

The Application of The Reconnaissance Method

and

The Square Foot Density Method

by

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A Thesis

Presented to the Faculty

of the

School of Forestry

Oregon State College

In Partial Fulfillment

of the Requirements for the Degree

Bachelor of Science

June 1939

Approved:

Professor of Forestry

I N T R O D U C T I O N

This report describes the Reconnaissance and the Square Foot Density methods of range survey as used during the past few years on the National Forests and other range lands. These methods are used to estimate and help in calculating the carrying capacity of the range.

The object of range surveys is to secure practically the fullest and most accurate up-to-date information, in connection with the use and administration of the range and related resources for such purposes as livestock production, watershed production, game conservation, recreation, and other legitimate demands. It is for the purpose of obtaining these basic facts, analyzing the various problems and from them developing a comprehensive plan for managing the resource that range surveys are conducted. A completed plan of range management should show what the range resource is, its physical condition, its relation to other resources, and how it may be best utilized, developed and improved. It must also be remembered that the training of the men who take part in the work is just of great importance as the collection of field data and the preparation of management plans.

The data for this report were obtained from an actual range appraisal made in the summer of 1936 using the

Reconnaissance method and in the summer of 1937 using the Square Foot Density method. Data were also obtained by interviewing men interested in range work, listening to lectures, and from written pamphlets on the subject. The purpose was to assimilate and prepare this report so as to give one a better idea of the working feasibility of range survey methods.

Typical range areas when these methods are employed vary so greatly that new problems arise all the time. Topography, climate, soil conditions and forage species all vary so greatly from place to place that it is often hard to properly classify the range lands as the cover, in many cases, is composed of as many as four species, each of which occupy 20% or more of the area being typed. That is 20% of the area may be covered by pine, 20% by ceanothus, and 20% by grasses, in which case, it would be correct to call this particular area a pine type, a ceanothus type or a grassland type, as all that is necessary to name an area is that 20% or more of the cover be made up of the type-name given it.

Although one range examiner may call the above mentioned area a pine type a second examiner may call it a grassland type, no difference is made in determining the carrying capacity of the area provided the two

examiners break types in the same place and, as a result, the two agree on the number of acres in that particular type.

THE RECONNAISSANCE METHOD

The reconnaissance method was used because it was one of the first methods developed that could be used practically and cheaply enough in covering large areas of range land.

In making range appraisals with this method, it was the general practice to start at the section corner and run the section lines by means of pacing and use of compass. In passing through the type the examiner will mentally calculate and carry with him a moving average of plant density and composition. In large types the examiner should jot down notes on density and composition changes in order to better analyze type averages and aid his mental calculations.

In estimating density the composition as a whole is given a density rather than each individual species. The density of more or less upright weeds should be based on the amount of ground that appears covered when the vegetation is viewed from directly above. In estimating the density of spreading weeds or browse or open clumps of grass this forage should be pressed together or raised at an angle so that all of the normal interstices between the leaves are completely filled without compressing or unduly crowding the vegetation. The

forage is then so compacted that it represents a 10/10 density. All density should be judged on a normal years growth as a basis. Density estimates of shrubbery species or browse consisted of the currant year's twig growth and the leafage on the plant. Trunks, heavy branches and the interior of dense clumps are not included. In estimating the forage for different classes of livestock, shrubbery material within 30 inches of the ground was regarded as being available to sheep and any within 60 inches was regarded as being available to cattle. Any vegetation not available to stock because of height, topography, or other reasons were not included in the estimate. Where a double story of available vegetation existed, such as browse over grass, judging the density of each story separately was done. Both stories are included in the density estimates. Care must be exercised at all times so that the density estimate represents a true average for the type as a whole.

Type composition estimates are based on the relative density abundance of each available vegetation species in the type. The examiner should not write up his type until he has seen a fair sample of the total type area. Preferably he should complete his write-up while still in a representative part of the type. The plants are classified into three groups weeds, grasses and grass-like plants, and shrubs. Each group heads a column in

which are listed the different species of that group as shown on form 764a in the appendix. A percentage is given each group and this should total 100%. A percentage is then given each species found under each group, and the sum of the percentage ratings for individual species under a certain group should equal the percentage previously given that group. In determining composition the examiner should rate each species in accordance with the best judgment as to its individual abundance with relation to the total cover.

In the interests of obtaining uniformity between examiners it is generally desirable to estimate composition by rating the species in accordance with their relative abundance in the type, starting with the most abundant species and rating each lesser species in turn. Such a rating scheme results in a definite expression of relative abundance. Afterward the individual initial ratings may all be slightly adjusted to total 100% without destroying the established ratio.

The range land was typed, examined and mapped by traveling through each section of the land twice. Control was carried by compass and pacing, and tie-ins were made on as many points as were possible and practical to make. In most National Forests section and quarter corners were used as control points. Where corners were

not available, control points were established.

The following data were recorded on the map:

Types of forage: The area was classified into types and subtypes and mapped as per the instructions given under the section of this report which deals with the classification of forage types. A change of type less than 20 acres was not typed in. Types were designated by their respective numbers, as given them in the classification of types on the map.

Drainage: The main drainages and all watering places, both developed and undeveloped are shown on map. Special attention should be given to the mapping of water facilities for stock, as they often are a controlling factor in range management.

Soil erosion: Where erosion was evident, notations were made on the back of form 764 as to the type of erosion and how serious it was.

Topographical features: The available topographic map should be checked in the field during the course of the work. Rim rock, sliderock, ridges, peaks and other minor features should be mapped in.

Culture features: Buildings, fences, corrals, roads, trails, telephone lines and other culture features that would have an influence on the management of an area are shown on the map.

Alienated lands: Time need not be spent in the field in accurately checking the boundaries of lands shown in the statue record, as it is assumed that the survey of such land is correct. However they should be regarded when making up a management plan.

After each type had been examined, and the density of plant growth had been estimated and the map sheets completed, the carrying capacity of each type was figured.

In figuring the capacity by the reconnaissance method, after the composition rating for each individual species has been recorded, that rating is multiplied by the accepted palatability rating for the species, and the sum of all the individual products yields the weighted average palatability of the type. Palatability is defined as being the percent of the total current year's growth, within reach of stock, to which a species is grazed when the range unit is properly utilized under the best range management. This last figure, the weighted average palatability, is multiplied by the estimated density, and yields the forage factor or palatable density of the type. This product multiplied by the number of acres in the type gives the number of forage acres. The forage acres divided by the forage acre requirement gave the carrying capacity of the area in animal units.

The forage acre requirement for cattle and horses was 1.68 forage acres and for sheep and goats 1.2 forage acres. These figures were determined by the Portland office. The difference in forage acre requirements is due to the difference of palatability ratings given the same plants for the various classes of stock. If the range was used by sheep the palatability table for sheep was used and if the range was used by cattle the palatability table for cattle was used.

In order to clarify the preceding discussion on calculating and recording carrying capacity of the range, a sample area has been worked out. The abbreviations for the plants found were taken from the plant symbols as given in the palatability list. The density for type 1 was estimated as .2 the percentage of weeds 25%, percentage of grasses and grass like plants 65% and shrubs 10%. The species found in the type was then listed under each group and given a percentage for example under Weeds there is GAY (Gajophytum) 5%, LAP (Lappula) 3%, HSO (Hieracium scouleri) 2% and Ala (Yarrow) 15%. The total percentage of each species under weeds equals 25% which is a check on the estimators work. The species found under grasses and shrubs are listed and given a percentage in like manner.

The next step is to multiply each percent of each

species by its respective palatability rating to get the forage palatability of the type, then to add the forage palatability to obtain the weighted forage palatability which is .42 for this particular type. The weighted forage palatability of .42 multiplied by the estimated density of .2 for the type gives the forage factor of .084. Assuming that the area of the type is 100 acres and multiply it by the forage factor of .084 will give 8.4 forage acres. The forage acres divided by 1.68, the number of forage acres required to support one cow or one horse for one month, gives the carrying capacity in animal units. For this 100 acre type 5 animal units can be supported.

THE SQUARE FOOT DENSITY METHOD

The square foot density method is a system of sampling vegetation by randomized and replicated plots. It differs from the reconnaissance method in the manner of estimating density and of obtaining average species composition and density on plant types of varying acreage. The procedure for computing grazing capacity following the determination of the forage factor is identical for the two methods.

In making range surveys on the National Forest, the first plot was taken one quarter of a mile in one of the four cardinal directions of the compass from section

corner and 4 chains in from that point, and the succeeding plots were eight chains apart, the last of the ten plots falling four chains from the section line. The examiner then went a $\frac{1}{2}$ mile over and came back through section making a total of 20 plots to a section. The plots were located by compass and pacing and no personal judgment was used. The plot used in this method is a circle 100 square feet in area, with a radius of 5.64 feet (or 5 feet 7.8 inches). The plot was laid out by two stakes connected by a light chain equal to the radius (5.64 feet) of the circle. One pin was stuck in the ground where the heel struck at the end of eight chains and the other pin was used as a marker to lay off the circumference of the plot. The plot was given a number, as shown on form 764-B in the appendix, and an estimate made of the vegetative cover on the 100 square foot area.

The plants were classified into three groups grasses and grasslike plants, weeds and shrubs. Each group was separated from the other by leaving one or more lines blank between groups as shown of form 764-B in the appendix. An estimate was then made of the amount of ground covered in square feet by each species present in plot and this estimate was entered in the proper column. A frame one foot square and divided into $\frac{1}{4}$ was used as an aid in estimating the cover.

In estimating by this method, the same rules are followed as used to estimate the density of grasses, weeds, and shrubs when using the reconnaissance method. Those rules have been listed above under the description of that method.

The number of square feet density recorded for a given species represents the percentage of total ground area covered by that species because a square foot is one percent of the total plot area. Estimates of density were made to the nearest half foot and in many cases species with less than a $\frac{1}{2}$ foot of density were listed but no density given them. This aided considerably in many cases to help jibe the examined types.

The range land was examined, typed and mapped the same as in the reconnaissance method the only difference being the estimating the density of each species in the plot rather than the type as a whole.

After the required number of sample plots were obtained and the map sheets completed, the range survey data on form 764-B was figured for the carrying capacity of the range.

In figuring the capacity, the plot densities were added vertically to get the total plot density, and the species were added horizontally to get the total density of each species for the ten plots or that number of plots

in the type. Then add the total densities of species and this sum should equal the total of the plot densities. Divide each total species density by the number of plots in the type and record the quotients in the average density column. Sum the average densities, and this sum should equal the average total density. Multiply the average density of each species by its percentage palatability taken from the same table as used in the reconnaissance method. Add the products thus obtained to secure the forage factor. This is expressed as forage acre per hundred surface acres and two decimal places should be pointed off to the left to obtain values expressed in terms of one surface acre.

In determining the grazing capacity, from this point on, it is the same as described under the reconnaissance method.

To clarify the preceding discussion on calculating the carrying capacity of the range by means of the square foot density method the following problem was worked out. By adding the species densities for each plot we get the total plot density of plot #one to be 19 feet plot #two 23.5 feet and a total density for the two plots of 42.5 feet or an average density of 21.25 feet.

By adding the densities for each species horizontally across the form for all plots, we get for POA (Perennial

bluegrass) a total density 16 feet, and an average density of 8.00 feet; for Asp (Bluebunch wheat grass) a total density of 7 feet, and an average density of $3\frac{1}{2}$ feet; for Btc (Bromus tectorum) a total density of $5\frac{1}{2}$ feet, and an average density of 2.75 feet; for Shy (Squirreltail) a total density of $4\frac{1}{2}$ feet, and an average density 2.25 feet; for Fid (Bluebunch fescue) a total density of 1.5 feet, and an average density of .75 feet; for GAY (Kitchenweed) a total density of 1.5, and an average density .75 feet for LAP (Stickseed) a total density of 1 foot and an average density of $\frac{1}{2}$ foot; for Hso (Woolyweed) a total density of 1.5 feet, and an average density of .75 foot; for Ala (Yarrow) a total density of 1 foot, and an average density of $\frac{1}{2}$ foot; for ART (Sagebrush) a total density of 1.5 feet, and an average density of .75 foot; and for CHR (Rabbitbrush) a total density of 1.5 feet, and an average density of .75 feet. By totaling the total of the species vertically we get 42.5 feet which is the same as the total density of the plots.

The next step is to multiply the average density of a species by its palatability rating which was recorded in its proper column. The total sum of these products give the forage factor of 9.90 for this particular type. The forage factor 9.90 divided by 100 gives the forage

acre factor of .0990. Assuming that the area in the type is 100 acres and multiply it by the forage acre factor .0990 gives the forage acres of 9.9. The forage acres divided by 1.68, the number of forage acres required to support one cow or one horse for one month, gives the carrying capacity in animal units which is 5.

These two systems of range surveys are the results of a relative few years experimentation and actual use. Both have their weak points and their strong points.

Neither system has gotten away entirely from allowing personnel judgment to enter into judging density. The square foot method has come closer to allowing for personnel error in judgment than the reconnaissance method. The square foot method provides for randomization and replication of plots and does away with personnel judgment in selecting the plots. However the reconnaissance method could be improved to allow for this by having the examiner make an estimation of density every so often just like taking plots.

The biggest problem that arises in range surveys is usually type designation. The examiner has very little trouble in determining what main type it is, but the difficulty arises in designating the sub-types. One area may have an abundance of Cru (Pinegrass) and another area may be the same in everyway but it may not have any or

very little Cru (Pinegrass) whether to type all this as one type or two different types is a big problem. Another problem that arises is where there is just a smattering of LUP (Lupine) and another area none at all. There is not enough density of lupine in the first area to effect the type designation yet it is different than the second area that has no lupine at all.

Types are designated according to aspect. For instance, if the type is predominantly a grass type with scattering timber, it will be shown as a 1 type followed by the timber symbol. The conspicuous or most important species or genus symbol will be shown first, followed by minor species as shown on the map in the appendix.

The symbols are taken from the palatability list which standardizes it for the whole region. The governing principle of this symbol is a three letter symbol; all capitals for the genus symbols and one capital and two lower-case letters for species.

The following is a list of the range type descriptions, together with the number assigned to the type and the color used for each type.

Type #1 (S) - Light yellow - Short Grassland
This type includes grassland other than meadow and secondary meadow. Perennial grasses predominate and determine the aspect, although weeds and browse may be present.

Type #1 (T) Dark Yellow Tall grass Grassland

Examples of types are: pama-buffalo grass, wheatgrass-sedge, alpine grassland, blue stem.

Type #2 Cadmium Orange Meadow

This type 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 Lake Red Perennial forbes (Weeds) (Not desert weeds)

This type includes all untimbered areas when 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 indec. The weeds will then be cared for in the sub-type.

Type #4 Stone Brown Sagebrush

This type includes all untimbered lands when 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 area which are listed below under browse. Areas dominated by shrubby species of sagebrush including big sagebrush (*Artemisia tridentate*) 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 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 Olive Green 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 Dark Green 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 Blue Green Waste

This type includes all areas of dense timber and brush which have no value for grazing or have such light 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. The 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. Principle species of timber should be shown by symbols.

Type #8 Blank 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 rest of the year.

Type #9 Light Green 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 designation.

Type #10 Pink 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 principle sub-types which will be encountered are: aspen, cottonwood, oak, birch, alder, ash-elm, etc., when they occur in tree form.

Type #11 Bottle Green Creosote

This type includes areas where creosote bush (*Covillea*) constitutes the predominant vegetation.

Type #12 Yellow Earth Mesquite

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

Type #13 Slate Saltbrush

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 semi-desert shrub types.

Type #14

Royal Purple

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

Light Tan

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

Dark Tan

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 horsebrush (*Tetradymia spinescens*), and

little rabbitbrush (*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 Wisteria 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 urightii*, etc. They commonly consist of a woody can dex from which herbaceous stems are produced that die back annually. These genera are sufficiently distinctive in habitat and of wide enough extent in certain localaties to justify a separate type designation.

Type #18 Red Terra Cotta Annuals (Weeds or Grasses)

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

In the use of these two systems of range appraisals, there are many things necessary to make the survey worthwhile and give an accurate inventory of the range these are:

First, Caleber of men. For a range appraisal, men that are interested in the work and have a good knowledge of range economics and value, are the best suited. They not only must have a good knowledge of range economics, but also be able to use the compass and pace correctly. Mapping is another prime essential for if an examiner can not make an accurate type map and culture feature map his work is of no value.

Second. Honesty and integrity of an examiner are imperative in that it is so easy for a man to go out and dry lab so much of his work. Instead of appraising the land, the examiner may find a soft spot under a tree somewhere and take a nap. He will spend about a half hour of that time filling in some type sheets and his map and let it go at that.

Third. Estimating Density. A mans ability to estimate density is a prime essential in range appraisal. There is no sure way of getting men to accurately estimate the density of a range. The big thing is to get a crew of men to estimate uniformly so that if the range is estimated too high or too low according to past usage figures the forage acre requirement can be changed accordingly to fit this discripancy. Another error in estimating density that are sometimes made is the naming of a species wrong. Listing POA which has a palatability

rating of 70% as Btc which has a palatability rating of 20% changes the carrying capacity a great deal.

Fourth. Season appraisal is made. As density for each species was based on the appearance of plants when in their full normal growth, allowances must be made for the following conditions (1) for growth still to be attained; (2) for portion already eaten; and (3) for abnormal total forage production due to sufficient rainfall or other favorable growing conditions that are cyclic in nature. This is all left to personal judgment and no way has been worked out for accurately judging this.

Fifth. Allowance for regrowth: In range appraisals no consideration has been given to regrowth in meadows. Throughout a grazing period a meadow will produce a forage crop two or three times and no credit is given this.

Sixth. Accuracy of Palatability percentage. The accuracy of palatability tables is questionable, but the standardizing them for the region does not allow for much discrepancy to fall here. However the regions should be pretty much local and not include a whole state. I strongly believe that the same species can be more palatable in an area than in an other.

There is a loop hole left for the correction of any such errors that may be listed and that is by the use of a changable forage acre requirement. The method of

determining this base is to select for forage acre requirement studies those allotments, pastures, or ranges that have every appearance of having been properly used for a period of years and that have been surveyed in the course of the seasons work. These areas should be as representative of large portions of the range as it is possible to find. Figures for controlled ranges, whenever obtainable should be used. From this data, the compiler is able to determine the number of forage acres per animal unit that have been used in the past, following up this determination with slight adjustments to correlate actual use with previously determined range conditions on the selected area should yield a satisfactory base from which to determine approximate grazing capacity.

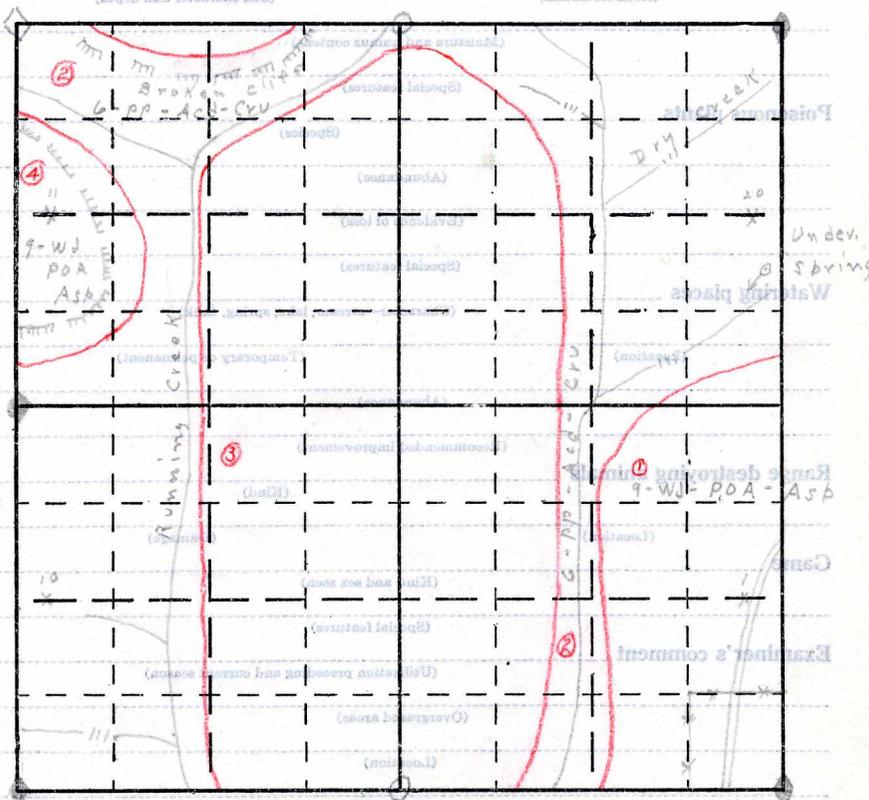
Range surveys of today are in the experimental stage and arguments pro and con can be made for their validity.

U. S. DEPARTMENT OF AGRICULTURE

FOREST SERVICE

Sec. 19 T. 6 S R. 27 E, Division or allotment

National Forest P.P. 11 Examiner July 15, 1937



Scale 4 inches = 1 mile

Types:

1. Grass land other than meadow.
2. Meadow.
3. Untimbered weed range.
4. Sagebrush.
5. Browse.
6. Conifer timber supporting grasses, weeds, and browse.
7. Waste.
8. Barren.
9. Woodland supporting grasses, weeds, and browse.
10. Range under aspen.

Special notations:

(Blank space for special notations)

Examiner Fred Pratt Date July 15, 1927
 Sec. 14 T. 615 R. 22E Timber _____
 Type Q9-Wd-POA-Asp _____
 Range vegetation .2 .42 _____
 F. A. Factor _____ For _____

PRINCIPAL SPECIES

WEEDS %	AMT.		GRASSES % GRASSLIKE PLANTS %	AMT.		SHRUBS %	AMT.	
	In %	X Pal.		In %	X Pal.		In %	X Pal.
25			65			10		
GAY	5	0	POA	30	70	ART	5	10
LAP	3	0	Asp	20	70	CHR	5	10
H50	2	40	Bte	5	20			
A1a	15	20	Shy	2	20			
			Fid	3	60			

TYPE COMMENT

Poisonous plants None
 (Species and location)
 Watering places 1/2 mile creek
 (Abundance) (Nearest available) (Losses) (Lake, spring, tank)
 Proper grazing season Summer High altitude cool
 (Temporary or permanent) (If temporary, state usable period)
 Utilization over grazed proper
 (In former year) (Present year in %)
 Recommendations and conclusions _____
 (Reasons for unsatisfactory conditions) (Bed or salt grounds)
 (Adjustments needed)
 (Range improvements needed)
 (Other remarks)

Examiner Fred Pratt Date July 15, 1937
 Sec. 14 T. 615 R. 27E Timber _____
 Type (2) 6-PP-Acd-Cru _____
 Range vegetation .2 .27 _____
 F. A. Factor .054 For C+H _____

PRINCIPAL SPECIES

WEEDS %	AMT.		GRASSES % GRASSLIKE PLANTS %	AMT.		SHRUBS %	AMT.	
	In %	X Pal.		In %	X Pal.		In %	X Pal.
<u>50</u>			<u>40</u>			<u>10</u>		
<u>Acd</u>	<u>28</u>	<u>0</u>	<u>Cru</u>	<u>20</u>	<u>20</u>	<u>Sau</u>	<u>10</u>	<u>10</u>
<u>Lob</u>	<u>8</u>	<u>40</u>	<u>Cge</u>	<u>12</u>	<u>50</u>			
<u>Hso</u>	<u>1</u>	<u>40</u>	<u>POA</u>	<u>5</u>	<u>70</u>			
<u>Ala</u>	<u>2</u>	<u>20</u>	<u>Fid</u>	<u>3</u>	<u>60</u>			
<u>Scb</u>	<u>11</u>	<u>0</u>						

TYPE COMMENT

Poisonous plants None
 (Species and location)
 Watering places 2-creeks and spring
 (Abundance) (Nearest available) (Losses) (Lake, spring, tank)
 Proper grazing season Summer - High Altitude cool
 (Temporary or permanent) (If temporary, state usable period) (Reasons)
 Utilization over sheep
 (In former year) (Present year in %)
 Recommendations and conclusions Prober
 (Reasons for unsatisfactory conditions) (Bed or salt grounds)
 (Adjustments needed)
 (Range improvements needed)
 (Other remarks)

Examiner Fred Pratt Date July 15, 1937
 Sec. 1A T. 61S R. 27E Timber _____
 Type ③ 4-ART-Pse (Composition) (Condition)
 Range vegetation 2 83 (Age) (Market class)
 F. A. Factor .166 For C+H (Reproduction) (Density) (Age)
 (Injury) (Cause)

PRINCIPAL SPECIES

WEEDS %	AMT.		GRASSES % GRASSLIKE PLANTS %	AMT.		SHRUBS %	AMT.	
	In %	X Pal.		In %	X Pal.		In %	X Pal.
15			60			25		
GAY	7	0	Pse	25	60	ART	22	0
MAD	4	0	Asb	20	70	CHR	3	0
LAI	2	0	Bte	9	20			
Hso	2	40	Fid	4	40			
			STI	2	60			

TYPE COMMENT

Poisonous plants None
 (Species and location)
 (Abundance) (Losses)
 Watering places 1/2 mile Creek
 (Nearest available) (Lake, spring, tank)
 (Temporary or permanent) (If temporary, state usable period)
 Proper grazing season Summer High Altitude
 (Reasons)
 Utilization over sheep
 (In former year) (Present year in %)
 (Reasons for unsatisfactory conditions)
 Recommendations and conclusions _____
 (Bed or salt grounds)
 (Adjustments needed)
 (Range improvements needed)
 (Other remarks)

Examiner Fred Pratt Date July 15, 1937
 Sec. 1A T. 61S R. 27E Timber _____
 Type (4) 9-WJ-Asp-POA _____
 Range vegetation 2 485 _____
 F. A. Factor .097 For C+H _____

PRINCIPAL SPECIES

WEEDS %	AMT.		GRASSES % GRASSLIKE PLANTS %	AMT.		SHRUBS %	AMT.	
	In %	X Pal.		In %	X Pal.		In %	X Pal.
25			70			5		
H ₅₀	15	40	Asp	35	70	ART	5	0
LAP	8	0	POA	20	70			
GAY	4	0	Bte	10	20			
			STI	5	40			

TYPE COMMENT

Poisonous plants None
 (Abundance) _____ (Species and location) _____
 Watering places 1/2 mile creek
 (Nearest available) _____ (Lake, spring, tank) _____
 Proper grazing season Permanent Summer High Alt. Cool
 (Temporary or permanent) _____ (If temporary, state usable period) _____
 Utilization over Proper
 (In former year) _____ (Present year in %) _____
 Recommendations and conclusions _____
 (Bed or salt grounds) _____
 (Adjustments needed) _____
 (Range improvements needed) _____
 (Other remarks) _____

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

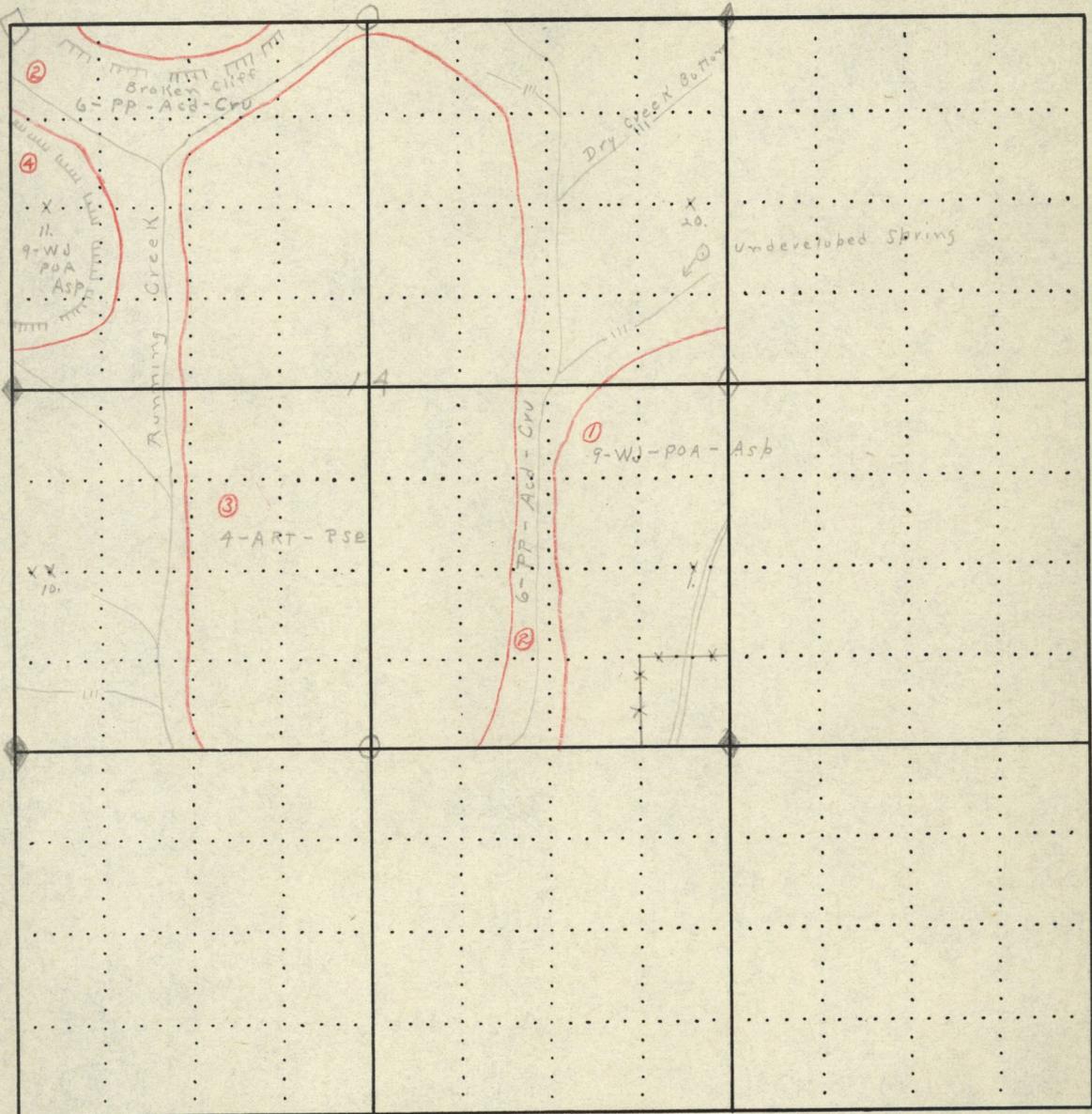
UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

RECONNAISSANCE MAP SHEET

NE 1/4 T. 61S R. 27E STATE Oregon COUNTY _____

SERIAL NO. _____

MAPPED BY Fred Pratt July 15, 1937



SCALE $\frac{2}{4}$ INCHES = 1 MILE

Square Foot Density Method Data

RANGE SURVEY WRITE-UP SHEET
 ADAPTED TO SQUARE FOOT DENSITY METHOD

PROJECT Forest Range Survey
 EXAMINER Fred Pratt
 TYPE 9-WJ-POA-Asp
 TOTAL DENSITY 42.50
 FORAGE DENSITY 29.25 % PAL.
 F.A. FACTOR .0990 FOR C+H
 C & H OR S & G

TYPE OR
 TRANSECT NO. 10

DATE July 15, 1937
 LOCATION S 14 T 61 S R 27 E WM

S., T. & R. - AERIAL PHOTO NO.
 TIMBER (COMP.) (COND.)

(REPROD.) (DENS.) (AGE)

(INJURY) (CAUSE)

UTILIZATION CUTS:- SLOPE ___% TIMBER ___% ROCKS ___% LACK OF WATER ___% EROSION ___%
 UNSTABLE SOILS ___% TOTAL CUT

SPECIES DENSITY

PLOT NUMBER			TOTAL DENSITY	AVERAGE DENSITY	PAL.	F.F.
	1	2				
DENSITY	19.0	23.5	42.5	21.25		9.900
SPECIES			42.5	21.25		
POA	6.0	10.0	16.0	8.00	70	5.600
Asp	4.0	3.0	7.0	3.50	70	2.450
Bte	2.5	3.0	5.5	2.75	20	1.550
Shy	1.5	3.0	4.5	2.25	20	1.450
Fid	1.0	.5	1.5	.75	60	.450
GAY	.5	1.0	1.5	.75	0	—
LAP	.5	.5	1.0	.50	0	—
Hso	1.0	.5	1.5	.75	40	.300
Ala	.5	.5	1.0	.50	20	.100
ART	1.0	.5				
CHR	.5	1.0	1.5	.75	0	—
			1.5	.75	0	—

TYPE COMMENTS

CURRENT FORAGE UTILIZATION: OVER-PROPER-UNDER
(CHECK ONE)

PLANT VIGOR: POOR-FAIR-GOOD
(CHECK ONE)

RANGE CONDITION: POOR-FAIR-GOOD
(CHECK ONE)

RELATIVE PRODUCTIVENESS OF SITE: LOW-AV-HIGH
(CHECK ONE)

WATERING PLACES None
(KIND - LAKE, SPRING, ETC.) (DISTANCE) (ADEQUACY) (PERM. - TEMP.)

POISONOUS PLANTS None
(KINDS) (RECOMMENDATIONS)

KIND OF STOCK BEST SUITED TO RANGE: CATTLE-HORSES-SHEEP-GOATS
(CHECK ONE OR MORE)

PROPER GRAZING PERIOD: SPRING-SUMMER-FALL-WINTER-YEAR LONG
(CHECK ONE OR MORE)

WILDLIFE 3 Deer
(GAME, PREDATORS, RODENTS - SPECIES AND ABUNDANCE)

SOIL EROSION (CHECK ONE OR MORE)

SOIL TEXTURE (TO SIX INCHES DEEP)

SHEET EROSION EVIDENT light

CHECK IN APPROPRIATE BLOCKS

	GRAVELLY	STONY
LIGHT		
MEDIUM		
HEAVY		

GULLY EROSION

- OCCASIONAL GULLIES - SHALLOW ✓
- OCCASIONAL GULLIES - DEEP
- FREQUENT GULLIES - SHALLOW
- FREQUENT GULLIES - DEEP

ALKALI (CHECK IF EVIDENT)

WIND EROSION

- DEPOSITION EVIDENT
- REMOVAL EVIDENT

SLOPE IN PERCENT (CIRCLE APPROPRIATE CLASSIFICATION) 0 TO 5, 6 TO 10, 11 TO 20, 21 TO 40, 41 TO 60, 61 TO 80, 81+

EXPLANATION OF GULLY TERMS: OCCASIONAL GULLIES ARE GULLIES MORE THAN 100 FEET APART. FREQUENT GULLIES ARE GULLIES LESS THAN 100 FEET APART. SHALLOW GULLIES ARE THOSE EASILY CROSSABLE BY STOCK. DEEP GULLIES ARE THOSE DEEP ENOUGH TO INTERFERE WITH STOCK MOVEMENTS.

ADDITIONAL TYPE COMMENTS _____

NOTE:

THE INFORMATION CONTAINED ON THIS SHEET IS PRIMARILY A FORAGE INVENTORY. WHEN AND IF FURTHER DATA ARE SECURED ON TIMBER, WATER, SOILS, EROSION, WILD LIFE, ETC., BY EXPERTS ALONG THESE LINES, SUCH INFORMATION SHOULD BE FURTHER CORRELATED TO BEST SERVE RANGE MANAGEMENT.

TYPE COMMENTS

CURRENT FORAGE UTILIZATION: OVER-PROPER-UNDER
(CHECK ONE)

PLANT VIGOR: POOR-FAIR-GOOD
(CHECK ONE)

RANGE CONDITION: POOR-FAIR-GOOD
(CHECK ONE)

RELATIVE PRODUCTIVENESS OF SITE: LOW-AV.-HIGH
(CHECK ONE)

WATERING PLACES 2-creeks and a spring 1/4 mile to water
(KIND - LAKE, SPRING, ETC.) (DISTANCE) (ADEQUACY) (PERM. - TEMP.)

POISONOUS PLANTS _____
(KINDS) (RECOMMENDATIONS)

KIND OF STOCK BEST SUITED TO RANGE: CATTLE-HORSES-SHEEP-GOATS
(CHECK ONE OR MORE)

PROPER GRAZING PERIOD: SPRING-SUMMER-FALL-WINTER-YEAR LONG
(CHECK ONE OR MORE)

WILDLIFE _____
(GAME, PREDATORS, RODENTS - SPECIES AND ABUNDANCE)

SOIL EROSION (CHECK ONE OR MORE)

SOIL TEXTURE (TO SIX INCHES DEEP)

CHECK IN APPROPRIATE BLOCKS

SHEET EROSION EVIDENT

LIGHT
MEDIUM
HEAVY

	GRAVELLY	STONY
LIGHT		
MEDIUM		
HEAVY		

GULLY EROSION

OCCASIONAL GULLIES - SHALLOW

OCCASIONAL GULLIES - DEEP

FREQUENT GULLIES - SHALLOW

FREQUENT GULLIES - DEEP

ALKALI (CHECK IF EVIDENT)

WIND EROSION

DEPOSITION EVIDENT

REMOVAL EVIDENT

SLOPE IN PERCENT (CIRCLE APPROPRIATE CLASSIFICATION) 0 TO 5, 6 TO 10, 11 TO 20, 21 TO 40, 41 TO 60, 61 TO 80, 81+

EXPLANATION OF GULLY TERMS: OCCASIONAL GULLIES ARE GULLIES MORE THAN 100 FEET APART. FREQUENT GULLIES ARE GULLIES LESS THAN 100 FEET APART. SHALLOW GULLIES ARE THOSE EASILY CROSSABLE BY STOCK. DEEP GULLIES ARE THOSE DEEP ENOUGH TO INTERFERE WITH STOCK MOVEMENTS.

ADDITIONAL TYPE COMMENTS _____

NOTE:

THE INFORMATION CONTAINED ON THIS SHEET IS PRIMARILY A FORAGE INVENTORY. WHEN AND IF FURTHER DATA ARE SECURED ON TIMBER, WATER, SOILS, EROSION, WILD LIFE, ETC., BY EXPERTS ALONG THESE LINES, SUCH INFORMATION SHOULD BE FURTHER CORRELATED TO BEST SERVE RANGE MANAGEMENT.

RANGE SURVEY WRITE-UP SHEET
 ADAPTED TO SQUARE FOOT DENSITY METHOD

PROJECT Forest Range Survey
 EXAMINER Fred Pratt
 TYPE 1-ART-Pse
 TOTAL DENSITY 208.5
 FORAGE DENSITY 20.8 % PAL. _____
 F.A. FACTOR .0700 FOR C+H
 C & H OR S & G

TYPE OR
 TRANSECT NO. (3)
 DATE July 15, 1937
 LOCATION S 14 T 61 S R 27 E WM
 S., T. & R. - AERIAL PHOTO NO. _____
 TIMBER _____
 (COMP.) _____ (COND.) _____
 (REPROD.) _____ (DENS.) _____ (AGE) _____

UTILIZATION CUTS:- SLOPE _____% TIMBER _____% ROCKS _____% LACK OF WATER _____% EROSION _____%
 UNSTABLE SOILS _____% TOTAL CUT _____%
 (INJURY) _____ (CAUSE) _____

SPECIES DENSITY

10-plots

PLOT NUMBER	4	5	6	7	8	13	14	15	16	17	TOTAL DENSITY	AVERAGE DENSITY	PAL.	F.F.
DENSITY	28.0	29.0	13.5	23.0	19.5	16.5	20.0	21.0	27.0	16.0	208.5	20.8		6,950
SPECIES											208.5			
Pse	8.0	4.5	3.0	6.5	5.0	3.5	6.0	4.0	1.5	5.0	47.0	4.7	60	2,820
Asp	5.0	5.0	2.0	3.5	1.5	2.0	3.0	5.0	3.0	1.5	31.5	3.1	70	2,170
Bte	3.5	4.0	1.5	4.0	2.0	1.0	1.5	3.0	1.0	2.0	23.5	2.4	20	480
Shy	1.0	.5		.5	.5		1.5	.5		.5	5.0	.5	40	1,200
Fid	.5	1.0	.5	1.0	.5		.5	1.5	4.5	.5	12.5	1.3	60	780
GAY	2.0	1.0	1.5	2.0	1.0	1.5	3.0	1.0	1.5	.5	15.0	1.5	0	—
LAP	.5		.5	.5	1.0		.5	.5	1.5	.5	5.5	.6	0	—
MAD	1.5	.5		1.0	.5	.5			3.0	.5	7.5	.7	0	—
Hso	.5	1.0	.5		.5		.5		1.5		4.5	.5	40	1,200
ART	4.0	6.0	4.0	3.5	6.5	5.0	3.0	4.0	7.5	4.5	48.0	4.8	0	—
CHR	1.5	.5		.5	.5		.5	1.5	2.0	.5	7.5	.7	0	—

TYPE COMMENTS

CURRENT FORAGE UTILIZATION: OVER-PROPER-UNDER
(CHECK ONE)

PLANT VIGOR: POOR-FAIR-GOOD
(CHECK ONE)

RANGE CONDITION: POOR-FAIR-GOOD
(CHECK ONE)

RELATIVE PRODUCTIVENESS OF SITE: LOW-AV.-HIGH
(CHECK ONE)

WATERING PLACES _____
(KIND - LAKE, SPRING, ETC.) (DISTANCE) (ADEQUACY) (PERM. - TEMP.)

POISONOUS PLANTS _____
(KINDS) (RECOMMENDATIONS)

KIND OF STOCK BEST SUITED TO RANGE: CATTLE-HORSES-SHEEP-GOATS
(CHECK ONE OR MORE)

PROPER GRAZING PERIOD: SPRING-SUMMER-FALL-WINTER-YEAR LONG
(CHECK ONE OR MORE)

WILDLIFE _____
(GAME, PREDATORS, RODENTS - SPECIES AND ABUNDANCE)

SOIL EROSION (CHECK ONE OR MORE)

SOIL TEXTURE (TO SIX INCHES DEEP)

CHECK IN APPROPRIATE BLOCKS

SHEET EROSION EVIDENT

°GULLY EROSION

OCCASIONAL GULLIES - SHALLOW

OCCASIONAL GULLIES - DEEP

FREQUENT GULLIES - SHALLOW

FREQUENT GULLIES - DEEP

WIND EROSION

DEPOSITION EVIDENT

REMOVAL EVIDENT

SLOPE IN PERCENT (CIRCLE APPROPRIATE CLASSIFICATION) 0 TO 5, 6 TO 10, 11 TO 20, 21 TO 40,
41 TO 60, 61 TO 80, 81+

LIGHT
MEDIUM
HEAVY

	GRAVELLY	STONY
LIGHT		
MEDIUM		
HEAVY		

ALKALI (CHECK IF EVIDENT)

°EXPLANATION OF GULLY TERMS: OCCASIONAL GULLIES ARE GULLIES MORE THAN 100 FEET APART. FREQUENT GULLIES ARE GULLIES LESS THAN 100 FEET APART. SHALLOW GULLIES ARE THOSE EASILY CROSSABLE BY STOCK. DEEP GULLIES ARE THOSE DEEP ENOUGH TO INTERFERE WITH STOCK MOVEMENTS.

ADDITIONAL TYPE COMMENTS _____

NOTE:

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RANGE SURVEY WRITE-UP SHEET
 ADAPTED TO SQUARE FOOT DENSITY METHOD

PROJECT Forest Range Survey
 EXAMINER Fred Pratt
 TYPE 9-WJ-POA-Asp
 TOTAL DENSITY 18.5
 FORAGE DENSITY 18.5 % PAL. _____
 F.A. FACTOR .0733 FOR CH
 C & H OR S & G

TYPE OR TRANSECT NO. 4
 DATE July 15, 1937
 LOCATION S 14 T 61 S R 27 E W 4
 S., T. & R. - AERIAL PHOTO NO. _____
 TIMBER _____
 (COMP.) (COND.)
 (REPROD.) (DENS.) (AGE)

UTILIZATION CUTS:- SLOPE _____% TIMBER _____% ROCKS _____% LACK OF WATER _____% EROSION _____%
 UNSTABLE SOILS _____% TOTAL CUT _____%

SPECIES DENSITY

PLOT NUMBER	DENSITY	TOTAL DENSITY	AVERAGE DENSITY	PAL.	F.F.
11	18.5	18.5	18.5		7.550
POA	8.0	8.0	8.0	70	5.600
Asp	2.5	2.5	2.5	70	1.750
BTC	3.0	3.0	3.0	20	.600
Fid	.5	.5	.5	60	.300
GAY	.5	.5	.5	0	—
LAP	.5	.5	.5	0	—
Ala	1.5	1.5	1.5	20	.300
ART	1.5	1.5	1.5	0	—
CHR	.5	.5	.5	0	—

TYPE COMMENTS

CURRENT FORAGE UTILIZATION: OVER-PROPER-UNDER
(CHECK ONE)

PLANT VIGOR: POOR-FAIR-GOOD
(CHECK ONE)

RANGE CONDITION: POOR-FAIR-GOOD
(CHECK ONE)

RELATIVE PRODUCTIVENESS OF SITE: LOW-AV-HIGH
(CHECK ONE)

WATERING PLACES _____
(KIND - LAKE, SPRING, ETC.) (DISTANCE) (ADEQUACY) (PERM. - TEMP.)

POISONOUS PLANTS _____
(KINDS) (RECOMMENDATIONS)

KIND OF STOCK BEST SUITED TO RANGE: CATTLE-HORSES-SHEEP-GOATS
(CHECK ONE OR MORE)

PROPER GRAZING PERIOD: SPRING-SUMMER-FALL-WINTER-YEAR LONG
(CHECK ONE OR MORE)

WILDLIFE _____
(GAME, PREDATORS, RODENTS - SPECIES AND ABUNDANCE)

SOIL EROSION (CHECK ONE OR MORE)

SOIL TEXTURE (TO SIX INCHES DEEP)

CHECK IN APPROPRIATE BLOCKS

SHEET EROSION EVIDENT

	GRAVELLY	STONY
LIGHT		
MEDIUM		
HEAVY		

GULLY EROSION

LIGHT

MEDIUM

HEAVY

OCCASIONAL GULLIES - SHALLOW

OCCASIONAL GULLIES - DEEP

FREQUENT GULLIES - SHALLOW

FREQUENT GULLIES - DEEP

ALKALI (CHECK IF EVIDENT)

WIND EROSION

DEPOSITION EVIDENT

REMOVAL EVIDENT

SLOPE IN PERCENT (CIRCLE APPROPRIATE CLASSIFICATION) 0 TO 5, 6 TO 10, 11 TO 20, 21 TO 40, 41 TO 60, 61 TO 80, 81+

EXPLANATION OF GULLY TERMS: OCCASIONAL GULLIES ARE GULLIES MORE THAN 100 FEET APART. FREQUENT GULLIES ARE GULLIES LESS THAN 100 FEET APART. SHALLOW GULLIES ARE THOSE EASILY CROSSABLE BY STOCK. DEEP GULLIES ARE THOSE DEEP ENOUGH TO INTERFERE WITH STOCK MOVEMENTS.

ADDITIONAL TYPE COMMENTS _____

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THE INFORMATION CONTAINED ON THIS SHEET IS PRIMARILY A FORAGE INVENTORY. WHEN AND IF FURTHER DATA ARE SECURED ON TIMBER, WATER, SOILS, EROSION, WILD LIFE, ETC., BY EXPERTS ALONG THESE LINES, SUCH INFORMATION SHOULD BE FURTHER CORRELATED TO BEST SERVE RANGE MANAGEMENT.