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Use of Key Species, Key Areas And Utilization Standards in Range Management

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THE importance of proper management of the nation's 728 million acres of range lands has received greatly increased recognition during the past five years. Many new developments pertaining to the range have occurred and a number of new agencies have entered the field. Soil conservation and flood control measures have been undertaken on vast acreages of depleted grazing land. Control is rapidly being extended over the one-time open public domain. Research projects involving both forage and watershed problems have been expanded on winter, spring-fall, and summer range areas. Numerous studies of the social and economic aspects of range use have been initiated with both state and federal agencies participating. Under the Agricultural Adjustment Act, benefit payments have been made during 1936 and 1937 for improved management practices on over 50 million acres of range land. Range problems are being given serious consideration by regional, state and county planning agencies.

All this activity indicates that the leadership of the nation, at least, has come to realize the important effect that range lands have on welfare of the country. It is realized that the dust bowl problem is partly a range problem, in that soil-binding forage plants could and should on many areas supplant the cultivated grains which leave the soil exposed for long periods and never completely protect it. It is realized that revegetation would arrest the erosion now in process on some 590 million acres of range land and would largely obviate much expensive erosion control by other methods. It is realized that mud-flow floods in the range area which, in an extreme case, caused over a million dollars damage in one county alone over a ten year period, can be prevented forever.
by restoration of the normal plant cover. It is realized that depleted range means abandoned homes and communities, lowered family incomes, loss of a market for hay and grain for winter feeding, reduction of the tax base, impoverishment of customers of business institutions, decreased livestock to transport and related ills.

All of the foregoing emphasizes the importance of the job of the man who is responsible for actually managing range areas. He may be a wood-lot pasture owner in the mid-west, a landed cowman in Montana, a grazier on a grazing district, a Forest Ranger, or any other member of that group who function, or should function, as range managers. What he does largely determines whether the range will continue to retrograde, with all the attendant evils, or will be rehabilitated to the benefit not only of the immediate land owner or user but of the general population who are directly or indirectly affected.

Range management, if properly done, is not simple. It is necessary to know the proper season in which to use various portions of the range; the adaptability of range to different classes of stock; to ascertain carrying capacity; how to use herding, salt, fences, etc., to obtain proper distribution of stock on the range; what range improvements are needed and how to install them; to be familiar with numerous species of poisonous plants and how to avoid losses from them; how to judge condition of the range; to determine changes in the plant cover; to
select key species and key areas and to base management upon their proper utilization.

**SELECTION** and use of key species, key areas and utilization standards are basic to proper range management, yet are little understood and seldom applied. The writer has had considerable experience with all varieties of range managers, but only a few have had the key species and key area concept. Sometimes stockmen have accused the Forest Service of leaving feed on the ground when what actually remained was unpalatable plants, or portions of partially palatable plants, whereas the valuable palatable plant species had been grazed all they could stand and yet survive. Tracts of range have been represented to be in good condition although the original important species have long since been replaced by inferior species. Old rangers have been observed to figure utilization at the close of the grazing season by taking a straight average of the percent of utilization on all grazed species, both palatable and partially palatable, which has given a figure of say 55% utilization, seeming to indicate underuse, when actually the important species have been grazed 80 or 90%. New appointees fresh from college about to undertake their first assignment as range supervisors have been lost as to how to proceed although they possessed degrees in Range Management.

**KEY SPECIES**

**SOME** ranges support only a few plant species, making management relatively easy, but most areas are characterized by up to several hundred plant species which presents a complicated problem to the range manager. These numerous plant species vary in palatability from none at all, unless livestock are forced to eat them, or only slightly palatable, on up the scale to fully palatable. It is common knowledge that when stock graze over the range they almost completely utilize some species, eat varying portions of others, and leave others entirely ungrazed. Ordinarily plants can have up to 75 or 80% of the current season's growth removed by grazing each year without injury, but if a greater volume is grazed they decline in vigor and soon die. Obviously, if the degree of grazing is so controlled that the more palatable species are not too heavily utilized, the less palatable species still have from 30 to 100% of their growth left at the close of the grazing season.

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Conversely, if overgrazing causes less palatable species to be grazed 70 or 80%, the highly palatable species will be completely utilized and range depletion is underway. The latter has been the story on most of the range areas. Sometimes the man responsible for managing the range has not recognized what has occurred. He allowed grazing to continue as long as plant growth remained. He thought in terms of the total plant cover on the range and not in terms of widely differing individual plant species.

One of the first steps, therefore, for any range manager to take is to determine which of the numerous plant species on the range are the important or key species on which he should base his management. As a general rule, these will be the most palatable species. Nature has been kind in that the most palatable species are usually the most nutritious, hold their own well in competition with other plants in the struggle for existence, are usually abundant, often being among the climax species, and ordinarily produce a good volume of herbage. Even on ranges which support several hundred different plant species, there are usually from about three to six species that have the qualifications of key species, namely: high palatability, reasonable withstandability to grazing and to competition from
other species, reasonable abundance on the range, nutritious, and production of a reasonable volume of growth. On some ranges only one valuable species may dominate and management may be based on it alone. If management is such that these species are not excessively grazed and are maintained year after year there is no need to worry about the hundred or so other species, for since they are less palatable, they will be grazed to a less extent which assures they will be maintained. Thus by the simple process of selecting key species the manager reduces the species he must deal with from a hundred or so to a half dozen, and places himself in a position to apply intelligent management.

In the selection of key species several precautions or safeguards must be exercised:

RARELY an individual species of minor importance will be found that is so highly palatable that it is unwise to use it as a key species. Such species are termed “ice cream plants” in range parlance. An example will probably best clarify what is meant. On the Uinta National Forest there is an aspen covered slope supporting a luxuriant stand of big mountain brome (Bromus carinatus). Growing in the brome are scattered, isolated cowparsnip plants (Heracleum lanatum). A bunch of cattle was observed grazing one cowparsnip plant after another until they were completely utilized, meanwhile scarcely nibbling the brome grass. Obviously it would be unsound to limit stocking to such an extent that the cow-parsnips would be utilized only 80%. Proper management would call for stocking on the basis of using 75 or 80% of the brome even though this degree of use would eventually eliminate the cow-parsnips. Cases of this kind are infrequent.

ANOTHER precaution to be taken is in deciding whether or not a species is sufficiently abundant to be considered a key species. Most ranges are now more or less depleted, some of them extremely so. Often only a remnant of the virgin forage remains and one must search out a railroad right-of-way, an uncultivated corner of a field, an inaccessible area or a cemetery to learn the pristine condition of the range. Good range management should provide for ultimately restoring the palatable forage species. In extreme cases this may require a complete rest of the range for a number of years, artificial

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reseeding, or other heroic measures. The least it will require is a reduction in rate of stocking to such a point that the valuable forage species, sparse though they may be, will be lightly grazed so they can produce seed, regain their vigor, and increase in abundance. They would constitute the key species although making up only a small percentage of the plant cover. Even on ranges in reasonably good condition the key species sometimes make up a low percentage of the plant cover. A notable case is a browse area on the Dixie National Forest in Southwestern Utah studied and reported upon by Forsling and Storm. Although the most palatable species made up only 16% of the total plant cover it was proper to use them as key species, for when less palatable species were used as a basis of stocking the cattle did not make profitable gains, the calf crop was reduced, the range was depleted, and erosion of the soil was induced.

The third precaution to take in selecting key species is to choose species of about the same palatability. Ordinarily there should not be a range of more than 10% in the palatabilities of the species. For example, if the most palatable species is grazed 80%, no species with a palatability of less than 70% should be included. The usual procedure to determine the percent of utilization on a unit of range is to figure the average utilization of the key species; and if species with only 60 or 65% palatability are averaged in with species having 80% palatability, the result is a figure which does not give a true picture and may actually be misleading as to the extent of grazing use. It is needless to include species which are 65% palatable or less, for if species which are 70 to 80% palatable are not overused, the species with less than 70% palatability are sure to be safe.

SELECTION of key species and using them as a basis of management gives direction to many principles and activities. Several specific examples follow:

Intelligent management requires study and records to check on trends in the vegetative cover. Most range gets better or worse too gradually to be detected without plots and measurements. Plot studies are simplified and made more effective when they are designed to check on the key species. If, for

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Forsling, C. L. and Storm, Earle V.—“The Utilization of Browse Forage As Summer Range For Cattle In Southwestern Utah”—U. S. D. A. Circular No. 62.
example, in the aspen zone on a typical Utah National Forest, it is known from plot studies that Mountain Brome (*Bromus carinatus*), slender wheat-grass (*Agropyron pauciflorum*), sweet-anise (*Osmorhiza occidentalis*), sawtooth butterweed (*Senecio serra*) and bitterbrush (*Purshia tridentata*) are slowly improving, there is not much need to study what is happening to lancelleaf yellowbrush (*Chrysothamnus lanceolatus*), pea-vine, (*Lathyrus spp.*), geranium, asters, pentstemon, meadow-rue (*Thalictrum fendleri*) and a host of other species. Conversely, if the valuable species are becoming less dense something is wrong, regardless of what may be happening to inferior species. This is one reason why, as a Ranger activity, the Forest Service favors “species plots” studies of the important species, rather than quadrat studies of all species, to check on changes in the plant cover. Similarly, brush study plots, on which only the most palatable browse species are mapped, serve the purpose of checking on range trends.

A knowledge of palatability and palatability tables is desirable in range management. Palatability may be defined as “The percent of use of a species when the range as a whole is *properly grazed* under the best possible management.” A range is properly grazed when the key species are utilized to the desired extent. Thus they provide a starting point in a study of palatability. Their degree of utilization is also their percent of palatability, since this is proper use, and the percent of palatability of all other species on a given unit is the percent they are utilized when the key species are properly grazed.

RANGE managers frequently find it necessary to judge the condition of ranges from “earmarks” discernible “on the ground.” This involves a size-up of erosion conditions, abundance and condition of stock trails, presence or absence of a “high water mark” and hedging on browse, and a variety of other observations, among which an appraisal of the conditions of the key species is very important. Are they vigorous, are they being used too heavily, are they producing sufficient seed, are they as abundant as they should be, and so forth?

One of the most valuable uses of key species is in estimating utilization of units of range. Part of the confusion which exists in methods of determining utilization is due to lack of the key species concept. The simplest and most effective method is to determine the average percent of utilization of each individual key species, and then obtain either a straight or weighted average
of the key species as the percent of utilization of the unit as a whole. In determining the degree of utilization of individual plants, the method followed in Region Four of the Forest Service seems the most satisfactorily developed thus far. For grasses and other herbaceous species, i.e., weeds or forbs, the plants are considered 100% utilized when they are eaten to the ground. An exception is made in the case of forbs with coarse stems. When all the leaves, side branches, and sometimes the ends of the main stems of such species are grazed, they are considered 100% utilized. Browse plants are considered 100% utilized when all the leaves and current year’s twig growth within reach of stock are utilized. If the plants are grazed three-fourths of the amount indicated above, they are 75% utilized; if grazed one-half they are 50% utilized, and so forth. Much additional technique is needed to determine and express the amounts of plants that have been utilized. The Forest Service is working on this problem at the present time and it is hoped something concrete will soon be available.

KEY AREAS

SELECTION of key areas on which to base management is essential in uneven topography, or when for any other reason livestock graze some portions of the range heavier than others. A range manager endeavors through use of herders, selection of salting places, construction of stock trails and bridges, construction of fences, and development of water, to accomplish distribution of the stock as uniformly over the range as possible in accordance with the amount and distribution of the forage. However, after he has done all he reasonably can some areas are still used more fully than others. This is often not the case with sheep to any appreciable extent, for they are constantly under the control of herders who direct their feeding so as to uniformly use the forage, but it is generally the case on cattle range. This means that if the more accessible areas are utilized as much as the key species can bear, the less accessible areas will be under-utilized; or that if the key species on less accessible areas are used as much as they should be, the more accessible areas will be over-grazed. One or the other situation is inescapable, and all too often the more accessible areas have been depleted as a result of attempts to get all the feed on the range.

The range manager who is on top of his job will carefully
study the use being made on the range and will decide upon key areas on which he will base his management and degree of stocking. These will usually be areas of appreciable size that are grazed the heaviest. He will then endeavor to so stock the range that the key areas will be properly utilized. This will assure that they will not be overgrazed, in which case the less accessible areas will not be overgrazed, unless for some reason they are very susceptible to grazing damage, for the degree of use will be lighter on them.

Key areas should be used, therefore, as a basis for degree of stocking, and as places on which to estimate degree of utilization, trends in plant cover, and condition of the range. A false picture of degree of utilization will be obtained if it is estimated or measured elsewhere, for it will show a light utilization whereas it will actually be as heavy as possible on the key areas. Likewise, studies of trends in vegetative cover would not be reliable except on the more heavily used key areas.

The most heavily grazed areas should not always be used as key areas. There may be isolated or small areas on which stock congregate where overgrazing may logically be tolerated in order to make reasonable use of surrounding areas. For example, small level places where cattle naturally bed down, or scattered shady spots where they gather to fight flies, or

*A saltground on the Sawtooth National Forest.*

*Ames Forester*
small areas around watering places will be grazed and trampled unduly heavily and may need to be sacrificed. If so, such areas would not be selected as key areas. Care must be exercised, however, not to be unwisely liberal in deciding that certain areas should be sacrificed. Meadows should almost always be considered as key areas and not overgrazed for depletion of the plant cover soon results in formation of a gully and lowering of the water table. Often overgrazing of a meadow is followed by extension of the depletion outward to the surrounding range, and the sore spot progressively increases in size.

**UTILIZATION STANDARDS**

THROUGHOUT this article 75 or 80% utilization has been used as the correct degree of use under proper stocking. It is the best general figure available and has some basis in experience and experimentation, but is by no means well founded. In fact, it is certain that on the decomposed granitic soils of West Central Idaho the plants cannot be grazed anywhere near 80% and survive. There is good evidence that the degree of utilization should be varied with localities, due to changes in soil, elevation, amount and kind of precipitation, and so forth. Degree of utilization should also probably vary with individual species. Apparently the elders (*Sambucus spp.*) can stand much heavier use than most species and no doubt other species also differ in their withstandability to grazing. All this can be ascertained only through research, and it is hoped someone will find the answers soon. In the meantime, range managers should note the requirements of plants carefully in each locality and make adjustments in stocking to fit their needs. Conservative stocking to be on the safe side should be the policy whenever it can be practiced.

Different standards of utilization are not only needed for different species and different localities, but for the same species in the same locality. For example, bluebunch wheatgrass (*Agropyron spicatum*) may be utilized more heavily in a canyon bottom in good soil on level ground than it can be a hundred yards away on a steep hillside in loose soil. It also can be grazed more heavily in a type where the plants are dense and vigorous than it can be where the plants are depleted and need restoration of vigor and an opportunity to revegetate. Sometimes soil condition is the limiting factor in extent of
utilization, as it may be damaged by a degree of grazing the plants can withstand. Range management of tomorrow will ascribe different standards of utilization to individual areas as necessary to care for peculiar conditions that exist.

There is a marked variation in favorableness of different years to plant growth. One year has abundant precipitation and plants produce a heavy volume of growth. Another year is dry and plants are stunted and soon wither. It is usually impractical to adjust the stocking to fit the volume of plant growth produced, both because the volume of forage usually cannot be predicted, and because most stockmen cannot make rapid adjustments in the size of their herds. Therefore, plants are commonly utilized much more heavily one year than another. The range man thus faces the problem of determining which year to use as a basis for stocking. Should the range be stocked so that utilization will be about proper during the best year; should it be stocked so that utilization will be about proper on an average year; or should there be some other basis? At a range management conference held by the Forest Service in Ogden in 1935, the general standard of so stocking the range that it will not be overutilized on an average of more than one year out of four, was adopted. This seems a reasonable and conservative basis, but this is another problem that requires factual data based on adequate experimentation.

It has been attempted in this article to give range managers some pointers they can put directly into use, and to present some unanswered problems that challenge solution. Much progress has been made in range management, but much development remains to be done. Leadership and research are needed to carry this important work ahead.

All cuts used in this article are used through the courtesy of the United States Forest Service.