. 28:380-385.
7. **Goetz, Harold. 1976.** Botany Department Annual Report. North Dakota State Univ.
8. **Johnston, A., S. Smoliak, A.D. Smith, and L.E. Lutwick. 1967.** Improvement of southeastern Alberta range with fertilizers. Can. J. Plant Sci. 47: 671-678.
9. **Lorenz, Russell J., and George A. Rogler. 1966.** Rootgrowth of Northern Great Plains grasses under various fertilizer and management treatments. Amer. Forage and Grassland Council Proc. Feb: 1-10.
10. **Lorenz, Russell J., and George A. Rogler. 1972.** Forage production and botanical composition of mixed prairie as influenced by nitrogen and phosphorus. Agron. J. 64: 244-249.
11. **Lorenz, Russell J., and George A. Rogler. 1973.** Growth rate of mixed prairie in response to nitrogen and phosphorus fertilization. J. Range Manage. 26: 365-368.
12. **Lorenz, Russell J., and George A. Rogler. 1973.** Interaction of fertility level with harvest date and frequency on productiveness of mixed prairie. J. Range Manage. 26: 50-54.
13. **Nichols, James T., and Wilfred E. McMurphy. 1969.** Range and recovery and production as influenced by nitrogen and 2,4-D treatments. J. Range Manage. 22: 116-119.
14. **Nyren, Paul E., and Warren C. Whitman. 1976.** Botany Department Annual Report. North Dakota State University.
15. **Power, J.F. 1970.** Nitrogen management of semiarid grasslands in North America, Int. Grassland Congr., Proc. 11th (Surfers' Paradise Aust.) p 468-471.
16. **Rogler, George A., and Russell J. Lorenz. 1957.** Nitrogen fertilization of northern great plains rangelands. J. Range Manage. 10: 156-160.
17. **Rogler, George A., and Russell J. Lorenz. 1965.** Nitrogen fertilization of natural grasslands in Northern Great Plains of the United States. Int. Grassland Congr. Proc. 9th. Sao Paulo Brazil. p 1327-1330.
18. **Rogler, George A., and Russell J. Lorenz. 1974.** Fertilization of mid-content range plants. In Forage Fertilization. D. Mays (Ed.) p 231-254.
19. **Ryerson, Don, Ray Roath, Dick Rohde, Gorden Maxness, and Walter Cornwell. 1974.** Vegetation response to fertilization, grazing and deferment of grassland Communities in Buggy Creek state grazing district. Montana Agr. Exp. Sta. Res. Rep. 64.
20. **Smika, D.E., H.J. Haas, and George A. Rogler. 1963.** Native grass and crested wheatgrass production as influenced by fertilizer placement and weed control. J. Range Manage. 16: 5-8.
21. **Smika, D.E., H.J. Haas, and J.F. Power. 1965.** Effects of moisture and nitrogen fertilizer on growth and water use by native grass. Agron. J 57: 483-486.
22. **Smith, D.R., and R.L. Lang. 1958.** The effect of nitrogenous fertilizers on cattle distribution on mountain range. J. Range Manage. 11: 248-249.
23. **Wilson, A.M., G.A. Harris, and D.H. Gates. 1966.** Fertilization of mixed cheatgrass-bluebunch wheatgrass stands. J. Range Manage. 19:134-137.

The Political, Economical and Social Considerations for Range Management in the 1980's

Dean A. Rhoads

The topic with its ramifications is a challenge. The future of the continuation of grazing livestock on federal lands in the 1980's is bleak!

Let's briefly analyze the past history of the people, agencies, and general public on our public lands. Ever since 1935 when the Taylor Grazing Act was passed, conflicts have resulted between the people administering the Act and the rancher. The land agency was not always at fault; after all it was only trying to follow the intent of Congress. Many times, though, the agency's interest was challenged and criticized by many. Resentment and lack of cooperation grew bigger into the 1960's; however, relationships were starting to ease off in the early 1970's when the E.I.S. (environmental impact statement) situation arrived—an issue many of us still feel was lost on purpose by the Bureau of Land Management.

We have had three significant pieces of public land legislation since 1935—the Taylor Grazing Act, the "Organic Act" of 1976, and the Public Rangelands Improvement Act of 1978. Thousands and thousands of rules and regulations have been born and raised out of these three Acts. Many of these "offspring rules" have become notorious and very unreasonable and have done little to alleviate our problems on public lands.

We seem to have lost sight of our professed mutual objective of better range management on the public lands. A good way to get a perspective on what has happened is to visualize two tractors out in the field, one belonging to the land agencies and one to the livestock industry. These two tractors are lined up and pulling against each other. This has been going on much of the time since 1935. Hopefully, the settlement of the very explosive grazing fee issue will help rectify some of these hard feelings, but we suddenly have other problems.

Along comes the 1960's and another tractor pulls into this same field, driven this time by the environmentalists—a group that has over 5 million people in its twelve largest organizations, and is funded to the tune of over $48 million per year. They also line up with the federal land agencies, and they'll pull against the livestock industry in efforts seemingly designed for a drastic reduction of grazing on much of our public lands. They demand that we produce more food, cheaper, but do it on fewer acres with more restrictions, rules, and harassments.

A good example of these two tractors pulling together against the livestock is the recent policy established by the Bureau of Land Management on crested wheat. In May of 1977 President Carter issued an executive order which stated in part that an exotic species is defined as "all species of plants and animals not naturally occurring, either presently or historically, in any ecosystem of the United States."

The BLM, and I believe because of pressure from the environmentalists, has taken this to mean that no exotic species may be introduced which does not now occur within any of the ecosystems in the United States. Let's look very briefly at one state's history of success and failure of crested wheat plantings—Nevada. Our first seedings were in the late 1930's. Since that time, 1,200,000 acres of crested wheat have been planted in Nevada. BLM has now stopped seeding this valuable grass apparently because it is an exotic. At the same time, two other federal agencies continue to seed crested wheat—the Forest Service and Federal Highway Department. One wonders—who is running the BLM?

If these two forces were not enough to discourage the rancher, suddenly in 1979 a third tractor came rolling along, even bigger than the first two. Some might call it the proposition 13 vehicle. The conservative trend is suddenly on us. The driver of this third tractor has suddenly become the American public via Congress. So now you can see we have a giant conglomeration pulling against us during these recent months when this third powerful faction has pulled into the lineup. This new opponent is, and will unfortunately be, placing food production on its lowest list of priorities.

While this is going on, the federal government seems to be in agreement with the environmental philosophy that fewer acres will be available to produce the food that will be necessary. They, these three groups—environmentalists, federal government, and now the mood of Congress—are sending signals back to us: don't use those lands to grow meat. I question these signals. God created this world to be used, and if he didn't—why did He put man on it?

We have RARE II (roadless area review and evaluation), conducted by the Forest Service, which is putting a minimum of 15 million acres into wilderness areas; and in addition we have BLM's proposal, which will probably be larger—never to be used again. It is like sentencing these millions of acres to life imprisonment—with no chance of parole. Sure, grazing can continue in wilderness areas, but the restrictions and harassment in their use will cause most of us to stop using them. Once a permit goes vacant, as history has proven in a wilderness area, it will no doubt remain vacant. The amount of unreasonable rules, regulations, and harassments are almost insurmountable.

The problem, however, will be the order of priorities. Some of our most needed programs are going to get shorted severely. This will include dollars spent for range improvements on National Forests and lands administered by BLM. Many legislative mandates will be ignored and postponed because of no dollars. The policy of federal land agencies will be reductions of livestock until range improvement dollars are available. A long time is predicted for such a happening to occur. We have a sad situation. The environmentalists are demanding and accomplishing less production on fewer acres and little chance of range improvements due to the current mood of Congress and the administration. The federal land agencies are scared almost completely to death of environmentalists on every move they

Dean Rhoads, rancher, president Public Lands Council and speakers in the plenary session, SRM Annual meeting in Casper, Wyoming. February 1979. This article was adapted for *Rangelands* from his talk there.

make. They are afraid they might end up in court again—an arena the environmentalists have been so successful in. Then add the fact that the Congress, who probably will be doing what we the people want, will quit spending so many dollars. With this problem, are chances for improved range conditions are slim; so we might have to live with our existing laws, more regulations, and less funds as is now available. It is unfortunate, however, that the production of food will be the one to suffer.

I believe it is time for Congress to seriously consider old ideas with a new approach. It has been suggested in the past to Congress, to the land agencies, and to the environmentalists that we ranchers would spend our own money to improve the public lands if given an opportunity. I am sure that the private ranching operations could make most of these range improvements at a third of the cost that the government is now undertaking. We could begin immediately to improve these lands by financing many of the developments ourselves, thus saving the government millions of dollars. The plan would work on a credit down through the years on grazing fees. As I see it in the near future and in the long range, this is the only way that range improvement dollars will be available in the next 10 years. So far, efforts by the livestock industry and some members of Congress for this venture have been unsuccessful due to the opposition of the land agencies.

It is rather ridiculous for the federal agencies to spend millions of dollars for nonproductive efforts. A good example of this are the 152 EIS's currently under preparation. So far, a lot of the EIS's are costing nearly a million dollars apiece. I'm sure when the American public finds this out it will not tolerate this wasteful spending. Especially when the end results will mean less food production and result in higher food costs to the consumer.

I have requested the BLM director, Frank Gregg, to make available a complete detailed report on the amount of dollars spent on these EIS's. We are spending millions of dollars for paper work only, while the ranges receive no measurable dollars for improvement. Perhaps our Western Congressional delegation should hold an oversight hearing on this problem. A hearing concerning the actions taken by not only the land agencies, but also the activities of the national Environmental Protection Agency as to how it has affected and is affecting range conditions in the West, is definitely in order.

I hope that you members of the Society for Range Management will help. The next 10 years will probably decide the density of whether we as family operators can continue in the livestock industry of tomorrow.

In conclusion I plead with you. Let's all work together, the Society for Range Management, the BLM, Forest Service, the many environmental groups, and the livestock industry for the benefit of a more productive public lands for tomorrow. Let's turn all those tractors around the other way and pull together. The results could be tremendous. ●

Change and Challenge of the 1980's

Guy R. Martin

Proper management of rangelands is one of the highest priorities in the Department of Interior. This article will tell of the changing role of rangeland management in the 1980's and social, economic, and political aspects associated with it.

The decade of the 1980's is to be a decade of challenge and change. The change is not the effort of a few for the discomfort of many—especially those who live in the West. Result of change is molded by events that reflect new public attitudes in the outlook of the courts, in the laws that regulate the public lands, and in changing economic conditions. This Administration is committed to achieving those changes in range management that will produce a healthy vegetative resource that can support an economically viable livestock industry, a thriving base for wildlife, wild horses and burros, and proper watershed management.

John Wesley Powell, in 1878, described the public range as lands whose value consists only in the scant grasses which they spontaneously produce and that the value could only be made available by the use of water for the sustenance of livestock. Gifford Pinchot said, "The planned and orderly development and conservation of our natural resources is the first duty of the United States. It is the only form of insurance that will certainly protect us against the disaster that lack of foresight has in the past repeatedly brought down upon nations since passed away."

During most of the 19th century, public land policy was basically one of nonfederal ownership to encourage settlement and development. Just before 1900, emphasis in public land policy began to shift towards retention of some lands in federal ownership for conservation of watersheds, preservation of natural beauty, and protection of timber lands. The shift began to increase in the early part of the 20th century with concern for wildlife and arid grazing land (Taylor Grazing Act, 1934) and recreation.

The United States Congress reinforced these changing concepts with passage of major, innovative legislation:

★ The Classification and Multiple Use Act of 1964 was a new approach to provide authority to manage the lands for recreation and other purposes.

★ The National Historic Preservation Act of 1966 requires that effects of each federal undertaking upon cultural resources be evaluated and that adverse effects be mitigated. This Act sets forth basic concern of the nation for preservation of its heritage.

★ The National Environmental Policy Act of 1969, expressing a major concern for quality of the environment, requires a detailed statement on major federal actions significantly affecting quality of human environment.

★ The Endangered Species Act of 1973 declared that all federal departments and agencies seek to conserve endangered

The author is Assistant Secretary of Interior for Land and Water Resources. This article was condensed from an address the Secretary made at the plenary session, 32nd Annual Meeting of the Society for Range Management, February 12, 1979, at Casper, Wyoming.

and threatened species and utilize their authorities to provide suitable habitat.

★ The Federal Land Policy and Management Act of 1976, the Bureau of Land Management's Organic Act, provides that public lands be retained in federal ownership, that public land resources be inventoried, and that land use planning and management be on the basis of multiple use and sustained yield principles.

★ The Public Rangelands Improvement Act of 1978 declared that the public rangelands are producing less than their potential and established a national policy to manage, maintain, and improve condition of range so that it becomes as productive as feasible for all rangeland values. This Act is the most recent Congressional action which provides specific direction and policy to the future of public rangeland management.

The process of change is continuous, but the rate of change is not. In the field of public lands management, the rate of change is increasing exponentially.

Recently there has been a change in public attitudes. More people are concerned about the way we manage the public lands than ever before. At the same time, people have become more representative of the broad spectrum of society and geography. These people absolutely reject the concept that only commodity-type users must be concerned with the way the Bureau of Land Management administers public land, and they also reject the idea that only Westerners should have a say in what happens.

One reason this change may be more noticeable in the West is that in a real sense it has not happened here. Changes have occurred to be sure, but here there are large areas where the view of the "good life" has not changed. Pioneer values of self-reliance and independence, with close ties to land and its products, are still alive and well. This gives the Westerner a benchmark against which to measure society and the changing values. These changes are frightening to some.

Some Americans are more concerned about how we manage the wild horses than about domestic livestock grazing or even wilderness. Over 100,000 pieces of mail in the last few years attest to this.

Recognition of changing values and demands in relation to public land management for multiple purposes is implicit in planning range management for the 1980's. The future of public rangelands will depend on the adoption and implementation of sound public land laws and policies that will assure environmental quality, and, at the same time, encourage healthy economic growth.

The value of land changes over time with population increases. The highest and best use of many public land areas today is not the same as it was 50 years ago, nor will it remain static for the remaining time of the 20th century.

Economic conditions, supply and demand factors, national and regional goals all impact our objectives in managing public lands. The state of the economy has a definite influence on Federal appropriations and public willingness to invest in the management of public rangelands. At the same time, social values and desire for a productive, healthy range contribute to obtaining a commitment of user groups, conservation organizations, the Administration, the Congress to ensuring that rangeland resources are protected and enhanced. Cooperation is needed to achieve this goal.

These considerations led me to make the Department's range program one of my highest personal priorities when I took this position two years ago. I was working fertile ground, as it turned out, because the Secretary enthusiastically supported truly new initiatives each time they were advanced. A short list of what's been done is instructive about our policy:

★ In the first BLM budget (for fiscal year 1978), I advocated an increase in all range areas, which truly changed past practice. The Secretary not only supported it, but went to the President to nail it down after seeing it cut out at O.M.B. We did the same the next year. Thus, in only two years, over $10 million were added in the Administration budget, reversing years of history which saw range funds lose out.

★ The 4-year authorization request by the Administration followed the same pattern, surpassing in its level of requested authority both previous budgets and all expectations. The receipt of this proposal in Congress provided a clear incentive on this issue because it signaled a genuine and sizeable commitment to improvement of the public range.

★ The Department early committed itself to not reacting against the court-ordered Environmental Impact Statements, but rather to using them as the best possible management tools under the circumstances. Rather than deal only with grazing, they have been developed to deal with the whole spectrum of uses and management actions. We are now firmly on a course to get them done on the court-ordered schedule. Environmental Impact Statements were an early impetus and source for funding for gathering badly needed range data.

★ We fought hard to see that the District Multiple Use Advisory Boards were spared in the overall Advisory Board cutback, and while unsuccessful, we strongly support the section in the Rangeland Act mandating them.

The above are some of the things we have done which indicate our approach to the task ahead. We are prepared to do much more.

Soon, we will be prepared to ask you to review a draft of the Rangelands Management Program. The draft is a comprehensive strategy which establishes the policies and objectives of the Department for rangeland management for the next 20 years. It establishes schedules for completion of inventory, planning, environmental statements and on-the-ground improvement work. It describes our budget strategy for making it work.

Writing the Program has helped us understand the particular problems we face, and your full participation in reviewing it will make the process even better. Here, briefly, are the objectives identified thus far for the next 20 years.

We intend to improve vegetative condition of the range, reduce erosion and insure stability of the soils, make sure that sufficient water quantity and quality is available for all public land resource needs. We plant to minimize short-term disruption and ensure long-term stability of western livestock industry and economies of many western communities through cooperative management.

We intend to increase forage supplies for all types of animals on public lands as well as provide protection of threatened and endangered plant and animal species. Protection of habitat for fish and wildlife; management and protection of floodplains and wetlands; and protection of areas of special, natural, scenic, historical, cultural, and scientific value will be provided. Public involvement of all interested parties in planning, managing, and administering our rangeland resources is essential.

There are other new concepts and directions we are pursuing. Establishment of the Experimental Range Stewardship Program is progressing; reorganization in the Washington office of the various disparate rangeland functions into a single comprehensive unit is being developed; improvement of the quality of BLM's relationship to the range science community is beginning. We have started to identify sources of assistance to provide the techniques needed to mitigating the economic effects of needed management actions. We are also ready to deal decisively with

the problem of intermingled ownership by developing new working arrangements that will provide the best management for the overall range resource.

My hope is that these actions, more than any words or good intentions, will characterize the commitment we are bringing to the overall task of recapturing the vitality of the American range. To succeed, we will have to put many past practices and attitudes aside as we create an alliance having a common interest in the basic rangeland resource. This alliance will require that the most constructive and tolerant elements of every involved interest must provide unprecedented levels of leadership and understanding of long-term objectives of range recovery.

"Sistemas de Pastoreo"—¿Superfluos y Complicados?

José S. Gutiérrez y Luis C. Fierro

Debido a la importancia de los pastizales, ya que estos constituyen la base de la ganadería extensiva en diversas zonas del mundo, es de primordial importancia el darles una utilización adecuada con el objeto de evitar su deterioro. Sin embargo, existen extensas áreas donde deibido al pastoreo inmoderado o sobrepastoreo se ha reducido notablemente la productividad de los pastizales, éste ha sido el caso de la zona norte de México, considerada como la zona ganadera más importante de tipo extensivo en el País. La condición en que los colonizadores españoles encontraron a mediados del siglo XVI, los pastizales del norte de la Nueva España (hoy norte de México y Suroeste de los Estados Unidos), dio origen a una importante industria ganadera que aún persiste. El pastoreo era continuo y generalmente inmoderado, dada la abundancia de forraje y las amplias extensiones disponibles. Esta situación ocasionó serios cambios en la vegetación, particularmente en lo que a productividad se refiere.

Hoy diá, el ganadero se encuentra con pastizales en condición pobre, enfrentándose a muy altos costos de producción, que lo obligan a intensificar el manejo de su rancho, para aumentar la productividad de su predio y continuar en el negocio de la ganadería. Para tal fin, deberá identificar el factor o factores que el pueda regular o modificar para aumentar su producción y eficiencia, estos factores serán la vegetación y principalmente su ganado. Dicha modificación de vegetación y ganado, será posible llevarla a cabo con la infraestructura que posea, particularmente cercos y aguajes, pudiendo de esta manera diseñar o adoptar un sistema de pastoreo, mas, ¿qué es realmente un sistema de pastoreo?, ¿será algo complicado que recomiendan los técnicos, y que tal vez resulta inútil? Empecemos pues por definir qué es un sistema de pastoreo. Se le ha definido como el control del ganado en tiempo y espacio, con el propósito de mantener o incrementar la producción forrajera y por ende la producción ganadera. Un sistema de pastoreo involucra cinco factores básicos: 1) carga animal; 2) tipo de animal; 3) época de pastoreo; 4) distribución del pastoreo; y 5) frecuencia del pastoreo.

Las diferencias existentes entre los sistemas de pastoreo pueden ser atribuibles a la variación de estos factores, siendo el más importante de estos la *carga animal,* ya que cualquier sistema de pastoreo funcionará mejor con una carga adecuada, ya que si la carga animal es alta, las plantas deseables perderán vigor al ser sobrepastoreadas y desaparecerán eventualmente del área, y al darse el caso de que el sobrepastoreo continue, se originará la degradación del pastizal provocándose la erosión. Por tal motivo, no existe sistema de pastoreo que nos permita ignorar la carga animal. Por supuesto a este factor se encuentran íntimamente asociados los cuatro restantes, sobresaliendo comúnmente el factor tipo de animal. No es raro escuchar en los medios ganaderos que si bien las cabras, los ovinos o el ganado caballar son altamente destructivos, y además causantes de la destrucción de tal o cual área. En repetidas ocasiones estas afirmaciones limitan o frenan el fomento de estas especies, desgraciadamente en detrimento de la economía del País. Con esto no se trata de decir que estas especies no pueden ser destructivas, sino lo que se quiere asentar es el hecho de que *cualquier* especie, si no está debidamente *manejada* puede ser altamente destructiva, sobretodo si no se respeta la capacidad de carga del terreno en cuestión. Obviamente especies como los caprinos, ovinos y equinos, dadas sus preferencias y hábitos de comportamiento son más destructivos si no se *manejan debidamente.*

Existen diversos tipos de sistemas de pastoreo, todos ellos dessarrollados con el fin de lograr una mejor utilización y distribución del pastoreo, así como de incrementar la producción del ganado, basados en el conocimiento de que la vegetación necesita un manejo adecuado, ya que el pastoreo tiene un impacto directo sobre ella, debido a la reducción del forraje, reconociendo que para mantener una cubierta densa y vigorosa de plantas forrajeras deberá dejarse suficiente follaje que permita la manufactura de reservas alimenticias y proteger las plantas durante el letargo. González (1976), indica que el potencial para el mejoramiento de la producción forrajera en el norte de México utilizando sistemas de pastoreo es del orden de un 40% a corto plazo, y de un 120% a largo plazo. Este mejoramiento en la producción forrajera, se verá reflejada en la producción ganadera, estimándose un incremento de 10% y 20% a corto y largo plazo, respectivamente. Estas estimaciones están basadas en trabajos de investigación realizados en le zona mencionada, y son clara muestra de lo que se podría incrementar la ganadería únicamente con la adopción de

Al tiempo de escribir este artículo los autores eran estudiantes de postgrado en el Depto. de Manejo de Pastizales de Utah State University. Actualmente son investigadores del Instituto Nacional de Investigaciones Agrícolas-SARH, y del Instituto Nacional de Investigaciones Pecuaris-SARH, respectivamente.

un sistema de pastoreo *adecuado*. Sin embargo, no es raro encontrarse con recomendaciones "al vapor" de un sistema de pastoreo, o bien la adopción de un sistema sin ninguna adaptación o consideración local. Los resultados no se hacen esperar, ya que un sistema de pastoreo mal planeado y ejecutado tendrá resultados más negativos sobre el pastizal y la empresa que el mismo sobrepastoreo. Además de la respuesta de la vegetación y el ganado, es necesario considerar el costo de establecimiento, ya que aunque con la infraestructura que un rancho posea es posible aplicar un sistema de pastoreo sin mayor problema, habrá muchos casos en que no se cuente con los cercos y aguajes necesarios, lo cual significará altos costos adicionales. Desafortunadamente tal sería el caso del norte de México, donde se determinó que el 27% de los predios ganaderos tenían solamente un potrero, y el 86% de estos, no tenía ningún aguaje permanente (CFAN-CID 1965).

Normalmente, los sistemas de pastoreo tienen un nombre descriptivo que los identifica, además de una descripción específica sugerida por la Sociedad de Manejo de Pastizales (Range Term Glossary Committee 1974-Society for Range Management). Dicha descripción específica consiste en el número de potreros a utilizar, el número de hatos, la duración del período de pastoreo y la duración del período de descanso. Por ejemplo, el Sistema de Rotación de Merril, que es uno de los más conocidos, se le menciona técnicamente como Sistema Merril (4-3; 12:4 m), lo cual significa que el sistema Merril requiere de *4* potreros-*3* hatos de ganado; un período de pastoreo de *12* meses y *4* meses de descanso. Lo anterior sirve para entender fácilmente cualquier sistema, además de describirlos propiamente en algún artículo científico sobre el particular.

El sistema de pastoreo más común, es lógicamente el llamado Pastoreo Continuo, un sistema que por barato y fácil de llevarse a cabo, ha sido utilizado por prácticamente todos los ganaderos y que además permite al ganado hacer una mejor selección de su dieta. Sin embargo, estas importantes ventajas se pueden ver opacadas por el hecho de que el animal al ser selectivo sobre las mismas plantas, pueden dañar seriamente las plantas forrajeras deseables, por este motivo la mayor recomendación es que se utilicen cargas moderadas, además de una buena localización de aguajes, saladeros, sombreaderos, etc., para lograr una mejor distribución del pastoreo. Con esto por ningún motivo se atenta contra el pastoreo continuo, ya que como antes fue mencionado, los efectos destructivos pueden ocurrir en cualquier otro sistema, si se ignora la carga animal. El resto de los sistemas de pastoreo a diferencia del pastoreo continuo, implican algún tipo de rotación de potreros y/o animales, y se considera que precisamente la rotación es una de las medidas más utiles para lograr mejorar la condición de los potreros.

Se considera un sistema de rotación aquel que se aplica en un pastizal dividido cuando menos en dos partes, asumiendo tres puntos básicos: 1) Grupos numerosos de animales hacen un uso más uniforme del forraje; 2) las ganancias de pesos de los animales no son sacrificados; y 3) aún cuando las ganancias de peso sean sacrificadas el mejoramiento de la condición de los pastizales será suficiente para compensarlas.

El clásico ejemplo del sistema de rotación, es el Sistema Hoenheim desarrollado en Alemania para vacas productoras de leche. En este sistema un potrero es subdividido en unidades, y a las vacas más productoras de leche se les da acceso a una unidad cuando el forraje es más nutritivo, al salir estas vacas, se meten en la misma unidad las vacas menos productoras y finalmente las vacas secas. Sistemas similares se han desarrollado en Australia y Nueva Zelandia con el mismo propósito, sobretodo en praderas cultivadas. Aunque este sistema no es precisamente adecuado o real para las condiciones de nuestros pastizales y ranchos ganaderos, el principio económico de correlacionar el valor nutricional del forraje con los requerimientos del animal es muy deseable. La adaptación de este principio a nuestras condiciones, radica en que por ejemplo las vacas lactantes deberán pastorear los mejores potreros y las gestantes o vacías serán más adecuadas para pastorear el forraje menos nutritivo. También es aplicable a que se utilice un tipo vegetativo en la época en que éste proporcione la mayor y mejor calidad de nutrientes, tal sería el caso de un matorral de gobernadora (*Larrea tridentata*) que puede proporcionar una cantidad considerable de nutrientes en base a las especies anuales que aparecen durante las lluvias, o bien el de un bajío de zacatón alcalino (*Sporobolus airoides*) que ofrece un forraje de alto valor nutricional durante la época de crecimiento. Bell (1973), hace una amplia y acertada descripción de los principales sistemas de rotación, haciendo hincapié en que para las condiciones áridas y semiáridas se requiere de un mínimo de cuatro potreros para llevar a cabo un sistema de rotación efectivo.

En los últimos tiempos se han originado sistemas de pastoreo más intensivos y/o elaborados que aún se encuentran en proceso experimental, estos son el "Sistema de Alta Intensidad y Baja Frecuencia" (High Intensity-Low Frequency) y el "Sistema del Mejor Potrero" (Best pasture System), los cuales serán adaptables a cierto tipo de ranchos, dependiendo de su extensión, tipo vegetativo, infraestructura y tipo de operación. A manera de detalle interesante, el "Sistema del Mejor Potrero es en esencia la práctica que muchos ganaderos llevan a cabo en el norte de México y en muchas partes del mundo, de colocar el ganado en el potrero que le ha llovido o que en mejor condición se encuentre.

A grandes rasgos, se ha visto, que los sistemas de pastoreo no son necesariamente complicados, y por ningún motivo superfluos, sino que más bien representan uno de los métodos más fáciles y efectivos de aumentar la producción ganadera. Por supuesto que no siempre un buen sistema de pastoreo puede ser la solución para mejorar un pastizal sobrepastoreado, ya que se encontrarán situaciones en que el pastizal está tan deteriorado que se requiera de un programa de revegetación para volver a hacerlo productivo.

El ganadero o técnico que se interesa en un determinado sistema de pastoreo, deberá entender su situación y hacer la selección que más se ajuste a sus condiciones y necesidades. También, deberá considerar que las especificaciones y calendarización de sistema que sirve como guía del programa, deberán ser flexibles para cualquier emergencia o imprevisto que se presente.

La respuesta al uso de un buen sistema de pastoreo podrá ser dramática y notable en los primeros años, aunque en la mayoría de los casos necesitará de un período mayor para realmente apreciar los beneficios.

Finalmente podremos decir, que realmente es bastante fácil entender, que a mejores pastizales, mejor ganado y mayores ganancias.

Literatura Citada

Bell, H.M. 1973. Rangeland management for livestock production. Univ. of Oklahoma Press. Norman. 303 p.

CFAN-CID. 1965. Estudio integral preliminar sobre la ganadería de la zona norte de la república mexicana. Tomo IV. COPARMEX, México, D.F.

Gonzales, M.H. 1976. En la producción de alimentos la ingeniería y el potencial de tierras no cultivables. Ingeniería Agronómica. Año 2, No 2 p. 31-40, México, D.F.

Range Term Glossary Committee. 1974. A Glossary of Terms Used in Range Management. 2nd. ed. Soc. for Range Manage. Denver, Colo. U.S.A.

Lehmann Lovegrass

Danny Freeman

Lehmann lovegrass (*Eragrostis lemanniana*) is a perennial grass growing about 12 to 20 inches tall. It has long, fine, sometimes prostrate stems that often root at the joints. Dr. L. Neal Wright, a grass breeder with USDA Science and Education Administration, headquartered at the University of Arizona at Tucson, has done considerable research work on this grass. In fact, he has spent the past 25 years working with it as well as other aridland grasses. His main objective with Lehmann lovegrass has been to develop a strain or cultivar for maximum seedling establishment, plant survival, erosion control, and forage production. The cultivars he has developed do best below about 1,400 meters (4600 feet) elevation with 25 to 35 cm annual rainfall (10-14 inches).

The grass is well adapted to warm climates and low elevations, but winterkills in higher and colder climates. It is fairly palatable to livestock and game, especially when it is tender green in early spring and later in summer and fall after rainstorms. Most years it will make two seed crops, is fairly easy to establish, and spreads naturally with little effort.

Background information indicates that Lehmann lovegrass was introduced to the United States from South Africa in 1932. The seed was sent by M. Willmann, a seed collector from Kimberly, Union of South Africa, to F.J. Crider, United States Department of Agriculture.

This is an interesting fact because, undoubtedly, Wilman lovegrass, also a native of South Africa, was named in honor of M. Willmann. (Wilman is probably an American misspelling of Willmann). Wilman lovegrass (*E. superba*) is a very beautiful grass. It has spreading panicles with distinctive spikelets that have been used many times as decorative table centerpieces for formal and informal occasions. However, it has proved to be too delicate to withstand the harsh climate and conditions of the American Southwest.

Lehmann lovegrass, on the other hand, is very hardy and was first grown in the United States in the 1930's in the Soil Conservation Service Nursery at Tucson by Charlie Marshall, then later by Louis P. Hamilton when he became manager of the nursery, now called Plant Materials Center.

There is speculation as to how the grass obtained its name. Presumably, it is named for a Mr. Lehmann—but there is nothing definite on that. Even more speculative is how it got the name of lovegrass. Since South Africa was settled by the British we can assume that it may have happened something like this. An early English settler might have said: "My animals love that bloody grass, even though the bloody pollen gets in my weeping and loving eyes." That also might account for the name of a sister grass, *Eragrostis curvula,* commonly called weeping lovegrass, which also was introduced from South Africa.

In passing I might mention Boer lovegrass (*E. curvula* var. *conferta,* formerly *E. chloromelas*)—another from South Africa. It grows at higher and colder elevations than Lehmann lovegrass, but is difficult to get established.

Larry K. Holzworth, Tucson Plant Materials Center manager, says the Center is working on two more lovegrasses at the present time. One is atherstone lovegrass (*E. trichophora*) from Pretoria, South Africa. It is a large, vigorous, tufted, perennial bunchgrass. The second, plains lovegrass (*E. intermedia*), is an attractive native of Arizona, prized for its palatability and long growing season.

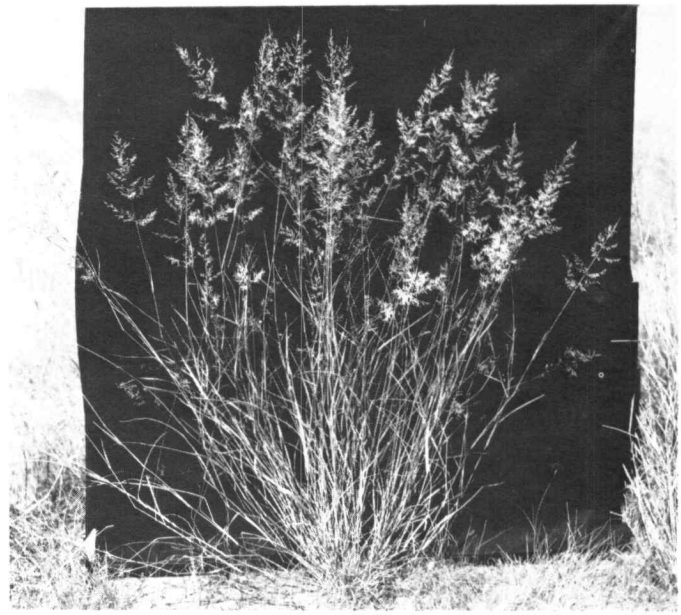


Photo: Courtesy Ervin M. Schmutz, University of Arizona

Lehmann lovegrass (Eragrostis lehmanniana).

My interest and first contact with Lehmann lovegrass goes back to when I was an SCS range conservationist at Warren, Ariz., near the Mexican border. In the summer of 1939—40 years ago—Louis Hamilton gave me 10 pounds of Lehmann lovegrass seed from the Tucson Nursery and asked me to try it in the field since it had never been grown outside of a nursery.

I took the 10 pounds, and with the help of Civilian Conservation Corps (CCC) boys planted the seed by hand on 100 acres of freshly contour-furrowed poor condition rangeland in southeastern Arizona on the Charlie McKinney ranch south of Pearce in Cochise County.

Lehmann was just a part of the seed mixture, and a rather insignificant part at that, because there were about 4 or 5 hundred pounds in the total mixture—but as it turned out it was the only grass that came up. It wintered well, appeared to be palatable, not so well liked by stock as were the native grama grasses, but it seemed to have promise. The next summer we seeded the new grass on three ranches in southern Arizona: the Babacomari ranch, an old Spanish Land Grant near Elgin, and the Charlie Miller and Bill Stevenson ranches along the Mexican border near Naco. These new seedings, as well as the original seeding on the McKinney ranch, continued to thrive.

Photo: Courtesy Ervin M. Schmutz, University of Arizona

Lehmann lovegrass seeding among mesquites in southern Arizona.

Since that time many thousands of acres of Lehmann lovegrass have been seeded in southern Arizona and southern New Mexico. Through these seedings, and spreading by natural reproduction, considerable acreage has become established in the southwestern United States and northern Mexico.

I left southern Arizona in 1941 to come to Prescott in northern Arizona. During these years I have had the opportunity to make two special visits down there just to see the lovegrass seedings. Once, in the summer of 1960 with my good friend Wayne Kessler (president of the Society for Range Management in 1964), and again in 1971 with two Willcox, Arizona, friends – Harvey Nessmith, SCS range conservationist, and Grover Pfleuger, who was the CCC camp foreman in 1939 in charge of the crew that seeded that first Lehmann lovegrass in the United States outside a nursery.

Bill Busenbark, who purchased the ranch from Charlie McKinney 20 years ago, said, "I like Lehmann because it gives my cows green feed the year around, even in winter and early spring. During the past 40 years it has spread over a considerable part of the ranch, until now the main grasses are Lehmann, blue grama, and black grama, in about equal amounts. On a yearlong grazing program as mine, the cattle graze the three grasses about equally on an annual basis."

All will agree, I'm sure, that the first 10-pound, 100-acre field trial seeding of Lehmann lovegrass started a highly successful venture in many ways for the warm arid lands of the southwestern United States and northern Mexico.

Coyotes Kill More Lambs Than Other Predators

Coyotes kill more lambs than any other predators, according to wildlife researchers with New Mexico State University's Agricultural Experiment Station.

The researchers also found that ranchers having at least one boundary fence facing land not used for sheep production reported a significantly higher percentage of lamb mortalities from coyote predation in both years of the study than did ranchers surrounded by other wool growers. These same ranchers also reported a significantly higher percentage of lamb mortalities attributed to predation from eagles during one year of the two year study.—*New Mexico State Univ. Extension Service*

Beef Cattle Ear Tags Style of the Future?

If the pastured cattle that help make up the nation's $20 billion beef industry had their say about raising their comfort level, they'd probably all support pierced ears holding fly-repellent tags. The tags work on the same principle as today's flea- and tick-repellent collars placed around the necks of dogs, explain a team of University of Tennessee agricultural workers. Tags can also carry identification symbols.

"The fly-repellent tags not only improve the comfort of beef cattle and calves; they also help reduce the chances of the animals' contracting pinkeye – an infectious eye disease of cattle that can cause blindness. Certain species of flies carry the causal organism," explain the agricultural scientists.

The UT beef cattle research was conducted under practical pasture conditions with four different comparisons: no fly control; control of flies with insecticidal dust bags and back rubbers and periodic but bothersome corrall spraying of cattle with insecticides; a Shell Development Corporation ear tag impregnated with Rabon, retailing at $1.15 each; and another Shell ear tag impregnated with an experimental material called "Fenvalerate." Rabon has been approved and used with salt and other materials for cattle fly control for several years.

"We found that the three control measures resulted in around 31 percent less pinkeye (Infectious Bovine Keratoconjunctivitus, or IBK) compared with the control cattle which had no insect protection," points out R.R. Shrode, animal scientist and member of the research team. Other members were R.R. Gerhardt, entomologist, and P.C. Smith and J.W. Allen, veterinarians—all on the University of Tennessee staff.

Results were similar with the eye-irritating haemolytic *Moraxella bovis* (Hauduroy). It was isolated from the eyes of 60 of 118 cows and calves or 51% in six herds that had no face fly control—compared with only 6 from 124 animals or 5% that had face fly control.

The beef cattle ear tag experiment extended over 5 months for face and horn fly control. The Fenvalerate tags on two herds reduced face flies by 46% and horn flies by 98%, the research workers conclude. – *Univ. of Tennessee Release*

Fertilizing Rangeland Increases Beef Production

Research conducted at the Fort Stanton Experimental Ranch shows that ranchers could double their stocking rates if they fertilize their blue grama rangeland with 40 pounds of nitrogen per acre.

According to Dr. Arnold Nelson head of NMSU's animal and range sciences department, the nitrogen fertilizer studies began 12 years ago.

"At that time our researchers studied small plots of blue grama grass to find out what nitrogen application rates would produce the best growth in blue grama grass. Once those rates were determined, we transferred our studies to Fort Stanton pastures where we applied 40 pounds of nitrogen fertilizer per acre. We then measured the weight gains made by cattle feeding on the fertilized pastures."

Nelson adds that "grazing 100,000 yearlings on fertilized blue grama range has the potential for a $2.5 million increase in annual cattle sales in New Mexico."

Legislative Log

The first session of the 96th U.S. Congress has had more than the usual amount of perplexing problems, actions affecting the economy Alaska Lands, energy, and now the SALT II agreements are just a few of the important subjects that continue to take the time of the Congress. As a result most other legislation has been delayed. Some of the more important bills are briefly presented below. A few of the more important issues are also summarized. (As of June 21.)

Proposed Bill	Description of Bill	Status as of June 21-1979
Udal-Anderson substitute for HR-39. S-9 Senator Jackson (Wash.) and Senator Durkin (N.H.)	Alaska Lands Bill as amended. This bill provides protection for over 120 million acres of some of the most valuable wildlife habitat and spectacular scenic areas in the state, while allowing for significant commodity development.	This complex bill was passed by the House by a vote of 360 to 65 on May 16. The Senate is expected to schedule action for July or later before the Energy and Natural Resources Committee.
H.R. 2610.	Bill was proposed to strengthen the oversight capability of the Water Resource Council while simultaneously increasing the financial commitments states must make to water projects.	This administration backed bill was reported out by the Interior Committee and then jointly referred to the Committee on Agriculture and the Committee on Public Works and Transportation. At a June 5 proceeding nearly every House member present objected to independent reviews by the Water Resources Council. The Senate Environment and Public Works Committee rejected the President's plan to make the Water Resources Council an independent review board. The Senators would not appropriate funds for oversight activities.
S-100 Senator Packwood, Oregon.	Encourage reforestation and timber stand improvement on both public and private lands.	Hearings were held on May 19, 1979, before the sub-committee of the Senate Finance Committee.
H.R. 2551 Rep. James M. Jeffords, Vermont S795 Senator Magnuson, Washington.	Bill aims at protecting farmland from development. There are four titles. Title 1 declares federal policy, in cooperation with the states and local jurisdictions, to promote farmland retention. Title II authorizes a study committee, for 3 years, to study factors on continued availability and quality of farmland. Title III establishes a cost sharing approval. Title IV establishes funding authorizations.	A lengthy hearing was held on May 17 by the House Agriculture Sub-committee on Family Farms, Rural Development and special studies. No date has been set for a hearing in the Senate. The Administration was not represented at the May 17 hearing. Much support for the bill but some fears that national land use planning direction might result—but bill specifically excludes it.

Government Reorganization

Of the several summaries of the decision as to what happened in federal reorganization the Conservation Report of the National Wildlife Federation on May 25 is the most complete. Following is the statement.

> In a policy reversal which caught even some of the Administration's own lobbyists by surprise, President Carter decided to abandon efforts to move natural resources reorganization through the 96th Congress. After agreement had been reached with Sen. Abraham Ribicoff. (Conn.) that the Administration's natural resources reorganization initiative would be sent up as a legislation rather than as a reorganization plan, the President encountered a number of additional obstacles. Not the least of these was Senate Majority Leader Robert Byrd's refusal to schedule reorganization in the Senate during this session of Congress. Confronted with these obstacles and the likelihood of a protracted struggle over natural resources reorganization at the same time that other administration priorities such as the Strategic Arms Limitation Treaty would be demanding attention, the President decided to shelve the entire effort.
>
> There were some indications that work by the reorganization team would shift to examining changes short of actual reorganization which could improve efficiency and coordination among the various natural resources components of the executive branch.

Energy Conservation

The House rejected President Carter's standby gasoline rationing plan 246-159 in a May 10 vote. Only one program of the four emergency conservation plans was approved by the House and Senate—a plan giving the President the authority to regulate heating and cooling in nonresidential buildings.

Nuclear Power

The House Interior Subcommittee on Energy and the Environment on May 21 led off its sweeping inquiry into the role and future of nuclear power in America. A serious reconsideration of the use and regulation of nuclear power is in progress.

National Forest Management Act

The NFMA regulations were reissued by the Forest Service again in early May for public review and comment eight months after the first publication. On May 16 the Senate Energy and Natural Resources Subcommittee on Public Lands and Resources held an oversight hearing chaired by Senator Dale Bumpers, Arkansas.

The regulations are required by Section 6 of the 1976 NFMA which specifies an integration of planning including the timber, range, fish and wildlife, water, wilderness and recreation resources including protection and use of resources such as timber. Although witnesses agreed that the revised guidelines are an improvement there are still some controversial items. Among them are maximum sizes of clearcuts for certain areas and forest types and departures from the Forest Service's long standing policy of timber harvesting.

The public comment period ended on July 3.

Land Treatment Needed to Prevent Soil Erosion.

On May 9 the Department of Agriculture announced that more than half of the nation's cropland, forests, pastures, and rangeland need increased conservation treatment to reduce soil erosion and improve water quality. This announcement came as the first results of the 1977 SCS national inventory of land resources.

Nearly 900 million acres of nonfederal land need conservation work, about the same as a decade ago, but with significant changes in the kinds of land needing treatment. Cropland acres that need conservation treatment declined from 64% to 58% in 1977. Forest land climbed from 62 to 67%; pasture land rose from 71 to 75%.

The amount of rural land available for farming, ranching, and forestry declined nearly 37 million acres between 1967 and 1977. Land available for grazing has increased sharply since 1967, rising to 541 million acres in 1977. Today more than half of the nonfederal agricultural land is used for native pasture, pastureland or rangeland. There has been a corresponding decline in nonfederal forestland.

Allowable Cut on National Forests.

The American Forestry Association on June 18 issued a reminder of two events of interest concerning Dr. Alfred Kahn's announcement of plans to study temporary departures from even flow on some National Forests. The House Subcommittee on Forests will conduct a meeting to hear administration witnesses on June 21. This is an information exchange and not a formal hearing. The Senate Subcommittee on Environment, Soil Conservation, and Forestry will hold a formal hearing on June 22.

Membership Report

(As of June 30, 1979)

Section	Students	Regular	Life	New	Deleted	Reinstated
Arizona	44	271	13	32	74	21
California	92	276	20	61	76	8
Colorado	113	305	23	71	88	19
Idaho	43	216	11	30	52	12
Kansas/Oklahoma	33	180	6	32	57	18
Nebraska	27	94	2	24	26	4
Nevada	26	139	6	19	39	10
New Mexico	63	121	11	47	74	16
N.G.P.	39	272	17	45	58	11
Internat'l Mtn.	50	245	16	31	69	16
P.N.W.	111	404	20	61	99	28
S. Dakota	20	122	6	16	33	6
Southern	24	126	6	20	38	7
Texas	193	443	15	134	156	25
Utah	73	245	12	47	73	13
Wyoming	36	146	4	50	60	15
Nat'l Capitol	2	91	8	3	22	4
N. Central	7	45	1	3	13	2
Mexico	25	48	6	12	56	13
Unsectioned	18	92	7	17	59	15

	7-15-78	6-30-79
Total membership	5,512	5,130
Individual Sustaining Members	147	183
Total Life Members	178	210
New Members	928	755
Total Suspended March 10	1,007	1,222
Suspended Members Reinstated since March 10	217	263

Sections can maintain a continuing record of their membership by referring to the monthly membership progress report sent to each Section from the Denver office.

President's Notes

Idaho Meeting

The Idaho Section of the Society for Range Management recently hosted a highly successful summer SRM meeting. The 300-plus attendance heard Idaho Governor Evans speak of the growing interest in and importance of rangelands. Evans' keynote address was followed by a description of phosphate mine reclamation work in southeast Idaho, which was the topic of the informative and enjoyable tour. The Society is grateful to the Idaho Section and their co-sponsors, which included the Idaho Woolgrowers, Idaho Cattlemen's Association, and mining companies, for their outstanding hospitality.

Executive Secretary

Floyd Kinsinger was selected by the Search Committee and Board as the new SRM Executive Secretary at the summer meeting. He replaced Lorenz Bredemeier in that position on August 13. Floyd brings with him a broad background of range experience including research, education, and land management through much of the United States. He has successfully managed fairly large staffs, programs, and budgets. Floyd has served as a Director and President of the Society. The duties of the Executive Secretary are not new to him since he provided the Board of Directors their main contact with the Headquarters Office for 5 months following the death of Francis Colbert. Floyd, we are honored to have you assume this great responsibility.

On behalf of the Society, I want to thank the individuals and groups that aided in the selection of a new Executive Secretary. There were many highly qualified applicants who could have served the Society very well. Special thanks go to these individuals for their interest in and willingness to serve the profession in this important position.

The Executive Secretary's column contains more information about the search and selection process. Lorenz also discusses the decision to not renew our SRM membership in the Council of Agriculture Science and Technology.

Washington Role

The Advisory Council recommended to the Board that the Society establish a more formal and stronger support role in

Washington, D.C. to provide more professional input into policy and legislative issues. The Board delayed final action until the Finance Committee had an opportunity to better evaluate the impact of this action on the total budget and until our members in Canada and Mexico have an opportunity to recommend ways SRM can assist them with range policy.

Office Operations

At the suggestion of the Planning Committee, President-elect Harold Heady and I have appointed a sub-committee to evaluate the overall operation and structure of the Headquarters Office and to recommend needed improvements. The evaluation will include staffing and equipment needs, personnel policy, work assignments, employee benefits, and office operation guides. Floyd Kinsinger will chair the sub-committee, which will include John Hunter, Pat Smith, Lorenz Bredemeier, and Bill Laycock. If you have any suggestions to help this group would you please contact Floyd.

Membership

A major concern to the Board at the Pocatello meeting was the loss in members during the last year. As of June 30, we had about 400 fewer members than at that time last year. I encourage you to help your friends become members by enrolling them for the 1980 membership year. Then help them remain active members by introducing them to the Society operations.

Special Thanks

One of the rewards of serving as your President is the opportunity to become more aware of the massive amount of work our members do for the Society and profession. So many people devote a great deal of time, energy, and resources to the improvement of the world's rangelands with little recognition. The following is an effort to say thanks to a few of these individuals.

Gerald Thomas has agreed to serve as a representative to the Council of Agriculture Science and Technology during the balance of our membership in CAST. He replaces Bill Evans, who resigned because of pressure of other duties.

Tom Eaman and *Lorenz Bredemeier* served the Society in cooperating with the Society of American Foresters to prepare a response to the Forest Service's Proposed Guidelines for Land Resources Management Planning.

Clare Hendee testified at the House of Representatives Agriculture Committee hearings on the Natural Resources Department reorganization.

Jack Artz and others prepared the Society's response to the Forest Service's 1980 Resource Planning Act draft.

Tom Bedell provided leadership in responding to the Bureau of Land Management's Environmental Impact Statement for the Drewsey, Ore. area. Tom also represented the Society at the Society for American Foresters' legislative action workshop in Portland.

Jim Klemmedson and the *Research Committee* revised the Cooperative Rangeland Research Act and prepared a statement describing a need for the legislation.

John Abbott determined the quality of the Society's service to student members through a student chapter questionnaire.

Joe Trlica developed a proposal for the establishment of a standing Employment Committee. This was the greatest need identified by Abbott's questionnaire.

Mike Stroud and the *Advisory Council Bylaws Revision Committee* have used membership suggestions to develop the first draft of the new SRM Bylaws.

Bert Reid edited the *Rangeland Hydrology* manuscript, which will be published this winter.

Jim Nichols and *Don Cox* presented a proposal for an International Range Judging Contest.

Bill Laycock co-chaired a joint SRM-Ecological Society meeting on Rangelands at the American Institute of Biological Sciences in Stillwater, Oklahoma. In addition to the formal papers, all three films from the Old West program were shown.

Last and most important on behalf of the Society I want to thank *Lorenz Bredemeier* for serving as Executive Secretary since March 1. Lorenz has provided SRM and me with outstanding support and guidance while the search for a permanent Executive Secretary proceeded. We will be forever grateful, Lorenz.—**Daniel L. Merkel,** President, SRM

Dates to Note

Sept. 15— National Capital Section, SRM, Field Tour
Oct. 30–Nov. 1— South Dakota Section, SRM, Meeting
Nov. 1–3— California Section, SRM, Meeting
Nov. 16–17— Wyoming Section, SRM, Meeting
Nov. 18–20— Pacific Northwest Section, SRM, Meeting
Nov. 29–30— Texas Section, SRM, Meeting
Nov. 30–Dec. 1— Southern Section, SRM, Meeting
Dec. 4— National Capital Section, SRM, Luncheon
Dec. 7–8— New Mexico Section, SRM, Meeting

Notes from Denver

This is the last Notes from Denver that I will be writing as your Executive Secretary. This has been an interesting, challenging, and gratifying experience involving a wide range of issues, problems and rewards. It has given me a better appreciation of the variety of the Executive Secretary's duties and the functions of the Denver office. Henceforth I shall support a better appreciation for the Denver staff and office, and greater tolerance for those minor situations which tend to balloon out of proportion to their significance. I would solicit from all members a similar tolerance.

The **staff of your Denver office** is sincere and dedicated. They strive for sound judgement with the welfare of the Society in mind. Please give them your continued support and cooperation.

S. Clark Martin, chairman of the committee charged with selecting a **new Executive Secretary,** reported that 48 persons were nominated or inquired about the job. Sixteen submitted applications. A very thorough scoring system was used to select five for interview, and the consensus was all would make a good executive secretary but the Society could hire only one. I assure you the Selection Committee's report and the Board's selection were done most conscientiously and deliberately by each

member of the Committee and Board. I commend each person who applied. By this you contributed importantly to greater recognition and dignity of the position and to the Society. Your participation in the process is greatly appreciated.

Your new Executive Secretary, Dr. Floyd E. Kinsinger, will take office August 13. I will remain available for a time to assist Floyd as he deems desirable. There remains much unfinished and followup work resulting from the summer Board meeting.

Our publications staff felt happy at having nearly all the September issue of JRM type-set by July. To our disappointment, the type began to fade. In fact when I returned from Pocatello, Pat Smith reported that the type being set then for *Rangelands* was fading. After thorough verification of the problem source and consideration of alternatives, we had to replace rollers and interior mechanism of the **processor.** We had hoped to delay decision on the processor until the decision is made on a **type setting machine.** Pat Smith and Pat Willems are investigating different machines and observing demonstrations to do preliminary screening. A decision on this must be made by the first of December.

The ***Old West Regional Commission*** contract ended June 30. We are attempting to gather all charges and outstanding bills under this contract. A new contract with the Old West Regional Commission was concluded June 12, 1979, for the period July 1, 1979, through February 28, 1981. This contract is funded by transferring a small amount of money from the previous contract. It is for the purpose of continuing public distribution of the three SRM/OWRC range films. This will be continued by Picadilly Films under a new contract. SRM is grateful to the Old West Regional Commission and its officials, and to all SRM officers and staff for their part in this productive and rewarding program.

SRM decided at the summer meeting to not extend its membership in the Council for Agricultural Science and Technology **(CAST)** for 1980. Finances and alternative uses of the funds were the primary considerations. This was not an easy decision nor was it unanimous. It was arrived at after thorough discussion and careful consideration by a broad segment of the Society's membership and organization units. The Board commended CAST for the good it has done and its many achievements. The Board further urges SRM members who support CAST's program to join CAST as individual members.

In Executive Session the Board tentatively approved the essence of a **policy on annual and sick leave** for the Denver office staff. The policy and rules are to be drafted in detail for final approval and incorporation into an Office Procedures Manual.

Some Section Newsletters are publishing **the membership report.** Total on June 30, 1979, was 5,130 contrasted to 5,512 on July 15, 1978, down 382. We are low in new members—755 in June 1979 compared to 928 July 1978. Suspensions in 1979 were 245 more than in 1978. The percentage of reinstatements was the same both years. Suspending and reinstating costs more than $100.00 per year plus the additional work. I encourage members to pay their dues promptly on receipt of their first notice. Sections should encourage this, then start followup on those who do not. This would help avoid suspensions.

Please not elsewhere in this issue the **slate of good candidates.** When ballots are received, please vote and return your ballot promptly in ballot envelope and include dues payment in the carrier envelope and save 15¢ or $750.00 for 5,000 members.

I hope to be around and continue my participation in SRM affairs. See you in San Diego February 1980—**Lorenz Bredemeier,** Executive Secretary, SRM

Kinsinger Takes on Duties of Executive Secretary

Dr. Floyd E. Kinsinger was selected at the Board of Directors summer meeting in Pocatello to serve as Executive Secretary of the Society for Range Management. He was selected from 16 applicants and will assume duties August 13.

Dr. Kinsinger was born at Ness City, Kans. received his Bachelor's and Master's degrees from Fort Hayes State University, Fort Hayes, Kans., and his Doctorate from Utah State University, Logan. His major studies were in ecology and range management. Additional training includes Management Institute for Supervisory Scientists, Management Program for Natural Resource Managers, and an Executive Seminar on Administration of Public Policy.

Dr. Kinsinger held associate and assistant professorships at Fort Hayes State University for 3 years and at the University of Nevada, 5 years. He then joined the Division of Range, Bureau of Land Management, Washington, D.C., as a range scientist and research coordinator. Subsequently, he transferred to Denver as Staff leader of the BLM's Standards and Technology Division.

Floyd served as Society President in 1972 and in this capacity on the Board of Directors for 3 years. Additionally, he was appointed to fill a Directorship vacancy 1975-76. He served as vice president and president of the Nevada Section, as newsletter editor of the Nevada, Kansas-Oklahoma, and National Capital sections, and vice president of the National Capital Section. He served on a number of committees and currently serves as Chairman of the Committee for Accrediting Institutions for Teaching of Professional Range Management.

He served as a consultant to US/AID in establishing a two-year range management curriculum in Nigeria. He has published many scientific papers and is a member of Sigma XI and Phi Kappa Phi.

Awards include: Special Service Award 1967, Special Achievement Awards 1970 and 1971, Meritorious Service award 1977, and Outstanding Performance Rating 1978.

Dr. and Mrs. Kinsinger reside in Denver. They have two married daughters, one in Denver and one in Boise, Idaho.

Dr. Kinsinger will take over as Executive Secretary from Lorenz F. Bredemeier, who served the Society as Executive Secretary for the interim period.

Society for Range Management Meeting Schedule

Annual Meeting

1978	February 5-10	San Antonio, Texas	Hilton
1979	February 12-16	Casper, Wyoming	Ramada Inn
1980	February 11-15	San Diego, California	Sheraton
1981	February 9-13	Tulsa, Oklahoma	Mayo
1982	February 8-12	Calgary, Alberta	Calgary Inn
1983	February 14-18	Albuquerque, N.M.	Hilton Inn
1984	February 13-17	Rapid City, SD	

La Tecnologia al Servicio del Ganadero

El pasado mes de enero, en el Centro de Investigaciones Pecuarias del Estado de Sonora (CIPES), se llevó a cabo una importante sección técnica en el Rancho Demostrativo "La Granada". En este rancho se ha estado aplicando la tecnología generada por los investigadores de CIPES en lo que respecta a la producción de bovinos productores de carne. En dicho acto se explicaron algunos de los sistemas de producción que se han integrado, y que se encuentran a la disposición de los ganaderos.

El Ing. Eduardo Salcedo y el Dr. Oscar Rodríguez, Director y Subdirector de CIPES respectivamente, explicaron en forma detallada los "sistemas de producción" que es posible utilizar en el estado de Sonora, y que permiten aumentar considerablemente la eficiencia y redituabilidad de los ranchos ganaderos. A continuación el Ing. Juvenal Velásquez del Departamento de Pastizales de CIPES, hizo una clara presentación del manejo de pastizales y ganado que se lleva a cabo en el "Rancho Demostrativo La Granada". Asímismo el Dr. Roberto Zambrano del Depto. de Nutrición explicó los aspectos nutricionales de las diversas alternativas que ofrecen los "Sistemas de Producción", tecnología generada en CIPES. Complementando el tema, el Ing. Efraín Wilson del Banco de México, S.A., presentó un análisis económico de estos sistemas, los cuales dada la disponibilidad de crédito, son aún más susceptibles de llevarse a cabo.

Como parte de la demostración se llevó a cabo el destete de los becerros, los cuales tuvieron un peso promedio de 192 kg. Se efectuó también la palpación de las vacas, determinándose un 93% de preñez. Estos altos índices de productividad, ha sido posible obtenerlos con prácticas sencillas, que empiezan con tener una carga animal correcta en los pastizales, hasta llevar a cabo el desarrollo de las becerras de reemplazo y el empadre controlado (tres meses), en praderas de zacate buffel bajo condiciones de temporal.

Estuvieron presentes, distinguidas personalidades del medio ganadero de Sonora, extensionistas y estudiantes, así como el Director General del Instituto Nacional de Investigaciones Pecuarias-SARH, Dr. Carlos Arellano Sota, quien en esta ocasión congregó a los Jefes de Departamento y Directores de los diversos centros del INIP, con el fin de examinar las posibilidades de implementar, en base a las investigaciones realizadas en las diferentes zonas ganaderas de México, ranchos demostrativos como éste, en los propios centros de INIP o en el área de influencia de los mismos.

Slide-Tape Cassette Programs Available:

The Life We Chose: Interagency effort in Pacific Northwest to portray the livestockman's appreciation for rangeland stewardship. Ranchers for Oregon, Washington, and British Columbia express dedication to the land, their business, and their families. Produced by Oregon and Washington Soil Conservation Service. Viewing time 20 minutes. Programmed for two projector, slide-dissolve unit, (Entre' unit). For check out within the states of Oregon and Washington, see below. For SRM sections outside Oregon and Washington, check out through *SRM 2760 West Fifth Ave, Denver, Colorado 80204*

Oregon: Soil Conservation Service
1220 SW 3rd Avenue, 16th floor
Portland, Oregon 97204

Washington: Soil Conservation Service
360 U.S. Courthouse
West 920 Riverhoouse Ave.
Spokane, Washington 99201

Program may be purchased for $55. Includes 160 slides with taped narrative (without impulses). Specify type of equipment to be used. Send to *SCS, 1220 SW 3rd Ave., Portland, Oregon 97204.*

Range, The Land, Its Management, the Profession: Defines range, (worldwide); rangeland; various landtype descriptions; examples of ranges and their management; gives SRM background, history and objectives. Viewing time 28 minutes. 160 slides, adaptable to 2 projector-slide dissolve unit (Kodak), or one projector. Includes taped narrative. Distributed by *Bob Hyde, Extension Range Specialist, Range Science, Room 240, Natural Resource Bldg., Colorado State University, Fort Collins, Colorado 80523.* Program may be purchased for $85. Adaptable to high school, nonproducer groups, and college level, (Freshman).

Of Interest to Forage Researchers

An "Atlas of Epidermal Plant Fragments Ingested by Grazing Animals" (USDA Technical Bulletin 1582) is now available with photo-micrographs of 70 different grass and forb species. There are four photographs of each species which show variation within the species. Most are from the Central Great Plains, but some major species from the Southern and Northern Great Plains are also included. The bulletin will be sent out free of charge, US Government Printing Office, Washington, D.C. 20402.

. . .and Collectors

Although "How to Collect Plants and Prepare a Herbarium" (ENR Report No. 122) in meant mainly to be an in-house publication for the use of Alberta Forest Service field staff, a few copies are available for libraries, schools, and interested individuals.

The publication describes materials and equipment required for collecting, shows how to makes presses, describes collecting procedures, drying, fumigation, mounting, herbarium labels, and arrangement of specimens. Drawings illustrate the items and procedures.

Copies can be obtained by writing to: *Forest Land Use Branch, 11th Floor Petroleum Plaza South Tower, Edmonton, Alta. T5K 2C9, Canada.*

Speak Out Space

How rapidly flow the waters of time. Seems like only the other day we were packing our bags to head for Casper, and now that is far behind us and green grass is here along with calving and lambing. I think it is time to pull our heads out of the water for a few minutes and examine where we have been lately and where we might be headed in the future.

Cattle numbers in this country as well as many foreign countries are considerably lower than they have been in a long time. Prices of beef and live cattle are at an all time high. Many of us are actually again beginning to feel somewhat optimistic about this multi-billion dollar gambling game we call the cattle business. We may even have to pay some substantial income tax this year if we can keep our anti-friends at that epitome of paperwork on the banks of the Potomac from slipping an unneeded and unwanted mouse into our lunchbox in the form of price controls. Some officials are now recommending one beefless day a week to the consuming public. In addition to this, the federal government is cutting back on its purchases of beef for the armed forces, school lunch programs, etc.

Throughout the spring months, we have seen yearling heifers selling for steer price or more. These heifers will soon be a part of the nation's cow herd and supply will again reach a point where we have a surplus. If the government just leaves us alone, we producers will again slit our own throats by over-supplying the country with beef and the consumer will again be able to eat steak for less than "peanuts."

Not too many years ago, the price of a barrel of crude oil was about the same as a bushel of wheat. Resuming this trading a bushel of wheat for a barrel of crude oil to the OPEC nations might be something to consider. They can either pay more for wheat, charge less for oil, or drink crude oil. Maybe when beef is again in a surplus situation, as it will be within 3 years, we could work some beef into this trade too.

For the past 30 years or so, our ranch here in western South Dakota has been involved in the practice of spaying all the heifers we don't keep for our own replacements. I certainly would recommend to the producers who read this publication that they consider it. It is the only sure way I know of to keep down cow numbers in this country. In an article currently under preparation for publication in *Rangelands*, I will elaborate on this subject.

By the way, I would like to see the title of the *JRM* changed to *Journal of Range Science,* and *Rangelands* changed to *Range Management Journal* or *Journal of Range Management*. How do you feel about it? Let your opinion be heard.

So much for this time. Where do we go from here? – **David A. Fischbach,** Faith, S. Dak.

Editor's Note: Dave is a rancher and past president of the South Dakota Section, SRM.

•

Some demographers are predicting the world's human population will reach 7 billion by the year 2000. Should this be the case, food production will need to nearly double in this same time frame. Two years ago a world Food Conference was held in Rome supposedly to deal with impending food shortages. Most of the dialogue revolved around emergency food distribution (in the main from the U.S.) to starving people. They failed to address the fundamental issue, the production of food where it is needed. Apparently they didn't solve the distribution problem either. Current news indicates half of the world's people still go to bed hungry and some people are starving in Africa.

What will the situation be 25 years from now? Here in the U.S. we are experiencing temporary shortages of production materials now. Also, in the past the better job agriculture did producing food the poorer it was paid. This is cited as one of the major problems limiting food production in the developing countries. If the increases in food production are made near the area of need, it would make the distribution problem smaller. Mismanagement of the soil will need to be controlled. Only about 7% of the world's land surface is classified suitable for intensive cultivation. In the U.S. alone some 3 million acres a year are being lost to urban sprawl, highways, and other non-food producing uses. They aren't making any more land but we are sure using a lot of productive acres up.

There are other problems! Some of us have been promoting Range Management and Performance Testing for over 25 years with little response from the industry as a whole. It took about that long for hybrid corn to become established as a common practice. Benefits could be demonstrated in one crop year. Both Range Management and Performance Testing are long-range practices. Gains, however, can be permanent and are energy efficient. The increases in crop production in the U.S. in the last decade haven't been energy efficient. This factor will become more and more important.

An adequate supply and equitable distribution of food is a problem we must come to grips with earnestly and soon. History teaches us that most squabbles between nations has been over land to grow food or to obtain other natural resources. Time is getting short. – **Don Cox,** Mullen, Nebr.

Editor's Note: Don is a rancher and past president of the Society. This treatise by him has been published in two Section Newsletters – South Dakota and Nebraska. It has a message I thought all readers of Rangelands would be interested in.

Inventory Standardization

At the 1977 summer meeting of SRM in Elko, Nev., the seeds of range inventory standardization were sown as the result of a small informal meeting and subsequent action by the Board of Directors. Some 10 months later, after followup by then-President Thad Box and the Research Affairs Committee, the first meeting of an interagency group met in Denver, Colo., to consider the Board's Elko resolution. The outgrowth of that meeting was formation of the Range Inventory Standardization Committee (RISC), a standing subcommittee of the Research Affairs Committee.

Representatives at the first meeting of RISC were: John L. Artz, Western Universities Public Rangelands Coordinating Committee; Robert F. Barnes, SEA-AR; R.S. Driscoll, FS; Richard E. Eckert, Jr., SEA-AR; Floyd Kinsinger, BLM; George Knoll, BIA; Don Pendleton, SCS; and C.B. Rumburg, SEA-CR; and J.O. Klemmedson, SRM Research Affairs Committee and chairman of RISC. In addition to the above, the current membership of RISC includes E. Lamar Smith, university representative; Jack E. Schmautz, FS; and John Baker, BLM, who is replacing Floyd Kinsinger.

The first task of RISC was to draw up a Working Paper, an informal, flexible document which serves as a guideline for the Committee's activities. The Working Paper has been approved

by the Board and is printed below for the information of SRM members. We solicit your comments on the Working Paper, or in any other way that you feel will facilitate the purpose and activities of RISC. From time to time we will keep SRM informed of our work through statements in *Rangelands.* Progess to date by RISC—we are meeting four times yearly—has been most encouraging, largely because of the complete support of the agencies and the dedication and cooperative attitude of RISC members.—**J.O. Klemmedson,** Chairman, Research Affairs Committee

Working Paper for the Range Inventory Standardization Committee convened by the Research Affairs Committee, Society for Range Management

Background

Only July 22, 1977, the Board of Directors, Society for Range Management, acting on a recommendation from the Advisory Council, resolved that "SRM take a position of leadership to draw agencies, universities, and land management organizations together to promote uniform methodology and terminology for rangeland inventories and assessments." The Board went further in February 1978 with a resolution endorsing efforts to coordinate and improve range inventory systems in the U.S., supporting national research and development programs on identification, classification, and inventory of natural ecosystems through coordinated efforts of applicable agencies and institutions, with the recommendation that emphasis of such efforts be addressed to local management needs.

Considerable information has been collected by a variety of inventory procedures, management studies, experience, and research, but application of that information to the solution of management problems has been hampered by:

1) poor accessibility of information
2) incomplete information
3) lack of uniform terminology and classification systems, and compatible inventory procedures.

Acting on the July 22, 1977, resolution of the SRM Board of Directors, then-President Thad Box invited appropriate organizations to send representatives to an exploratory meeting and assigned SRM responsibility to the Research Affairs Committee. This meeting was held in Denver, Colorado, on May 31, 1978, and the Range Inventory Standardization Committee (RISC) was established.

This paper has been developed for guidance of the Committee, and to inform the SRM Board of Directors, SRM Membership, and others of the purpose of the Committee.

Purpose of the Committee

The purpose is to develop and recommend adoption of:

1) Standard terminology for inventory, classification, and analysis of range ecosystems;
2) a uniform system for classification and mapping of range ecosystems;
3) minimum standards and guidelines for data collection; and,
4) a common philosophical base for data interpretations.

Accomplishment of the above will facilitate communications among range users and managers. It will also facilitate the collection and availability of valid and useful data for:

1) local management needs;
2) regional and national assessments and programs; and, research proposes to establish a common core of terms and definitions relating to inventory and classification, and to encourage its usage.

Issues to Be Addressed

Terminology

Standard definitions of works and phrases are basic for mutual understanding and communication. Problems with current terminology include (1) use of the same term to describe dissimilar items or concepts and (2) use of different terms to describe the same item or concept. RISC

Inventory

The range resource inventory should be conducted to collect data necessary for local management purposes as well as for regional and national assessments and program planning. The inventory should include certain information on basic resources (e.g. soil, vegetation, animals, water) collected by all who conduct range inventories, and such additional information as needed.

Classification. A uniform, ecologically based classification system is needed. Such a system would provide a common base upon which to collect range inventory information, to accumulate and extrapolate management experience and research results, and for the assessment of the status and needs of ranges. Such a system would facilitate storage and retrieval of data and have a hierarchical capability for aggregation and disaggregation of all types of information about range ecosystems.

Mapping. The basic resource map should be based on integrated ecological units as defined by the classification system. Criteria for mapping at various scales and mapping intensities should be standardized. Uniform standards should be developed for map display of certain kinds of resource data and interpretations.

Data Collection. Data should be collected by compatible procedures and in readily convertible units and in such a manner as to allow reproducibility in the characterization of the resource, within identified limits of error, and facilitate reproducible interpretations of range ecosystems.

Data Interpretation. Interpretation of basic data will be made for each ecological unit to determine (a) its potential, (b) its present condition, and (c) the current trend in the condition. Other interpretations can be made as necessary. These interpretations should be made with a common conceptual framework.

Data Management. Basic inventory data and interpretations of potential, condition, and trend of ecological units should be expressed in terms that are standard and uniform. This is desirable to permit consistent accumulation, storage and retrieval of data for local management needs, and is imperative for aggregation of information on ecological units for use in resource planning and assessment at the regional and national levels. In planning for the use of computers to do the job of data management for range inventories, it is important that final interpretations of data be reviewed and approved by qualified and locally knowledgable professional people.

Editor's Note: We welcome periodic reports from SRM Committee Chairmen. Let us hear from more of you.

Grassland Society Offers Opportunities

The *Journal of the British Grassland Society,* after 30 years, has changed to *Grass and Forage Science,* effective with first issue of volume 34, March 1979. Emphasis in selection is given to research and development in all aspects of grass and forage production, management, and utilization with results applicable in wider regions than where experiments were carried out. All papers are published in the *Journal* on the understanding that they are not offered to any other journal. This is an opportunity for some authors to publish a few select articles and another avenue for the SRM's range management philosophies to be presented in other venues.

The British Grassland Society c/o Grassland Research Institute, Hurley, Maidenhead, Berks SL6 5LR, United Kindgom, welcomes overseas members and subscriptions. I urge those who can to become members and broaden their perspective, and then become an ambassador for SRM. We can benefit from a broadened international perspective.—**Lorenz F. Bredemeier,** Chairman International Affairs Committee

NOMINEES for Society Offices

The 1979 Nominating Committee, under the chairmanship of J. Stan Tixier, Brookfield, Wisc., has named two nominees (*one* to be elected) for the position of president elect, and four nominees (*two* to be elected) for 3-year terms on the Board of Directors.

Ballots will be mailed to all 1979 members of the Society early in October. To help you know the candidates better, their picture, biographical sketches, and a brief statement from each are presented here.

It is suggested that you save this material for future reference, as the information regarding the nominees which will be enclosed with the ballots will be abbreviated.

For *President Elect:* Ehrenreich, Merrill

John H. Ehrenreich
College of Forestry, Wildlife, and Range Sciences
University of Idaho
Moscow, Idaho

Born: February 17, 1929, Wisconsin

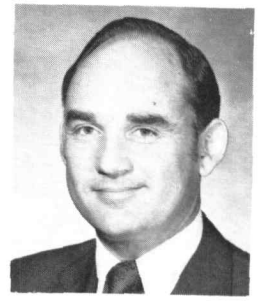
Education/Training: BS in range management and MS in range ecology from Colorado State University; PhD in plant ecology from Iowa State University.

Positions: Dean, College of Forestry, Wildlife, and Range Sciences and Director of the Forest, Wildlife, and Range Experiment Station, University of Idaho since 1971; formerly head of Dept. of Watershed Management, University of Arizona.

Section Activities: President and vice-president, Arizona Section.

SRM Activities: Director, 1972-75; JRM editorial board, 1968-71; various committees.

Other: President, Idaho Research Foundation; officer, Society of American Foresters; advisory committee member for President's Office Science and Technology Policy; member, US/AID; member of five advisory boards for federal agencies and private industry. Sigma Xi, Xi Sigma Pi, Phi Kappa Phi, Beta Beta Beta, Gamma Sigma Delta.



John L. Merrill
XXX Ranch
Route I, Box 54
Crowley, Texas

Born: October 14, 1932, Tyler, Texas

Education/Training: BS in range and forestry, Texas A&M University, correspondence and short courses.

Positions: Self-employed as manager of the XXX Ranch (cow-calf and stocker cattle on range, cropland, and tame pasture) since 1960; formerly director of Texas Christian Univ. Ranch Management Program, USDA/SCS range conservationist.

Section Activities: President, director, committee chairman, Texas Section.

SRM Activities: Former chairman of Advisory Council; various committees;, active in initiating *Rangeman's Journal,* rangeland inventory standardization, and development of Cooperative Rangeland Research Act. First SRM Blockbuster pin, which was later auctioned.

Other: Officer and committee member for Texas and Southwestern Cattle Raisers Association, National Cattlemen's, active in various breed and ranching organizations, as well as civic and chruch organizations.

Statement of John Enrenreich:

The Society for Range Management is a dynamic, growing organization dedicated to service: service to its members, to the public, and to improving rangeland use in America and throughout the world for the betterment of mankind. This dedication is recognized in the official objectives of the Society.

Continuing to strive for these goals of current knowledge, effectiveness and understanding in the face of increasing demands on our rangeland resources will require the concerted efforts of all members. Because the strength of the Society for Range Management is its members, coordinated and working together, we must continue the Society's two-fold tradition of steady growth and effective leadership. We must continue to grow, not only in individual effort, but also in collective effort, because to cease growing would be to deteriorate relative to our world today.

We must continue to search out effective leadership; we cannot afford to "slip a cog" in these demanding watershed times. The issues facing us are critical. Our decisions will be imprinted on rangelands for many years to come, and in the future, the rangelands themselves will judge the Society's effectiveness.

To achieve its objectives the Society must take an involved, active stance in developing and guiding issues rather than reacting merely as an outsider. There are good examples of the Society's activity in this vein at local, regional and even national levels, where it is working with local and national segments of administrative, governmental and congressional entities.

The Society must be aggressive in influencing public policy and private practices, in gaining acceptance and use of sound concepts and technology, and in bringing diverse groups together to promote a common understanding of rangeland resource management.

The Society must continually strive to increase communications between its members and land-user groups, professional organizations, and non-professional groups which have interest in rangelands. In this way we can increase public acceptance of the Society and strengthen its professional leadership image.

In accomplishing its objectives the Society must remain alert to pending change and flexible to meet the challenges which change will bring.

Statement of John Merrill:

We need more and better information upon which to base range management assessments, advice, decisions, and actions. We need to communicate, motivate, organize, and apply what we know better than we have, from individual ranch or allotment through the full scope of international concerns. SRM provides the best forum and format to fulfill these needs.

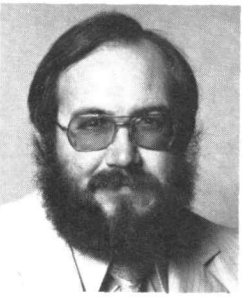
I can think of no higher calling than increased understanding, protection, and enjoyment of and production from the soil, water, plants, and animals upon which the existence of mankind ultimately depends. Committed to this calling, SRM is a fellowship of the most dedicated, best prepared, and least pretentious people I know. As an amalgamation of students, teachers, researchers, agency personnel, and producers from all over the world, the very diversity of backgrounds and interests that could be divisive more often results in an exchange of ideas and a balance of opinion and action that serves our profession well.

An international professional society can be no stronger than the performance and participation of the individual members and the sections. If each of us prepares for and performs in our daily work and professional activities to the best of our unique abilities and maintains the communication and cooperation vital to any corporate action, then the results, recognition, and rewards we seek will come. We can take justifiable pride in who we are, what we do, and in the profession and purposes we serve. Should we fail to fulfill the remarkable opportunities and responsibilities which are ours, there is no one to blame but ourselves.

For *Directors:* Burzlaff, Busby, Hyatt, Pendleton

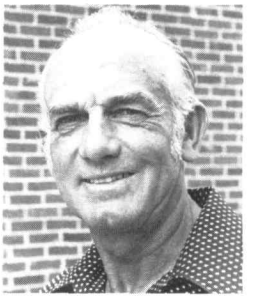
Donald F. Burzlaff
2121 55th Street
Lubbock, Texas

Born: May 5, 1923, Dodge Center, Minnesota.
Education/Training: BS and MS, University of Wyoming, PhD, Utah State University.
Positions: Chairman and professor, Department of Range and Wildlife Management, Texas Tech University; formerly professor and vice-chairman, Range Program, Agronomy Dept., University of Nebraska.
Section Activities: President, Nebraska Section, and Rangeman of the Year, 1969.
SRM Activities: JRM editorial board; liaison coordinator; program committee; Fellow Award, 1979.
Other: SCSA, Wildlife Society, Sigma Xi, Gamma Sigma Delta, Alpha Zeta.



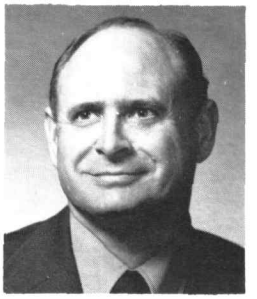
Frank E. "Fee" Busby
Division of Range Management
College of Agriculture
University of Wyoming
Laramie, Wyoming

Born: November 10, 1945, Brownfield, Texas.
Education/Training: BS in agricultural education and MS in range management, Texas Tech University; PhD in range watershed management, Utah State University.
Positions: Associate professor and head, Division of Range Management, University of Wyoming; formerly associate professor of range management and Extension range management specialist, Utah State University.
Section Activities: Newsletter editor and Chapter chairman, Utah Section; Rangeman of the Year, 1979.
SRM Activities: Helped establish university student Conclave; 1979 Annual Meeting program chairman; chairman of Western States efforts to organize a regional rangeland development committee; active on other committees; present for all Annual Meetings since 1969.
Other: Toastmasters Club.



S. Wesley Hyatt
Box 49
Hyattville, Wyoming

Born: July 4, 1920, Hyattville, Wyoming.
Education/Training: Business accounting, Woodbury Business College; animal husbandry, Iowa State College.
Positions: Rancher, self-employed.
Section Activities: Past president, Wyoming Section, Excellence in Grazing Award, Man of the Range award, committee chairman.
SRM Activities: Past director; OWRC/-SRM Advisory Board.



Donald T. Pendleton
1518 Sadlers Wells Drive
Herndon, Virginia

Born: December 19, 1933, Breckenridge, Texas.

Education/Training: BS in range management, Texas Tech University, MS in public administration, Harvard University; short courses.

Positions: Chief Range Conservationist, Soil Conservation Service, since 1976; formerly assistant State conservationist, New Mexico and Texas.

Section Activities: Director, Texas Section, in 1973; president, National Capital Section, 1978; committees.

SRM Activities: Professional Affairs, International Affairs, and Nominations committees.

Other: Involved in small livestock/ranching enterprise in North Central Texas.

Statement of Don Burzlaff:

If one word were necessary to describe the Society for Range Management and the professions it represents, it would be "dynamic." The word implies energy in motion. Other synonymies include changing, energetic, forceful, or vigorous. All of these describe Society programs and member attitudes.

Dynamics are inevitable. Not only have there been changes in name, format of publications, by-laws, dues, leadership, and activities, but there has been a decided change in the maturity of the Society. We have grown from a brash youngster demanding attention because of our goals and objectives into a respected adult.

One thing that has remained constant over the years is the basic purpose of the Society. The goals and objectives of SRM have been carefully and thoughtfully prepared. Each member should read the "Benchmarks" once a year and evaluate his or her activities in light of these concepts.

The management of our rangeland resources grows more diverse and complex with each passing year. The SRM is growing in respect and recognition for accepting responsibility and positive leadership in meeting these challenges. The members of SRM must stand against concepts that are in opposition to its "Benchmarks." Each day there are pressures from uninformed people who respond to statements by special interest groups. They demand regulation and legislation that is out of harmony with sound ecological approaches to management.

The professional range manager and the International Society to which he belongs must seek an increasing role in assuring a sound scientific base for intelligent decision-making relative to use of our rangeland resources.

Statement of Fee Busby:

The Society for Range Management has five basic objectives which can be found on the title pages of *Rangelands* and the *Journal of Range Management*. In my opinion our most basic objective is the one which reads, "to improve the effectiveness of range management to obtain from range resources the products and values necessary for man's welfare." I believe that this objective is the motivation for most of us belonging to the SRM. It is my motivation.

But should I be elected as a Director of the Society, I feel my job would be to help the Society achieve the objective which reads, "to promote professional development of members. "Our future and ability to improve the effectiveness of range management depends only partially on our ability to assist legislators and bureaucrats in writing good range management related laws and regulations, to accredit schools teaching ranch management, and to certify range management consultants. These activities are important and necessary, but our future and effectiveness as the professional Society representing range managers depends upon our developing programs and activities that make each member feel that he or she is gaining something from and contributing something to the Society and the profession of range management.

Too often in the past, policy makers in the Society have suggested ways in which SRM members could become involved with the Society. In my opinion, too little attention has been given to getting the Society involved with members. I don't know of all the changes that are needed in our programs, but feel that the Society policy makers must work with the members to identify needed changes and then implement needed new programs and activities. That is the only way we can achieve our goal, "to promote professional development of members," and achieving that goal is the key to successfully achieving any of our goals. I am willing to work as a member of the Board of Directors to help the Society discover and implement those changes that are needed to help every SRM member feel he or she is a vital, needed part of the organization.

Statement of S. Wesley Hyatt:

I believe the Society for Range Management is the leader in promoting the proper use and management of the rangelands. These lands have varied uses and users. Within the Society there are members who have the knowledge of how to manage these different uses. The Society has been sincere and dedicated in its effort in promoting cooperation between users and managers for proper use of these rangelands. To me, one of the greatest assets of the Society is the integrity and frankness of the range managers and administrators within the society when discussing the proper use and management of the rangelands with the different user groups.

The annual meeting is a super short course in range management because of the variety of papers and slide presentations available to the interested listener. This individual can take home many ideas which are beneficial if he plans to initiate management plans. These plans will relate to specific uses of the rangelands.

The parent Society and sections within the Society conduct regular rangelands tours, giving those attending first hand impressions of what can be accomplished when the managers and users of the range work together.

Statement of Donald Pendleton:

The last 2 or 3 years have been banner years for rangeland and rangemen. The Global Conference on Desertification (Nairobi, Kenya, September 1977) started the ball rolling. The conference emphatically drew attention to the world-wide significance of rangeland and to its needs.

A second major event was the First International Rangeland Congress (Denver, August 1978). It too focused attention on the world's rangeland as a source of food and fiber, as watersheds and wildlife habitat, as a place for recreation, and a myriad of other less obvious uses and products.

Third, the Rangeland Policies for the Future Symposium (Tucson, January 1979) brought together two assistant secretaries, five agency heads, and over 300 range lovers and users of almost as many diverse interests. At the Symposium, representatives of the Departments of Agriculture and Interior, and the President's Council on Environmental Quality made a commitment to give range needs a higher priority and to place rangeland on an equal billing with other natural resources. Several panelists pointed out that even though U.S. rangelands are in the best condition they have been in this century, we still have a long way to go before we can be satisfied with their status and condition. One "common ground" that the many participants agreed on was the desirability of the urgent need to accelerate improvement in range condition.

Finally, numerous legislative acts, both Federal and State, have been enacted in the United States in the past few years aimed at range conservation and improvement. Others are on the drawing board. These also reflect the heightened concern of Congress, State legislators, and the general public for rangeland.

What does this all mean to SRM? How should SRM and its members take advantage of this public attitude of concern and appreciation for rangeland to promote range improvement?

(1) Actively recruit new members with an interest in range, especially ranchers. Lest we forget, they are the "grass roots" of range improvement. (2) Assume a leadership role as the spokesmen for the use and management of rangeland. If we don't, someone less qualified will. We have the expertise and wherewithal. (3) Become more involved politically. Governmental representatives need and want your advice and expertise in range matters. (4) Advocate and pursue uniformity and compatibility in range terminology, inventory, and range data systems. Let's break this bottleneck. (5) Enhance professional status by (a) upgrading range conservationist standards. (b) certification of consultants. (c) accreditation of range education institutions, and (d) sponsoring and attending tours, field trips, meetings. (6) Convene forums and panels to resolve conflicts and develop compatible solutions. (7) Sponsor range education activities for youth, Service clubs, etc.

Employment Service

Visiting Professor (3-6 month position available September 1, 1979 but not later than March 15, 1980), Range and Wildland Ecology and Management, Dept. of Agronomy and Range Science, University of California, Davis, to teach one course in multiple use of rangelands with emphasis on North America and one graduate seminar. Must have aptitude for relating to multiple use of range and wildlands including livestock-wildlife relationships; Ph.D. or adequate training and experience in range science, range ecology, wildlife biology and management, or animal science and livestock management. If interested, send resume and list of publications to *J.W. Menke, Search Committee Chairman, Dept. of Agronomy and Range Science, University, of California, Davis, CA 95616.*

Range Ecologist, hydrology engineer, plant materials specialist, and range livestock scientist for a 5-year range research project in Kenya are sought by the Winrock International Livestock Research and Training Center. Required: PhD or equivalent in speciality area; research experience; overseas, graduate research/education and field training experience are desirable.

Applications with resumes are due September 1, 1979—range ecologist; December 31, 1979—other positions, and should be sent to: *Dr. Ned S. Raun, Winrock International, Route 3, Morrilton, Arkansas 72110.*

Area Range Specialist, Texas Agricultural Extension Service, to conduct educational programs in the Rolling and High Plains of Texas with headquarters at Vernon. PhD in range management is required, as well as 2 years experience in Extension teaching and the ability and desire to work with people. Contact *Dr. Delbert Black, Personnel Officer, Texas Agricultural Extension Service, Rm. 104 K, System Building, Texas A&M University, College Station, Texas 77843.*

Associate Specialist for the University of Hawaii in Kamuela, Hawaii, to provide educational leadership in the area of tropical range, pasture, and livestock management. A doctorate trained in pasture agronomy with substantial experience in pasture/livestock management. Minimum salary $19,608. Send application letter, resume and arrange to have three letters of reference sent to: *George Nakasato, Cooperative Extension Service, 3050 Maile Way, Gilmore 203, Honolulu, HI 96822.* Closing date: August 15, 1979. FOE/AAE

Program assistant to perform duties of an organizational and administrative nature. Provides administrative supervision for programs in membership, chapter development, student chapters, booklet sales, and other areas. Supervises the preparation of annual directories of officers, Council members, committees, and divisions.

Minimum requirements are: graduate of a four-year college or university with major course work in an agriculture or natural resource curriculum and two years of experience in conservation, teaching, or a related occupation. Letters of application, with resumes attached, will be accepted by the Soil Conservation Society of America until the position is filled. Applications and requests for further information regarding salary and other details relating to the position should be submitted to: *Executive Vice-president, Soil Conservation Society of America, 7515 N.E. Ankeny Road, Ankeny, Iowa 50021.*

Certification of Range Management Consultants

Applications must be submitted by *October 1, 1979,* to be considered for certification in 1980. Applications Forms and Procedures for Certification in 1980 are available by request to the Executive Secretary. The Procedures have been revised, especially to include more detail on eligibility requirements, and published in the April issue of *Rangelands.* The Certification Panel welcomes suggestions for further revision, which should be sent to the Executive Secretary.

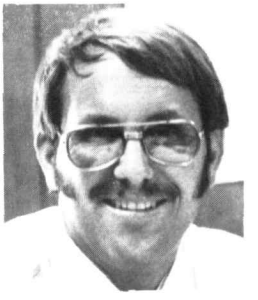
Members roundabout

Rex D. Pieper, editor of the *Journal of Range Management,* has just received the Distinguished Research Award for the College of Agriculture Faculty at New Mexico State University. This award is particularly significant because in 1971 he received the Distinguished Teaching Award, thus making him the first person to receive both.

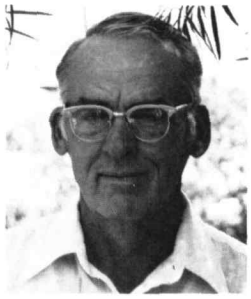
Wayne Hamilton, Texas A&M University Range Science Department faculty member, is on assignment for the United Nations Development Program in Paraguay, S.A. Hamilton will serve as a consultant to the UNDP Mission in Paraguay where he will recommend brush control alternatives in the Chaco region of that country.

Hamilton is immediate past-president of the Texas Section, Society for Range Management. He joined the staff at Texas A&M in 1976 following positions with SCS and 10 years as Resource Manager of the Chaparrosa Ranch in southwest Texas.

Arthur R. Tiedemann has been named Project Leader for Forest Service research conducted at the Shrub Sciences Laboratory, Provo, Utah. He will direct studies on shrub and tree improvement and culture for rehabilitation of wildlands, and the biology of associated diseases and insects. Tiedemann most recently served as a Project Leader at the Pacific Northwest Forest and Range Experiment Station's field laboratory at Wenatchee, Washington, where he was responsible for research on stability and water quality of forests in Eastern Oregon and Washington.



John C. Bedell has been named Deputy Forest Supervisor, Tonto National Forest, Phoenix, Arizona. Bedell graduated from the University of Arizona at Tucson in 1964. Since then he has held various positions with the U.S. Forest Service in Washington and New Mexico. His most recent was Ranger of the Cuba District on the Santa Fe National Forest.



S. Clark Martin, a well-known USDA Forest Service Range scientist retired June 1 after 37 years of service.

Except for a 6-year stint in Columbia, Mo., and his assignment in Tempe, Ariz., since April 1977, he has worked his entire career at the Rocky Mountain Forest and Range Experiment Station's Santa Rita Experimental Range neear Tucson, Ariz.

Early in his career, Dr. Martin developed information on weed and brush control, including the Diesel Oil Method for controlling mesquite, and methods of measuring livestock grazing use. As Project leader for Range Management Research at Tucson (1955-1977), his research on basic ecology, range burning, and effects of seasonal grazing culminated in development of the "Santa Rita Grazing System."

He is a charter member and currently a director of the Society for Range Management, and is a long-time active member of the Arizona Section, SRM. Clark and his wife, Loetta, plant to live in Tucson, where he will work part time on range research at the University of Arizona.

Victor R. Squires of Alice Springs, Northern Territory, Australia has recently been appointed officer in charge of the newly opened Central Australian Laboratory CSIRO, division of Land Resources Management. The Laboratory is a center for research on semidesert rangelands. (CSIRO stands for Commonwealth Scientific and Industrial Research Organization.)

Squires, holder of a PhD in range science from Utah State University, has worked in New South Wales, Iran, and South Africa. Last August, 1978, he attended the 1st International Rangelands Congress in Denver, Colo., and the 4th World Conference on Animal Production in Buenos Aires, Argentina. He has just recently been elected president-elect of the Australian Rangeland Society.

H. Leo Brown, a charter member, a life member of the Society for Range Management and a past president of the Kansas-Oklahoma Section retired from the Soil Conservation Service on December 29, 1978.

With the U.S. Soil Conservation Service he served in Kansas for 34 years, the last 18 being spent at Eureka working in five counties as a range conservationist and farm planner.

Leo is currently employed by the Walnut-West Creek Watershed District in Greenwood County Kansas procuring easements for flood retarding structures.

Robert F. Barnes has been named associate regional administrator for agricultural research, Southern Region, in USDA's Science and Education Administration (SEA). Barnes' primary contributions have been in the areas of forage physiology and management with emphasis on forage quality evaluation. He was instrumental in the development and application of laboratory methods in forage evaluation and the use of infrared reflectance spectroscopy for predicting forage quality.

Robert M. Williamson, a veteran Forest Service employee and the immediate past president of the Society for Range Management, has been appointed one of the three assistant directors for range in the U.S. Forest Service.

Williamson most recently had been forest Supervisor for Gila National Forest in Silver City, N.M. and before that was with the regional office in Albuquerque, N.M. He will be the range division's environmental coordinator which means that he will have responsibilities over grazing permits, wild horses and burros, and structural range improvements.

Requiescant in Pace

Steward J. Adams, District-Ranger, Pawnee National Grasslands, died July 26, 1979, following a short illness.

Adams, born November 7, 1932, served in the Army in 1951 and 1952. Following graduation from Colorado State University in 1958, he served the Forest Service on the Routt and Shoshone National Forests. In 1963, he moved to the Cimarron National Grasslands, and in 1973 became the District Ranger for the Pawnee National Grassland, the position he held until his death.

Surviving, in addition to his wife, Janet, are two daughters, a son, and his parents, Mr. and Mrs. Glenn Adams of Minnesota.

John M. Hall passed away March 22, 1979. He had been a long-time and active member of two societies: Society for Range Management and Wildlife Society.

John was a graduate of Utah State University and had worked for the Arizona Game and Fish Department for 11 years, 5 as State Director. He joined the US Forest Service in 1958. He held several positions in range and wildlife, and was Forest Supervisor on National Forests in New Mexico until his retirement in 1973.

Upon retirement he and his wife, Jean moved to the family ranch a few miles north of Springerville, Arizona.

John Hall was active in both the Arizona and New Mexico Sections, SRM, and for awhile served as secretary-treasurer of the New Mexico Section.

33rd Annual Meeting—

Plan Now for a Great Visit!

The California Section invites SRM members to the 1980 Annual Meeting. This advance word is to let you know of the scheduled events and to suggest that you start making your plans to attend—early reservations are an absolute must in San Diego.

San Diego, California

February 10-14, 1980

Why come to San Diego

The setting is perfect on one of the world's greatest natural harbors, with miles of beach and rocky cliffs on the Pacific and pleasing valleys and hills on the inland side. Odds are good for some real nice days in February—but come prepared for a little rain and cool evenings.

The visitor never lacks for exciting things to do in San Diego. The area is loaded with points of historical interest along with beautiful parks and other recreational areas. Entertainment opportunities are topnotch—San Diego Zoo, Sea World, Wild Animal Park, deep sea fishing, whale watching, harbor cruises, and other activities. Colorful Tijuana is just across the border. Visits to these attractions can be made readily whenever convention members are not occupied with SRM events; commercial tours for individuals or groups can be planned at the hotel.

Sheraton Harbor Island Headquarters

This nice hotel is away from the traffic rush, yet near the airport and only a few miles from most attractions. It is spacious with fine meeting facilities and comfortable visiting areas. Views of the city and bay are outstanding. The surroundings make this an excellent spot for combining vacation with business—great for loafing whenever time permits.

The amenities of San Diego have drawn many people. Could a better place be found for pursuing the convention theme, People Impacts on Rangelands?

*

Watch for the Next Notices

The October issue of *Rangelands* will describe San Diego and the 1980 Annual Meeting in more detail. It will have the forms for pre-registration, tickets, and hotel reservations. Next fall the California Section will mail to all members a full convention report. It will explain the really valuable awards that can be won by early pre-registration, to promote some fast action on your part.

The Convention in Brief

Registration will start Sunday afternoon. A large Hospitality Area will be the gathering place for regular members, student members, spouses, and guests. The Hosts will go all out in providing information and assistance.

Special for the Entire Membership

Monday: (1) Afternoon opening program on *Rangelands of Latin America;* and (2) Evening entertainment feature on *California Rangeland History.*

Tuesday: (1) Morning *Plenary Session* with addresses by notable figures in the political scene followed by an open discussion period; and (2) The evening *Presidential Reception.*

Wednesday: (1) Afternoon Town Hall Meeting on *Communications Within SRM,* followed by the *Awards Ceremonies* and *SRM Business Meeting;* and (2) Evening *Cocktail Party, Banquet,* and a spectacular *Entertainment Hour.*

Friday: All-day tour of San Diego County foothills and mountains featuring *Use of Fire in Managing California Chaparral.*

Especially for the Ladies

Tuesday: *Ladies Luncheon* followed by an afternoon *Trip to Old Town* for sightseeing, shopping, and visiting.

Wednesday: Morning *Coffee Hour* at the famous and elegant Hotel del Coronada.

Thursday: Morning *Scenic Bus Tour* of the spectacular coast up to La Jolla and back to Balboa Park for *Luncheon*—with afternoon options (a) Return to the Sheraton Harbor Island, (b) Visit at the museum area, or (c) Trip to the San Diego Zoo.

Especially for the Younger Crowd

Tuesday: (1) Early morning *Plant Identification Contest;* and (2) A Nighttime *Student Party.* The *Youth Forum* will be Tuesday afternoon or Wednesday morning.

Concurrent Sessions

Three *Town Hall Meetings* and four half-day sessions for Volunteer Papers will be held Tuesday afternoon, Wednesday morning, and Thursday morning and afternoon.

SRM Business and Workshops

Board and Council Meetings will start Sunday morning and continue as needed through Thursday afternoon. *SRM Committees* will meet Sunday afternoon and Monday morning, with a few other meetings during the week. The *Range Rehabilitation Workshop* will be held as usual on Sunday all day and Monday morning; other workshops will be scheduled during the week.

Rangelands
(ISSN 0190-0528)
2760 West Fifth Avenue, Denver, Colorado 80204
RETURN POSTAGE GUARANTEED