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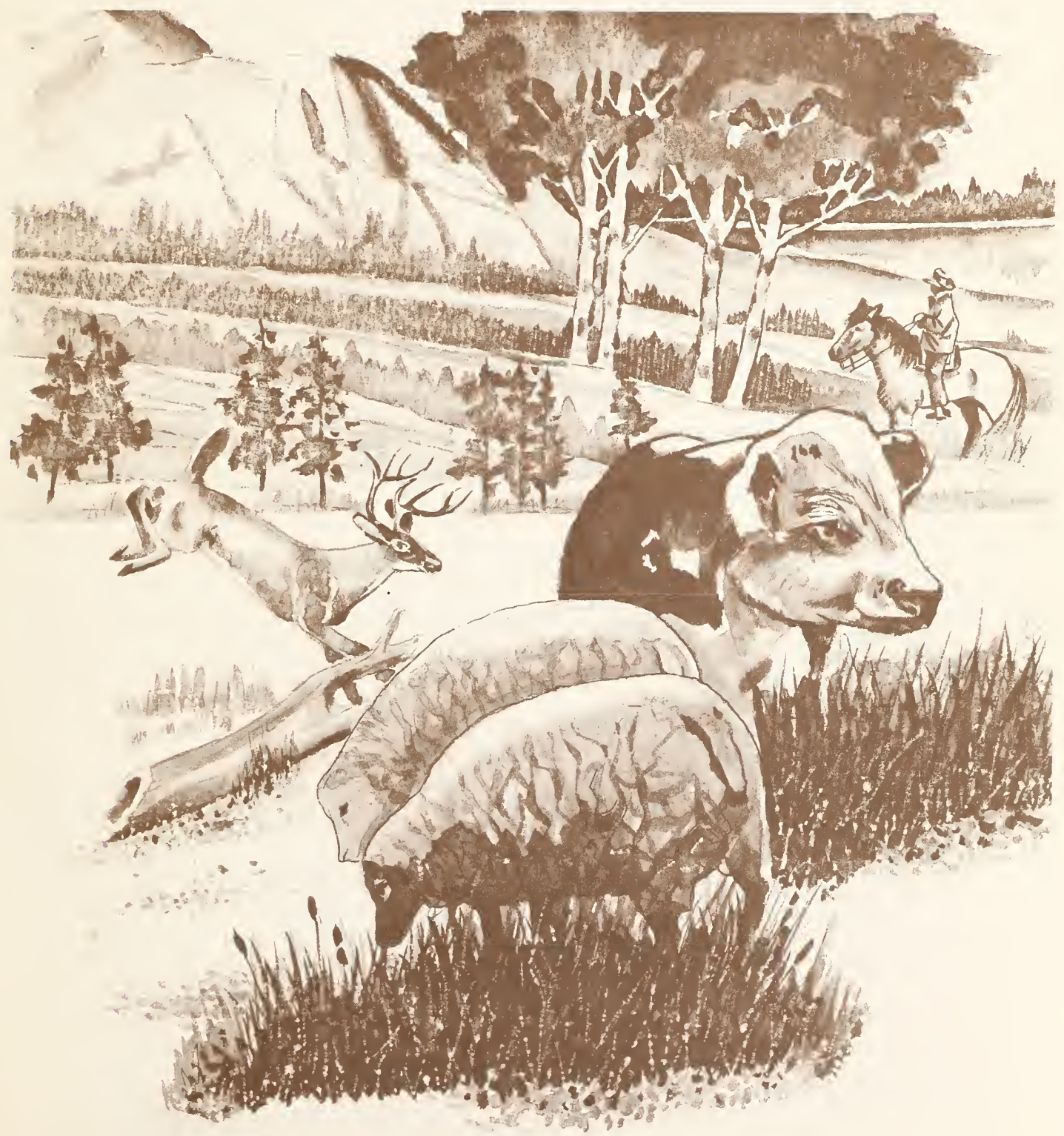
Alternatives for Strengthening Range Research

Proceedings of a Meeting Held in San Diego,
California, February 9, 1980

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ALTERNATIVES FOR STRENGTHENING RANGE RESEARCH

PROCEEDINGS OF A MEETING HELD IN SAN DIEGO, CALIFORNIA
FEBRUARY 9, 1980, PRECEDING THE ANNUAL MEETING OF THE
SOCIETY FOR RANGE MANAGEMENT

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United States Department of the Interior

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PREFACE

"Alternatives for Strengthening Range Research" was the title given to a meeting called by the Departmental Committee on Range, U.S. Department of Agriculture, and the Bureau of Land Management, U.S. Department of the Interior. The meeting was held to provide a public forum for exchanging information, ideas, and opinions on range research. The reason for sponsoring the meeting arose from concern among members of the Departmental Committee on Range over the decline in range research support, and for recommendations to the Secretary regarding the Department's position on the proposed Rangeland Research bill.

This proposed bill is to enable legislation relating to rangeland research similarly to the way in which the McIntire-Stennis legislation relates to forestry research. Public reaction to the proposed legislation has been mixed. The Departmental Committee on Range wanted a discussion of the

implication of this legislation and other alternatives for strengthening range research.

The program was organized into four general areas: Responsibility, location, magnitude, and goals of range research funded by the Federal Government; viewpoint of range scientists and user groups related to range research; viewpoint from State institutional perspectives and participation of the audience.

Not every possible viewpoint or interest group could be represented in the time available. Invitational viewpoints were selected to represent the spectrum of opinions on range research.

The diverse opinions on goals and objectives in these proceedings indicate the amplitude of disciplines and interests that embrace the Nation's rangeland.

Organization Committee Cochairmen

C. B. Rumburg
Agronomist
Science and Education Administration--
Cooperative Research

Robert S. Rummell
Assistant Director
Range Management, Forest Service
and Executive Secretary
Departmental Committee on Range

PURPOSE OF THE MEETING

By

M. Rupert Cutler
Assistant Secretary of Agriculture
for Natural Resources and Environment
and
Cochairman, Departmental Committee on Range
U.S. Department of Agriculture

As cochairmen of the Departmental Committee on Range, U.S. Department of Agriculture, Dr. Bertrand and I welcome you to this meeting. The Bureau of Land Management of the U.S. Department of Interior has joined us as a sponsor.

We are here to obtain your ideas about the adequacy of present levels of range research and your suggestions for achieving needed research levels.

Those of us who are responsible for research programs in USDA believe that range is an important part of the U.S. agricultural system and deserves adequate research support. We are all for an adequately supported range program. But we must have concrete evidence that current levels of range research are inadequate before we can go to bat for additional range research.

Let me review with you some of the facts that helped us decide to host this meeting at this time.

(1) During the past several years, some of you have told us that range research is inadequate to provide the fundamental knowledge and technology for meeting tomorrow's needs. Through the Society for Range Management, the range science profession has spoken out for greater support for range research.

(2) Pending legislation would establish a national program of rangeland research to be carried out by the United States although USDA has not yet taken a position on this legislation. We are looking to the information we obtain here today to help us make our recommendation.

(3) The 1980 Range Assessment, completed under direction of the Forest and Rangeland Renewable Resources Planning Act (RPA), indicates need for substantially more range research effort to meet range management goals of the USDA's Forest Service, Interior's Bureau of Land Management, other Federal Agencies, and non-Federal landowners.

(4) On the other hand, we are confronted with increasing demands for knowledge and technology to support other resource areas, while holding the line on Federal budgets. This means that if we are to get more support for range research, our effort has to be well designed and orchestrated.

We asked you here because you can speak for those who depend upon range for a living or who value range for other reasons.

We want to leave here today with a clear understanding of your concerns. But, most important, we want to take with us solid information with which we can obtain more support for range research.

We want to hear each of your ideas on strategies to obtain adequate range research support. Give us your thoughts on legislation. The option of using existing authorities to increase funding should be aired. Let's not overlook State legislatures. You may wish to express your ideas about shifting research priorities to accommodate need for higher levels of support for range research.

As I have indicated, we want and need information that fully supports our belief that present levels of range research are inadequate.

With this introduction, we will begin "setting the stage" with four presentations on range research supported through Federal programs.

In this section, Dr. Anson R. Bertrand, my fellow cochairman of the

Departmental Committee on Range and Director of the Department's Science and Education Administration, will be joined by Dr. Robert E. Buckman, Deputy Chief for Research, of the Department's Forest Service, and Dr. Rick Burroughs, Chief, Resource Sciences Staff, Bureau of Land Management, U.S. Department of the Interior. Representing the National Science Foundation is Dr. Melvin Dyer, Program Director, Ecosystems Studies Program.

RANGE RESEARCH SUPPORTED BY THE
SCIENCE AND EDUCATION ADMINISTRATION

By

Anson R. Bertrand
Director, Science and Education Administration
and
Cochairman of the Departmental Committee on Range
U.S. Department of Agriculture

It is a pleasure to be with you today and to discuss range research. I think we are in general agreement that range research has not received the support and visibility that it deserves. We in The Science and Education Administration (SEA) are genuinely interested in, and want your proposals for, strengthening range research. The competition for today's research dollar is great. Thus it will take the collective effort of all of us to maintain present range programs and to build even stronger ones.

U.S. Department of Agriculture Programs

From its inception the U.S. Department of Agriculture has played a major role in rangelands and range research. The Department has two Agencies with authority to conduct range research--the Forest Service and the Science and Education Administration.

Science and Education Administration Programs

Within the Science and Education Administration, we have responsibility for range research and extension. Range research is funded under three separate authorizations. I want to address these three authorizations--how they function, the size of the program, and how priorities are established. Two programs--the Hatch Act and the McIntire-Stennis Act--are similar. They are both conducted cooperatively with our State partners. Under these acts, funds appropriated by Congress are distributed directly to cooperating institutions in every State that elects to participate. Funds are

distributed to the States by formulas set forth in the laws. The States are required to match approximately, dollar for dollar, the Federal funds. In most cases, however, the present ratio is about 80 percent State dollars and 20 percent Federal. It is important to understand that, in both of these programs, priorities are determined by the State, and not the Department of Agriculture. McIntire-Stennis money is restricted to forest and associated rangeland and is the only restriction. Expenditures of Hatch and McIntire-Stennis funds are largely at the discretion of the experiment station directors.

Cooperative Research Programs

The total range research program conducted through the Federal-State partnership is about \$7.8 million with \$7 million contributed by the States and \$800,000 by the Federal Government. This supports the annual equivalent of just over 80 scientists-years (80 SY's) in range research. The programs are largely in the 17 western States, but Arkansas, Florida, and West Virginia have significant range research efforts.

Agricultural Research Programs

The remaining range research program in SEA is that of Agricultural Research (AR). Funds for range research in AR are appropriated directly by Congress. Priorities for range research are arrived at by SEA staff in consultation with Federal and State cooperators; user-group representatives; range scientists; and other Federal Agencies, such as the Forest Service, the Bureau of Land

Management, Soil Conservation Service, and the Animal and Plant Health Inspection Service.

The program of AR covers a broad spectrum of research relating in varying degrees to range. To better define this research effort, we have identified three major research categories:

- primary range research
- related range research
- contributing range research

Primary range research includes those programs and projects related to interactions among plants, animals, and the environment with emphasis on sustained productivity.

Related range research includes studies on the components of the range ecosystem, such as weed and insect control, selection and improvement of native and introduced vegetation, and identification and control of poisonous and injurious plants. These studies have an impact on primary range research and range productivity.

Contributing range research includes the programs which supplement total range research effort. These studies generate information to strengthen range research. Included are plant and animal genetics, animal nutrition, hydrology, water and wind erosion, and insect control in the 17 Western States.

Although our selection of these categories is subjective, we believe that it presents an acceptable accounting of AR's range research effort.

In the 17 Western States in Fiscal Year (FY) 1980, AR will have 58 SY's engaged in primary range research with a budget of about \$6.6 million. In addition, there will be 40 SY's involved in range-related research at a funding level of \$4.6 million. In these two categories of research, there are 98 SY's funded at \$11.2 million.

Contributing range research consists of 217 SY's and \$28.6 million in FY 1980. Thus, the total effort for these three categories of research amounts to 315 SY's and \$40 million.

Although we have not been as successful in getting increased support for range research, we have attempted to respond to range research needs in the past 5 years and have moved to strengthen the program by:

(1) Establishing the High Plains Grassland research program in Cheyenne, Wyoming, from what was formerly a horticultural research station.

(2) Reinstating range research at Miles City, Montana, after 10 years as an animal research station.

(3) Assuming responsibility for range research program at Dubois, Idaho, when it was discontinued by the Forest Service.

(4) Restructuring the program at Woodward, Oklahoma, with more emphasis on fundamental aspects of range improvement.

We are also adding a range specialist to our Extension staff in the Washington office. This addition will strengthen the total research and extension effort in range.

We recognize that our efforts have not been enough. In planning for the future, AR has undertaken an extensive assessment of its current range research capabilities and programs in the 17 Western States. As part of this assessment, AR scientists have recommended high-priority research needs in such areas as range improvement, grazing systems, multiple use of rangelands, and range productivity. In the second phase of this priority-setting process, we will need the input of Federal and State cooperators, user groups, and other agencies.

Conclusions

At present we feel that we have a sound nucleus of range research supported by strong programs in related disciplines, such as breeding, genetics, physiology, nutrition, etc. However, much more needs to be done to strengthen the impact of the total research effort on this dynamic ecosystem that we call range. We especially need to strengthen

the primary and related range research programs at key locations. However, I don't need to tell you that competition for research dollars is tough. We need your help. Therefore, please provide us with alternatives that will help strengthen the total range research effort.

By

Robert E. Buckman
Deputy Chief for Research,
Forest Service
U.S. Department of Agriculture

Responsibility for Range Research in
the U.S. Department of Agriculture

Principal responsibility for conducting range research within the USDA falls upon the Science and Education Administration (SEA) and the Forest Service (FS). The current working relationship between SEA and FS is outlined in a 1953 committee report on the transfer of "certain grass and range management research" from FS to the Agricultural Research Service (now SEA-Agricultural Research). As outlined, FS is responsible for conducting research on grazing management of forest and related ranges while SEA is responsible for non-forested ranges. The committee further recommended that SEA have responsibility for conducting research on rangelands, such as the Jornada experimental range in New Mexico and throughout the Great Plains region.

This leaves all research on range grazing management of forested lands plus adjacent integrated nonforest ranges with FS. Included here is the research on range ecology, control of undesirable plants by grazing and prescribed fire, management of seeded ranges and animal responses relative to forest range management studies. Also included as a FS responsibility is revegetation of wildlife range (habitat) as defined in the 1960 Memorandum of Understanding between the FS and the Fish and Wildlife Service, U.S. Department of Interior.

Range Research Programs in the
Forest Service

The Forest Service views range as a category of land rather than a specific use. FS range research focuses on the

development of management alternatives for increasing forage and livestock production in harmony with other range resource values and uses. Rather than the traditional range livestock grazing systems research, the ecosystems approach has been emphasized, that is, attempting to understand the interrelationships of productivity and use among the multiple range resources. An understanding of resource interrelationships is becoming more critical in view of the current and projected increasing demands for rangeland resources. For example, currently there are demands on rangelands for coal and minerals, livestock grazing, water, wildlife, timber, recreation, and residential developments, and we must determine how the use of both renewable and nonrenewable resources influences other resource uses and values.

Historically range research funding has not kept up with rising costs nor permitted needed program expansion. In terms of "real" dollars the range research program has been declining for a number of years. Range research received 2.5 percent of the FS research budget in FY 1979, or \$2.8 million. In contrast to the range research budget, appropriations for action programs have increased dramatically in little more than a decade. For example, the National Forest Systems range management budget has increased from \$14 million in FY 1970 to \$41 million in FY 1980, and the Bureau of Land Management's range budget has gone from 7.6 million in FY 1970 to \$52.6 million in FY 1980.

Current Research Program

The total Forest Service range research effort includes contributions

from range scientists and other disciplines, such as wildlife and fisheries, watershed, fire, timber, recreation, and resource evaluation. During FY 1979 the range program involved 26 range scientists in 14 research work units at 12 locations (table 1). The range research work units can be grouped into two broad program areas: (1) work units dealing primarily with forage and livestock production, and (2) work units investigating rangeland ecosystems and interactions. Five work units deal primarily with rangeland management, including forage and livestock production and nutritive value, livestock production systems, rangeland revegetation, ecology, and range validation. Nine work units conduct multiresource range research with emphasis on ecological interactions; wildlife habitat; and multiple uses of rangelands including reclamation of disturbed lands.

Table 1. Range research effort with project needs for FY 1981

Unit	Forage and livestock production		
	FY 79	FY 80	FY 81
Scientist-years	12.5	14.0	20.0
Millions of dollars	1.5	1.5	2.0
<u>Rangeland ecosystems and interaction</u>			
Scientist-years	13.6	15.0	16.2 ^{1/}
Millions of dollars	1.3	1.5	2.4 ^{1/}
<u>Total range resources research</u>			
Scientist-years	26.1	29.0	36.2
Millions of dollars	2.8	3.0	4.4

^{1/}Includes new units planned for Riverside, Calif. and Tucson, Ariz.

Research closely related to range management and rangeland support activities is conducted in 17 additional work

units which contribute to better understanding and multiple-use management of range resources (table 2). This work is directed towards problems concerning wildlife and fish habitat management, including threatened and endangered species; water yield and quality; fuel management and fire effects; land-management practices, such as reclamation and effects of human use; and resources evaluation, including techniques development.

Table 2. Range-related research effort with projected changes for FY 1981

Unit	Related and supported Activities		
	FY 79	FY 80	FY 81
Scientist-years...	39.2	41.9	43.7
Millions of dollars..	4.5	5.3	5.7

Range Research Needs for Forest and Related Rangelands

Additional research could substantially improve multiple-use management, productivity, and value of forest and related rangeland resources; improve the current condition of rangelands; and increase resource outputs commensurate with the Nation's projected demands.

Research to meet these needs can be categorized into six broad areas:

(1) Develop a standardized system to access, identify, classify, inventory, and evaluate the condition, potential, and trend of rangeland resources. Currently no standardized inventory and classification system is used, regardless of ownership, on the Nation's forest and rangelands. Rather, many systems of resource evaluation are in use, and the resulting array of systems fosters

duplication of effort. Perhaps more important, the assessment data lack compatibility, as experienced during coordination of appraisal assessment of the Forest and Rangeland and Renewable Resources Act (RPA) and the Soil and Water Resources Conservation Act (RCA). Research in progress at Ft. Collins, Colo., will provide new and improved resource evaluation techniques. But resource survey and evaluation work units located in Portland, Ore., Anchorage, Alaska, Ogden, Utah, Asheville, N.C., and New Orleans, La., require expansion to include assessment of rangeland resources.

(2) Develop new methods, techniques, and better understanding of forest and related rangeland management with emphasis on revegetation, restoration, improved productivity, and integration of grazing with other resource uses and values. We must accelerate the Oregon range validation project in LaGrande, Ore., and fully implement the southern range evaluation project in Alexandria, La. A Great Basin range improvement and demonstration program at Provo and Logan, Utah; Reno, Nev.; and Boise, Idaho, requires full implementation. We also must accelerate research for improved range productivity (LaGrande, Ore.; Fresno, Calif.; Provo, Utah; and Alexandria, La.).

(3) Develop guidelines and techniques to combat desertification, and improve condition and productivity of arid and semiarid lands for multiple-resource outputs. The Nation's rangelands are capable of producing a variety of resources. Expanded research efforts will help provide an understanding of multiresource interactions. For example, research will evaluate the compatibility of livestock grazing with other resource uses and values such as water quality, soil stability, water yield, timber supply, recreation, fish and wildlife habitat value, and maintenance of riparian ecosystems. Research will also determine the response of other resource values to range management and improve-

ment practices, particularly on unique and fragile arid and semiarid ecosystems. Establishment of two new work units (Tucson, Ariz., and Riverside, Calif.) with emphasis on arid and semiarid rangeland management will be required.

(4) Develop improved methods for revegetating, protecting, and managing disturbed forest and related rangelands. Rangelands have been depleted because of unwise attempts to cultivate marginal lands; encroachment by undesirable shrubs and trees; and destruction by rodents, insects, and diseases. Restoration of rangelands to their ecological potential will enhance all resource values and must be the objective for future range research. Increased research effort on reclamation of disturbed lands in the arid Southwest (Albuquerque, N.Mex.), Northern Great Plains (Rapid City, S.D.), and in the Great Basin (Logan, Utah) specifically is needed.

(5) Evaluate the biological, physical, economic, and social impacts and energy requirements of resource uses. Expanded research efforts are needed to improve knowledge and understanding of the multiresource interactions, impacts, and tradeoffs, and energy requirements of various range uses. Resource outputs in terms of local, regional, and national socioeconomic interrelationships, needs, and stability must also be determined. Resolution of this problem will be obtained only through an interdisciplinary team approach.

(6) Develop effective ways to implement technology into action programs. The present status of range management and range productivity does not truly reflect the current state of knowledge. Much can be done towards improving range condition and increasing renewable range resource outputs through intensive application of existing knowledge. But new effective methods and processes must be developed to transmit technology into application. Increased investments in time, talent, and funds will be required to effectively utilize technology.

Opportunities for Range Research Expansion

Opportunities for meeting rangeland research needs in the Forest Service are closely tied to RPA assessment of the Nation's supply and demand for forest and related rangeland resources. The RPA assessment projected an increase of \$1.3 million for western range research in FY 1981. This increment would permit range research to be initiated at two new locations and intensified at four other locations. This would support a larger research effort in range ecology and range evaluation, intensification of the Great Basin improvement and demonstration program, and implementation of arid land (desertification) research.

The RPA projected increment of \$5.4 million for range (western) in FY 1985 will provide for full implementation of the research to validate, demonstrate, and improve range ecosystem productivity. Because of the many problems requiring intensified research on the Nation's 850 million acres of rangeland, we need help

from cooperators and users of research information. We need your support and cooperation in identification of problems and in planning activities, such as was done in providing input to the National Program of Research for Forest and Associated Rangelands.

Forest Service extramural research programs is one process that will provide new knowledge to resolve existing problems. Cooperation and cooperative agreements with private landowners can also provide valuable support and assistance on research areas and by applying test research recommendations. State colleges and universities must also make a commitment to forest and related rangeland management by supporting an aggressive research program and providing educational opportunities for both range managers and researchers. Only through combined and cooperative efforts can we assure that the Nation's forest and related rangelands will be managed on sound ecological principles to provide the multiple resource goods and services demanded.

SCIENCE AND THE PUBLIC RANGELANDS:
A BUREAU OF LAND MANAGEMENT PERSPECTIVE

By

R. H. Burroughs
Chief, Resource Science Staff
Bureau of Land Management
U.S. Department of the Interior

As each of you realizes, the Bureau of Land Management is in the midst of a profound transition concerning the management of public rangeland. Court actions interpreting our obligations under the National Environmental Policy Act and subsequent legislation--primarily Federal Land Policy Management Act (FLPMA) and Public Rangeland Improvement Act (PRIA)--have broadened our mandate for management from historical patterns of use to those of multiple use. As our Director, Frank Gregg, has indicated on several occasions, the Bureau is firmly committed to meeting these mandates in a fair and equitable manner. To that end we have circulated for review Managing the Public Rangelands, and last week in Salt Lake City we conducted a midcourse review of progress to date under these new requirements.

What do the changes in our management obligations portend for research? Well, I believe there are several issues we must consider. First, the objectives of management are different. In the past, optimization of the output from this ecosystem sought to maximize livestock production over the short term. To reach that objective, empiricism played a dominant role. Detailed ecological models were neither available nor relevant. The result of what I will call the empirical approach was the degradation of those rangeland ecosystems. Some believe that much of the severe damage occurred long before our scientific understanding of the resource was sufficient to meet the management challenges. Few will argue that a doubling of vegetation from the public range is not within our grasp. However, at the time when we as a Nation

are summoning the willpower to confront the challenge of increased productivity from the rangelands, we must also recognize a new distribution of use for and consumption of that primary productivity.

The forces we confront today are characterized by traditional use patterns and subsequent simultaneous requirements both to restore productivity and, at the same time, distribute that productivity among several uses. The challenge to our scientific understanding implicit in meeting these new requirements in the use of public lands is indeed large. I suspect a factor in meeting it will be a much better understanding of the functioning of grass land ecosystems. My recent experience at the Yale School of Forestry and the Ecosystems Center in Woods Hole indicates that models of forest; grassland; marsh; and carbon global systems are producing useful information for management. Their contributions will become more significant as time progresses. However, the International Biological Program's (IBP's) grasslands experience indicates that we must proceed with caution, and that leads me to the issues that are at the base of my second point.

On one hand, the management obligations of the Bureau require direct action while, on the other hand, the results of work in any vigorous field of scientific inquiry include some certainties and many uncertainties which, in fact, become the frontier for research. In all of this, a difficult question for both the scientist and the manager is the extent to which the "shorthand" required to make a management system operational distorts

the accuracy of that system. To what extent does our current scientific understanding diverge from the actual workings of the natural system? For the management purposes intended, does a 5- to 10-percent divergence from this "scientific reality," as we understand it today, make a significant difference in our decisions? My suspicion is that the divergence does not affect the validity of decisions, but these are all topics for continued discussion.

To answer these questions and a variety of others about methodology, the Bureau has commissioned a series of symposia to be conducted by the National Academy of Sciences (NAS), and we feel that the Department of Agriculture and others desire to join us in supporting that effort. Over the first year our intent is to examine vegetation allocation, rangeland measurements and suitability criteria for grazing and the socioeconomic issues associated with mitigation. These discussions, plus the recently completed midcourse review in Salt Lake City, will provide a format for adjusting our activities.

One trend that developed in the discussions of the midcourse review, and the proposed NAS symposia is the need for a better definition of the contribution that social and economic science can and will make to these questions. These contributions are the basis for my third point. The mandate to manage the public rangelands for a variety of uses implies a complex series of social and economic questions. The requirement for the Bureau to consider these topics comes at a time when a variety of seemingly conflicting pressures are evident. At the base of this discussion, similar to the broadened scope for the natural sciences mentioned in my first point, is another challenge to our intellectual acuity. Specifically, some commentators question the basic ability of the social sciences to provide the fundamental information that this problem and others

require. Clearly, the NAS Symposia will be a useful step in resolving these issues. Beyond that, however, the Bureau will establish additional capabilities to do these analyses.

Finally, I would like to emphasize our enhanced commitment to a vigorous extramural program for research. I recognize that the topic for this meeting indicates that you are not satisfied. We continue to believe that an agency with resource management authority for the public lands must be responsible for commissioning research with other Federal Agencies, universities, research laboratories, and others if it is to be most effective in discharging its obligations. To that end, our current program includes and has included a continuing relationship with the Forest Service and projects with U. S. Geological Survey, Science and Education Administration, National Aeronautics and Space Administration, as well as a number of universities. In addition to commissioning our own work, we are currently evaluating the results from a number of studies funded by other Federal Agencies to determine their applicability to our pragmatic concerns.

Within our extramural research program and under the requirements of the Public Rangelands Improvement Act, we have requested the assistance of the National Academy of Sciences to provide sound and acceptable advice on the question concerning appropriate population levels for wild horses and burros on the public rangelands. In completing this difficult and intricate task, we intend to rely on the judgment of Professor Fred Wagner and his committee. All of us recognize the difficulties in meeting the congressional deadline with the scientific accuracy we would prefer, but we are committed to a vigorous effort. Beyond that, the project demonstrates our willingness to have interested scientists participate through the NAS in shaping our program.

In conclusion, I wish to reemphasize my four major points. First, the management requirements under which the Bureau now operates are much broader and more complex than they have been in the past. This will have a significant effect on our science programs and lead to examination of ecosystems rather than individual components. Second, there are a number of questions concerning methodology which inevitably occur when state-of-the-art science is transformed into practical management. We are seeking solutions to these questions through the NAS and others. Third, implementation of these changes will require enhanced capability in the social and economic sciences. Finally, a

vigorous, ongoing scientific program that results in increasing expenditures for research outside the Bureau seems inevitable when we realistically face our expanded needs.

In all of these activities the informed judgments of skilled scientists are an important part. I, therefore, look forward to the meeting of the Society for Range Management this coming week as a source of scientific insight that should both shape our research agenda and enable more effective management of the public rangelands. You have our attention. Let's cooperatively design a more effective research program.

RANGE RESEARCH SUPPORTED BY THE
NATIONAL SCIENCE FOUNDATION

BY

Melvin I. Dyer
Program Director
Ecosystem Studies Program
Division of Environmental Biology
National Science Foundation

The National Science Foundation (NSF), mainly through auspices of the Division of Environmental Biology, has given significant support to research in grazing land ecology during the past decade. Associated with the International Biological program (IBP) were emphases in arid and semiarid regions funded through the desert and grassland biome programs which have yielded a great deal to an understanding of form and function in grazing lands. Over the 8-year period in which the biome programs were carried out, approximately \$20 million were spent on fundamental research questions related to grazing lands.

Since IBP terminated in 1976, NSF has continued to fund projects concerned with basic questions about grazing lands. While total volume of work is considerably reduced at this time, NSF funds proposals related to the following areas:

Biogeochemical cycling. An understanding of cycles of carbon (C), nitrogen (N), sulfur (S), and phosphorus (P) is essential to the management of any ecosystem, especially of grazing lands. Many grazing lands have been put to other uses, not always with beneficial returns. Grazing lands themselves have been severely perturbed, resulting in significant changes in primary and secondary productivity which affect nutrient relations. Studies on associations of herbivores and nutrients continue to be important, and considerable emphasis is being placed on the interactions of C, N, S, and P in grazing land systems. Such studies are important because of the

necessity to understand how livestock grazing intensities affect the overall productivity of improved and unimproved pastures and how nutrients might be affected throughout the United States.

Effects of herbivores on grasslands. This emphasis has several important facets. There is considerable interest in learning how herbivores affect the plant community. The basic questions revolve around carrying capacity of any given grassland unit from both a short- and long-term perspective. By knowing how the plant community reacts to various herbivores and grazing intensities, it is possible to construct a better strategy for utilization of grazing lands.

The effects of episodic perturbations. Perturbations such as flood and fire are extremely important to arid and semiarid grazing lands. More needs to be learned about the impact of such stress factors on various communities; the effects of varying intensities of these perturbations in terms of seasonal, annual, or longer cycles; and, lastly, the frequency of such events over long periods of time.

A new emphasis in long-term ecological research. Many programs funded by NSF are of short-term duration, usually 2 or 3 years. There is a need for long-term studies in grazing lands to evaluate the effect of climate on grasslands, for instance, or how long-term high and low grazing intensity may affect certain regions. NSF, through its newly announced emphasis on long-term ecological research (LTER), anticipates being

able to conduct a limited number of such studies in conjunction with other shorter term studies that concentrate upon mechanisms or processes within grazing lands. Such studies will add greatly to our ability to recommend management strategies and tactics, as well as to formulate new research questions.

The National Science Foundation is ready to review and fund research related

to fundamental problems about grazing lands. NSF staff is in contact with investigators from U.S. universities who are interested in this subject. As a result, significant numbers of projects are funded in ecosystem studies, ecology, population biology and applied studies. NSF coordinates its research with range management Agencies in the Departments of Agriculture and Interior, and that pattern will continue.

RANGE SCIENCE VIEWPOINT ON
RANGE RESEARCH

By

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The comments that follow represent the views of the 5,700 members of the Society for Range Management (SRM) on a subject that is vital to the profession; that has been of great personal interest and concern to me for all my professional life; and, most importantly, that has critical consequences for the vast rangelands of this Nation and the world and for the welfare of our society. It is no small task for one individual to represent the views of so large a group.

Although my own viewpoint may be biased because of the amount of time I spent in the past 3 years on problems related to the state of range research, I believe that the profession is genuinely impressed with recent developments relating to rangelands. We have come through a most significant year marked by many events with relevance to rangelands, beginning with the Tucson Rangelands Policies Symposium, a meeting that I regard as perhaps the most significant in the last 20 years. There was considerable substance to that meeting. Moreover, the commitments made by Dr. Cutler and Guy Martin in their opening remarks have been followed by actions that we can generally endorse.

The call for--and demonstrated willingness of--adversaries to see the light and begin working together has been most welcomed. Positive benefits have been expressed in a number of meetings and statements that suggest a change in attitudes from what we have experienced in the recent past.

The Secretary of Agriculture's Memorandum No. 1999 appears to be a very sound document which, in fact, recognizes that rangelands have not been treated as

a full partner in the management of natural resources. Presumably, this memorandum provides the mechanism for a beginning to solutions of longstanding problems of rangelands and range research, but only a beginning. The memorandum needs to be scrutinized to understand exactly what it means, and the actions of those charged with its implementation should be followed to assure that the policy is being carried out.

When I read the purpose of this meeting and the subtitle of the viewpoints section of the agenda, I got the uneasy feeling that we may not get to the heart of the problem as I see it. The purpose is to discuss alternatives for strengthening range research. This seems to imply that range research has been rather ill. Well, we could not agree more. It got sick in the early 1960's and its state of health has gradually worsened. It has been lingering in the intensive-care ward for several years.

If we are going to save this patient, we had better get down to the basics--get some doctors who really care about the patient, who will thoroughly analyze the patient to determine what is wrong before starting treatment. Superficial treatment will only prolong the illness.

I will not be talking about researchable problems; that would be like constructing a house without a foundation. If we do not get range research on a better footing than it is now and find ways for it to function at a level commensurate with the needs, we may as well close up shop.

A first step in strengthening range research should be an honest attempt to understand its dilemma. I strongly recommend that the Departmental Committee on Range (DCOR) do this. The committee should inquire into the history of range research, particularly since 1960, from people who were a part of it and who understand the various factors that contributed to its current status.

I want to mention just three things that have taken place in the past 15 to 20 years, each of which contributed to the decline of range research:

(1) Cost-benefit analysis (now termed cost-effective analysis), as it has been employed to evaluate budget initiatives in natural resources, has had a strong negative influence on range programs. Under present methods of cost-effective analysis in the Forest Service, range comes out poorest of all functions evaluated.

Do not misunderstand me. Not for one minute do I think rangelands should be exempt from cost-effective analysis. But I do make a plea that we eliminate the double standard in its application and do the job right if we are going to do it at all. In my judgment, doing the job right involves an evaluation of all resource values, noncommodity and negative values (negative benefits) as well as commodity values.

The Office of Management and Budget and many Federal policymakers still look at range as a crop with forage as the only resource of economic value that is produced. Range is not a crop. Rangelands produce forage crops. But forage is certainly not their sole resource; they also produce wildlife, water, energy, minerals, recreational opportunities, esthetic values, and often wood fiber. And when not properly managed, they produce negative benefits that show up as costs to society.

In the early 1960's the Economic Research Service (ERS) extrapolated their graphs of beef and lamb marketed from the

range and from feedlots into the future and concluded that the range-livestock industry would soon be dead and that rangelands were a poor investment for management and research dollars. The Bureau of the Budget bought it "hook, line, and sinker." Ever since, range programs have been difficult to sell to the executive branch of the Federal Government.

(2) When the Current Research Information System (CRIS) and Research Program Group/Research Program (RPG/RP) classifications of research evolved, new problems surfaced for range research. In particular, these classifications reduced the identity of rangeland resources and allowed range-related and nonrange research, especially research on forage crops, to drain off range dollars to satisfy other research needs. Moreover, research administrators have been quick to count these dollars and the associated SY's as "range research" when faced with criticism for a lack of attention to range research. This has frequently led to an inflated picture of the actual amount of range research being conducted. The categorization of "range, range-related, and contributing to range," that Dr. Bertrand used in his opening remarks, gives a far more realistic picture, but one that is still subject to misinterpretation.

In a report prepared in 1977 in SEA's Washington office, range scientist Don Hyder states that by the RPG/RP system:

...78 percent of range research is tallied as crops research (Forage, Range, and Pasture) as RPG 3.00, 22 percent forestry research under RPG 2.00, and a trace as natural resources under RPG 1.00.....Forestry and agriculture appear to be treated very well in this RPG/RP classification, which probably accounts for its wide usage, but range isn't even identified as a natural resource.

It should be noted, however, that rangeland accounts for 1.56 billion acres in the United States, that is, 69 percent of its land area and larger than either forest or cropland. Obviously, something is wrong with these classification systems.

(3) A third major problem relates to trends in organizational structure and staffing of research by the Forest Service and SEA-AR over the past 15 years that have diminished the identity and visibility of range research and greatly reduced the voice of range expertise in the decisionmaking and policymaking process. By my reckoning, neither the Forest Service nor SEA-AR has a trained range scientist on their Washington staff today.

No one is blameless for the situation I described--least of all the range profession and the society I represent. In fact, I would place major blame for allowing these things to happen on the profession, SRM, and related user and interest groups. We have been closest to the problem, have watched it happen, but have really done little to counteract the trends that were so obvious. We have talked to ourselves, become apathetic, languished with our problems and the circumstances, and failed to address our plight head-on with a substantial and aggressive effort. If you understand SRM as an organization, its people, their traditions and pride, you can understand how this could have happened. But the faith we placed in Federal policymakers and administrators to look after the interests of rangelands and to do what is right has extended beyond all limits of reason.

In recent years a metamorphosis has begun within SRM. The voices of a few vocal and aggressive members who understand the "principle of the squeaky wheel" and how the American political process works have come to the forefront,

and the organization has shown some real signs of wanting to solve its problems.

In regard to research, this rejuvenation began 3 years ago with action by president Thad Box that led to establishment of the Research Affairs Committee, the first of its kind in the history of SRM. The work of this committee is relevant to the purpose of this meeting because it was established to address the very problem we face here today.

The primary objective of this committee has been to stimulate, justify, and gain support for more adequate funding of range research. Some of the ways in which we are working toward this objective are the following:

(1) We are seeking to develop liaison with administrators of State, Federal, and private organizations involved in range research. We want to understand their organizations and their research programs; to recommend additions or changes to their research programs, or both; and to obtain support.

(2) We are establishing liaison with user and interest groups, units of government, environmental groups, and State and national legislators.

(3) We are seeking to gain a larger voice for range scientists in research policy, planning, and decisionmaking processes in the Forest Service, SEA-AR, and SEA-CR, and to improve the identity of range in CRIS and RPG/RP classification systems.

As most of you are aware, the SRM Research Affairs Committee, has actively assisted in work to obtain enactment of the Cooperative Rangeland Research Act. This bill was not the child of this committee, but HR 14327 and S. 1903 have served as a vehicle for the committee to pursue its objective of getting range research in this country on solid ground.

There has been considerable reaction to the bill, some supportive and some in opposition. There is some feeling that more special interest formula funding would fragment and erode research under current authorities. We agree that present authorities are adequate in the Federal sector and that most purposes of S. 1903 could be served under existing authorities; funding is the primary problem. However, we do not agree that stimulation of higher education in range management, a primary purpose of S. 1903, is served by existing authorities. It is highly problematical that provisions for higher education under title XIV of Public Law 95-113, if funded, would fulfill this need.

A fear expressed by most organizations now engaged in agricultural and natural resources research is that they would have to give up funding in other programs to accommodate S. 1903. This is perhaps a natural reaction, but those who express these concerns should realize that range research has been giving up programs, dollars and SY's for a long time, and the record is clear on that.

Our intent with this bill is not to favor any sector of the research community, and SRM certainly cannot conduct research itself. We believe there is a genuine need to support range research in the colleges and universities. We do not suggest cutting funding for any other area of research, but we do insist that some solution be found. If Senator Melcher's bill is not the solution, then it would seem that a suitable alternative must be found if we are to believe the language of the Secretary's Memorandum No. 1999.

Now I want to make some recommendations and suggest some alternative courses of action for strengthening range research:

(1) The organizational structure of research by the Forest Service and SEA-AR

at the Washington level should be examined for ways to improve the identity of range and return it to full partnership in the policymaking and decisionmaking process of research.

(2) The CRIS and RPG/RP classification systems should be examined for ways to improve the identity of rangelands in those systems. The SRM Research Affairs Committee is beginning a study of this matter at its meeting in San Diego this week. In all likelihood, we will have recommendations for modifying both the CRIS and RPG/RP classifications later this year. We feel there is support outside of SRM for reasonable and justifiable changes, and we trust the Department and DCOR will work with us.

(3) SRM should cooperate with appropriate groups to establish a basis for periodic reviews with administrators of State and Federal programs in range research for the purpose of fostering strong programs commensurate with national needs.

(4) It would seem prudent for DCOR to consult with appropriate user and environmental groups, units of State and local government, and professional organizations and societies, as may be required, in implementation of the research aspects of Secretary's Memorandum No. 1999.

(5) In a statement titled "Rangeland Research and the Cooperative Rangeland Research Act--Why Are They Needed," the SRM Research Affairs Committee identified six recent acts of Congress that either call for range research or a level of rangeland technology that is not presently available. These laws and others should be searched for mandates of specific range research needs not presently being met.

(6) The cost-effectiveness method for evaluation of budget initiatives should be improved to remove the strong

negative bias toward arid and semiarid rangelands. Noncommodity values and negative benefits should be included in the analysis.

(7) There should be closer cooperation between the Forest Service, SEA-AR and SEA-CR, and the universities in planning, developing, and coordinating range research programs. Under present authorities, planning has been redundant and inefficient, has not produced a balanced or adequate program of range research, and has not achieved adequate coordination.

(8) Coalitions of user and environmental groups, of professional organizations and societies, and of representatives of State and Federal Government and legislative leaders should be continued and strengthened.

(9) Steps should be taken to include State governments and the National Governors' Association Rangeland Subcommittee into planning, developing, and coordinating research on rangelands.

(10) Means should be sought to over-

come the provincialism among the various research agencies and functional areas of research. We support Rex Resler's attempts to develop more unity among the natural resources in the funding and support of research.

(11) We endorse the recommendations of the 1977 Arlie House Symposium titled, "A Review of Forest and Rangeland Research Policies in the United States," conducted by the Renewable Natural Resources Foundation.

In summary, I think we should all remind ourselves that we are talking about strengthening a research program for lands that comprise 69 percent of the United States and about 50 percent of the world. That is a humbling thought. And in those terms, it seems to me that we have a tremendous responsibility to make wise decisions in the investment of our human and monetary resources--to care for and use wisely those range resources provided to us. The choices are ours to make--I trust we have the wisdom and good sense to make the choices that reflect well on the responsibilities entrusted to us.

AN ENVIRONMENTAL VIEWPOINT ON RANGE RESEARCH

By

Maitland Sharpe
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My organization and I are actively concerned about improving the health of the public rangelands while maintaining a viable ranching economy. The League has no explicit policy on range research. But because of the organization's long-standing commitment to conservation, professional management, and restoration of the public rangelands, I have no doubt that the League will support an expanded range research effort.

There seems to be little question about the need for increased range research. Each of the previous speakers has presented persuasive arguments to that effect. And their conclusions are corroborated by the stark realities of range-research budgets over the last several years. In addition, the official summary of the Tucson symposium noted that the need for a well-tuned program of range research was an important area of agreement.

I do not deal in range science, and I am not in a position to independently evaluate these findings of need. I do deal with the public and with policy-makers. And from that perspective, the qualitative and quantitative improvements in the range-research system are needed to provide a firmer foundation for making policy choices in the political arena.

My experiences in a number of intensely fought battles over natural resource policy issues--notably including the National Forest Management fight--have convinced me of the overriding value of credible, objective, widely shared, and well-interpreted information, a value that benefits all parties to the policy debate.

It has been my observation that, in policy conflicts, uncertainty breeds rigidity. If we are not certain what the resource interactions and trade-offs are --if, for example, we don't know how certain brush management practices affect particular wildlife values--then we tend to retreat into inflexible positions, based on worst-case assumptions. And we tend to push our opponents into an equally rigid position on the opposite side of the argument.

When we lack adequate information or are faced with conflicting information, compromise often appears too risky. We cannot afford to meet the other side halfway if we are not sure what it is you are giving up and do not know how much we may be hurt.

Better information will not resolve all policy differences. A great many resources conflicts are all too real. But it would solve some and narrow many others. Better information would help us focus on the real differences and, by reducing uncertainty, would help us break out of rigid, ideologically determined, categorical positions.

But information--or research--will not have that effect if it is not credible. And it must be credible not only within the discipline, but to the full range of actors in the policy debate.

As I'm sure you know, many people feel that range research is tied far too closely to its ranching constituency, to its commercial patrons, and to livestock-oriented legislatures. Undoubtedly, range research in general is being

unjustly maligned on the basis of a few examples. Nevertheless, the public's perception of range research does present a very real problem for the research effort because this perception affects whether, and how, the research findings are applied particularly on sweeping policy matters.

I think the problem is serious enough that it should be directly addressed in designing any enhanced range research effort. I do not have any startling solutions to recommend, but several rather obvious possibilities come to mind:

(1) Find ways to channel range research monies to a more diverse array of research institutions;

(2) Consider doing more research in-house, through the forest and range experiment stations, for example;

(3) Fund third-party, or blue-ribbon review of research findings, as BLM is now doing through the series of NAS symposia; and,

(4) Establish a larger range research capability within BLM.

An enhanced research program also needs to provide for delivery of the research findings. If delivery is not included as a central concern in the design of the research system, the policy benefits that I have been touting simply will not be realized.

It seems to me that delivery should be targeted to five distinct audiences: Range scientists, professional range managers, working ranchers, politicians and policymakers, and the interested public. Your list may be a bit different, but the point is: there are a number of different audiences, each important and each with different needs.

I am not in a position to comment on delivery to range scientists, managers, and ranchers, although the Tucson summary suggests that technology transfer could use some attention. My concern is that research findings, and the array of trade-offs and management options they

define, are not getting through to the public and the policymakers as promptly or clearly as they should.

I grant you, it is not an easy task. To those of you who have tried to teach us some basic range science, we may well have seemed to be a slow class. But, please do not give up on us.

We need some rather basic information and much help in interpreting it. We need it in relatively nontechnical, policy-oriented language, and in a concise format that we will have time to read. We need to be walked through the basic, accepted findings of range science and then alerted to areas of uncertainty and controversy. Finally, we will need to keep up with new research findings that have significant policy implications.

There is also much that we do not need to know, and it is just as vital that the delivery system cull the flood of information so that the important material is clearly identified. Otherwise, the will to learn will buckle under the sheer weight of paper, and communication will fail.

In closing, I would like to touch briefly on the scope and focus of the research effort. We feel that the total research program must be balanced, including both basic and applied research. But, as I am sure you are aware, many environmentalists are leery of supporting any additional range research because they fear that the bulk of the effort will go into what I might call ranch research--studies aimed at commodity production--and that basic hydrological and ecological research will come in a poor second. I suggest you would do well to address those fears directly by designing an ecosystem-oriented research program that embraces all of the multiple uses and all elements of the range resource. If it is also designed to achieve broad public credibility and to insure that the information is widely shared and well interpreted, then the expanded research program should make a major contribution to both on-the-ground management and to national decision on range policy.

A LIVESTOCK INDUSTRY VIEWPOINT ON RANGE RESEARCH

By

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Range research is no exception to the historic neglect or disregard that this Nation has demonstrated toward the range as a source of food and animal fiber.

Despite the fact that nearly 70 percent of the United States is range, the contribution that this resource makes --and potentially could make--to feeding and clothing the Nation has never been given the attention it deserves.

The 1980 Resource Planning Act (RPA) documents indicate that 217 million animal-unit months of livestock grazing are produced on the range--about 38 percent of its biological potential. The RPA documents also suggest that this production will have to be substantially increased--perhaps doubled--if the food demands of the next 50 years are to be met.

Such an increase, however, is not possible unless range research is significantly increased above its present meager and inadequate level.

The total research and development budget in the United States is about \$32.3 billion. Expenditures for all forest and range research is only \$300 million--nine tenths of one percent (0.9 pct.) of the national Research and Development effort.

But by far, most of this \$300 million is spent on forestry, recreation, and wildlife issues--not on issues related to food and animal-fiber production from the range. The Department of Agriculture, State agricultural experiment stations, and universities spend

about \$125 million annually on forest and range research. The Department of Agriculture, primarily the Forest Service, conducts about two-thirds of the latter.

Of the 934 scientist-years of forest and range research by the Forest Service in 1975, only 16 scientist-years--less than 2 percent (1.71 pct.)--were devoted to range research (National Reference Document: National Program of Research for Forests and Associated Rangelands). The number of scientist-years of research by State agricultural experiment stations and universities is likewise less than 2 percent of their total forest and range research.

The Forest Service spent 38 scientist-years on wildlife and fish habitat research. The amount of research on range wildlife by State agricultural experiment stations and universities was four times that conducted on range-management subjects.

The Forest Service devoted 16 times more research on forest insects, diseases, and fires than it gave to management of range resources. Timber management research was more than 14 times that of range research; wood product research was 13 times greater; watershed, soils, and pollution research was 7 times greater. Even research on recreation was considerably larger.

Much of the present range research appears designed to rationalize or justify range policy decisions adverse to livestock grazing. Indeed, research into possible actions or programs to increase food and animal fiber production from the range is largely ignored.

As many at the Tucson Rangelands Policies Symposium pointed out (and admitted), Department of agriculture Programs concentrate on croplands with little attention given to rangelands.

As far as the public rangelands are concerned, livestock grazing has long been tolerated rather than encouraged. Grazing in the national forests is suitable only if it does not interfere with tree growing, recreation, or other activities. On Bureau of Land Management lands it is the same story. Recreation, wildlife, feral horses, and so forth, come first; if there is anything left over, then it is okay to graze domestic animals.

Previous conferences by the Forest Service on research needs involved questions such as how grazing affects wildlife, recreation, birds, trout, etc.

I am not saying that these are not important issues and should not be studied; however, I would like to see more balanced research issues conducted in a more positive vein. If the premise is that grazing is always bad or the only culprit, then how can wise decisions or balanced trade-offs be made?

The need for more range research is becoming critical. Because of a flood of legislation and court orders concerning range issues or issues affecting range resources, many Federal Agencies are making far-reaching and sometimes irreversible decisions based on scanty or questionable data.

The Bureau of Land Management, for example, is cutting livestock grazing on the public rangelands even though it admits that "many basic scientific and methodological questions will have to be resolved before a successful rangeland management program can be fully implemented." The Agency says that "Fundamental disagreements exist within the range science community and among federal

agencies and range user groups over definitions, methods of measurement, the effectiveness of specific management techniques, and other questions which (it says in an understatement) will hamstring effective management."

My fellow panelist, Maitland Sharpe of the Izaak Walton League, made the point in the Tucson Rangeland Policies Symposium that better inventories of range conditions are needed, but "the science of range management is partly the art of making good decisions based on bad data." I am not sure how anyone knows a decision is good if the data are bad. Despite Mr. Sharpe's optimism, range scientists or managers are not omniscient their decisions are not likely to be any better than the quality of their data.

Our past neglect and deferment of range research is coming back to haunt all of us...Government officials and range users alike. Further delay will not "save money;" it will cost more in the long run in lost opportunities and perhaps in a degraded environment. Range decisions are being made on "apparent trend" of range conditions. This is an excuse for not knowing the real or dynamic trend.

We in the livestock industry are convinced--and many range scientists outside Government believe--that the BLM is putting livestock ranchers out of business because the Agency is misinterpreting inventory and trend. Its reply that it is using the best data available is small consolation when it is realized that many ranching units will never be put back together again even if further research reveals errors have been made.

Another important area which urgently needs immediate research is the economic analysis of range grazing and the economic impacts of Federal decisions affecting range uses. One reason grasslands agriculture has been so downgraded in the past is that it has long been

considered relatively unimportant economically. However, there have been no comprehensive studies in this area. Indeed, a recent study at Colorado State University indicates that previous superficial studies have grossly underestimated the total impact of range grazing on regional and national economies. The lack of socioeconomic data on range grazing is a prime reason why range programs of all kinds have fared so poorly in the Federal budgetary process.

Another issue which has gained increased importance is the energy efficiency of range grazing. Now that our energy needs have taken on new dimensions, how important is range grazing (generally considered to be the most energy-efficient form of agriculture)? Are there ways to make range grazing even more energy-efficient and productive as, for example, using solar power to keep water impoundments from freezing?

I could go on and on giving examples of research needs.

- Sagebrush: How much is needed for wildlife purposes and how do we control the excess in an environmentally sound manner?

- Riparian Ecosystems: The effects of livestock grazing on such systems have been discussed in several forums but these discussions have only demonstrated how little we know.

- Grazing Systems and Management: These are subjects we are just beginning to understand.

- Range Improvements: We have an opportunity to increase our investments in range improvements, but we need to identify those that are most productive.

- Weed and Pest Control...Predator Controls: These are issues which desperately need further research, especially in view of recent constraints.

The United States is the greatest

agriculture producing Nation in the world because of research and new technology. It is generally believed, however, that we have reached the limit of the agricultural productivity of our cropland.

If we devoted the same amount of research and development to our rangelands as we have to our croplands, how much could we increase range productivity? Development of new and improved species of crop plants has increased yields tremendously. Would not the development of new and improved species of forage plants also have a similar effect?

This panel was also asked to discuss "strategies." How do we achieve increased research? That subject brings me full cycle to my original point--the one repeatedly mentioned at the Tucson symposium: That the Nation's range resources have been underrated. They have been underrated because Government officials and the public are unaware of range values, and they are unaware because little has been done to evaluate --or to make the public aware of--these values.

It seems to me that the greatest research need is to measure range values. To sell range programs to the public and to the budget planners and decisionmakers in OMB and on Capitol Hill, we will have to do a better job of showing the values to be gained by making range investments now.

For that matter, we will have to do a better job of showing the urgent need and potential practical returns of research itself. It may sound like superficial doubletalk, but maybe the greatest need for range research is to research what the greatest needs for range research are!

At a time of tight budgetary restraints, we should emphasize the most urgent immediate research needs. Long-range basic research is also needed, but I doubt that we will get much along those lines until the public's perceptions of

the range changes. I note that some of the research topics suggested by various groups in past research conferences are a bit esoteric.

I believe that all range users--the livestock industry, wildlife interests, recreational and environmental groups--have a lot more to gain from sound research and good data than from the present situation where disagreements often turn on speculations over what the facts might be.

I am not so naive as to believe that research will settle all differences or make trade-offs unnecessary. I am convinced, however, that we waste much time and energy on nonexistent or exaggerated conflicts and that some conflicts could be settled or compromised if we all had a better understanding of the true nature of the conflicts or the possible alternatives available.

We feel Federal Agencies and range scientists should better articulate and justify range research needs. If this were done, the interest groups (livestock, conservation, etc.) would be better able--and, I believe, willing--to carry the ball politically.

In summary, there is no doubt that there is a great need to increase Federal Agency budgets for range research. There also is a great need to increase aid to colleges and universities for range research and education such as proposed by bills H.R. 14327 and S. 1903.

We commend the Secretary of Agriculture for his range policy statement. We are on the threshold of a new era for the Nation's range. If we work together to achieve the kind of research that is needed, and just as importantly, if we utilize the results of that research, the whole country will be the beneficiary.

A NATURAL RESOURCES ECONOMIC VIEWPOINT
ON RANGE RESEARCH

By

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The paramount range-economics policy issues center on rangeland outputs adequate to meet future needs. Physical and biological relationships within range ecosystems must be further researched. The economic feasibility and political acceptability of resulting new range management practices will condition their adoption. Further, economic analyses of the aggregate benefits and costs of range improvement programs and practices, both regionally and nationally, must be performed. In addition, economic studies are needed to indicate both the timing and extent to which range managers should adopt new practices. Timing and the extent that improvements are applied are crucial to maintaining adequate range output supply to meet changing demands.

To enumerate range economics research needs necessitates first developing a framework for and perspective on the problem. First, consider the supply side. In this discussion, the term "rangeland" includes all permanent pastures and ranges. Numerous outputs are derived from these lands and haylands as well. Important outputs from these lands, respectively, are grazed and harvested forages for livestock and certain wildlife species. Range ecosystems may also provide timber as a joint product. The amounts of products vary within and between years, affected by climate, management, and levels of other outputs. The spatial (locational)

dimension is also important since the outputs are mostly used at points of production.

Demands for the various range outputs can be similarly defined. Rangelands are primarily used for grazing by livestock and wildlife. Recreation demands are also present; they may be either compatible or competitive with other demands. Society is also increasingly demanding that these ecosystems be preserved; other uses may not be excluded, but often constraints are imposed on them. Demands for using rangelands as watersheds involve snow management and forage management, and, as with ecosystem protection, may require constraints on other uses. As with supply, the demand for range outputs also varies by season and between years. But, other sources of forage can serve as direct substitutes for range. Market mechanisms create shifts in the relative demands for alternative forage types and add complexity to the demand for grazed forages.

Demands for other range outputs are not directly satisfied through the market. Environmental and recreational demands are met through the political process. Technical experts and special interest groups help to insure that ecosystem and watershed protection is practiced.

Recreationalists encourage game wildlife and access to rangelands for other uses. Unlike commercial uses, these nonmarket demands are considerably more constant over time. Restoring a threatened wildlife population or ecosystem may be a very expensive process and, in some cases, impossible. Both market and nonmarket demands also have a spatial dimension. Range outputs are mostly used in place; the bulky nature of forages results in transport costs which prohibit long shipments.

Supply Research

The set of research topics requiring the input of range resource economists which focus on the supply of range outputs and the policy variables range managers and policymakers can affect is outlined below.

A. Economic analyses of increasing range outputs on the intensive margin, that is, the application of nonland inputs more intensively to an existing land base.

1. Economics of important range management and range improvement practices by range or forage type and region. Supply costs of existing output levels must be known, and the cost of inducing additional output from each major range type needs to be estimated. The time required to achieve output responses also needs to be estimated.

2. Analyses are also needed of the physical and economic potentials of shifts between grazing and harvesting of forage.

3. The relationships between the various forms of range outputs must also be known.

4. The effects of government policies on range outputs must be evaluated.

B. The economics of altering range outputs along the extensive margin--changing the amount of land use for pas-

ture and range--must also be researched. The relationships to be considered include:

1. Shifts to non-agricultural uses.
2. Shifts to other uses in agriculture.
3. Land use shifts between timber and rangeland.

C. Each of the above must be related to the economics of firms operating in the range-livestock economy.

Demand Research

Research on the potentials and needs for increasing the supply of range outputs cannot proceed independently from estimates of future demands for these outputs. The goal of range managers is to insure a balance between the demands for range resources and the supplies forthcoming while insuring the ecological integrity of the ranges. Economic analyses of the demand for rangelands need to include the following objectives. As with supply, the research would have to include spatial and temporal dimensions.

A. Estimates are needed of future demands for forages by livestock. This involves developing (or adapting) estimates for forage-consuming animals and the amounts of forages consumed by type of livestock. Further, estimates are needed of:

1. Forage consumed by source of feed (disaggregated as with supply estimates),

2. Changes in the demand for alternative forage sources as influenced by time and economic factors, and

3. The effects of changes in policy-affected variables such as grain prices, land-use provisions of farm programs, and grazing fees on public lands on the demand for alternative sources of forage.

B. Accounting for the demand for forages by various types of wildlife must be completed and kept current. The accounting would be extended to:

1. Estimates of future demands of forages by wildlife and

2. The nature of the interaction between wildlife and domestic animals.

C. Estimates of the demands recreation places on pasture and rangelands are also required.

D. Evaluations of the constraints to range and pasture use and management to meet the requirements of ecosystem protection watershed management, or both.

E. Demand analyses also must consider the indirect as well as the direct effects of changes in use. For example, a shift in demand from range-livestock to, say, recreational uses must be examined as to its local economy impacts.

Like range supply, the demand estimates must also make explicit measure of the effects of climate on demand. The sporadic nature of the increase in demand for range outputs--primarily, numbers of forage-consuming animals, mostly increasing in the "upswing" portions of the cattle cycle, and the climatically uncertain nature of seasonal range outputs combine to make a challenging problem in planning for needed resource development. Range outputs when averaged over time may appear completely adequate to meet anticipated demand. In any one year, or in a series of years, marked shortfalls in supply may be experienced. If, for example, a drought happens at a time of the cattle cycle with large numbers of livestock, serious supply shortfalls occur. Costs of range output deficits include forced liquidation of herds, shipping forages to deficit areas, overgrazing of ranges so that reclamation costs are incurred, and forced changes in other land use to provide needed feeds for livestock.

One important goal of range management should be to avoid such supply deficits. Range-economic research is important in assessing the needs for range improvements and the timing of those improvements. Viewed in this manner, evaluation of needed range resource developments is analogous to the evaluation of costs and benefits for investments in public water resource development. Water resource developments which provide, say, supplemental irrigation and flood control are not justified because there is a flood every year or water deficits for irrigation occur each year; rather, hydrological variability creates the need for protection against 1-in-10-year floods, or to alleviate 3-years-in-10 crop moisture deficits. Range management must be applied so that supply shortfalls are avoided as these deficits cause serious economic dislocations and damage to the range resource base.

Research Strategy

The needed range economics research program discussed has the following elements:

1. Research must be spatially diverse.

2. Research approaches among regions must be consistent.

3. Research directed toward any one part of the problem must be designed to become a part of a larger interdisciplinary analytical perspective.

These research needs imply a much larger commitment of range economists' time than is available in any one agency. A telephone survey of universities and Government offices in the Western States revealed that there is only a handful of range economics researchers. Among universities in the 11 Western contiguous States plus Texas, there are about 10.5 scientist-years (SY's) of range economics research effort. These 10.5 SY's are

supplemented by four research associates. The Federal Agencies contacted reported only 3.0 scientist-years of economists' time allocated to range. As with the universities, not all Federal Agency offices were contacted. When one considers that much of the economic research effort is directed toward ranch economic management problems, these numbers reflect a relatively small commitment to range resource economics questions.

It is doubtful if the range economists' time in all Federal and State agencies and State experiment stations is sufficient to complete researching the problem in all its dimensions. But, with leadership and the appropriate coordinating mechanism, we could make a good start. A regionally organized research approach must be considered. If budgets prohibit initiation of research in all regions simultaneously, priorities will have to be set for sequencing among regions.

Priorities

To insure additivity and comparability between regions, a comprehensive analytical system is needed. Such a system also offers the potential for use as a mechanism to establish priorities for urgent research needs. Setting research priorities must weigh a number of factors, some of which are outside the model or analytical system and others which can be identified from within the model.

Models or analytical systems are available which can help guide research priorities. The Forest Service has the FRES (Forest-Range Environmental Study) model and the MRUI (Multi-Resource Use Interaction) model. Iowa State has a multiregional model of the crop sector of U.S. agriculture. Use of these models, with minor modifications, can provide much information about priorities for range economics research. Simulations of

alternative supply-demand conditions can help us identify where bottlenecks will begin to occur. The relative cost effectiveness of alternative range improvement practices can be examined.

A new cooperative effort between ESCS, the FS, and BLM will go part way to providing the microperspective. This activity will provide rancher economic data useful to evaluating the economic well-being of livestock producers and the local economies in which they operate.

Not all factors affecting research priority are included within such analytical systems. Exogenous to the model, three factors important to setting priorities are: (1) range condition, (2) imminent demand conflicts, and (3) anticipated supply-demand imbalances. Considering range condition recognizes that even greater reclamation costs will be incurred should range improvements not be initiated. In other cases, shifts in the composition of demands on range outputs may establish a research priority. Finally, a complexity of forces may result in supply shifts causing supply-demand imbalances in a given region or range ecosystem.

Research Administration

These discussions indicate that needed range-economics research be conducted with the following structural considerations:

(1) Because of the spatial dimension to range and pasture resources, a regional approach is needed.

(2) Within each region an interdisciplinary approach is required.

(3) The two structural dimensions mentioned imply an interagency structure between Federal and State institutions.

(4) Finally, the research planned should be problem-oriented.

Research support allocated on an institutional and administrative subunit basis will not guarantee the required interdisciplinary focus on priority problems. Institutions with an interest

in range economics research should seek to design new ways to accomplish regional research so that the much-needed research information is forthcoming as soon as possible.

2

A WESTERN AGRICULTURAL EXPERIMENT STATION
VIEWPOINT ON RANGE RESEARCH

By

Donal D. Johnson
Dean, College of Agricultural Sciences
Colorado State University,
and
Chairman

Western Association of Agricultural Experiment Station Directors

1. There is a considerable need for range research because:

- Research in natural resources has traditionally been minimal.

- Agricultural experiment station funds have, in most of the West, been directed toward more intensive land management since the rangelands have been largely federally owned and managed by BLM and the Forest Service. The Forest Service has had its own research arm.

- In the long term the millions of acres involved can produce significant crops of red meat with little energy consumption.

- Much of the deteriorated range in the West was produced in the early part of the century as a result of societal pressures and World War I Government policies. Society should help bring the ranges back to their optimum production.

- Range research is largely in the synoptic state, descriptive. We need much more information, acquired through research, to provide the data needed for wise management.

- Range research is involved in the management of a natural ecosystem. Results require a long time.

- In my experience of involvement with international agricultural development through a consortium of western universities, the needs of the Lesser Developed Country's for soil-water-range personnel on short- and long-term assign-

ment have been great--and, for range scientists, often unfillable. The failure of an adequate research program has resulted in a lack of trained personnel. A limitation to the accomplishment of the research recommended here will be the manpower available. Research through universities achieves two goals--new knowledge and new scientists.

2. The western agricultural experiment station directors place a high priority on this research because:

A. We have a mechanism which has a committee of range scientists who have produced a set of research priorities.

B. We have a technical committee researching the optimization of red meat production with range as a part of the forage system.

C. At a recent session in San Francisco, the executive committee of the western directors voted to recommend to SEA-CR that \$600,000 over the next 3 years be devoted to:

(1) An intensive research project into development of methods of range assessment and inventory, and

(2) Integrated-pest management as it relates to ruminant-forage production.

Both of these activities will, if approved, seek cooperation and involvement of SEA-AR, the Forest Service, and BLM.

3. While much of the rangeland in the West is under Federal management, there is significant privately owned rangeland east of the Rockies and west of the 100th meridian. The Great Plains Council, made up of Federal and State research and action agencies, in 1976 produced a bulletin on range research needs of that area. It is significant that their lists of priority research topics are essentially the same as those developed by the western region's coordinating committee.

4. The western directors support the proposed Cooperative Range Research Act. It indicates a serious concern and should be passed with new monies to carry it out. Existing State and Federal monies spent through the experiment stations are inadequate for their present programs. If range research is funded from that total, there will be irreparable consequences to our already inadequate agricultural research program.

STATE AND LOCAL GOVERNMENT VIEWPOINT
ON RANGE RESEARCH

By

Leonard U. Wilson
Research Associate
Council of State Governments

As a Vermonter, I am the furthest away from home of the members of this panel. I am not a range scientist, nor even a range specialist. My research focus is on the operating relationships of local, State, and Federal governments in national resource management. I am particularly interested in State roles and responsibilities--State obligations and opportunities--in resource conservation and development. Because of my work on state-land and water-management issues, I serve as a consultant to the Subcommittee on Range Resource Management of the National Governor's Association (NGA).

The NGA range subcommittee is made up of 12 mountain and pacific States--including Alaska. Louisiana is the 13th member. Meeting at the staff advisory committee level in Salt Lake City 2 days ago, the 11 State representatives present endorsed S. 1903, the Range Research Act. It was clear from the discussion that in the member States there is a close working relationship between State agencies with range responsibilities and the range scientists of the State land-grant institutions. Strong support was expressed for the range programs of the experiment station network.

The observations that follow are an expression of my own personal views.

As the final panelist, I want to emphasize several factors which I feel have not been significantly highlighted in today's discussion and which are not being given adequate attention in current range research programs. I will make four points:

(1) There is critical need for more integrated and comprehensive research projects by interdisciplinary teams of scientists. We hear much of coordinated, cooperative range planning. This must be based on coordinated, cooperative range research. Such research projects should bring together specialists from Government Agencies--State and Federal--as well as those from the academic and consulting communities.

As a trustee of a land-grant institution and as a State official, I have observed that not only in my own university and State, but also generally across the country, experiment station and other academic research in the natural resource area is often carried out in individual, isolated projects. Too rarely are these tied to current planning and management priorities of State government and the private sector. We need not only integrated, multidisciplinary research, but also institutionalized communication and coordination between the academic and government communities.

(2) An interdisciplinary approach in range-research projects must encompass more than the technical, hard science fields. The management problems and conflicts we are seeing in the field are very often institutional and procedural. As we heard continually at BLM's meeting in Salt Lake City this week, range management is an art as well as a science. We must be concerned, in a research sense, with people--their behavior, their communication skills, their ability to work together, their capacity to manage.

In The sense of the Symposium, the summary of last year's Tucson meeting on rangeland policies, we read, "Technology is available for much of the job of improving conditions and applying sound rangeland management, yet the administrative and management process often constrains the job." To remove constraints first requires that they be isolated and analyzed. The improvement of the administrative and management process involves factors demanding research effort from the social science sectors including political science, law, economics, psychology, communications, and public administration.

(3) Dissemination and utilization strategies must be built into range research projects. In undertaking research for the National Science Foundation, my colleagues and I are bound by a contractual obligation to conduct a specified dissemination and technical assistance program and, subsequently, to evaluate the impact of our products and efforts. This approach should be incorporated in range research procedures. Moreover, problems of technology transfer in range management need study, and new techniques and strategies need to be

developed. This should be recognized as a significant element of the range research agenda.

(4) A substantially higher level of government support for range research is essential. We must expand our basic scientific knowledge of every aspect of range ecology. Moreover, as I have argued, we need far greater emphasis on interdisciplinary projects that include the social sciences. We must invest in both the study and practice of technology transfer. I am advocating an expanded research effort, but not a shift away from essential basic research and technology development.

To conclude, on what may seem a self-serving point, USDA should recognize and utilize the research capacity that exists beyond its own Agency and its experiment station network. The organizations for which I work are two of many institutions--representing governmental, environmental, professional, and other interests--possessing specialized knowledge and experience of the type needed to help meet the research needs I have discussed.

AUDIENCE PARTICIPATION:

COMMENTS, QUESTIONS, AND DIALOGUE

HAROLD HEADY: An underlying assumption is that if you get range research money, something else must be given up since there is a finite pot. I am not willing to accept that assumption.

Another question of equal importance is whether or not we have the organization in place to handle any new or expanded research program. Forest Service has part of the range research program, the Science and Education Administration has a piece of the range research, and the universities have pieces and parts. We don't necessarily have the organization in place to handle the research we need to do. Range research could profit by developing an integrated systems approach to range similar to that being developed for integrated pest management.

RUPERT CUTLER: How do we get range research on its feet? You have told us that we are not telling the range management needs story; the flood of information must be culled; proper and justified values are not being assigned to rangeland products outputs and services. I know this is true because it has been most difficult for budget managers to accept the value of range management and range-research programs.

The primary reason for this meeting was to ask for your assistance to determine how to conduct and fund the research. You have opened up some interesting questions on research organization structure. The Forest Service management, for example, is just scratching the surface on the multiresource analysis and interdisciplinary land-management planning. The functional and separate resource plans of the

past are inadequate. We are beginning to work on an interdisciplinary basis in management, and now the same thing is called for in research. The challenge we have just heard to our research agencies to review their organizational structure will be taken seriously.

We have heard a diverse set of reactions to the range research bill. We are here to poll you. In the discussion period, tell us how you believe the Department of Agriculture and, if you like, the Department of Interior, should respond to the initial momentum for this legislation and any alternatives you feel are worthy of explanation.

JOHN MERRILL: There is never enough money, so I would like to talk about priorities. Food is a basic human need. Range scientists need not apologize for their role in basic food production. Recreation and all other uses must be of secondary importance.

I support and am fully committed to multiple resource use. There was a time when we were too much production-oriented to the detriment of other resource uses. The pendulum may now have swung too far away from production benefits. Now might be the time that we should reemphasize range livestock production as one of the multiple use benefits compatible with or complementary to other benefits.

The third priority I want to discuss is our preoccupation with public lands when, in fact, the largest percentage of production comes from private lands, not only in the private land States, but also from

private land within the public land States. A lot of the research in place ignores that fact.

The fourth priority is to ask why some of the funds being spent on RPA and RCA cannot be directed to the basic research and input that would make them meaningful and technically sound.

THOMAS KIMBALL: Research on public lands should follow the mission of the management agency, which is usually one of multiple use. In this day and age, it is foolish to think we are going to get lots of money for research. My observation of Washington has been that whenever there is a crunch on the Federal budget, research takes it on the chin first and resources second. So the question is, "How do you do the job and do it effectively?" I think Mr. Wilson said it all when he suggested a coordinated, integrated approach to range research. Agency responsibility for managing public land is not amenable to separation into bits and pieces and to try to do so may be an error in light of trying to get funding to do these things. For example, the RPA and RCA law says that when needs have been determined, the executive branch is to fund those needs equally. But, the Office of Management and Budget always funds those things that put money in the Treasury, such as cutting timber which will be funded at 100 percent, reforestation will be funded at about 50 percent, wildlife at about 10 percent, and range a little less. That is the problem, and when the executive branch doesn't do what Congress directs, I don't know what you do about that.

If we get any money and do research, I would like to see some emphasis on

the reasons why we can't apply the knowledge we already have. The real problem is in getting the information applied, which implies socio-economics research to make the information salable. The information must be sold to the same constituency that will in turn provide political support for funding.

W. J. MOLINE: I am presenting some brief comments from the southern directors relating to S-1903 (the Rangeland Research Bill). First, we believe the bill offers nothing that cannot now be handled within the authority of the Hatch Act and associated funding. The second concern is that the proposal tends to dilute formula funds and there is resistance to the trend toward further dilution and small packages: The third concern is the use of the words "accredited range programs." There are many States that do not have accredited range teaching programs that could accommodate and make significant contributions to range research needs.

With that said, I wish to add our general endorsement of the need for expanded range research. I agree with range research taking on a holistic approach to the resources. We encourage any strategy that would expand the concepts of production and ecology into the eastern grasslands.

DANIEL MERKEL: First, I want to thank the two of you (Drs. Cutler and Bertrand) for this meeting and focusing on research problems encountered in rangeland. A letter has already been sent to your boss (Secretary Bergland) thanking you not only for rangeland research, but also for Secretary's Memorandum 1999 (statement of range policy), the

cooperation on the Tucson symposium followup, and many other efforts.

I would like to ask three questions. Since the Secretary's Memorandum 1999 addresses research, how does the Department perceive those words? How does that interpretation of 1999 relate to S-1903? And, is the new position in range extension a funded position and is it filled?

ANSON BERTRAND: The Department interprets 1999 quite broadly and in a holistic approach. The Melcher Bill (S-1903) addresses research, extension, and teaching needs from the technical view and does not bring in the socioeconomic view that has been expressed here today.

MERRILL PETOSKEY: The range extension job was offered to the top candidate, and he decided not to come to Washington. I am negotiating with another person and hope to have the position filled shortly either by permanent assignment or Interagency Personnel Act.

DALE BOHMONT: We have several problems that S-1903 addresses. Anson mentioned that 80 cents in every research dollar comes from the States. When a Federal dollar comes in, it isn't a free dollar, but a matched dollar or supported dollar. State legislators look at the Federal-State relation as a partnership. If we put Federal money into research, we are going to have State money in a great amount in research. I suggest to you the best way to obtain it is by having a way to identify range research rather than by present authorities which are sometimes hard to find.

Present regulations give you fits when you try to identify and apply technology to research in the public land areas. I hope we can find some

way that research can avoid some of the problems that management would face so that we can research it out without all the various problems associated with the normal management systems of land applying to the research sector.

RUPERT CUTLER: I don't know how you can exclude research that has an impact on the environment from the application of inputs.

We should acknowledge that the renewable resources extension act was, in fact, a redundant authority. Cooperative Extension was already involved with natural resources in many States. What you are proposing with S-1903 is comparable on the Cooperative Research side. It gives more visibility and more explicit direction and authority to Cooperative Research.

ANSON BERTRAND: One of the most heartening things I have heard today is that the western directors are going to use \$600,000 of high-priority research money for range research. I'm elated by that.

DONALD BURZLAFF: As a representative of a nonland-grant institution, my concern with S-1903, regardless of what happens to it, is that the funds be distributed on a competitive basis so that nonland-grant institutions can compete for the funds based on the ability of an organization or institution to accomplish the research.

The second thing I would say is that we are looking forward to and hoping that we can create an interest here on the transfer of technology. Somehow, I would like to find a way of incorporating the technology developed at nonland-grant institutions into the existing technology transfer systems.

WILLIAM SWAN: I want to endorse the statement John Merrill made earlier to the effect that our most productive rangeland is privately owned and the research should address the private sector. Secondly, all research projects should be reexamined in the light of a petroleum shortage which will be with us for a long time. We cannot go forward on the assumption that things will be the same.

RUPERT CUTLER: One thing that occurs to me is that the word "food" is not among the Forest Service's official multiple uses. We don't think about the role of our Forest Service in terms of food, at least not directly. You're right, we should think more about red meat.

ROBERT BUCKMAN: My remarks address a subject that has come up several times during this discussion and has to do with the mechanics of coordination, planning and inception of research. If you folks are not comfortable with present mechanisms, let us explore ways that scientists can become more involved in the planning. If those that use the research need better mechanisms to review our programs, that is fully negotiable and we would welcome the opportunity to explore possibilities with you. If we need to search for new mechanisms to handle larger scale research of the kind Harold Heady mentioned, that is also open to exploration. The point I want to make is that the mechanisms by which we administer, plan, and conduct these programs is highly negotiable and we welcome the opportunity to explore them with you.

JAMES KLEMMEDSON: The Research Affairs Committee (of the Society for Range Management) is attempting to develop a liaison with organizations like the Forest Service. We want to be

in a position to familiarize ourselves with ongoing programs in all research organizations.

Somebody commented that S-1903 does not address economic policy questions. Read the bill again. I believe it does.

As for the term "accredited schools," as much as I have worked with that bill, I don't know for sure whether that term is in there or not. You all understand the need to compromise. If there is something in the bill that concerns you, let us know. The concern relating to institutions is that any research be performed by competent people; that is a primary consideration.

In reference to Don Burzloff's question, the bill is not restricted to land-grant institutions, and there is, perhaps, an opportunity to include a provision on competitive grants.

JEANNE EDWARDS: It seems to me that the Forest Service 1981 budget shows a decrease of \$3,909,000 in range management support, a decrease of \$162,000 in wild horse management, a decrease of \$10,204,000 for watershed and everything else is plus unless I misinterpreted the information.

I was informed by a Government economist that the range-livestock industry was not cost effective. A representative from Her Majesty's Kingdom told me that they had let the economists rule their nation and today, under their health care plan, they don't have blood replacement for people over a certain age because it is not cost effective. I am not going to let somebody in Washington decide what is cost effective.

I am not clear on the Forest Service budget. You say you have an increase in range research, but is it coming out of these other on-the-ground programs? Please explain it to me. Are these decisions being made by economists that don't know what is actually going on?

ROBERT RUMMELL: The increases and decreases I heard you talking about were in the National Forest System portion of the budget. Your figures are correct; as I recall there was a reduction in wild horses and burros of about \$140,000 and other parts of our program, which led to reductions of about \$2.5 million below previous years. I am really not in a position to deal with the reasons for that reduction other than the general concern to keep the cost of government down.

JEANNE EDWARDS: I understand that and am very sympathetic with President Carter's efforts. I only have to run a household; he has to run a Nation. But it struck me that every other item in the budget was increased with the exception of rangeland. This is what bothers me --on philosophical grounds.

ROBERT CUTLER: We are back to the point that was made earlier, which is our inability to quantify rangeland values. We get a lot of support from our budget people when they are comfortable with our numbers, but when they are not, we don't get their support. The most shocking thing I have learned this afternoon is the shortage of range economists.

JEANNE EDWARDS: My question is, what can we do to get support?

MAITLAND SHARPE: What Jeanne brings out is evidence of a problem, but not evidence of economical problems as much as evidence of a political

problem. The problem is we do not have our political act together, or don't have it together tightly enough, or haven't had it together tightly enough for long enough to be able to prevent the kind of reduced budgets that you have been pointing to. You have to add 13-1/2 percent inflation, so that even if we were holding even according to your numbers, we would be 13-1/2 percent down from last year. We have a long way to go, and the answer is political.

While I am on the subject, let me go back to another refrain. Part of the political answer has to come from the scientific community; bench scientists cannot exist outside politics. Scientists have the responsibility, the same as all the rest of us, to pick up the levers on that system and make it work.

WILLIAM BROOKS: In terms of adding value to our existing rangeland, one of the problems we are involved with in the Office of Arid Lands Studies is to take a look at native crops, with industrial potential. We believe the 70 percent range base contains a large gene pool of plants that may have industrial potential. My two suggestions would be first, that range surveys include plant resources of possible industrial culture and that we develop a category for including potential industrial plants which may contribute to the Nation's need to explore various bioconversion options to help satisfy an array of energy requirements as well as new food and fiber crops. Four examples are plants producing low molecular weight hydrocarbons for petrochemical feedstock; rubber-producing crops, such as guayule; industrial-lubricant-producing crops, such as jojoba; and plants producing proteins and edible oils. My second suggestion would be

that once a reasonable assessment is built into existing surveys, then there is the need to develop management programs to allow maximum efficient utilization in a multiple-use program. The Department of Agriculture might make use of the Department of Energy funds for this purpose. An example of this is the first phase of a study we have just completed with the Forest Service in the Tonto National Forest in which we are attempting to determine the impact of jojoba seed harvesting on grazing lands and the converse.

ANSON BERTRAND: The Department of Agriculture is working on an agreement with the Department of Energy, but we have not yet been able to reach an agreement with them.

JOHN MERRILL: I want to ask a question in regard to cost effectiveness. How can industry be supportive of your efforts at addressing range economics? Data from Florida many years ago showed the range livestock operation was more profitable when compared with more intensive systems. Coastal Bermuda was thought to be the salvation of the southern beef industry until ammonium nitrate went from \$60 to \$120 to \$150 per ton. Maybe we need to address the changes in priority.

I run on rangeland, cropland, and tame pasture, and I've had to back off both cropland and tame pasture because the economics weren't there. The rangeland is the most energy efficient and most profitable at this point. We have to be careful about the years of data going into a cost-effectiveness study. We would like to work with you any way we can.

ANSON BERTRAND: I will leave here with the idea that we need to get on with

the job of assuming that economic assessments include all rangeland values. I have a note to discuss this with Ken Farrell when I return. The reason that Agricultural Research doesn't have any economists is that economic research activity is the responsibility of Economics, Statistics, and Cooperatives Service (ESCS).

HENRY PEARSON: I want to comment on an earlier statement to the effect that we already had the authority to do range research. We may have the mechanism, but the Southeast United States has gone a lot of years without initiating programs through the State experiment stations nor the educational systems. Senate bill 1903 will encourage research in the Southeast in aspects of range that have had no emphasis except for that contributed by the Forest Service. I believe this bill would give the States an incentive for providing research across an area with vast potential for providing food (red meat) and other amenities.

W. J. MOLINE: We don't have any basic disagreement. The problem lies in communication among the scientific community. In the Southeast, there is difficulty communicating the concepts of range forage and range pasture. In a constructive way, we could find more support in a holistic concept and try to avoid terms that cause the problem. I suggest we change the language in the bill to something like "range and grassland research" to broaden the terminology. I believe we are talking about the same thing, but using different language. The southern directors are concerned, that, as they understand the bill, it will drive a wedge between what they are presently doing and what is called for in the bill, but this

could be changed with a change in the language of the bill.

JAMES KLEMMEDSON: This is where rangeland and range research are defined in the bill; there is no State in the Union exempt from that bill. There may be a need for my committee to resolve some of these differences and compromise. The inclusion of pastures has been suggested.

W. J. MOLINE: Perhaps we should ask the ranchers' opinion. When they talk about range, do they want to talk about the entire feed package for their livestock operations? I have worked with both range and forage and find the concepts compatible.

DONALD BURZLAFF: You can't really draw a line between them. For example, in west Texas, there is a water deficiency, and sooner or later there are going to be land-use changes. These changes could benefit from improved germplasm for reseeding these lands into grasses that would be productive and minimize the use of energy. A breeding program would be in forages so I don't know how to draw the line.

WILLIAM SWAN: I am astounded at the lack of ranchers and landowners at this meeting. It sounds like we have a lot of professional people who are going to decide some research projects, and then they are going to the people for support when the people may not want these things. You have to get involvement from the users of public land and owners of private lands in deciding research priorities. These are the people that can go to Congress and get the projects funded. We can be more effective than all of academia and much of the bureaucracy in getting projects funded. If we are sold on the research projects, involved in

establishing priorities and go in as partners, I believe we can guarantee funding.

JOE SCHUSTER: I don't know why the southern directors are opposed to S-1903. The only reason I can see is that they are afraid some of this money may go to the Western States and not come to the Southern States and, therefore, favor calling it grassland. I would go back to the classification of range research into primary, related, and associated research. I had a CSRS review last year and was amazed at how much money I had in range research when all these related things came piling in. Are they related? Is the genetic work related to range or pasture work for the 40-inch rainfall belt? The same thing for nutrition. Is it for the rangeland or the feedlot? I am going to say that if we can get something like S-1903 through, it is a recognition of the importance of range. The next step after the bill is appropriations. There might be sunset clauses on some research areas and range if it is redundant. We are going to have to begin looking at terminating projects and making hard decisions.

ANSON BERTRAND: This has been an interesting afternoon. I hope it will be helpful to all concerned. The thing that comes through to me is that we have hid our light under a bushel. There is a tremendous resource out there and a tremendous opportunity to tell the world about range resources; particularly in regard to energy-efficient food production and the management of that resource base, which is the foundation of this whole existence from here on out, and the rancher, who is the custodian of that resource base. I have a feeling the general public is

ready to begin listening to concerns about energy-efficient food production and management of that resource base.

All of us should be concerned about the diversity of interest expressed here today. We are one person and one vote, and more and more individuals and groups want to be heard and are being heard. I wonder if we haven't dropped the ball in terms of telling our story. Whether it is the rancher or someone else, they have to speak with one voice to be heard in Congress. We haven't come to a consensus this afternoon. I was hoping we would. It has been pointed out that we have the authority we need to put money into range. It is a matter of experiment station directors setting priorities that put range and pasture higher than in the past. The directors have listened to other commodity supporters, but nobody was speaking for range and pasture. I am still ambivalent about S-1903. I recognize some strong points. It will help focus attention on range, particularly on range education and the manpower needs.

The Departmental Committee on Range (DCOR) was established by Secretary's Memorandum No. 1999 to handle internal USDA concerns. Let me ask if it would be helpful to form a new committee comprised of some DCOR members plus representatives from ranchers, landowners, and research directors and create a task force that would be vigilant on rangeland concerns?

RON MICHEILI: We already made that request and got a bureaucratic answer back: We like the idea, and we don't like the idea. I requested it 3 months ago and got the answer about 3 weeks ago.

ANSON BERTRAND: From whom?

RON MICHEILI: Secretary Bergland.

ROBERT RUMMELL: Ron, was that in reference to livestock advisory committees?

RON MICHEILI: Yes.

ANSON BERTRAND: Oh well, that is a different matter. Livestock advisory committees are entirely different.

RON MICHEILI: We asked for input to form a vehicle recognizing that you (the USDA) need that kind of rapport.

ANSON BERTRAND: I'll speak with you later about why you got the answer you did on livestock advisory committees.

DANIEL MERKEL: SRM Board of Directors has an agenda item to discuss this very thing, along the same lines that James Klemmedson mentioned earlier to give a broader spectrum.

MICHAEL ZAGATA: The idea is a good one. I would hope you would include the myriad of users connected with multiple use. Some of us working with the Weaver bill last year got the title changed to read not just "Forestry Extension," but "Forest and Related Renewable Resources." You could engender a broader support base for the rangeland research by a simple modification of the language to indicate a broadened perspective. I think people like Maitland Sharpe and Tom Kimball would feel more comfortable with that kind of title even though you may intend a holistic approach under the present title. A little thing like a title change is very important in the way things are perceived.

RUPERT CUTLER: One approach to making the proposed committee an official body of some standing would be to change the language of S-1903 to provide statutory direction to the

Secretary to appoint the kind of body you have in mind. I have been impressed by the National Agricultural Research and Extension Users Advisory Board because it is an independent entity and has been very effective.

One of the reasons I bring it up as a statutory possibility is that

there are all kinds of hurdles facing us in relation to the advisory committee act; making it difficult to arbitrarily create new advisory groups because clearance takes so long.

We have run out of time. Thank you very much for coming, we enjoyed the meeting.

