PROCEEDINGS

of the

WESTERN FARM ECONOMICS ASSOCIATION

Thirty-Third Annual Meeting

August 23-26, 1960

Stanford University
Stanford, California

ECONOMICS OF RANGE IMPROVEMENTS AND POLICY CONSIDERATIONS

by

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The chairman has presented the history and development of the Committee on The Economics of Range Use and Development of the Western Agricultural Economics Research Council. Although some studies of the economics of range resource use date back to the early 1900's, these studies were mostly descriptive and few in number. Until the last decade when the Range Economics Committee and Regional Research Project W-16, "Economics of Rangeland Improvement," were started, intensive research into range economics had not been developed.

Agricultural economists became interested in range economics after range technicians had developed needed methods to seed depleted native western ranges successfully. Range seeding was being promoted and large areas were seeded before economic analyses had been made. Range technicians, untrained in economics, were making very favorable claims about the costs and benefits of range seeding.

Costs of Range Seeding

One of the first problems faced by the economists of the W-16 Technical Committee was to determine the pertinent costs of range seeding. It was evident that the range technicians of government agencies had not been including all the costs in their promotion of range seeding projects.

Members of the W-16 Technical Committee concentrated their initial efforts on the cost side of range improvements. Some researchers divided costs into direct and indirect categories while others did not differentiate between the various costs. Although there is some variation between the results of the two approaches, both methods provide a sound basis for decision making.

In research at Nevada, an analysis of all costs that could conceivably occur in range seeding was made. Although it was realized that all these costs would not occur on each seeding, they were listed so ranchers and government agency personnel contemplating range seeding could consider all relevant costs for a particular project.

The costs considered in seeding big sagebrush ranges to crested wheatgrass in Nevada[1/] and Utah[2/] were:

1. Removal of unwanted vegetation[3/]
2. Preparation of a seedbed[3/]

1/ From, "Costs and Returns of Range Reseeding in Nevada", soon to be published by the Nevada Agricultural Experiment Station;.

2/ Lloyd, R. D., "Costs and Returns from Seeding Publicly-Owned Sagebrush-Grass Ranges to Crested Wheatgrass," Unpublished, Ph.D. Dissertation, Utah State University, 1959.

3/ (See next page)

3. Seed
4. Planting
5. Nonuse until the new grass is ready[4/]
6. Fencing[5/]
7. Pest control
8. Overhead[6/]
9. Risk
10. Renovation[7/]
11. Water development[8/]
12. Interest on investment
13. Operation and maintenance of water development and fences

For 16 seedings planted in Northern Nevada, the following is the indicated relative importance of each of the costs. These costs are based on compounding the interest on initial costs over a 2 year establishment period and then amortizing the costs over the expected 20 year useful life of the seeding at 6 percent interest.

Average annual total cost = $1.06 per acre.

Average carrying capacity of seeded land = 3 1/2 acres per animal unit month (AUM).

Average annual cost = $3.71 per AUM.

In most public agency reports and in most popular literature, only part of the cost story is told. Frequently, such reported costs include those of brush control and seedbed preparation, seed, and planting. From Figure 1 it can be seen that these are only 29 percent of all costs. Sometimes costs of nonuse and interest on investment are included. Commonly, the rest are not included. This tends to result in unrealistically low-cost figures and to provide a misleading basis for decision making.

The Nevada project was a limited case study and averages are not too meaningful. However, this information can serve as a guide to expected costs for anyone contemplating range seeding.

Figure 1 was compiled primarily for use by ranchers, and risk was not included as a cost. In the Nevada study 12 percent of the seedings failed, due

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3/ Commonly Joint operations

4/ Based on costs of providing feed or forage during the nonuse period equivalent to the carrying capacity of the site prior to seeding.

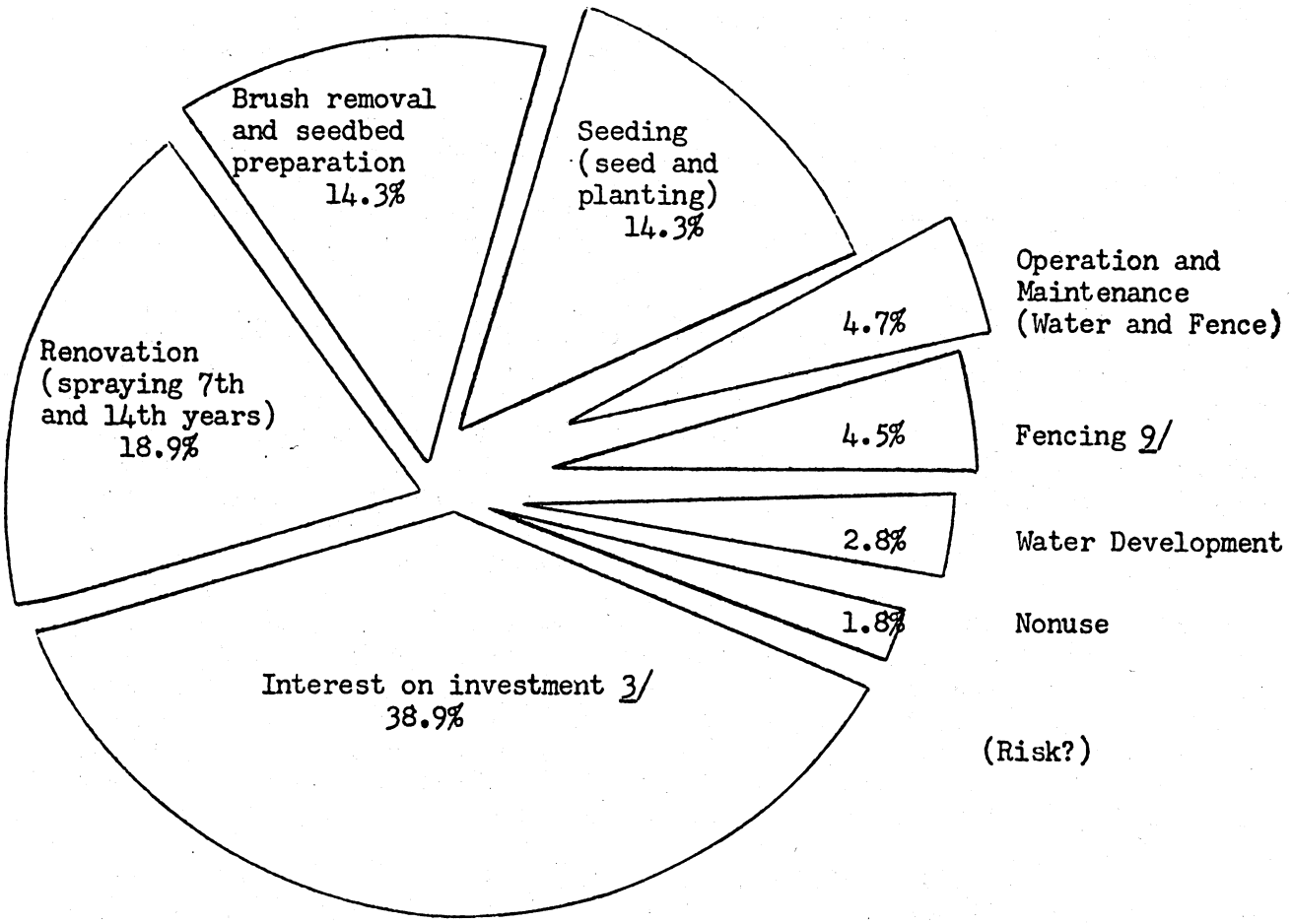
5/ Based only on those costs for fencing necessary for protection and success of the seeding which would not occur if a seeding were not undertaken.

6/ Additional cost of planning, supervising, and inspecting work by contractors or hired workers.

7/ Costs of renovating a seeding by chemical or mechanical treatment of invading brush, Renovation is expected to be needed once or twice during 20 year assumed lifetime of a seeding.

8/ Based only on those costs for development of water necessary for the successful use of the seeding which would not occur if a seeding were not undertaken.

FIGURE 1. Proportionate Break-Down of Cost of Seeding Crested Wheatgrass in Nevada Sagebrush-Grass Ranges



2/ Fencing costs were charged 50 percent to the seeding and 50 percent to ranch management.

primarily to planting in a poor moisture year. Therefore, for government agencies and others planning numerous seedings over time, a risk cost of 12 percent of the cost for reseeding[10] should be added to the costs in Figure 1, However, for the individual who plants one or two seedings, an actual risk cost is not charged because risk is evaluated and handled in ranch management decisions rather than as a chargeable cost. The basis for this reasoning is that the rancher who plants one range seeding which fails must incur all the additional costs of reseeding, not merely 12 percent of these costs. This reasoning is backed by Frank Knight who states "Risk is a measurable uncertainty, and uncertainty is an unmeasurable uncertainty....That it is possible (to measure uncertainty) does not mean this will be done and for the individual there is no difference between a measurable uncertainty and an unmeasurable uncertainty."[11]

Using Knight's definition, seeding success, which is largely dependent upon weather, is uncertainty to the individual. The rancher planting one or two seedings takes a calculated risk, as he does in most ranch management decisions, and it is unrealistic to add a charge for risk to the seeding cost.

Economic studies of range seeding in the various states participating in the W-16 project have provided a rather intensive analysis of range seeding costs. Although there is still disagreement between members on some of the methodology, it is basically agreed that this portion of range economics has been well explored. Additional studies of costs of other types of range improvements such as chemical control of brush, rehabilitation of range seeding, rotation grazing, fencing and others will be or are presently being studied.

Benefits of Range Reseeding

Although considerable progress has been made in determining costs of range seeding, the benefits have been more elusive. The initial phase of the research of the W-16 Technical Committee was to analyze costs. This phase has been largely completed and the committee members are turning to more intensive studies of benefits from range seeding and other range improvements. In 1959 the W-16 Regional Research Project was revised to emphasize the effects of range improvement practices on the ranch firm.

Results from studies of benefits from range seeding to date have been often misleading if not occasionally erroneous. A review of the published information indicates that in most of the studies part or all of the questionable assumptions were made that show up in the following example.

> It is found from physical research that yearling steers gain X pounds per day on range seeded to crested wheatgrass. It is assumed, therefore,

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10/ Reseeding costs usually include only the continued compounding of interest on initial cost and the non-use cost for additional time seeding is not used plus the additional cost of seed and planting.

11/ Frank H. Knight, Risk, Uncertainty, and Profit, Houghton-Mifflin Co., New York, 1921, pp. 223-234.

that the benefits from an AUM of seeding is X pounds x 30 days x price per pound of steer.

Questionable reasoning in this example:

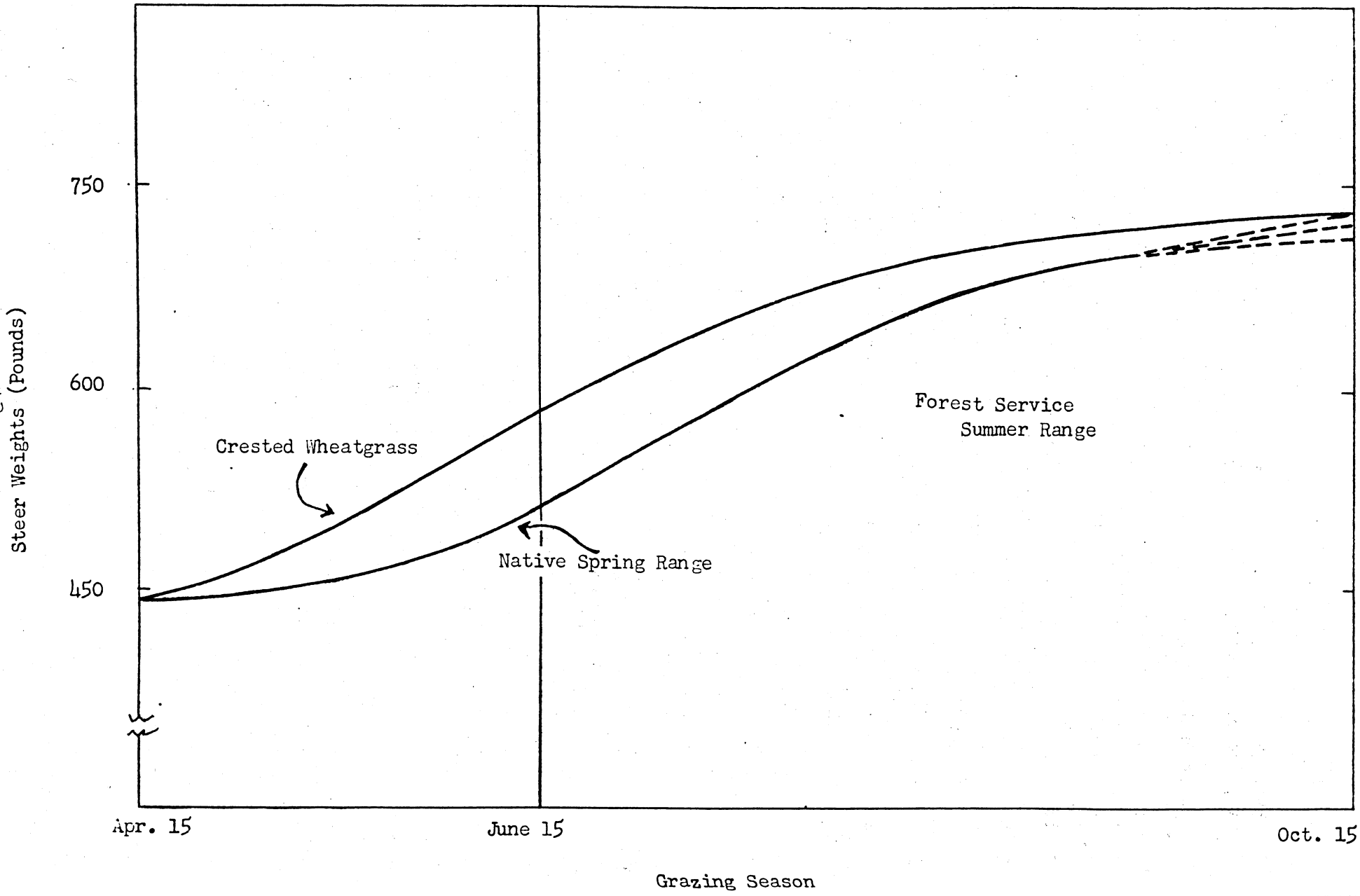
1. It is assumed that production before seeding on native range was zero which is probably never the case.
2. It is assumed that livestock production is due entirely to the range forage when in fact it is the result of all the combined factors of production.
3. It does not obtain results from the seeding for any class of livestock except steers which exaggerates the benefits of seeding.
4. Lastly, and very important, it assumes that this gain in production is meaningful in the market place. This may be partially true if the cattle were taken immediately to market from the seeding. In reality, crested wheatgrass seeding has its greatest value as spring-fall range in which substantial gains are made in the spring but weights are only maintained in the fall. Animals making rapid gains in the spring on seeded ranges usually do not gain as rapidly on summer range as do livestock that were on native ranges. By round-up time, there may be little or no difference in weights between animals on seeded range in the spring and animals on native range (See figure 2).

If the rancher is short of native range in the spring to balance or expand his operation, then range seeding can be very valuable to the ranch firm. If spring range is not a limiting factor a crested wheatgrass seeding may be of little value.

Other researchers have attempted to evaluate range seedings in terms of opportunity costs, the costs of alternative feeds of equal nutritive value. Here too, problems have arisen. Methods used by range technicians to determine amounts of range forage produced on a given area of land are at best only estimates. Range forage which must be harvested in place by livestock and at the proper season of use is a much different product than storable hay and concentrates. Nutritive values of range forage that are usable by range livestock are difficult to determine. Actual livestock consumption of range forage in terms of species composition varies from what the range and animal husbandry technicians predict the animal will eat. Although these problems are not insurmountable, further physical research is needed before accurate values can be determined for alternatives for range forage. In short, economic studies of benefits of range seeding at the firm level have been incomplete.

Current range economic studies have been designed to consider the total ranch operation in evaluating range seeding. These studies use various budgeting techniques or linear programming to determine the marginal returns from range seeding for differing sizes of ranches using various capital limitations. Preliminary results from some of these studies look promising and in the near future more reliable methods of evaluating benefits of range seeding for domestic livestock use should be available.

FIGURE 2. Hypothetical Growth Curves of Yearling Steers on Range Forage



Oct. 15

Grazing Season

June 15

Apr. 15

Multiple Use Considerations

Range economics research to date has been mostly confined to the micro level dealing with individual firms. This research has dealt primarily with the costs and benefits of range development for domestic livestock use. Only limited attention has been given to the value of other uses of range land.

If range economics dealt only with privately owned lands the single-use evaluation might be sufficient. However, with the federal government controlling 54 percent of the land area of the 11 Western States, consideration of the multiple use values of range land becomes the most needed evaluation.

Members of the Range Resources Committee realize the necessity of evaluating multiple uses of public lands. They believe one of the ultimate goals of range economics research will be to provide public land administrators with realistic economic guides to the complex problem of multiple use evaluation.

Evaluation of multiple use aspects of public land use is not an easy task. As Upchurch has pointed out,[12/] firm theory is not very applicable to the multiple use concept. The government does not function as a private firm in that its costs are administrative costs, not production costs, and its goal is maximization of benefits to the majority rather than maximization of revenue. Many of these benefits are intangible and elude evaluation in monetary terms. Institutional and administrative controls frequently prevent reallocation of resources to a more economic optimum. Political considerations, not economic considerations, often become the most important consideration in public land policy formulation.

The problems involved in an economic analysis in determining and aggregating the multiple use values of public lands may not be insurmountable. However, economic research into new areas cannot proceed without first laying the groundwork a step at a time. Members of the W-16 Technical Committee started with costs at the firm level and have now proceeded to benefits to the firm. As the committee members proceed to gather the basic information, they are continually looking forward to the time when they can aggregate micro values for the macro level. In line with this approach, they have been actively pursuing new methodology and new ideas for evaluating and quantifying the various multiple use values in objective form. Recent meetings of the Range Committee on Economics of Range Use and Development have been confined to problems in multiple use evaluation. The 1957 and 58 meetings dealt with the evaluation of recreation; the 1959 meeting was on methodology for evaluating multiple land use; and the next meeting will be a joint meeting with the Water Committee to discuss the inter-relationship of range and water problems.

During the past 10 years in which serious study of range economics has been developed, there have been encouraging gains. It is true that errors have been made and some hasty conclusions arrived at, but the knowledge necessary for continued progress has been gained. Within the next 10 years, I believe

12/ Upchurch, M. L., "Resource Allocation Under Conditions of Multiple Use of Land," Report No. 2 of proceedings of Committee on the Economics of Range Use Development, 1959, pp. 135-148.

that many of the complex problems now being faced in range economics will be solved and that range economics will become a more valuable tool for use in range management decisions and development of public land policy.

Public Land Policy

In recent years as the techniques of developing range improvements have become somewhat standardized and our knowledge of the possibilities of range improvements have increased, questions arise on the soundness of public land policies of some of our federal agencies. During the past 10 years when range economics research was being intensified, considerable change in the administration of grazing policies dealing with federal lands was initiated. These lands are a very important part of the operations for a large proportion of ranches in the 11 Western States. For many ranch operations, public domain lands provide spring-fall and sometimes winter grazing, and national forest lands provide summer grazing. Ranchers are required to provide feed for their livestock from private lands for periods varying from 2 weeks to 5 months, depending upon the area, base property requirements, and length of winter.

One of the basic requirements of a ranch is to have a balanced feed operation. That is, to have sufficient feed for livestock at the time, place, and season of year when needed. Shortage of feed for any particular season may well be the physical factor that limits the actual or potential number of livestock on a given ranch.

Successful ranching requires ranch management decisions involving long term investments. Reliability of tenure in the control of ranch resources either through ownership, long term leases, and/or long term grazing permits is essential if management plans for maximizing income are to be carried out. The rancher using federal lands, who is faced with a year to year grazing license subject to possible reduction, is placed in an uncertain position. He usually cannot afford to risk long term investments if a portion of his seasonal forage supply is in jeopardy.

The Bureau of Land Management, the government agency responsible for public domain lands, originally issued 10-year grazing permits. As these permits expired, annual licenses were issued until an adjudication of the range area or unit could be made. Range adjudication in the Bureau of Land Management program means to equate livestock use with range carrying capacity. In most areas, due to range depletion, this usually results in a reduction in the number of permitted domestic livestock. Once the adjudication is complete, the 10-year permit, which has usually been reduced, can be re-issued. On the surface the BLM adjudication procedure looks like a fair and just method of allotting range permits. However, a brief review of the history of the organization and the methodology used in arriving at range carrying capacity raises many questions.

Administration of grazing on public domain lands began with the establishment of the Grazing Service under the Taylor Grazing Act in 1934. The Grazing Service and the General Land Office were consolidated and established as the Burear of Land Management in 1946. From its beginning the Grazing Service and now the Bureau of Land Management has been understaffed. The basic reason for this limited staff is that the agency was originally established with the

understanding that grazing fees would be based on the cost of administration, not on the value of the resource used. Livestock groups, anxious to hold down grazing fees, were largely responsible for holding the administrative staff to a minimum. It was not until 1957 that this restriction on grazing fees was changed so that a more realistic fee could be charged.

As a result of a limited staff, the Bureau of Land Management prior to about 1950 was unable to do much in the way of range management or improvements. Personnel were kept busy writing licenses and making spot investigations where disputes over use occurred. Intensive management and accurate record keeping were impossible.

Since 1950 the original staff, who were mostly people with livestock experience but little college training, have about faded out of the organization. The grazing division of the B. L. M., though still understaffed, is now primarily made up of college trained range technicians.

Early in the 1950's a strong drive for range adjudication was started. The first step in adjudication was to reduce livestock numbers to the present carrying capacity of the range. This land has been misused and depleted for more than a half century. No consideration was given to the potential carrying capacity of the site. Only the existing depleted condition of the range was considered.

Carrying capacity has been determined by a single range survey. The weight-estimate method is most often used. Surveys have been usually done in only one year extending through seasonal changes in range vegetation from spring to late summer conditions. A series of sample plots are taken and the pounds per acre of usable forage are computed.

Numerous articles criticizing range survey methods have been written. Some of the basic criticisms are: the survey makes little or no allowance for dry years; insufficient samples are taken; there is too great a variation in seasonal time periods during the survey; there are considerable variations between estimates by range technicians making the survey; too much attention is given to key species and ecological succession; and the survey is taken only once instead of over a period of years.

I am not here to criticize range survey methods. Range technicians have their problems too, and the measurement of usable range forage by sampling methods is difficult. Range surveys when used as <u>guides</u> to range management, where it is understood that the results are only estimates, can be a valuable tool to good land management. Problems arise when carrying capacities determined by range surveys are accepted as absolute values and range use cuts are made on this basis.

The Bureau of Land Management started adjudication before intensive range management had been tried. The Bureau's program is to first reduce range use and then apply range developments and intensive range management. The claim is made that once the ranges are improved and carrying capacities increased range use cuts can be restored. This fact will be of little consolation to the

rancher who was forced out of business by the original cuts which in some cases run from 50 to 80 percent.

Some range technicians are more interested in physical resources than human resources. To them grass for the sake of grass and conservation for the sake of conservation come first. They are often more interested in protecting the physical resource in the short-run than they are in protecting the over all long-run economic well being of the local people.

Range cuts are sometimes necessary and range-use reduction, in some cases, is a good range management practice. Certain areas are overstocked for the potential of the site and if optimum economic production over time is to be obtained, numbers must be reduced. Such reductions in livestock numbers often result in increased total pounds of livestock production. However, for most areas, intensive range improvement practices should be applied and range cuts should be the last course of action not the first.

Most public domain grazing lands have never been intensively managed. Prior to the Taylor Grazing Act of 1934 they received no management at all. Since 1934 the management has been with such a limited staff that it has been mostly of a custodial nature. However, since 1934 most range technicians would agree that the majority of the BLM range land has at least held its own in range condition or has improved to some degree. If this is true, is the need of immediate cuts to speed up improvement as important as is often indicated?

Range depletion did not occur overnight--it took years of over-use. Range improvement also cannot occur overnight. Why then can't we take a positive rather than a negative approach to public land management? The following is a proposed range adjudication method as an alternative to the present Bureau of Land Management procedure. Adjudication in this instance means bringing livestock numbers in line with potential carrying capacity within economic limits.

1. Conduct a range survey to get an estimate of the present carrying capacity.
2. Make soil surveys, historical reviews of the weather of the area, studies of private ranges in good condition, and any other studies needed to determine the potential carrying capacity of the unit.
3. Call a meeting of all livestock users and explain the situation as to existing carrying capacity and potential carrying capacity.
4. With the cooperation of the ranchers and state game management personnel set up a ten year range management plan to bring range carrying capacity up to its potential and develop an effective means of carrying the plan to completion. Costs of such a plan should be shared between the government, state fish and game departments, and ranchers in the ratio of benefits received. The plan should include the following measures:

a. If present stocking rate exceeds the potential carrying capacity, make immediate range use cuts in line with the potential of the unit.
b. Remove all trespass livestock from the unit.
c. Set proper seasons of use if changes are needed.
d. Arrive at realistic wildlife and recreational uses of the area.
e. Erect management fences and/or use herding practices for livestock control where needed.
f. Adopt proper salting practices.
g. Develop or haul additional livestock water where needed.
h. Construct livestock trails to presently inaccessible range areas.
i. Plant areas suitable for range seeding.
j. Make range condition and trend studies over the ten year period.
k. Make livestock counts to determine actual use.
l. At the end of the tenth year make range use cuts if range condition and trend studies indicate they are still necessary.

As a former range manager and employee of the Bureau of Land Management, I have had considerable experience in working with ranchers on these problems. I am sure the ranchers would welcome such a program, and much of the bitter fighting between ranchers, government agencies, and recreational groups would be greatly reduced. Also, I believe our range resources would be in a much more productive and better managed state in the future, than they will be when range use reduction is the first step used in range adjudication.