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Field Comments on the Range Condition Method of Forage Survey

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METHODS for the appraisal of natural resources normally undergo a period of testing and modification early in their development. This is a natural and healthy sign indicating improvement of a basic concept. Modifications of field techniques should come in large part from field workers.

The thoughts in this paper represent conclusions about the range-condition survey method reached during the past several years while tramping the hills and mountains of Washington surveying many thousands of acres, talking with ranchers and co-workers, preparing ranch plans and analyzing and writing about the method. The ideas are presented in the hope they may be of value in further developing the range-condition survey method or at least in helping to clarify thinking about survey methods in general.

Range condition, as the term is used today, commonly indicates forage production on an area expressed in terms of the amount it would produce under good management. Range condition is measured directly in terms of forage production and indirectly in pounds of meat or wool produced.

History

The value of range condition surveys in analyzing range problems was early recognized by the Soil Conservation Service in the Pacific Northwest, and it is from this region that the technique has received its greatest impetus.

Various aspects of range condition have been covered in several publications. It is probable that the first published account was by Spence (*12*). There seems to be some doubt as to the originator of the basic idea. It has been traced back, however, to Dr. L. A. Stoddart who appears to have been the first to attempt to give the method general field use.

The earliest general analysis of range condition showing its application to sound range management and to flood control was made by Humphrey and Lister in 1941 (*8*). Six condition classes were described and the predominating vegetation characteristic of each was given. Other features pertaining to each were discussed. These included: (a) Management practices responsible for condition, (b) Revisions required in present management practices, (c) Erosion or flood control remedial measures indicated.

A USDA Farmers Bulletin by Renner and Johnson (*11*) was published in 1942. This bulletin gave criteria for recognizing ranges in each of 4 condition classes; told how to recognize upward and downward trends, and recommended desirable range management practices on each class.

Humphrey in 1945 (*5*) and 1947 (*7*) discussed some of the basic principles

underlying the method; the 1947 paper gave in some detail the steps required in making range-condition surveys in the field.

Reid and Pickford (*10*) in 1946 discussed range condition as applied to mountain meadows in eastern Oregon and eastern Washington. They described criteria for recognizing 4 condition classes in mountain meadows and pointed out the grazing value of each condition class for sheep and for cattle.

Parker and Woodhead (*9*) in 1944 developed a score card for ranchers to use in determining the condition of their ranges. Although the score card given as an example was particularly adapted to southwestern perennial grassland ranges grazed yearlong, application of the method is not restricted to these ranges.

Bailey (*1*) in 1945 developed rather fully the importance of recognizing range-condition trends. The value of determining trends has also been shown by others (*7*, *10*, *11*). Bailey's principal contribution lies in his stress of the ecological nature of the factors affecting trends and the need for a better knowledge of soils in range-condition analyses.

Costello and Turner (*3*) described range condition classes in the central Great Plains region. The purpose of their work was "to furnish ranchers with guides for judging prevailing condition of the range, yearly forage production, and current forage utilization of the short-grass range on the central Great Plains."

Talbot (*13*) in 1937 described reliable criteria for determining whether ranges were improving or deteriorating. Although his criteria largely pertain to degree of utilization rather than range condition, as the term is commonly now used, they do in many instances indicate range-condition trends. Some of them, as a consequence, have been rather widely adopted in recent field guides.

Any biographical account should mention the range condition guides developed by the Soil Conservation Service for use by ranch planners and ranchers. These describe each of the principal forage types within an area, the area generally being a Soil Conservation District. Each type is analyzed on a condition-class basis. Criteria for recognizing each class are given together with the essentials for determining trend. Desirable range management practices are then listed for application within each class.

These guides are written in simple, non-technical language and are adapted for use by the non-technical man as well as the trained technician. The first of these (*6*) appeared in 1945. Since then extensive range areas in the states of Washington, Oregon, Idaho, Nevada, and California have been similarly described. Some of these guides vary in form or organization but the general approach has remained unchanged. Modifications of this field application approach have been developed in other western states where grazing is an important industry.

Two Range Condition Concepts

The climatic approach

Range condition as used for the past several years has two meanings. One employs condition as a strictly temporary rating of the forage produced this year or month as compared with another similar period or with a long-time average. This approach indicates the effect of present or recent climatic conditions on forage production. Thus, current or very recent favorable growing conditions result in good condition; unfavorable conditions in poor condition. Forage composition, erosion, and litter are not used as criteria. Thus, a range that once supported peren-

nial grasses and required only one acre to graze a cow for one month may have deteriorated until it now produces only annual weeds and grasses and may require 10 acres to produce a cow month of feed. Yet, both might be classified as in the same condition.

This type of range-condition classification might aptly be termed the *climatic* approach. It is typified by the monthly range-summary reports published for the various range-livestock states.

concerned in this paper. It might be called the *range-potential* approach since it expresses current production in terms of the ultimate potential for the same area (Figs. 1, 2). This classification may indicate to a minor extent a temporary forage abundance or shortage resulting from recent growing conditions. Properly trained technicians, however, make little allowance for such temporary fluctuations. The basis for the range-potential approach lies in the assumption that

FIG. 1. EXCELLENT CONDITION PALOUSE-BUNCHGRASS RANGE
Note the large volume of erosion-controlling forage produced

This concept of condition has a place. This place, however, is strictly one of the temporary effect of growing conditions on forage production. It cannot be extended to indicate the relative grazing values of various ranches or range units, or to show the sustained improvement on a run-down range.

The range-potential approach

The second concept of range condition is the one with which we are primarily

range condition is not a temporary state. It lies also in the assumption that an excellent- or good-condition-class range will produce more forage year in and year out than a fair- or poor-class range. The range-potential approach recognizes that the amount of forage produced on a given site may vary considerably as a result of climate from year to year. This variation does not, however, constitute a basis for reclassifying the range every year.

Essentials of a Range Condition Classification

Forage production

Essentially, under the range-potential concept, the more forage an area is producing the better the range condition. As the method is most commonly used in field surveys today the following classes have been adopted.

Excellent: Range producing 80–100% of possible forage (Fig. 1).

Good: Range producing 60–80% of possible forage.

Fair: Range producing 40–60% of possible forage.

Poor: Range producing 20–40% of possible forage.

Very Poor: Range producing less than 20% of possible forage (Fig. 2).

It is seen from the above that range condition, for practical purposes, has been defined in terms of forage production. In order to classify a range as to condition, therefore, it is necessary to determine the amount of forage being produced. This figure must then be analyzed to ascertain its relative value with respect to the maximum production possible on the area.

Although an evaluation of present forage production is the first step in determining condition it is only one of several. The final classification is an expression of the combined effect of all the factors involved.

Fig. 2. Very-Poor Condition Palouse-bunchgrass Range
This area has the same potential production as that shown in figure 1

The various items that usually need consideration are forage density, erosion, plant vigor, and litter. One or more of these items has been discussed in previous publications (*1*, *2*, *3*, *4*). They will be touched on here, therefore, only insofar as they involve points on which there is not general unanimity of thought in field practice, or to develop ideas resulting from field usage that have not been covered in previous work.

Density

Forage, being in a continual state of flux, does not lend itself well to classification. This is perhaps particularly true with respect to forage-production classifications. For this reason, it is desirable, or even essential to measure all the major factors that may affect production. In some instances field guides for range-condition analyses have been developed that omit the density factor. It is the conviction of the writer that in omitting this factor we deprive ourselves of an essential tool for determining not only range condition but even forage evaluation per se.

The amount of forage required to sustain a grazing animal is expressed as volume. Volume reflects not only height of forage; it also reflects ground cover or density. Thus, a range capable of supporting .4 of a complete ground cover is not in excellent condition when it is currently supporting only a .2 cover. An added indication of the essential nature of the density factor is seen in the fact that many ranges, when classified without density, would seem to be in excellent condition. These same ranges, when rated as to density in addition to other factors, would be classed as no more than fair. This condition has been observed many times on ranges overgrazed for years by sheep. In these instances the coarser grasses were grazed lightly or not at all when mature. Seedlings of these species, however, were grazed wherever they appeared. At the same time the fine grasses were grazed out. As the old perennial grasses gradually died they were not replaced and the density was gradually lowered. Yet, their vigor was excellent and as a consequence a considerable amount of litter often accumulated. Furthermore, the areas involved were essentially level and the soils porous so that there was no measurable erosion. If these ranges were to be judged on a basis of plant composition, litter, forage vigor, and erosion, but excluding density, they would appear to be in excellent condition. Yet they are not producing the amount of forage required for an excellent-condition range. Including a measure of density in cases of this sort and, indeed, in all estimates of grazable forage produced, would seem to be essential.

Erosion

Failure to record degree of current erosion may lead to an over-evaluation of range condition and consequently of a safe stocking rate. A range where erosion is active must have more forage left ungrazed than one where there is little or no erosion. When erosion is one of the factors used in determining range condition, the matter of a safe stocking rate is determined by virtue of the correct condition classification. For example, a range might rate as excellent and have a stocking rate of 1 acre per cow month of forage if current erosion were slight or negligible. This same range if producing the same amount of forage, but with moderate erosion would be classified as good and would carry the recommendation by definition (good = 60–80% of full production) that about $1\frac{1}{2}$ acres be allowed per cow month. The approximate rule can be followed that other factors remaining unchanged, moderate erosion will reduce a condition rating one class; severe erosion will reduce it two, or occasionally more, classes.

In using erosion as a criterion of range condition the condition classification should be based on current, rather than past, erosion. Old rills or gullies now healing may indicate a former state of deterioration that no longer exists. Eroded areas becoming vegetated will

generally indicate an improving range. Old gullies completely grown over may indicate a range that was once in poor condition but that has recovered to the excellent level (Fig. 3).

Forage vigor

Forage vigor, though used as a criterion for determining condition, is probably the least dependable of those commonly employed. The reason for this can be shown best by example. A range long overgrazed by sheep gradually changes in composition. In the Palouse bunchgrass region of the Northwest, for example, the fine-leaved Sandberg bluegrass (*Poa secunda*) and Idaho fescue (*Festuca idahoensis*) are heavily grazed. This ultimately may result in their partial or complete disappearance. Mature plants of the accompanying bluebunch wheatgrass (*Agropyron spicatum*) are very lightly grazed. Seedlings of this species, however, being small and good sheep feed, have little chance for survival, being either pulled up or starved out by continued close grazing. After a number of years this results in almost pure stands of wheatgrass composed largely of the old coarse plants. The accumulation of ungrazed dead material in the plants makes them gradually more and more unpalatable to sheep and as a result they characteristically possess good to excellent vigor. Yet, as mentioned under the discussion of density, this range may be in no more than fair condition.

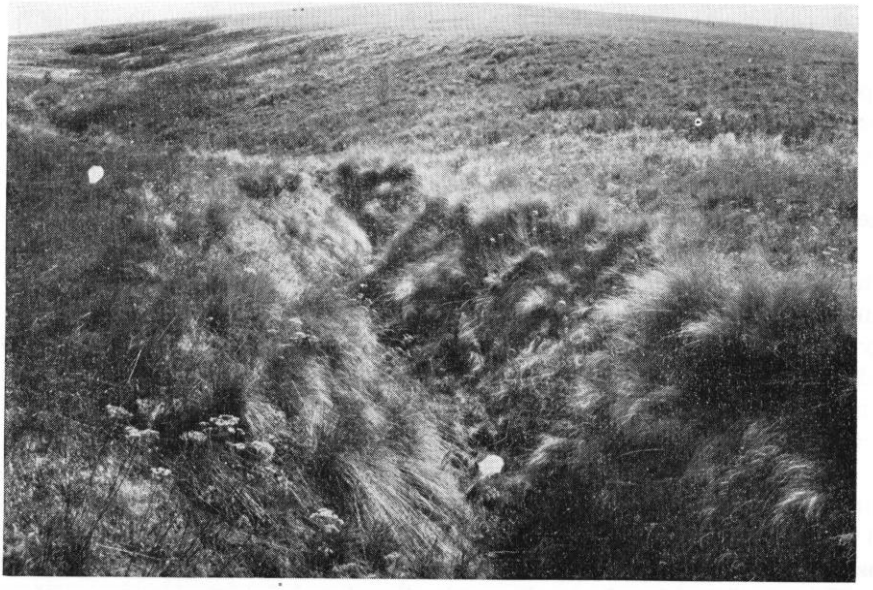

FIG. 3. GRASSED-OVER GULLY ON EXCELLENT-CONDITION BUNCHGRASS RANGE
As indicated by the deep gully, this range has improved from a lower condition class

Forage vigor as a criterion may also be misleading on run-down ranges protected from grazing for a few years. These ranges may have deteriorated because of poor livestock-management practices or because the grasses were suppressed by a dense brush cover, or for other reasons. Whatever the cause, its correction usually will restore the vigor of the grasses. Within a period of only one or two years the previously established grasses may show good to excellent vigor. Yet, they are so widely spaced, i.e., density is so

low, that the stocking rate is less than would be expected from the vigor of the plants. It should be noted in this example, also, that omission of density as a rating factor would further weaken the classification.

It is not recommended that forage vigor be abandoned as one of the criteria for determining range condition. It should, however, be used with care and with due consideration for the factors that might make it misleading.

Litter

On open grassland ranges litter has proved to be one of the most reliable factors employed in determining condition ratings. Rather generally on open grasslands, an increase in litter indicates an improvement in condition. Moderate to abundant litter provides a surface layer of organic material that protects the soil surface from the erosive and puddling action of raindrops and surface runoff. It also constitutes part of the raw material for humus formation. And, likewise important, an accumulation of litter indicates that past grazing use was not abnormally heavy.

In forested areas, as contrasted with open grassland, abundant litter may not indicate unused forage or, for that matter, that any forage was produced. The litter may be derived largely or entirely from fallen leaves, needles, or other tree-derived material. This may provide adequate erosion control and improve the soil. It does not, however, indicate range condition as defined by forage-production classes. This fact must be considered in classifying timbered ranges.

A Dynamic Approach

Range-condition surveys have supplanted the reconnaissance and square-foot surveys as a Soil Conservation Service forage evaluation method. The methods formerly used were comparatively slow and gave results of no more value in ranch planning than the more rapid range-condition method.

The greatest asset of the range-condition method, however, lies in its dynamic approach. The reconnaissance and square-foot systems classify a range into forage types based solely on current aspect. They do not indicate whether a range is improving or deteriorating, nor do they indicate whether a range once produced, and is again capable of producing, more forage than at present. These two methods are, therefore, static in their approach. The range-condition method, in contrast, is an analysis of present production expressed in terms of possible future production. Emphasis is also laid on the direction of current changes in range condition to determine whether present range-management practices are benefiting or harming the range (Fig. 3). This dynamic approach, together with its relative simplicity, have given the method a popularity among practical-minded ranchers that the older systems never enjoyed.

Proposed Modifications

Four condition classes

No range survey method yet devised has proven entirely satisfactory. Because of the complexity of forage it is possible that none ever will be. Several defects, some of which are remediable, exist in the method as it is commonly used for surveys today.

In most instances a breakdown into 4 condition classes rather than 5 would be adequate. Several years' field experience in making range condition surveys indicates that the following 4 classes would serve in most instances and might possibly be universally adequate:

Excellent: 75–100% of possible forage production.

Good: 50–75% of possible forage production.

Fair: 25–50% of possible forage production.

Poor: Less than 25% of possible forage production.

Depleted areas would not be classed as poor condition but would be mapped separately as "depleted". This reduction of the number of classes would simplify field surveys, reduce compilation time, and provide a breakdown more readily accepted by most ranchers. The slight sacrifice in detail would not adversely affect ranch planning.

Modification for sheep grazing

Sheepmen object to the method because they say it frequently does not correctly classify their ranges for sheep use. This objection is justified, for the method expresses condition in terms of maximum forage production regardless of kind of livestock. Thus, for example, a Palouse bunchgrass range generally produces the maximum amount of forage when bluebunch wheatgrass is the principal species. Bluebunch wheatgrass, however, because of its coarseness, makes poor sheep feed. This range, therefore, might rate excellent in terms of forage production for cattle, but no more than fair for sheep. If, on the other hand, the bulk of the wheatgrass were replaced by Sandberg bluegrass, a classification according to present standards would rate this range as no more than fair. Because of the value of Sandberg bluegrass as spring sheep feed, however, the sheepman would probably consider this range as excellent. And, in terms of forage production for sheep, he would be right.

In areas where sheep raising is an important industry separate range-condition classifications should be set up for cattle and sheep. This would involve enlarging our concept to permit basing the classes on kind of livestock to be run, rather than on total volume produced regardless of kind of livestock, as at present.

Preparation of condition guides

The objection is raised by some that the method is difficult to apply broadly because, as a prerequisite to its use, descriptive guides must first be made of the types involved. This is true. However, the time required for the field work of preparing such a guide generally runs into no more than 2 to 5 days. The training obtained in observing successional trends and causes for these trends generally proves in itself to more than pay for the time expended. Careful analysis of forage types and grazing management problems frequently will show that extensive areas can be included in a single so-called type. This should be true particularly of National Forest areas or on Indian Reservations where the local administrative problems common on Soil Conservation Districts may not obtain.

It is believed, therefore, that the time required to lay the ground-work requisite to application of the range-condition method is one of the definite benefits of the method rather than one of its drawbacks. The condition of many of our public and private ranges today would seem to indicate that we must be forced to stop and consider what is happening to our forage resources. If the range-condition method will succeed where previous methods have failed, it may be worth adopting universally at any cost of time.

Subtype mapping

Men trained in the reconnaissance or square-foot survey systems have a tendency under the range-condition method to make more subtype breakdowns than necessary. This can be corrected if the

surveyor will ask himself these questions before mapping a new subtype.

1. Is there enough change in composition, density, erosion, litter, or plant vigor to indicate a different condition class?
2. Is there a marked change in factors that should affect allowable grazing? These factors include erodibility of soils, steepness of slope, direction of slope, potential productivity of site, presence of rocks, down timber, or dense brush.
3. Are there special range management or other recommendations that apply to one area and not to another that would be masked if no subdivision were made?

When the answer is no to all 3 of these questions there will generally be no need to subtype.

The use of estimates

The objection has been raised that the condition method, like other widely used range-survey systems, relies on estimates rather than on verifiable measurements. This is largely correct; density and forage composition are still estimates. In a sense erosion, plant vigor, and litter are also based on estimates. With due consideration for the inaccuracy of estimates as compared with exact measurements, however, the information derived from condition surveys has proved to be adequate for planning on many hundred-thousand acres of range land. This record has extended over a period of several years, long enough to indicate fairly conclusively that the method is serving its purpose.

In discussing the adequacy of any method, the use to which the results will be put should be considered. Forage production, livestock prices, overhead and, indeed, most items involved in a ranch operation are subject to wide fluctuations. This being so, there is little to be gained, and perhaps much to be lost, by gearing any one operation as, for example, a forage evaluation method, down to a higher degree of accuracy. The means should justify the end, but no more than that. A more accurate system does not seem to be needed in ranch planning.

Condition ratings in timber

The writer is aware of no unified approach to rating range condition in dense timber where competition precludes the production of much forage. Two approaches seem to be most commonly used. One considers condition in terms of the effect of livestock upon it; the other in terms of the effect of all factors.

Range condition is defined in terms of potential forage production. On open grassland the factor that usually prevents development to the potential is grazing pressure from either domestic livestock or game animals. Even here, however, other influences are sometimes important. Abandoned cropland, for example, on which the native sod was destroyed by plowing, may rate poor or very-poor condition. Reseeding to native or introduced species may be necessary to restore such areas within a reasonable period of time to excellent condition. The potential, however, is still there and the correct treatment will bring it out.

This same line of thinking should be applied to forested or, even, densely brushy areas. Dense timber may produce little or no forage because of competition for light or moisture. If the timber were removed or thinned, the site might produce an abundance of forage. Since, therefore, our assumed forest is now producing little forage but could be made to produce an abundance,

it may correctly be classed as being in very-poor condition.

Whether it may be economically desirable to remove the timber in order to produce more forage does not seem to be involved. The basic fact is that a range-condition classification is a classification of forage resources. In making such a classification, therefore, present as compared with potential, forage production is the only factor to be considered. For economic or other reasons it may be desirable to maintain a dense stand of timber or brush. Yet, from a forage production viewpoint, this area is of little value and consequently must be given a low condition rating.

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