

A Proposed Reclassification of Range Forage Types

R. R. HUMPHREY

University of Arizona, Tucson, Arizona

MANY range technicians have felt for some time that the 18 Western Range Survey forage types are in need of revision. The proposed changes outlined in this paper are the outcome of discussions with technicians and ranchers over a period of years. Many of the ideas were developed while the writer was employed by the Soil Conservation Service. Mr. F. G. Renner of the Soil Conservation Service and Dr. W. S. Phillips, Department of Botany, University of Arizona, have been very helpful in their criticism of the manuscript.

ORIGINAL TEN GRAZING TYPES

There have been only local minor modifications of the range-type concept since it was first developed, and the definitions of type and subtype as given by Sampson (2) in 1923 are still widely used:

"A grazing type as used in reconnaissance consists of an area upon which the cover may be composed of one class of vegetation, as for instance, a grass cover; or of two or more classes of vegetation, as grass and sagebrush, the more conspicuous of which determines the type designation. Subtypes within the major unit are used to designate the identity of a mixed cover."

This definition applied to the following 10 types. These types have been used for many years by the U. S. Forest Service and other agencies. Most of them are composed of definite growth forms or ecological classes of vegetation, although two—sagebrush and aspen—are based on generic distinctions.

- "1. *Open grasslands* (other than meadow). This includes bunchgrass areas, grama-

grass lands, and other grass cover not meadow in character.

- "2. *Meadows*. This cover embraces both the dry and the wet meadowlands where sedges and rushes and species like tufted hairgrass (*Aira caespitosa*) predominate, as well as moist meadowlike areas which occur commonly as glades in the timber type.
- "3. *Weeds*. This type includes all untimbered areas where plants popularly known as weeds, that is, broad-leaved herbs, predominate.
- "4. *Sagebrush*. Lands where sagebrush predominates.
- "5. *Browse*. This type includes all lands outside of coniferous timber where browse plants (brush) prevail.
- "6. *Timbered areas*. This cover supports a stand of grass, weeds, and browse. It includes all range in coniferous timber.
- "7. *Waste lands*. This type includes all timbered, brush, and other lands that have no grazing value on account of their inaccessibility.
- "8. *Barren lands*. All areas potentially incapable of producing the higher (flowering) type of vegetation are classed as barren.
- "9. *Woodland-Juniper and Pinyon*. A cover so designated supports a variety of vegetation composed of grasses, weeds, and browse in which trees other than aspen and large conifers predominate.
- "10. *Aspen*. This type embraces grasses, weeds, and browse, or a cover of any one of these, in a true aspen type." (2)

INTER-AGENCY COMMITTEE, 18 TYPES

In April, 1937, the Inter-agency Range Survey Committee, representing the U. S. Forest Service, the Soil Conservation Service, the Division of Grazing, the Bureau of Indian Affairs, and the Resettlement Administration, met in Salt Lake City and drew up a standardized set of instructions for use on range surveys

conducted by these agencies (1). A number of changes in typing methods were introduced and adopted. These included, among others, a breakdown of the 10 original Forest Service types.

In most cases, the breakdown was accomplished by subdividing certain of the former ecological classes (the browse type, for the most part) into new types based on aspect and generic or even species differences. Two principles of classification were thus adopted, one employing ecological life forms, the other, floristic differences. Either method can be used to indicate the vegetal breakdown required for range surveys. However, an ecological classification is comparatively simple and avoids the necessity for making subdivisions to indicate genera or species. A taxonomic basis on the other hand is rather lengthy, even at the start, and may lead logically to an indefinite number of subsequent breakdowns that may hopelessly complicate the effort to clarify such a complex. Such a method would probably be justified, however, in spite of its present and potential complications, were it necessary to type individual species and genera separately for purposes of forage evaluation. Since an equally accurate forage inventory can be made, however, by more direct methods, it would seem that the complicated system should be discarded. In any event, there is nothing to be gained from using two bases of classification when one will suffice. The Inter-agency Committee 18 types are as follows: (1)

"Type 1—*Grassland, 1(S) Short grass; 1(T) Tall grass*. Includes grassland other than meadow and secondary meadow. Perennial grasses predominate and determine the aspect, although weeds and browse may be present.

Examples of types are: grama-buffalo grass, bunchgrass, wheat-

grass-sedge, alpine grassland, blue stem.

"Type 2—*Meadow*. Includes areas where sedges, rushes, and moisture-enduring grasses predominate. Two classes of meadows are recognized; wet meadows and dry meadows.

Wet meadows are characterized principally by sedges and remain wet or moist throughout the summer. These shall be designated as 2W-Wet Meadow or Marsh.

Dry meadows are dominated by grasses rather than sedges and occur as moist meadowlike areas in open timber, or intermittent meadows, both of which become moderately dry by midsummer. These shall be designated as 2-D-Dry Meadow or Flood Plain.

"Type 3—*Perennial forbs (Weeds) (Not desert weeds)*. Includes all untimbered areas where perennial weeds predominate over other classes of vegetation. There is very little true weed type, as a weed cover is usually more or less temporary in character and is soon replaced by a more permanent type if the disturbing factor is removed. If there is no great predominance of the weeds over the grass or brush vegetation, and if it is possible to judge that the weed predominance is due to some unnatural factor, the weeds should be disregarded in designating the type, and the more stable vegetation should be used as an index. The weeds will then be cared for in the sub-type.

"Type 4—*Sagebrush*. This type includes all untimbered lands where sagebrush or shrubby species of similar appearance predominate. The sagebrush lands are usually of different range values and different in season of grazing from the areas which are listed below under *browse*. Areas dominated by shrubby species of sagebrush, including big sagebrush (*Artemisia tridentata*), shall be classed as sub-types, as for example: *Artemisia filifolia*, *A. cana*, and *A. tripartita*. Other shrubby species, such as *Chrysothamnus*, should be designated as sub-types

when they become dominant in sagebrush areas.

This and the browse type, which follows, are sometimes difficult to distinguish from the grass and weed types if aspect rather than the dominant class of forage is used as the distinguishing characteristic. Sagebrush may form only 15 percent of the total vegetation of a type and still its aspect may be that of a sagebrush type.

It may prove desirable, in a given region, to decide on a certain percentage of all the vegetation in the type, say 20 percent, as the minimum proportion of sagebrush that may be present if the area is still to be classified as a 4 type, providing, of course, it does not already have the aspect of some other type. The same will hold true of the browse type.

"Type 5—*Browse-Shrub*. This type includes all untimbered lands where browse, except sagebrush or its sub-types, gives the main aspect to the type or is the predominant vegetation. Characteristically, it occupies the transition zone of the lower mountain slopes, foothill, and plateau areas. Examples of sub-types are mountain mahogany, bitter brush, willows, *Ceanothus Manzanita*, California Chaparral, etc.

"Type 6—*Conifer*. This type includes all range in coniferous timber supporting grasses, weeds, browse, either singly or in combination, except as provided under Type 7 and 9. The forage may vary from a pure stand of pine grass, or some other grass, to a pure stand of weeds or browse. It usually, however, consists of grasses, weeds, and browse; and the proportion of each species varies so widely that it is not thought advisable to attempt a division into types with distinct colors. These variations can best be represented by sub-types.

"Type 7—*Waste*. This type includes all areas of dense timber and brush, which have no value for grazing or have such slight value that they cannot be used economically, owing either

to denseness of standing or down timber or sparseness of forage growth. Large areas of very sparse forage, unless within easy reach of a better type, shall be classified as waste because of the impracticability of running stock over so large an area to get such a small amount of feed.

This type also includes other waste areas not strictly in timber or brush and not barren, which are so rough or inaccessible as to make their future use improbable.

The sub-type designations generally encountered in this type are as follows: 7T-Waste in Dense Timber; 7D-Waste in Down Timber; 7B-Waste in Brush; 7R-Waste Areas where Rocky Character Prevents Use; and 7I-Permanently Inaccessible Areas. Principal species of timber should be shown by symbols.

"Type 8—*Barren*. This type includes all areas on which there is naturally no vegetation, or practically none, including intermittent lake beds, saline flats, active sand dunes, shale, rock slides, lava flows, etc. Areas which have been denuded by overgrazing should not be confused with areas naturally barren, nor should areas containing only annuals for a part of the year be shown under 8, although these may be without vegetation for the remainder of the year.

"Type 9—*Pinon-Juniper*. This type includes pinon, juniper, pinon-juniper, and digger pine. The character of the range in this type as regards location, grazing capacity, and management is sufficiently distinct from the conifer type to justify a separate color. The forage may vary from a pure stand of grasses, weeds, or browse to a combination of any two or all. This variation can best be shown by sub-type designations.

"Type 10—*Broad Leaf Trees*. This type includes all range in deciduous timber. The combination of grasses, weeds, and browse, and the proportion of individual species, will vary as in other types.

The principal sub-types which will be encountered are: aspen, cottonwood, oak, birch, alder, ash-elm, etc., when they occur in tree form.

"Type 11—*Creosote*. This type includes areas where creosote bush (*Covillea*) constitutes the predominant vegetation.

"Type 12—*Mesquite*. This type includes areas where various species of the Mesquite (*Prosopis*) give the characteristic aspect or constitute the predominant vegetation.

"Type 13—*Saltbush*. This type includes areas where the various salt desert shrubs of the *Atriplex* family form the predominant vegetation, or give the characteristic aspect. There is sufficient significant difference in the range value and the use of salt bush areas to justify their separation from other desert or semidesert shrub types.

"Type 14—*Greasewood*. This type includes areas where greasewood (*Sarcobatus*) is the predominant vegetation or gives a characteristic aspect. Characteristically, this type occupies valley floors, subject to overflow during flood periods, or areas underlain with ground-water at shallow depths where the soil is more or less saline. It is sufficiently differentiated from other desert shrubs to justify an exclusive type.

"Type 15—*Winterfat*. This type includes areas where winterfat (*Eurotia*) gives a characteristic aspect or constitutes the predominant vegetation. Though commonly associated with other semi-desert shrubs, the occurrence of this plant in Utah and Nevada as a type character is of sufficient extent to justify a separate type.

"Type 16—*Desert shrub*. This is a general type which includes areas where other desert shrubs aside from those separated into individual types, constitute the predominant vegetation or give the characteristic aspect. This type includes several genera which are quite distinctive in type habit such as black brush

(*Coleogyne*), coffee berry (*Simmondsia*), Catclaw (*Acacia*, *Mimosa*), gray molly (*Kochia*), hopsage (*Grayia spinosa*), spiny horsebush (*Tetradymia spinescens*), and little rabbit-brush (*Chrysothamnus stenophyllus*) but pure types of each are so limited in extent as to not justify separate type. The plant symbols used will be sufficient to indicate the predominant species present.

"Type 17—*Half-Shrub*. This type includes areas where half shrubs constitute the dominant vegetation or give the characteristic aspect.

Half shrubs are semi-woody perennials of low stature, such as *Aplopappus*, *Gutierrezia*, *Artemisia frigida*, *Eriogonum wrightii*, etc. They commonly consist of a woody caudex from which herbaceous stems are produced that die back annually. These genera are sufficiently distinctive in habitat and of wide enough extent in certain localities to justify a separate type designation.

"Type 18—*Annuals (Weeds or Grasses)*. This type includes areas in which annual weeds or annual grasses constitute the dominant vegetation. Both transitory stages and semipermanent conditions should be included in this type as for example: Russian thistle, downy chess (*Bromus tectorum*), desert weeds. The plant symbols used will be sufficient to indicate the predominant species present.

Abandoned Lands. Abandoned lands should be classified according to aspect. In mapping, the boundaries should be hatched.

REVISION OF TYPES PROPOSED

In order to simplify range-survey procedures, and thereby establish a basis for typing that is believed to be more practical, the 10 types below are proposed. They are based on broad ecological classes of vegetation or, as in types numbered 9 and 10, on certain general characteristics of the land itself. This

classification includes all the vegetal types that occur on our grazing lands.

1. *Grassland*. Grassland, other than meadows, where perennial grasses, sedges or rushes predominate in the vegetal composition (fig. 1).
2. *Meadow*. Areas where sedges, rushes, and moisture-enduring grasses predominate in the vegetal composition.

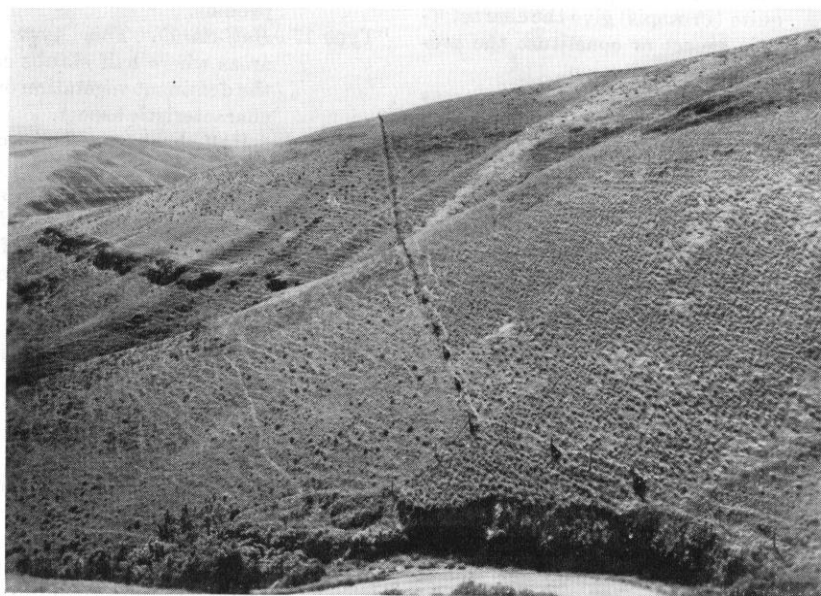


FIG. 1. TYPE 1—*Grassland*

Bunchgrass range typical of extensive areas in the Pacific Northwest.

- 2W *Wet meadow*. Areas remaining wet or moist throughout the summer and usually characterized by sedges and associated species (fig. 2).
- 2D *Dry meadow*. Moist meadow-like areas in open timber or intermittently wet meadows, both of which become moderately dry by midsummer, and usually are characterized by grasses or sedges (fig. 3).
3. *Perennial Forb*. Areas where perennial forbs predominate in the vegetal composition (fig. 4).
4. *Annual*. Areas where annual forbs or annual grasses predominate in the vegetal composition (fig. 5).
5. *Shrub*. All types where sagebrush, mountain browse, creosote bush, salt bushes, greasewood, winterfat, desert shrubs or half shrubs predominate in the vegetal composition (fig. 6).
6. *Conifer*. Areas where the taller conifers predominate in the vegetal composition (fig. 7).
7. *Woodland*. Types where low-growing woodland species predominate in the vegetal composition. This would include such species as piñon, juniper, low-growing but tree-like evergreen and deciduous oaks, mesquite, ironwood, paloverdes, saguaro, and joshua tree (fig. 8).
8. *Broadleaf tree*. Areas where broadleaf trees predominate in the vegetal composition (fig. 9).
9. *Waste*. All dense timber, brush, or other areas inaccessible to livestock. Also, those areas that have so little grazing value that they cannot be used economically because of denseness of standing or down timber, sparseness of forage growth, or topographical inaccessibility (fig. 10).
 - 9T Waste in dense timber.
 - 9D Waste in down timber.
 - 9B Waste in brush.
 - 9R Waste areas where rocky terrain prevents use.
 - 9I Topographically inaccessible areas.



FIG. 2. TYPE 2W—*Wet Meadow*

Meadows of this type remain wet or moist throughout the year and support a mixture of rushes, sedges, and moisture-enduring grasses. Photo taken in the Blue Mountains near Tollgate, Oregon.



FIG. 3. TYPE 2D—*Dry Meadow*

Meadows of this type become moderately dry by midsummer and usually are characterized by grasses or sedges.



FIG. 4. TYPE 3—*Perennial Forbs*

On this southern New Mexico hilltop phlox, penstemon and loco weed have replaced the former grass cover.



FIG. 5. TYPE 4—*Annuals*

An annual type in Okanogan County, Washington, comprised largely of Indian Wheat.

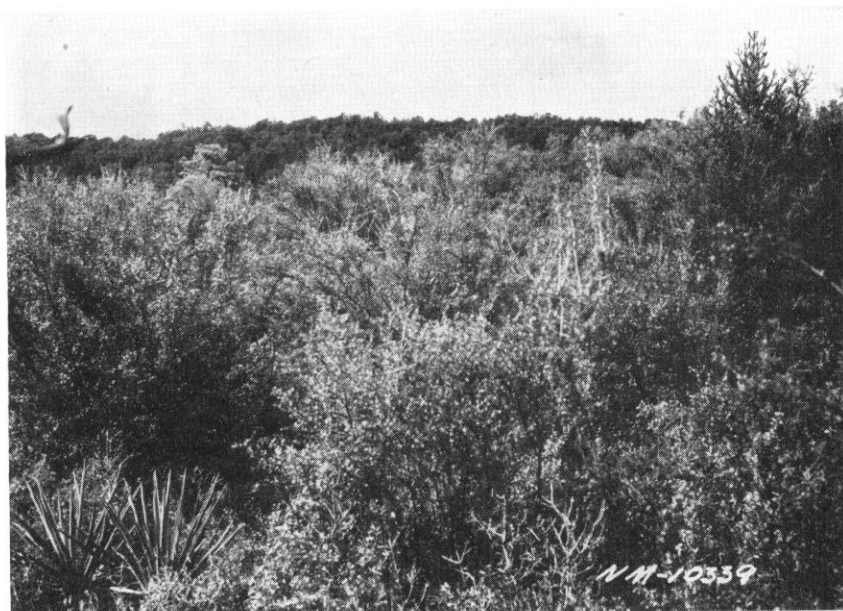


FIG. 6. TYPE 5—*Shrub*

Shrub type made up largely of mountain mahogany and oak on the Mescalero Indian Reservation, New Mexico.



FIG. 7. TYPE 6—*Conifer*

Representative coniferous forest type near Conconully Dam, Okanogan County, Washington.



FIG. 8. TYPE 7—*Woodland*

Representative woodland type composed largely of juniper. Mescalero Indian Reservation, New Mexico.

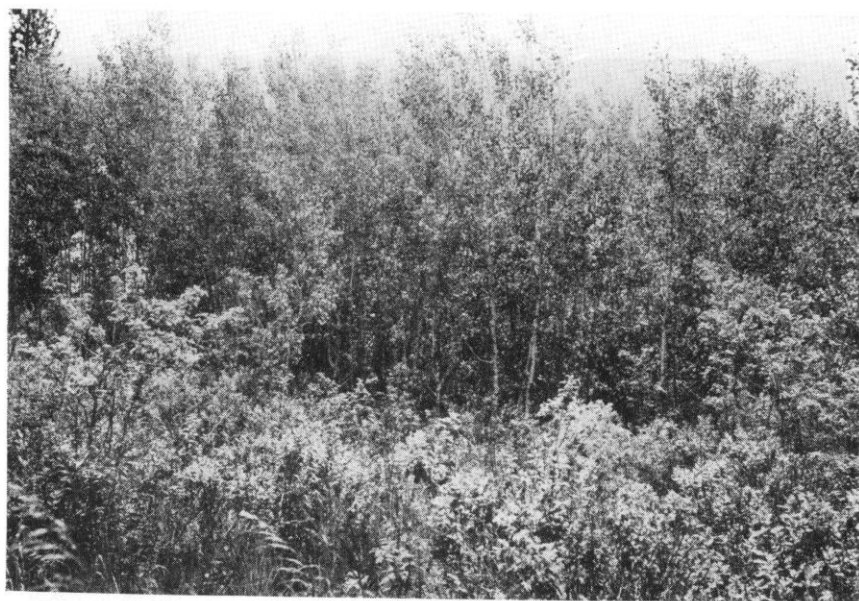


FIG. 9. TYPE 8—*Broadleaf trees*

Aspen thicket in Spokane County, Washington.

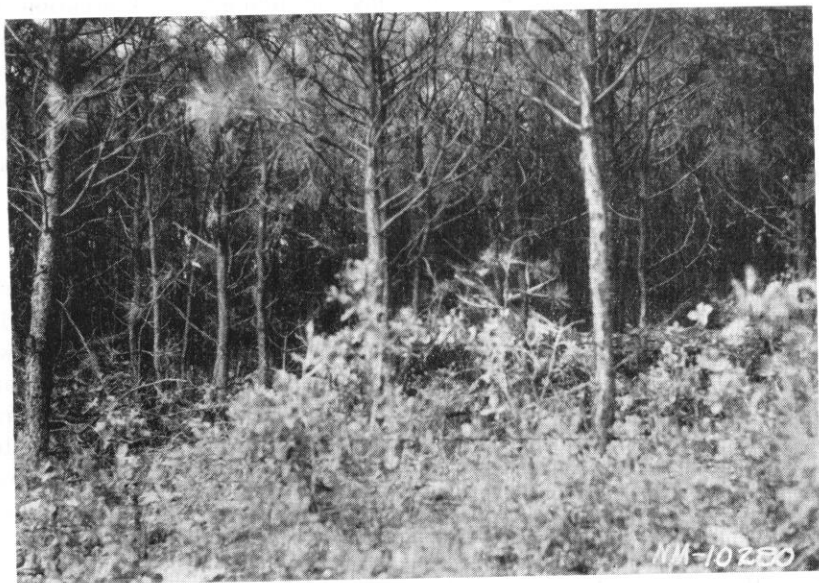


FIG. 10. TYPE 9T—*Waste in dense timber*

Dense stand of ponderosa pine in southern New Mexico. Too dense for stock to penetrate and containing little forage.



FIG. 11. TYPE 10—*Barren land*

Badland area in South Dakota nearly void of palatable vegetation.

10. *Barren land.* All areas void or nearly void of vegetation, such as intermittent lake beds, saline flats, active sand dunes, shale, rock slides, lava flows, and badlands (fig. 11).

In the 18 types of the Inter-agency Committee no provision is made for such low-growing but often dominant desert trees as ironwood, the paloverdes, saguaro, and joshua tree. These are taken care of in the proposed revision of type 7.

BASING FORAGE TYPES ON GRAZEABLE FORAGE

The proposed classification differs importantly from the original Forest Service types and from the 18 types set up by the Inter-agency Committee in that it bases the designation of a type on the kind of vegetation that predominates in the vegetal composition rather than on the aspect of such cover. Under current typing procedures, although the predominating vegetation and aspect are often the same, in many instances they are very dissimilar. Designation of types on a basis of vegetal composition, rather than on aspect, would shift the emphasis to the forage rather than placing it on visually prominent species that may constitute a minor part of the forage.

Objections to the use of aspect have been voiced by a number of individuals for many years, but no valid reasons for retaining the "aspect" method have come to the writer's attention. When aspect determines designation of type, a number of highly variable factors may influence the field man's decision. Perhaps the most important of these is seasonal aspect of the vegetation. Important, also, are time of day, as it affects the angle of incidence of light on the vegetation, and color of the vegetation as affected by either bleaching or moisture content at the time of survey. Plants that are light in color, whether because of bleach-

ing or temporary desiccation of dead plant tissues, usually stand out more conspicuously than do the same plants when unbleached or when darker colored because they might be wet. Added to these variables is the personal equation of the examiner himself as expressed in his opinion as to what constitutes appearance or aspect.

Substitution of vegetal composition for aspect would not eliminate all disagreement between examiners, in view of the fact that composition figures are estimates, rather than exact measurements. Experience, however, has indicated that less variation exists between examiners with regard to density and composition estimates than with regard to aspect. More important is the need for placing the entire emphasis on composition of the vegetation measured rather than partly on composition, as in the species breakdown of the field description sheet, and partly on appearance or aspect. From a knowledge of the species and the percent of each in a given type, as recorded on the field description sheet, it would seem logical to expect that one could in all cases name the type. However, as aspect may bear little relation to composition, this cannot be done under the present system, where one species constituting a minor portion of the forage density may be used to designate the type.

The aspect method of typing may be extremely misleading. This was brought out by range surveys made in central Washington in the spring and summer of 1943. The year was what is known in the Northwest as a "mustard year," when climatic conditions were exceptionally favorable for the growth of Jim Hill mustard (*Norta altissima*). Surveys made in the spring on areas where perennial grasses predominated classed the areas as grass types, with the immature mustard comprising from 5-15 percent of the

vegetation. By midsummer a large proportion of these same areas were classed as annual weed types because the mustard had matured and for the most part had hidden the grasses from view. The preceding summer, as in most years, this same range had a typical grass aspect. Had the types been designated according to the percentage of ground covered by the mustard, these same types, even during an abnormal "mustard" year, would have been classed correctly as grassland.

In the instructions for making range surveys issued by the Inter-agency Range Survey Committee there is an apparent attempt to correct some of these weaknesses. In the description of the perennial weed type, for example, is the statement: "If there is no great predominance of the weeds over the grass or brush vegetation, and it is possible to judge that the weed predominance is due to some unnatural factor, the weeds should be disregarded in designating the type and the more stable vegetation should be used as an index" (1). Note that this statement refers to perennial weeds and does not apply to such annual weeds as the mustard referred to in the preceding paragraph.

And again, referring to the sagebrush type: "It may prove desirable, in a given region, to decide on a certain percentage of all the vegetation in the type, say 20 percent, as the minimum proportion of sagebrush that may be present if the area is still to be classified as a 4 type, providing, of course, it does not already have the aspect of some other type. The same will hold true of the browse type."

These attempts to disregard aspect in a type designation confuse, rather than clarify, the issue. The preceding quotation, for example, is contradictory in that it provides that a definite percentage of the type be sage, or perhaps browse, then cancels this instruction by "providing, of

course, it does not already have the aspect of some other type." The solution of the problem would seem to lie, not in such tacit acknowledgments of the weaknesses of the aspect method, but in its complete abandonment in favor of the adoption of a system wholly based on composition of the species comprising the forage density.

APPLICATION OF FORAGE TYPES IN RANGE CONDITION SURVEYS

There is need for a set of standard vegetation types for use in range condition surveys. In the Soil Conservation Service the reconnaissance and square-foot methods have been entirely supplanted by range condition surveys. There has been, however, no generally accepted system for naming the forage types involved.

Designation of a type in range condition surveys commonly indicates the type the area can support for most effective forage production. This is at variance with designation of types under the reconnaissance and square-foot systems. These indicate what is currently growing on an area rather than what should be there.

For this reason, in applying the 10 proposed type designations to range condition surveys the type designation may not be the same as the species that were dominant at the time of the survey. The present growth form—e.g., grasses, forbs, browse—may differ from either the original or the ultimate desirable and practically feasible growth form. Where this is the case the type will be named, not on a basis of predominating vegetation but on a basis of original or potential future vegetation. This implies, of course, a knowledge on the part of the examiner of the ecological history of the area and of the basic principles of plant succession.

SUMMARY

A proposal is made to replace the 18 range-forage types developed by the Inter-agency Range Committee with 10 types based on predominant vegetation rather than on aspect. The ten types proposed are:

1. Grassland (Perennial grasses)
2. Meadow
3. Perennial forb
4. Annual (forbs & grasses)
5. Shrub
6. Conifer

7. Woodland
8. Broadleaf tree
9. Waste
10. Barren land

LITERATURE CITED

- (1) Inter-Agency Range Survey Committee. Instructions for range surveys as formulated by the Inter-agency Range Survey Committee and adopted by the Western Range Survey Conference, April 24, 1937 (USDA).
- (2) SAMPSON, A. W. Range and pasture management. p. 312, 421 pp. Illus. (New York) 1923.