

RANGE.  
14000.

# Range Management Standards

By R. Merton Love



*Reprinted from*

**THE APPRAISAL JOURNAL**

**Vol. XXII .. No. 3**

**JULY ..... 1954**

**(Pages 409 to 414)**

# Range Management Standards

By R. Merton Love

For livestock properties it is the carrying capacity that largely determines income and, indirectly, values. Past experience is one of the best criteria for estimating present carrying capacity. Dr. Love presents the agronomic approach to this problem.

---

## Range Survey

THE FEDERAL AGENCIES are still in the continuing process of developing the science of range reconnaissance, or range survey. The aim of the range survey is to study resources and to assemble data that lead to an estimate of grazing capacity.

Range survey is directed into two distinct phases: (a) the mapping of grazing types, and (b) the analysis of the vegetation as to density and species composition for the purpose of determining its livestock grazing capacity. Aerial photographs are used to delimit the major types.

There are 18 vegetation types recognized by the federal agencies. They may be subdivided further according to factors that influence their grazing capacity or use. Some of the major types are:

*Grassland:* perennial grasses predominate, although forbs and browse may be present. Example—bunchgrass.

*Meadow:* sedges, rushes, and grasses predominate. A meadow usually remains wet or moist throughout the summer.

*Sagebrush:* species of sagebrush predominate. There are about 7.0 million acres of coastal sage in California.

*Browse-shrub:* shrubs, except sagebrush, predominate. Characteristically, this type occupies the transition zone of the lower foothill or

mountain slopes. The California chaparral is of this type and covers upwards of 10 million acres in the state.

*Annuals:* annual forbs and grasses predominate. Abandoned croplands fall into this type. Throughout both coastal and Sierran foothill areas the California range is of this type.

*Barren:* (naturally no vegetation) such as lava flows, rock slides, intermittent lake beds.

Following is an example of the use to which vegetation maps may be put: the Harvey Valley Allotment in the Modoc <sup>ASSER</sup> National Forest contains 32,352 acres. The map shows five major vegetation types—grass 1.5%, meadow 4.1%, sagebrush 12.7%, conifer 45.5%, waste 36.2%. The permittee is allowed 500 animal units for the four months' grazing season, approximately June 1 to October 1.

It can be readily seen that in areas including a mixture of types, such as obtain in the National Forests, the maps are very helpful, particularly to distant administrators.

It is when we come to the second part that difficulties begin. The analysis of the forage vegetation as to density and species composition leaves much to be desired in setting up range management standards.

There follows a partial list of the methods of estimating utilization. "Utilization" means the degree to which animals have

consumed the current herbage production of a range area. It is expressed in percentage by weight. If a given plant has been utilized 100%, all the herbage produced the current season has been taken.

1. *Ocular*—based upon previous experience.
2. *Height*—a plant normally 10 inches high and grazed to a 5-inch average height is considered to be 50% utilized. Actual stem measurements are taken.
3. *Weight*—Australian workers suggested a precise method of estimating range utilization. The method involves two transects of randomized plots. One is harvested after grazing and the other without grazing. The percentage utilization is calculated from the difference between the two transects.
4. *Ocular estimate by plot*—this is a refinement of the ocular estimate. The method involves the use of small randomized plots which are studied by trained observers. The plants may be considered individually and averaged to obtain an over-all utilization, or the plot may be considered as a unit.
5. *Height-volume*—a chart is constructed for each species. One side of the vertical line is a scale from 0 (at the top) to 100% (at ground level) to indicate percentage height taken. On the other side of the vertical line is a scale from 0 (at the top) to 100% (at ground level) to indicate the percentage volume taken. Thus, percentage height grazed can be converted directly into percentage volume by means of the charts.

It can be seen that each method involves a vast amount of detailed vegetative study and in this country it is very expensive to apply.

The Grazing Service of the United States Forest Service has initiated a utilization method called the "primary forage plant method." At the end of the grazing season detailed information is recorded about each of the main forage plants (usually about 6) which carry the principal grazing load. Other factors which influence use of the area are described also. Considering all these factors, the investigator de-

termines into which of nine use-classes to place the range. The nine classes are:

1. *Unused*. No livestock use.
2. *Slight*. Practically undisturbed.
3. *Light*. Only the best plants grazed.
4. *Moderate*. Most of the range covered. Little use of poor plants.
5. *Proper*. Range entirely covered. Primary forage plants correctly grazed.
6. *Close*. Completely covered. Some use of low value plants.
7. *Severe*. Trampling damage. Primary forage plants almost completely used. Low-value plants carry grazing load.
8. *Extreme*. Range stripped of vegetation.
9. *Destructive*. Death loss of primary species. Only remnants of good plants survive. Range in critical condition.

It should be emphasized here that there is still no substitute for past experience in estimating present carrying capacity.

#### Federal Agency Standards

The Soil Conservation Service has set up a system of land use classification based on soil type, erosion possibilities, and slope.

Land capability is the suitability of land for a specified use. There are eight land-capability classes. The first three as suitable for cultivation. They are:

- I. No special practices.
- II. Simple conservation practices.
- III. Intensive conservation practices.

The next four are not suitable for continuous cultivation, but are suitable for permanent vegetation. Land capability classes IV through VII are essentially rangeland classes. Class VIII land is not suitable even for grazing.

- IV. Suitable for occasional or limited cultivation; limited use and intensive conservation practices. The land is moderately sloping, severely eroded or very susceptible to erosion, or it may be difficult to drain or irrigate. It is less fertile than classes I, II, and III.

#### Range Management Standards

- V. No special restrictions or special practices. The land is nearly level and not subject to erosion. It is too wet or stony for cultivation.
- VI. Moderate restrictions in use. Class VI land is steeper than IV, and more subject to wind erosion. The soil is shallow. The moderate restrictions have to do with the better distribution of livestock. Judicious location of salt licks is one way, for example.
- VII. Severe restrictions in use. Land in this class is steep, rough, eroded, or highly susceptible to wind erosion. The severity of the restriction is occasioned by the fact that salt and watering places should not be located on class VII land.
- VIII. Not suitable for agriculture. Swamps, marshes, and badlands fall into this class. It may have value for wildlife, but it is considered useless for grazing.

Another approach used by the federal agencies to appraise range utilization is based on the climax vegetation as a point of reference. The climax vegetation may be defined briefly as the natural vegetation occurring in an area as a result of the influences of soil and climate (and wildlife). Examples: the short grass climax of the middle west, or the rain forests.

Five condition classes are recognized, ranging from the undisturbed climax to that devoid of climax vegetation.

1. Climax vegetation.
2. Predominantly climax vegetation, but invaded by perennial forbs and better annuals.
3. Climax vegetation present but not dominant. Can be brought back by protection.
4. Climax vegetation absent, but some valuable plants present.
5. Climax vegetation absent. Land nearly worthless for grazing.

In the foothill ranges of California the climax was bunchgrass. Now a subclimax, called annual-type, is recognized. Such a range in "good condition" has bur clover, filaree, soft chess, and slender wild oat comprising 80 to 90% of the ground cover.

Dr. Kenneth W. Parker, Range Conservationist, U. S. Forest Service, has made a notable contribution to the methods of establishment of trends in range condition, especially as it applies to the administration of range allotments. The method is also applicable to private range lands. He calls it the "3-step method." As the name implies, this method consists of three major steps.

Step One is concerned with the establishment on the range of permanently marked transects. Basic field data are collected from these transects and from the site within which the transects are located.

Step Two consists of the field analysis of these data. Range condition is classified at the time of record, and current range trend is indicated.

Step Three is concerned with a permanent photographic record of range conditions on the site that is sampled.

#### The Agronomic Approach

In the foregoing, which might be called the traditional approaches, the question asked is: how closely may the range be grazed *without damage* to the forage stand and to the soil?

The Agronomy Department of the University of California has used a different approach. How may the range be grazed to improve the forage stand and the soil? What other practices may be put into effect to improve the forage stand and the soil? The discussion that follows draws upon experience in California, which has a Mediterranean-type climate. Obviously, the same techniques will not apply throughout the entire range country of the United States. Nevertheless, as will be seen, the emphasis is on the soil-plant-livestock complex, not one of which can be neglected. A similar dynamic program of soil and cover improvement can be worked out for any region.

An example of the difference in the two approaches may be cited. One of the criteria listed for a moderately grazed annual-type range states: "A large proportion of the seed heads of the less preferred grass species should be ungrazed." The agronomic approach is to plan livestock use in order that the less preferred (and therefore less desirable) species should be the most heavily grazed—when they are most palatable and nutritious.

As a result of the work of the Agronomy Department on the range, we have defined range improvement as the process of replacing a relatively undesirable population of plants with a more desirable type of forage.

Emphasis on *improvement* has much more appeal to the stockman than emphasis on *protection*. If the program results in improvement from the production standpoint, it automatically takes care of the problem of conservation.

The definition provides a basis for assessing the results of range work. But in order to be able to do that, it is necessary to be familiar with the types of plants concerned—not only to recognize them, but also to know something of their growth characteristics and feed value. Such knowledge is a solid foundation for a range improvement program.

One of the first steps in range improvement is for the livestock operator to recognize the plants on his range. Because there are so many hundreds of species, most of us decide it is an impossible task, and so we give up before we start. It is true that because of their large numbers it is difficult to learn to distinguish every variety of plant growing on the range. However, from the standpoint of growth rhythm and season of use, we have found that the forage plants of California's annual-type range can be grouped into three classes, relatively easy to define. The three types are:

1. Weedy aggressive winter annuals and summer annuals.
2. Desirable annuals and short-lived perennials.
3. Long-lived perennials.

The characteristics of these classes are:

- 1a. Weedy winter annuals:  
*Examples:* ripgut or bronchoglass, foxtail grasses.  
*Life cycle:* germinate following fall rains; rapid seedling development; early maturity.  
*Characteristics:* good feed when green; obnoxious barbed seeds that remain on the seed heads for a long time after maturity.  
*Season of use:* early spring feed, very short season.
- 1b. Summer annuals:  
*Examples:* star thistle, tarweed.  
*Life cycle:* maximum growth begins in late spring and summer.  
*Characteristics:* obnoxious; may be of some feed value following fall rains.
2. Desirable annuals and short-lived perennials:  
*Examples:* soft chess, wild oats, bur clover, rose clover, mountain brome.  
*Life cycle:* germinate following fall rains; fairly rapid seedling development; later maturing than weedy annuals.  
*Characteristics:* good feed when green; recover following spring grazing if given a chance; good late feed.  
*Season of use:* early spring feed, but good later than weedy annuals; the clovers provide nourishing feed in late summer and fall even when dead and dry.
3. Long-lived perennials:  
*Examples:* smilo, hardinggrass, alfalfa.  
*Life cycle:* slow seedling development; poor competitors as seedlings, but older plants green up even before the fall rains; remain green long after the last spring rains.  
*Characteristics:* good feed when green; often less palatable than annuals in winter and early spring; must be allowed to store reserve carbohydrates in order to ensure ample root development to withstand dry periods.  
*Season of use:* long.

## Range Management Standards

This classification is based upon a knowledge of the physiological behavior of the types of plants involved. Use of the range is predicated on treating the range as a crop. Farmers know when and how to harvest barley. They know that cotton must be treated differently. Bringing this same agronomic approach to the range not only makes good use of all plants, undesirable as well as desirable, but also uses the grazing animal as a means of biological control of the weeds.

From the range management standpoint this classification of the range forage crop is extremely important because it reduces the multitudinous plants to three workable groups. Season of use is an important factor to be considered when thinking of the three groups of plants.

The perennials turn green in the fall, often before the first rains, and they remain green longer into the spring than do the annuals.

The better annuals such as soft chess (*Bromus mollis*), wild oats (*Avena barbata* and *A. fatua*), and bur clover (*Medicago hispida*) are excellent feed when green. They provide fair quality hay that can be used for fall feeding. They usually mature a little ahead of the perennials.

On the other hand, the weedy annuals such as the foxtail barleys (*Hordeum murinum* and *H. gussoneanum*), ripgut brome-grass (*Bromus rigidus*), and most of the annual fescues (for example, *Festuca megalura*) must be grazed early in order to obtain any feed value from them. They mature very early and should not be grazed when mature because of the obnoxious character of the mature seeds with their barbed awns.

A grazing management plan that encourages the perennials also encourages the better annuals, and it discourages the weedy annuals.

FIGURE 1.  
PLAN FOR GRAZING FOOTHILL RANGES

I	II	III
•	•	•
↑	↑	↑
water	water	water
Early close grazing	Early close grazing	Early close grazing
FIRST YEAR	SECOND YEAR	THIRD YEAR

A practical rotation grazing plan is one whereby the desirable annuals and perennials are favored at least one year out of three. It is especially applicable to those dry foothill range areas of California where livestock are taken to the mountains or put on irrigated pasture for the summer months.

If possible, divide the range area into three subdivisions of fairly comparable production capacity.

Concentration of the stock in Field I the first year makes use of the weedy species while green and succulent before they set seed. It also cuts down on their seed production. Transfer of stock to Fields II and III before the last spring rains allows the desirable annuals and perennials in Field I to recover and set seed. Field II is treated in this manner the second year, Field III, the third year, returning to Field I the fourth year. This is one way of making the range pay more.

We take a 51 per cent chance every day with the weather, the wind, and the elements. The technicians should raise their sights, and instead of working on a 5 per cent level of significance, report their results at a 25 per cent or 30 per cent level . . . . If a new idea has a 50-50 chance, don't hold it up because of some petty insignificance.<sup>1</sup>

Research is the keynote to progress in range improvement. A knowledge of the results of research is an aid to the understand-

<sup>1</sup> Harris, Harry L. "Colorado Rancher," *Journal of Range Management*, 3:287-290, 1950.

ing of practices suggested by those results. However, the quotation above is important to keep in mind. With all the vagaries that beset a rancher an improved practice must result in significant benefits if it is going to be worth his efforts. In the years ahead, livestock ranching is bound to become a more scientific, cost-controlled business, taking its place as a modern industry. The task is to build low forage-per-acre areas into

profitable grazing land. This, of course, will make range lands increase in value as capital assets. It must be recognized that the present tax structure has a powerful influence on the amount of money an owner can or will spend on range improvement. Nevertheless, the biggest "block" to range improvement is a mental one. Overcome that, and the possibilities are virtually unlimited.

#### BIBLIOGRAPHY

- Beeson, R. W. et al. 1940. Handbook for range managers Region 5 (California). U. S. Forest Service, San Francisco. 212 pp.
- Deming, M. H. 1939. A field method for judging range utilization. U. S. Dept. of Interior, Div. Grazing. 8 pp. (mimeo.)
- Hockensmith, R. D. and J. G. Steele. 1943. Classifying land for conservation farming. U. S. Dept. of Agric. Farmers Bull. 1853. 45 pp.
- Inter-Agency Range Survey Committee. 1937. Instructions for range surveys. U. S. Dept. of Agric. 30 pp. (mimeo.)
- Jardine, J. T. and M. Anderson. 1919. Range Management on the national forests. U. S. Dept. Agric. Bull. 790. 97 pp.
- Love, R. Merton. 1948. Good range management. Calif. Agric. 2:7:6.
- Love, R. Merton. 1952. Range improvement experiments in the Arthur Brown Ranch, California. Journal Range Management 523:120-123.
- Parker, Kenneth W. 1951. A method for measuring trend in range condition on National Forest Ranges. U. S. Dept. of Agric. Forest Service. 26 pp. (mimeo.)
- U. S. Dept. Interior, Div. Grazing. 1938. Instructions for making range surveys. 38 pp. (mimeo.)
- Wieslander, A. E. and H. A. Jensen. 1946. Forest areas, timber volumes and vegetation types in California. Calif. Forest and Range Expt. Station. Forest Service Release No. 4. 66 pp. (processed).