The Point Observation Plot Method Of Range Survey As Used By The Western Division Of The Agricultural Adjustment Administration

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A Comparison Of Weight Estimates With Estimates Of Density For Indicating The Amount

Of Forage On An Area

By

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Professor of Forestry

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OBJECT

To compile in such a manner the procedure of the field work in using the Point Observation Plot Method of range survey as used by the Agricultural Adjustment Administration on private lands of eastern Oregon and Washington in 1937; to give some comparative results of the survey of 1937 with estimates of carrying capacity of the different counties and the three Pacific Coast states; to make available a sample survey and procedure used in the field in arriving at the carrying capacity of a range unit (and to include problems in the sample which were confusing to the range examiners when first encountered in the field); and to give a general introduction of the possible use of the Weight Estimate Method³ over the Density Estimate Method of determining the amount of forage on an area.

Execution of the field work in conducting range surveys by the Point Observation Plot Method is of prime importance to the range examiner; however, it is approximately of equal importance that the range examiner should know the results obtained by such forage inventories and the basis of arriving at the formula for determining carrying capacities. Also, it is important that the range examiner know the basis of the factors used in the formula.

The Point Observation Plot Method.

The Point Observation Plot Method is commonly called

the "Square Foot Density Method"¹ because density is measured in square feet of ground covered by each species as viewed from above on a circular plot inscribed in the soil enclosing one hundred square feet of ground area. This being the case, the number of square feet of vegetation on the plot is read directly as a percentage of the total area of the plot. "The Point Observation Plot Method is a system of sampling vegetation by randomized and replicated plots."¹

Preliminary Considerations.

That you may understand to best advantage the object and mechanics of this method of survey, it is desirable to have a general understanding of the values included in palatability tables, density, and forage acre requirement factors.

Palatability Tables.

The palatability of a species is "the percentage of the readily accessible herbage of a species that is grazed when the range is properly utilized".⁴ A special board was appointed, including members who represent all agencies involved, to make a standard palatability table for all forage plants occurring on the ranges of eastern Oregon and Washington. This table was made to facilitate uniformity of range surveys which were being carried on by the different agencies of the Cooperative Western Range Survey Project. It should be noted that percentage

utilization of a plant species by an animal has little relation to nutrition value. This being the case, size of plant and nutrition value of that plant should be correlated. As far as this consideration goes, we will be obliged to accept palatability ratings of plant species as they are now formulated for there are no studies available that will allow palatability tables to be formulated with due consideration to nutrition value of plant species.

Density Estimates.

Density of each species occurring on a particular plot is estimated individually but not as a percentage of the total density. The total density of each plot will be the sum of the densities of the species occurring on that particular plot. The total density will be in square feet or percentage of total plot area. The estimator should carry a wire frame, one foot square, divided into quarters, which will aid him in determining the number of square feet or part of a square foot of density on the plot. Another very common aid is to divide the one hundred square foot plot into quarters and then count the number of square feet of density in one quarter. This should only be practiced where the entire one hundred square foot plot is uniformly covered by all species present. By determining the amount of density for each species on one quarter, the value may be applied to the remaining three-quarters of the plot area.

"Density for each species should be based on the apprearance of the plants when they have attained their full normal growth. In other words, the plants should mentally beconstructed to compensate for one or all of the following conditions: (1) growth still to be attained, (2) portions already eaten, and (3) abnormal total forage production."¹

"In considering a double story of vegetation the density of each layer should be estimated."1

Examiners should check their estimates daily by pulling the vegetation on a given plot and placing species in the wire frame so as to be representative of 10/10 density for square feet or any part of a square foot. This should be done by all members of the crew as the success and accuracy of the method depends upon the uniformity and accurate estimating by all examiners.

Forage Acre Requirement Factors.

"In Oregon and Washington a large number of ranching units were given a preliminary examination in order to make inventory of the forage resources as an aid to this inter-agency group in determining a forage acre requirement for cattle and sheep. In selecting these sample units, an effort was made to exclude lands known to be either greatly under utilized or greatly depleted since to have included such lands would have introduced an element of personal judgment which it was desired to eliminate. In other words, the lands to be examined for

this purpose were to be those in reasonably good condition, full but not overstocked, and operated by men who could be depended upon to provide reasonable complete and accurate histories of grazing use extending over a period of five or more years."²

The forage acre requirement factor is a figure that is set up to be the amount of forage required to carry a cow or sheep animal unit for one year. The forage acre requirement factors that were decided upon for the Oregon and Washington division of the Western Range Division were 1.2 forage acres per animal unit for sheep and 1.68 forage acres per animal unit for cattle. It should be noted that these figures for forage acre requirement vary. To be an accurate survey, these figures would vary by types, regions and altitudes.

Field Procedure.

The procedure was to pass through the center of each section or part of each section. The control was section corners or one-quarter corners. The customary procedure was to tie into a known corner at least every two sections. Direction was obtained by hand compass and distance measured by pacing. Plots were started by pacing 4 chains in from the section line and across the section until ten plots were taken. The tenth plot should fall 4 chains short of the opposite side of the starting side of the section. The standards set up by the Western Range Survey Instructions for minimum number of plots to sample

various sized types are: 10 to 20 acres, 3 plots; 20 to 80 acres, 5 plots; and 80 to 640 acres, 10 plots.

Mapping.

All cultural features were to be placed on the map sheet which was on a scale of 2" to the mile. All seasonal water sources were to be mapped in with an approximate accuracy requirement. Types were to be mapped in to a minimum size of 10 acres. Poisonous plant and rodent infested areas were to be mapped and designated by their proper symbols.

How To Lay Out Plots.

A circular plot of 100 square feet in area inscribed in the surface soil by using a radius of 5.64 feet long (or 5 feet 7.8 inches). The place to inscribe the plot is mechanically chosen by using the point on the ground where the pacer's heel strikes at the end of the distance between plots. In other words, the distance from center to center of each plot is pre-determined. This is done to obtain an average sample of the vegetation and to eliminate the individual from choosing the spot to take the sample. In case it is desirable to have a representative number of plots in a type within a section other than the main type, the examiner should go through the type in a straight line and place plots at pre-determined intervals. In case of small types of 10 to 20 acres, the distance between plots doesn't necessarily have to be eight chains.

Care should be taken in inscribing the boundaries of the plot, as an error of six inches in the diameter of the plot will result in an error of thirteen square feet in area.

The instruments for laying out plots are several in number. The best method is to use two sharpened iron pins attached by a chain 5.64 feet long. The chain should be fastened to the iron pins approximately six inches from the sharpened end, at which point there should be a swivel placed on the chain or a large link that will allow the chain to turn on the pin. This is important because if the chain becomes twisted the area of the circle will not be correct. The chain and pins should be made of light material, as added weight is not desirable to the average hiker.

How To Estimate And Record Density.

The best method of estimating and recording density, as practiced in the field, is to first list by symbol all plant species on the plot that will have 0.5 feet or over of density. The grasses are listed in a group at the top of the column provided for species on the write-up sheet; the weeds are listed in a group approximately mid-way down in the species column; and lastly, the shrubs are grouped at the bottom of the column for species. It is well to note that following this systematic procedure all species are estimated and none are omitted. In estimating the different species of plants occurring on a plot, the estimator should reconstruct those species that are not at the maximum growth stage. Certain early plant

species should be accounted for by remnants of current dead material. An example of one of these plants is filaree (<u>Erodium cicutarium</u>) which is an early spring plant with high palatability. Livestock operators in eastern Oregon depend upon this plant species on their early spring range. Fig. 1.

In estimating density of grasses (especially those belonging to the bunchgrass genus (Agropyron)), the grass-stalks should be raised and gently pressed together to the extent of ten-tenths density for each stool or individual clump. Each stool may then be accurately estimated separately by placing the density frame over the stool and the sum of the values of all stools of the same species on the plot will give the total number of square feet for that species. In estimating annual grasses the estimators should pick all annuals on a sample plot at least once every two or three days and lay the picked herbage in the density frame. The plants should not be crowded tightly together to determine tentenths density. Before picking the plants on the sample plot, the estimators should record the density individually and keep in mind a mental picture of the stand before it is picked. After measurement is completed, the estimators should mentally adjust his original estimate to fit that obtained by actual measurement. All examiners working on the same survey area should be together when this check is made in order to keep the individual

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estimators of the group somewhat uniform.

Weeds, with the exclusion of rosette types, are raised to approximately fourty degrees and then estimated according to procedure of estimating annual grasses. Rosette type of weeds are estimated as full coverage.

Explanation Of Field Write-up Sheets.

Type or Transect No. This is nothing more or less than the type identification number. For each type a transect is set up. A transect is a series of plots placed within a given type that is either closed naturally by other types or by boundary of unit. In progressing through the first type, the type or transect number will be number one. Upon crossing from one vegetative type into the second, a new series of write-up sheets are used and the second vegetative type will be the second transect and thus the type or transect number will become two. The type or transect number should be placed on field map sheet so that the write-up sheets bearing the same type or transect number may be easily compared as to location and number of plots. Fig. 1 and 7.

Project, examiner's name, type, date and location (section, township, and range) should be written in the spaces provided on the write-up sheet before any density estimates are recorded. Fig. 1.

<u>Type</u>: There were eighteen general vegetative type classifications used on the survey in eastern Oregon and Washington. These general type classifications are

- Type 1. Included grassland other than meadow and secondary meadow. Perennial grasses determine the aspect and are usually predominant. Weeds and browse may be present and still be a number one type.
- Type 2. Meadow (dry and wet).
- Type 3. Perennial forbes (weeds).
- Type 4. Sagebrush.
- <u>Type 5</u>. "Browse Shrub. Examples of sub-types are mountain mahogany, bitter brush, willows, Ceanothus - Manzanita, California Chaparral, etc."¹
- Type 6. Conifers.
- <u>Type 7</u>. "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."¹

Type 8. Barren.

- Type 9. Pinon Juniper.
- Type 10. Broad Leaf Trees.
- Type 11. Creosote.
- Type 12. Mesquite.
- Type 13. Saltbrush.
- Type 14. Greasewood.
- Type 15. Winterfat.

Type 16.	Desert Shrub.
<u>Type 17</u> .	Half Shrub.
Type 18.	Annuals (weeds or grasses). Fig. 5 and 6

Species symbols.

Species symbols will consist of the first letter of the Latin name followed by the first two letters of the specific name. For instance, <u>Agropyron spicatum</u> will be symbolized as <u>Asp</u>. In case of conflicting symbols, the first three letters of the generic name are used. This also may be the case when all species of a certain genus are to be included in one symbol. When letters of the genus name are used, the symbol is capitalized. Palatability tables give the correct symbol for each plant listed.

Species density part of write-up sheets.

<u>Plot number</u> should be written in consecutive order horizontally across the write-up sheet. Plot numbers remain in consecutive order until a change of type is encountered, then write-up sheets are changed and plot numbers start at one again. Fig. 2 and 3.

Density: The vertical columns below the plot numbers are for recording density. The first space below the plot number is for total density on each plot of all species of grasses, weeds and shrubs. The remaining spaces below the double line are for each species density. The vertical column below species is for plant symbols. Density is recorded under proper plot column for each species. After all densities are recorded for a plot, the total density for that plot is recorded directly under the plot number in the horizontal column labelled "density". When a sheet is filled with 10 plots the totals for each species is placed in the vertical column labelled "total density". Total density for all plots is placed in first space of "total density" column. Total density for all species should be added in the vertical column labelled "total density" and this figure, if correct, will equal the total density of all plots which is in the first space of the "total density" column. Fig. 2.

Average density. To get the average density for all plots, divide the total density of all plots by the number of plots. This figure will be placed in the first space in the column labelled "Average Density". To get average density of each species, divide the total density of each species by the number of plots and this figure will be placed in the proper species space in the "Average Density" column. After this is done for each species the total of these species averages should be equal to the average density of all plots which occurs in the first space in the "Average Density" column. Fig. 1 and 5.

Palatability. In the vertical column labelled "Pal.", the palatability percentage for each species is taken from the Standard Palatability Table for the proper stock using the area and placed in the proper space for each species listed on write-up sheet. Fig. 1 and 5.

Forage factor. To get the (F.F.) forage factor, the * average density of each species is multiplied by the pal-

atability percentage for that species and then divided by 100. This figure is placed in the proper space for that species in the "F.F." column. This is the forage factor for each species. After this is done for each species the "F.F." column is totalled and this figure is the forage acre factor for the type and is placed at the top of the sheet in the space provided for the "F.A.Factor". Fig. 1.

Surface acres. To get the surface acres of the type, the examiner takes the area from the field map sheet (Fig. 7.) and writes this value on the write-up sheet directly below the "F.A.Factor" figure. Fig. 1.

<u>Forage acres</u>. To get the forage acres for the type, the forage acre factor (F.A.F.) is multiplied by the surface acres of the type. This figure is labelled "Forage Acres" and is written in on write-up sheet directly below "Surface Acres". Fig. 1.

Animal units. To get the animal units on the type, the forage acres are divided by the forage acre requirement factor (F.A.R.). This figure is then written in on write-up sheet and labelled "Animal Units". Fig. 1.

<u>Summary sheet</u>. To save time in compilation, a group of write-up sheets belonging to the same type or transect may be summarized on a write-up sheet and labelled at top, "Summary Sheet". If this procedure is followed, the average density, palatability, and forage factor compilations on individual write-up sheets will be eliminated and done only on "Summary Sheet". Fig. 1 and 5.

Reverse side of write-up sheets will be filled out

as soon as the type has been completely sampled. If the "Summary Sheet" procedure is followed, then only the reverse side of the "Summary Sheet" need be filled in. Fig. 1 and 5.

Sample Survey.

The privilege to use the Forest Service "Reconnaissance Map Sheets" and "Range Survey Write-Up Sheets" is appreciated by the author. Fig. 1 to 8.

The sample survey of a hypothetical area is included for explanatory and procedure purposes only.

The method of indicating plots, transects, type symbols, and type lines are shown in Figures 7 and 8. Type or transect numbers are the circled numbers in red. Types are indicated by the symbols 1-Pse-Asp and 18-Bte. Each individual map sheet is representative of only one quarter of any particular township. Areas of the transects occurring on each map sheet are indicated at the bottom of each map sheet. Fig. 7 and 8.

The following symbols are used in Figures 7 and 8:

Boundary line
Boundary fence
Cross fence
Type or transect number (D (2)
Type symbols I-Pse-Asp
Permanent stream <
Intermittant stream
Permanent springs $\bigcirc \longrightarrow$

Temporary springs	0~>
Poor road	======
Type lines	
Known section corners	+
Corral	C

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Figure 1.

Summary Sheet

RANGE SURVEY WRITE-UP SHEET

ADAPTED TO SQUARE FOOT DENSITY METHOD

Surface Forage Animal	. Hessig Pse-Asp .0460 e Acres- 15 Acres - 69 Units - 41.	10 с&н 46 3	OR S & G	LOCATI TIMBER (REPRO	ON <u>S. 8.</u> S., T. (CO D.)	4, 1937 _ 3,10,9,& & R MP.) (DENS ER% ER	4: T.5; AERIAL PH (COND.	т NO. S; R ото N)	.26E
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NUMBER	10	9	10				DENSITY	PAL.	F.F.
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SPECIES	67.0	33.0						100	0000
Pse	61.0		43.5		NO 6-7243	137.5	4.7	60	0282
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	4.0	2.5	7 5			10.0	0.3	00	.0000
ERO Ala	2.5	5.0	3.5	and a series		11.5		20	0008
ERG	1.0	1.5	4.0	a a haraka		2.5		20	.0002
Eck	4.0	2.0	8.5			14.5		60	0030
AST	2.5	1.5				4.0		00	,0000
Saj			1.0		10%	1.0		10	.0000
Ptr Atr	3.0	3.5	12.5			6.5	0.2	40	0008

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TYPE COMMENTS

		DI ANT	VIGOR: PO	OR-FAR-GOOD
CURRENT FORAGE UTILIZATION: OVER-PROPER-UNDER		r Lanni		CHECK ONE)
(CHECK ONE)	RELATIVE PR	ODUCT I VENESS		
(CHECK ONE)				(CHECK ONE)
WATERING PLACES _ 2 springs and on	stream	<u>ex</u>	(PERM	TEND.)
(KIND - LAKE, SPRING, ETC.)	(DIOLANCE) (A	DEQUACY)	(PERM.	I CMI-0)
POISONOUS PLANTS None of Impor (KINDS)	-tance	RECOMMEND	ATIONS)	No. of Contraction
KIND OF STOCK BEST SUITED TO RANGE: CATTLE-HOR	SES-SHEEP-GOATS	3		
KIND OF STOCK BEST SOTTED TO KANGE	ONE OR MORE)			
PROPER GRAZING PERIOD: SPRING-SUMMER-FALL-WINT				
	ADE)		gar and a start	
WILDLIFE Deer, coyotes, and	Sage her	s No	st abu	ndant
(GAME, PREDATORS, RO	DENTS - SPECIES	S AND ABUNDAN	ICE)	
(dame) meaning	81 CE 105			
SOIL EROSION (CHECK ONE OR MORE)	SOIL TEX	TURE (TO SIX	INCHES DEEL	P)
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SHEET EROSION EVIDENT			GRAVELLY	STONY
SHEET EROSION EVIDENT	LIGHT			A CONTRACT OF
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OCCASIONAL GULLIES - DEEP	A Constant of the	AL ST.		
FREQUENT GULLIES - SHALLOW	ALKALI (CHECK IF EVI	DENT)	
FREQUENT GULLIES - DEEP		14.		GODA
WIND EROSION DEPOSITION EVIDENT				
		-		
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THE INFORMATION CONTAINED ON THIS SHEET IS				

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. FORM 764B (FRONT) REVISED APR. 24, 1937

Figure 2.

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		No.										TYPE OR TRANSEC		T
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						SPECI	ES DEN	SITY						
			346.6			102.00					TOTAL	AVERAGE	-	
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Asp											43.5	SAME LONG		
Bte		2.5									15.5	A MARCELESS		
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TYPE	CON	ME	NTE
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CURRENT FORAGE UTILIZATION: OVER-PROPER-UNDER		PLAN	T VIGOR: POC	
(CHECK ONE)				HECK ONE)
RANGE CONDITION: POOR-FAIR-GOOD	RELATIVE	PRODUCT I VENES	S OF SITE: L	OW-AV-HIGH
(CHECK ONE)				(CHECK ONE)
WATERING PLACES		Same and Mart		
(KIND - LAKE, SPRING, ETC.) (DI	STANCE)	(ADEQUACY)	(PERM	TEMP.)
POISONOUS PLANTS	The designed	and the second second		
(KINDS)		(RECOMMEN	IDATIONS)	
KIND OF STOCK BEST SUITED TO RANGE: CATTLE-HORSES				
PROPER GRAZING PERIOD: SPRING-SUMMER-FALL-WINTER-				
(CHECK ONE OR MORE		in the second second		
WILDLIFE (GAME, PREDATORS, RODEN	TS - SPEC	IES AND ABUNDA	NCE)	
(GAME, FREDATORS, RODER	10 - 01 20	TEO AND ADDIDA		
SOIL EROSION (CHECK ONE OR MORE)	S011 T	EXTURE (TO SIX	INCHES DEEP	
SOIL EROSION (CHECK ONE OR MORE)	OULT	CHECK IN	APPROPRIATE	BLOCKS
			GRAVELLY	
SHEET EROSION EVIDENT	LIGHT		dimit and	VT DI
	MEDIUM			Sultra a
GULLY EROSION				1
OCCASIONAL GULLIES - SHALLOW .				
OCCASIONAL GULLIES - DEEP		1000000 15 500		
FREQUENT GULLIES - SHALLOW	ALKALI	(CHECK IF EVI	DENT	
FREQUENT GULLIES - DEEP				
WIND EROSION				
DEPOSITION EVIDENT				
REMOVAL EVIDENT				10
SLOPE IN PERCENT (CIRCLE APPROPRIATE CLASSIFICATIO				40,
	41 TO	60, 61 TO 80,	814	
"EXPLANATION OF GULLY TERMS: OCCASIONAL GULLIES A	RE GULLIE	S MORE THAN IC	DO FEET APART	• FREQUENT
GULLIES ARE GULLIES LESS THAN 100 FEET APART.	SHALLOW G	ULLIES ARE THO	DSE EASILY CR	OSSABLE BY
STOCK. DEEP GULLIES ARE THOSE DEEP ENOUGH TO I	NTERFERE	WITH STOCK MON	EMENTS.	
ADDITIONAL TYPE COMMENTS				
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NOTE:				
THE INFORMATION CONTAINED ON THIS SHEET IS PRIM	ARILY A F	ORAGE INVENTO	RY. WHEN AND	IF FURTHER
DATA ARE SECURED ON TIMBER, WATER, SOILS, EROSION				
SUCH INFORMATION SHOULD BE FURTHER CORRELATED TO				
and the original for original or for the forther of the set the set of the se			the second for particular substances	

FORM 764B (FRONT) REVISED APR. 24, 1937

Figure 3.

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				ADAP	FED TO	SQUARE	. FOOT	DENSI	TY METH	100		TYPE OR		
PROJECT J	ohn I	Doe							Algebras	en i la la		TRANSEC		T
PROJECT J EXAMINER H	. Hes	ssig		Market State	St. and						1937		Sec. 12	
TYPE 1	-Pse-	Asp	-201934 	e regular	अन्य अग्र	TAUSP.	1	LOCATI	ON S.	9 &	4; T.	5S; R.	26F	<u> </u>
TOTAL DENSIT	Y	115		-99	e Marine and Andrews						R 1			0.
FORAGE DENSIT	TY		% I	PAL.	<u> </u>			TIMBER	-	10000	.)	10000	1	<u>an 18</u>
F.A. FACTOR			F	OR	& H OR	H				(COMP.	•)	(COND.)	
				U i	& H UR	5 & G		7	- \		1	1	Property	1
							838901	(REPRO	D.)		(DENS	•)		(AGE)
							us area		(INJUR	RY)	AL STREET	(CAUSE)		
UTILIZATION	CUTS:-	SLO	DPE.	% TI	MBER	% R0	OCKS	% L	ACK OF	WATER	% ER	OSION	%	
		UNS	STABLE	SOILS	%				TOT	AL CUT				
						SPECIE	ES DENS	SITY						
PLOT		un men a	1911 mar			100				Con Conservation	TOTAL	AVERAGE	Γ	
NUMBER	11	12	13	14	15	16	17	18	19			DENSITY	PAL.	F.F.
DENSITY	8.0								8.5		69.5			
SPECIES		al a star										Section 1		
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Asp	1.0	0.5	1.0		2.0	0.5	1.5	2.5	1.5	90730	10.5	Strand Sec	No. 1	
Bte		1.5	0.5	1.5			0.5	1.0	1.5	262.154	6.5	IN YEAR		
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					19. Sec. 1		C. Ches							
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TYPE COMMENTS

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CURRENT FORAGE UTILIZATION: OVER-PROPER-UNDER (CHECK ONE)		PLANT	VIGORS	POOR-FAIR-GOOD (CHECK ONE)
RANGE CONDITION: POOR-FAIR-GOOD (CHECK ONE)	RELATIVE	PRODUCT I VENESS	OF SITE:	LOW-AV-HIGH (CHECK ONE)
WATERING PLACES		149 19	,	
(KIND - LAKE, SPRING, ETC.)	(DISTANCE)	(ADEQUACY)	(PERM.	- TEMP.)
POISONOUS PLANTS (KINDS)		(RECOMMEND	ATIONS)	
KIND OF STOCK BEST SUITED TO RANGE: CATTLE-HOR	SES-SHEEP-GOA			
PROPER GRAZING PERIOD: SPRING-SUMMER-FALL-WINT	ER-YEAR LONG			
WILDLIFE	and the second	14912 5612.0	800 × 5	
(GAME, PREDATORS, RO	DENTS - SPECI	ES AND ABUNDAN	ICE)	
SOIL EROSION (CHECK ONE OR MORE)	SOIL TE	EXTURE (TO SIX		
		CHECK IN	GRAVELLY	TE BLOCKS
SHEET EROSION EVIDENT	LIGHT		GRAVELLI	010NT
GULLY EROSION	MEDIUM			A Section and a section of the
OCCASIONAL GULLIES - SHALLOW	HEAVY			A Street Land
OCCASIONAL GULLIES - DEEP		(. l.	la la	
FREQUENT GULLIES - SHALLOW ,	ALKALI	(CHECK IF EVID	DENT)	
FREQUENT GULLIES - DEEP				
WIND EROSION				
DEPOSITION EVIDENT				
REMOVAL EVIDENT SLOPE IN PERCENT (CIRCLE APPROPRIATE CLASSIFICA	TION) 0 TO 5	. 6 TO 10, 11 T	0 20, 21	то 40,
		60, 61 TO 80, 8		
⁰ EXPLANATION OF GULLY TERMS: OCCASIONAL GULLIE GULLIES ARE GULLIES LESS THAN IOO FEET APART STOCK. DEEP GULLIES ARE THOSE DEEP ENOUGH T	. SHALLOW G	ULLIES ARE THOS	BE EASILY	
ADDITIONAL TYPE COMMENTS	1	- 0.0	lan an an	
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		And the second second		
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		and the second s		
NOTE:				
THE INFORMATION CONTAINED ON THIS SHEET IS P	RIMARILY A F	ORAGE INVENTOR	. WHEN	AND IF FURTHER
DATA ARE SECURED ON TIMBER, WATER, SOILS, EROSI				
SUCH INFORMATION SHOULD BE FURTHER CORRELATED T	O BEST SERVE	RANGE MANAGEM	ENT	

FORM 764B (FF REVISED APR.		937				F	igur	e 4.				19		
ç					Charles and a second se	SURVEY								
				ADAPI	FED TO	SQUARE	. FOUT	DENGI		HUD		TYPE OR		~
PROJECT JO			property.	-				E Barris	A	94	1077	TRANSEC	T NO.	(1)
EXAMINER H.			CHINE I	110.20	1175 . 31 .	C. SALER	I I		Aug	24,	<u>1937</u> & 10.	r.55; F	2. 20	5E.
TOTAL DENSITY					Print Print				S.,	T . & F	2 1	AERIAL PH	OTO NO	0.
FORAGE DENSIT		Canada State of the second state of the	% F	PAL.	0.0	H	1	IMBER		10000	1	(COND.	1	17.291
F.A. FACTOR			F	C R	& H OR	H S&G				(COMP.	.)	(COND.	,	
				039) ¹				REPRO	D.)	IN L.	(DENS.	•)		(AGE)
								- ann	2		gatha	rialit yobri		Min.
UTILIZATION	CUTS:-	SLO	DPE	% TI	MBER	<u>%</u> RC	оска _	_% L	(INJU ACK OF TO	RY) WATER TAL CUT	% ER	(CAUSE)	<u>%</u>	ion4
						SPECIE	ES DENS	SITY						
PLOT	20	21	20	97	24	25	26	917	20	20	TOTAL	AVERAGE		-
NUMBER	a gran thread of	CH STALL	22		-					69	DENSITY 93.5	DENSITY	PAL	F.F.
DENSITY SPECIES	10.0	LA.U	0.0	7.0	<u></u>	11.0	1.0	0.0	9.0	0.0	30.0			
Pse	6.0	7.0	5.0	4.0	8.0	10.0	6.0	5.0	6.0	4.0	61.0	Series Series		
Asp	1.0	2.0	1.0	2.0	1.0		1.0	2.0	1.0	3.0	14.0	dedous de		
Bte		0.5	1.0								1.5	15 Talmar		
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		10.00						•			. totaciero	Hotresse	10.	
	100	10.0							•			193 19703		
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ERO	1.0	0.5	1.0			0.5			1.0		4.0			
Ala	0.5	0.5		0.5	0.5						2.5			
ERG Eck		0.5	0.5	0.5				1.0	0.5		1.0	South State	an an chu	
AST	1.0				1.0	1.0					2.5			THE REAL
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			1. 1. N. 1.	200		2.12	no sea					anninga.		
		Maria	Winni	1.1973	S. Chine		in the	11.134						
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						1					and the second	Sale Sale		

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TYPE COMMENTS

		DI AN		OOR-FAIR-GOOD
CURRENT FORAGE UTILIZATION: OVER-PROPER-UNDER (CHECK ONE)	•	FLAN		(CHECK ONE)
RANGE CONDITION: POOR-FAIR-GOOD	RELATIVE	PRODUCTIVENES		
(CHECK ONE)				(CHECK ONE)
WATERING PLACES		and the second star		- Coloren -
(KIND - LAKE, SPRING, ETC.)	(DISTANCE)	(ADEQUACY)	(PERM	• TEMP•)
POISONOUS PLANTS	0.000.00	,		
(KINDS)		(RECOMMEN	DATIONS)	
KIND OF STOCK BEST SUITED TO RANGE: CATTLE-HO	ONE OR MORE)	TS		
PROPER GRAZING PERIOD: SPRING-SUMMER-FALL-WIN				
(CHECK ONE OR	MORE)			
WILDLIFE	A CARLES	ance they		
(GAME, PREDATORS, R	ODENTS - SPECI	ES AND ABUNDA	NCE)	
SOIL EROSION (CHECK ONE OR MORE)	SOIL TE	TURE (TO SIX	INCHES DEE	·P)
SUL EROSION (CHECK ONE OR MORE)	OUL IL		APPROPRIAT	
SHEET EROSION EVIDENT			GRAVELLY	
SHEET EROSTON EVIDENT	LIGHT		1 1	a la
GULLY EROSION	MEDIUM		States and	
OCCASIONAL GULLIES - SHALLOW			State of the second	
OCCASIONAL GULLIES - DEEP	. ,			
FREQUENT GULLIES - SHALLOW	ALKALI	(CHECK IF EVI	DENT)	
FREQUENT GULLIES - DEEP				
WIND EROSION				
DEPOSITION EVIDENT		21-1-1-		
REMOVAL EVIDENT				
SLOPE IN PERCENT (CIRCLE APPROPRIATE CLASSIFIC	ATION) O TO 5,	6 TO 10, 11	TO 20, 21 1	ro 40,
		O, 61 TO 80,		
"EXPLANATION OF GULLY TERMS: OCCASIONAL GULLI				
GULLIES ARE GULLIES LESS THAN IOO FEET APAR				ROSSABLE BY
STOCK. DEEP GULLIES ARE THOSE DEEP ENOUGH	TO INTERFERE W	ITH STOCK MOV	EMENTS.	
Q. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.			The late	
ADDITIONAL TYPE COMMENTS				<u>+ () - () + () - () - () - () + () + () </u>
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		- Providence - Pro		
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NOTE				
NOTE:		PAGE INVENTOR		
THE INFORMATION CONTAINED ON THIS SHEET IS DATA ARE SECURED ON TIMBER, WATER, SOILS, EROS				
				a mede critedy
SUCH INFORMATION SHOULD BE FURTHER CORRELATED	IN DEDI DERVE	MANGE MANAGEM	-IVI 0	

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FORM 7648 (FI					Figur								
REVISED APR.	24, 1937				And	Sumn	nary				2	0	
¥				Statistics of Concession, Name			TE-UP SH	7.0.200 00000000000000000000000000000000					
			ADAPI	TED TO	SQUARE	FOOT	DENSIT	Y MET			TYPE OR		~
PROJECT	John Do	9 The P							and all	10174514	TRANSEC	T NO.	(2)
EXAMINER	H. Hess:		Sec. Sec.				DATE	Au	g. 24	, <u>1937</u> T. 5S			
TYPE 18	-Bte	an angernav	T LOUI		144138		LOCATIO	N S.	. 3&4	T. 5S	: R. 20	SE.	<u>10186</u>
TOTAL DENSIT		%	241 .										
F.A. FACTOR	.0207	/0 F	OR	C &	H		TIMOER	av 19	(COMP.	.)	(COND.)	
F.A. FACTOR Surface	a Acres-	- 570 1	A. C .	& H OR	5 & G				A Start			ivanoi	
Forage	Acres -	- 11.80)				REPROD	•)	121	(DENS	•)		(AGE)
Animal	Units -	7.02											
							THE THEY	(INJU	RY)	al transfer	(CAUSE)	C. S.	000
UTILIZATION	CUTS:-	SLOPE	% TI	MBER	% R0	CKS	% LA	CK OF	WATER	% ER	OSION	%	
	1	UNSTABLE	SOILS	%				TO	TAL CUT	·		Sector	
					SPECIE	S DEN	VILIA						
()	S.3)	(Sum	narv			J DLI	10111						
PLOT	11		Plot							TOTAL	AVERAGE		
NUMBER	Wind West				12 million					and the second se	DENSITY	PAL.	F.F.
DENSITY	11.0	8	32.5		and the second		-			93.5	8.5		
SPECIES				1000	Sec. 1								
Bte	4.5	States of	45.0		1314			al filmer	LIAND		4.5	.20	.0090
Bbr	1.0		2.						1235		0.3	-	.0009
Pse	1.0		3.0		1.1 A				199 1. TAN		0.4		.0024
Asp	0.0		2.0	۴						2.5	0.2	170	.0014
								•		Crunnic	Dis grant		
	No. St. Sheet	10 10 - 10 M		See St				:		1	1.12 . 1 L.V.	10.4	
	SQL 21 - 10	See Lifese	11.24	1.2.0	0.00	11.22	(Denks	1 31.4	100 399	(the second	Set in set in	1. 1. 1.	
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Atr			2.0	2	Contract of					2.0		00	
and space the	gris in m	LAND THE N	11. 1941	363 8	Vana	serie in		Rim	un de	and the second	and and a	-	
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		al Managa	AL SUM	1 360	C. T. Las	61.6		<u> </u>		and the second	- All - All		
								1000 A					
		10 8 5 1				1.5	1					-	

TYPE	COMM	ENTS
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CURRENT FORAGE UTILIZATION: OVER-PROPER-UNDER	PLANT VIGOR: POOR-FAIR-GOOD									
(CHECK ONE)	(CHECK ONE)									
RANGE CONDITION: POOR-FAIR-GOOD	RELATIVE PRODUCTIVENESS OF SITE: LOW-AV. HIGH									
(CHECK ONE)	(CHECK ONE)									
WATERING PLACES <u>Seasonal stream</u> .	VIANI. Tradequate									
(KIND - LAKE, SPRING, FTC.) (DIS	STANCE) (ADEQUACY) (PERM TEMP.)									
POISONOUS PLANTS Not importan (KINDS)	(RECOMMENDATIONS)									
KIND OF STOCK BEST SUITED TO RANGE: CATTLE-HORSES-										
(CHECK ONE										
PROPER GRAZING PERIOD: SPRING-SUMMER-FALL-WINTER-YEAR LONG										
(CHECK ONE OR MORE)										
WILDLIFE Deer, coyotes, and So	agehens.									
(GAME, PREDATORS, RODENT	S - 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									
GULLY EROSION	MEDIUM									
OCCASIONAL GULLIES - SHALLOW	HEAVY									
OCCASIONAL GULLIES - DEEP										
FREQUENT GULLIES - SHALLOW	ALKALI (CHECK IF EVIDENT)									
FREQUENT GULLIES - DEEP										
WIND EROSION										
DEPOSITION EVIDENT										
REMOVAL EVIDENT SLOPE IN PERCENT (CIRCLE APPROPRIATE CLASSIFICATION	N) 0 TO 5 6 TO 10, 11 TO 20, 21 TO 40.									
SLOPE IN PERCENT (CIRCLE APPROPRIATE CLASSIFICATION	41 TO 60, 61 TO 80, 81+									
	41 10 00, 01 10 00, 01+									
"EXPLANATION OF GULLY TERMS: OCCASIONAL GULLIES AF	THAN LOO FEET ADAPT - EPEOLENT									
GULLIES ARE GULLIES LESS THAN IOO FEET APART.										
STOCK. DEEP GULLIES ARE THOSE DEEP ENOUGH TO IN	STERFERE WITH STOCK MOVEMENIS.									
	the second secon									
ADDITIONAL TYPE COMMENTS										
- · ·										
NOTE .										
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. FORM 764B (FRONT) REVISED APR. 24, 1937 Figure 6.

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RANGE SURVEY WRITE-UP SHEET ¥ ADAPTED TO SQUARE FOOT DENSITY METHOD TYPE OR TRANSECT NO. (2) PROJECT John Doe DATE _____ Aug. 24, 1937 EXAMINER H. Hessig TYPE 18-Bte LOCATION S. 4 & 3; T. 55; R. 26E. S., T. & R. - AERIAL PHOTO NO. TOTAL DENSITY (COMP.) (COND.) FORAGE DENSITY % PAL. F.A. FACTOR FOR C & H C & H OR S & G (REPROD.) (DENS.) (AGE) UTILIZATION CUTS:- SLOPE __% TIMBER __% ROCKS __% LACK OF WATER __% EROSION __% UNSTABLE SOILS __% TOTAL CUT SPECIES DENSITY TOTAL AVERAGE PLOT 8 9 10 DENSITY DENSITY PAL. F.F.
 1
 2
 3
 4
 5
 6
 7
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 9
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 DENSITY

 11.08.0
 8.5
 8.5
 9.0
 5.5
 4.5
 6.0
 9.0
 12.5
 82.5
NUMBER DENSITY SPECIES 4.01.0 3.0 5.0 6.0 3.0 2.0 4.0 7.0 10.0 45.0 Bte 2.5 1.0 0.5 1.0 --- --- --- --- --- ---Bbr 0.5 0.5 1.0 0.5 --- --- 0.5 --- --- --- --- --- --- --- --- 0.5 ----3.0 Pse 2.0 Asp **1.0** 0.5 0.5 **1.0** --- **1.5** 0.5 0.5 0.5 **1.0** 0.5 3.0 0.5 **1.0 1.5 1.0 1.0 0.5** --- 0.5 7.0 Ala 9.5 Eck 4.5 LUP-G 2.5 ERO 1.0 0.5 --- 0.5 --- --- --- --- --- ---2.0 Atr 0.5 1.0 1.0 0.5 --- --- 0.5 --- --- 1.0 4.5 CHR

	COMMENTO	
IYPE	COMMENTS	

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CURRENT FORAGE UTILIZATION: OVER-PROPER-UNDER		PLANT	VIGOR: P	OOR-FAIR-GOOD
(CHECK ONE)				(CHECK ONE)
RANGE CONDITION: POOR-FAIR-GOOD	RELATIVE P	RODUCTIVENESS	OF SITE:	LOW-AVe-HIGH
(CHECK ONE)				(CHECK ONE)
WATERING PLACES		1 DE 0111 011	(DEDU -	TEND
(KIND - LAKE, SPRING, ETC.) (DISTANCE) (ADEQUACY)	(PCRMe -	(CMP)
POISONOUS PLANTS (KINDS)		(RECOMMEND	ATIONS)	
KIND OF STOCK BEST SUITED TO RANGE: CATTLE-HORS	ES-SHEEP-GOAT			
	NE OR MORE)	-		
PROPER GRAZING PERIOD: SPRING-SUMMER-FALL-WINTE				
(CHECK ONE OR MO				
WILDLIFE		the the rout	281	
(GAME, PREDATORS, ROD	ENTS - SPECIE	S AND ABUNDAN	ICE)	
		,		-1
SOIL EROSION (CHECK ONE OR MORE)	SOIL TEX	TURE (TO SIX		and the second
		CHECK IN	APPROPRIAT	
SHEET EROSION EVIDENT			GRAVELLY	STONY
		2 3		
GULLY EROSION	MEDIUM			
OCCASIONAL GULLIES - SHALLOW	HEAVY ,	L		
OCCASIONAL GULLIES - DEEP	A	CHECK IE EVIL	FAIT)	
FREQUENT GULLIES - SHALLOW	ALKALI (CHECK IF LVII	LIVI ,	
FREQUENT GULLIES - DEEP				
WIND EROSION				
DEPOSITION EVIDENT				
REMOVAL EVIDENT SLOPE IN PERCENT (CIRCLE APPROPRIATE CLASSIFICAT	ION) 0 TO 5.	6 TO 10. 11 1	0 20. 21 T	0 40.
SLOPE IN PERCENT (CINCLE APPROPRIATE CENCETTON		, 61 TO 80, 8		
PEXPLANATION OF GULLY TERMS: OCCASIONAL GULLIES	ARE GULLIES	MORE THAN IO	FEET APAR	T. FREQUENT
GULLIES ARE GULLIES LESS THAN IOO FEET APART.				
STOCK. DEEP GULLIES ARE THOSE DEEP ENOUGH TO				
and the second and the second second				
ADDITIONAL TYPE COMMENTS	R.U	U.	Company and	
a har the second se				
		March 1996		
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and and and and			6. 0.	
A			9 9	
NOTE :				
THE INFORMATION CONTAINED ON THIS SHEET IS PR				
DATA ARE SECURED ON TIMBER, WATER, SOILS, EROSIC	ON, WILD LIFE,	, ETC., BY EX	PERTS ALONG	THESE LINES,

SUCH INFORMATION SHOULD BE FURTHER CORRELATED TO BEST SERVE RANGE MANAGEMENT.

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~	31	32	33	34	35	36

UNITED STATES DEPARTMENT OF AGRICULTURE FOREST SERVICE

RECONNAISSANCE MAP SHEET

INW 1/4 T. 5 S R. 26 E STATE Oregon COUNTY Morrow									
	SERIAL NO. XYZ								
MAPPED BY H. Hessig	Aug.	241937							
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SCALE 2 INCHES = I MILE

0 = 1185 Acres .

0: 415 11

Total = 1600 Acres

22

Figure 8. Figure 8. Figure 8. UNITED STATES DEPARTMENT OF AGRICULTURE FOREST SERVICE RECONNAISSANCE MAP SHEET NE 1/4 T. 5 S. R. 26 E. STATE Oregon COUNTY Morrow SERIAL NO. XYZ MAPPED BY H. Hessig Aug. 24, 1937								
R-Bte 0 R-Bte 0 R-R-R-R-R-R-R-R-R-R-R-R-R-R-R-R-R-R-R-	3							
	.15	14						

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SCALE 2 INCHES = I MILE

@= 155 Acres 0=325 11 Total 980 Acres

Figure 9

Type or Transect No.	: Surface Acres : Per type	: Forage Acres Per: : type :			
1	1510	69.46			
2	570	11.80			
TOTAL	2080	81.26			

Grand summary of sample survey

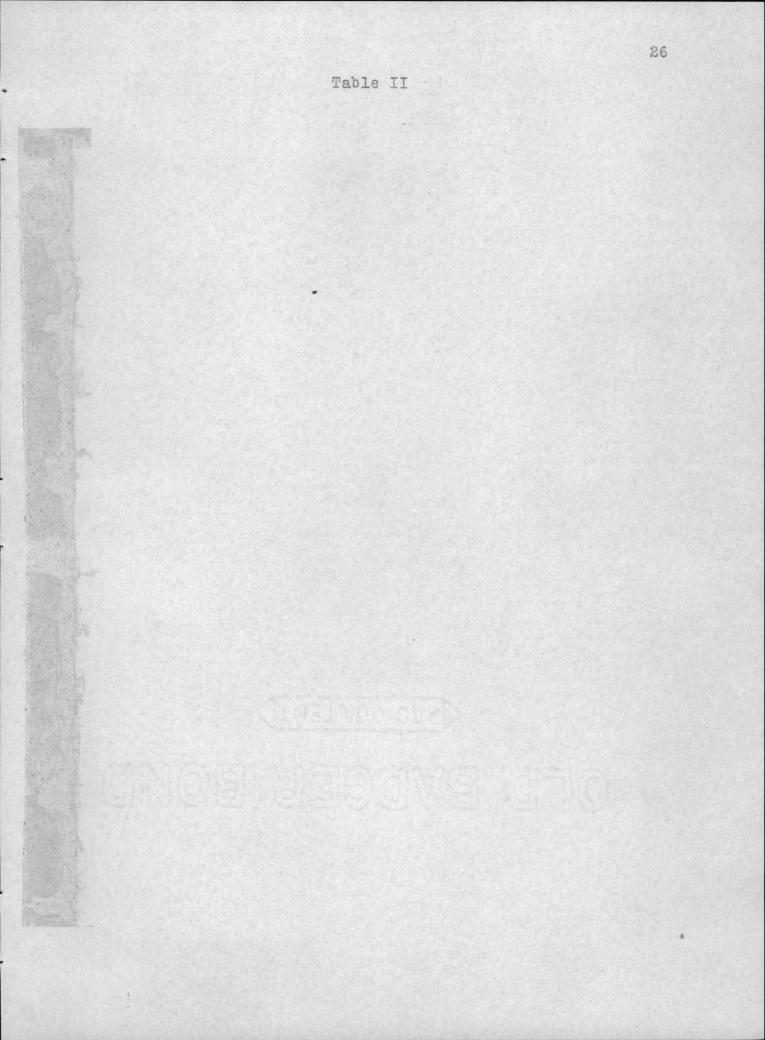
81.26 1.68 = <u>48.3</u> Animal Units

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A comparison of total acres examined, total grazing capacity (examined), and acres per animal unit (acres examined) for the three states of Oregon, Washington, and California. Figures were obtained from the report on participation in 1937 Range Conservation Program for the period ending October 31, 1937.

State	:Total acres : examined :		Acres per A. U. (acres examined)
Oregon	5,338,914	159.205	34
Washington	: 2,071,470	53,262	39
California	7,902,896	411,914	17



G Cooperation, AAA RCP, 1937

RANGE CONSERVATION PROGRAM, EASTERN OREGON, 1937

County	: : Total Pasture : Area : Woodland : and Other	:Acres Per :A. U. for :12 Months	Total Area Covered By Applications R.C.P. 1937	:(Survey Method): : (only) : : Area Examined : : as of : : November 30 :	Capacity : in A. U.	: 1937 : A. Per :A.U. fo:	:(col. 1 :Covered r: by	: % Area):(col. 1) :Surveyed : to :November	: % Area :Appl'ns. :Actually :Examined
Baker Grant Union Wallowa	: 599,005 : 885,000 : 278,668 : 425,560	* 37 * 50 * *35 * 38	623,551 565,905 181,326 377,024	: 138,474 : : 125,989 : : 89,033 : : 94,516 :	3,729 4,060 2,729 3,938	37.1 31.0 32.6 24.0	: 104.0 : 63.9 : 65.0 : 88.5	: 23.1 : 14.2 : 31.9 : 22.2	: 22.2 : 22.2 : 49.1 : 25.0
TOTAL	: 2,188,233	: 42.1	1,747,806	: 1,1,8,012 :	14,456	30.9	: : 79.8	: 20.4	: 25.6
Umatilla Morrow Gilliam Sherman Wasco	768,772 721,893 409,793 154,000 672,204	: *60 : : 66 : : 60 : : *60 : : •55 :	666,128 444,105 273,063 59,659 334,361	: 384,763 : 357,073 : 92,394 : 35,394 : 120,286	15,067 : 9,708 : 2,705 : 1,046 : 3,172 :	25.5 36.7 34.1 33.8 34.6	: : 86.6 : 61.5 : 66.6 : 38.7 : 49.7	: 50.0 : 49.4 : 22.5 : 22.9 : 17.8	: 57.7 : 80.1. : 33.8 : 59.3 : 35.9
TOTAL	: 2,726,662	: 60.3 :	1,777,316	: : 989,910 :	31,998 :	30.9	: 65.1	: 36.3	: 55.6
Crock Deschutes Jefferson Wheeler	694,655 103,856 368,335 724,000	* 43 * * 43 * * 43 * * 35 * * **39 *	538,115 145,214 367,291 591,802	: 275,605 : : 30,686 : : 294,287 : : 317,728 :	; 6,799 ; 506 ; 8,597 ; 9,176 ;	4035 60.6 34.2 34.6	: : 77.5 : 43.5 : 99.7 : 81.7	: 39.6 29.5 79.8 : 43.8	: 51.1 : 67.8 : 80.1 : 53.6
TOTAL	: 1,890,846	: 39.9 :	1,542,722	: 918,306 :	25,078 :	36.6	: 81.5	* 48.5	* 59*5
Harney Klamath Lake Malheur	: 1,108,813 : 357,613 : 540,384 : 651,249	: *43 : : *143 : : *73 : : 88 : : 66 :	589,982 265,048 162,800 481,190	: 349,156 : : 208,671 : : 91,929 : : 69,101 :	: 5,580 : 2,108 : 1,134 : 2,281 :	62.6 86.6 64.1 30.2	: : 53.2 : 74.1 : 30.1 : 73.8	: 31.5 58.3 : 17.0 : 10.6	* * 59*2 * 78*7 * 56*4 * 14*3
TOTAL	: 2,658,059	: 61.8 :	1,1,99,020	: 719,157 :	11,703 :	61.L:	: 56.3	: 27.0	: 47.9
AND AVERAGES	: : : 9,163,800	: 52.4 : 52.4	6,566,864	: : : : : : : : : : : : : : : : : : :	: 83,235 :	36.9	: : : 69*3	: : : 32.4	: : : 46.8

* Revised

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** Error Corrected

Weight Estimate Method

A comparison of weight estimates versus estimates of density for indicating the amount of forage on an area.

For any one plant species, weight estimates in indicating differences in herbage productivity on different areas. For plant species differing in growth habit and stature, weight estimates are definitely superior to density estimates in indicating herbage production. Weight estimates are slightly more subject to personal error than density estimates. Weight estimates fluctuate equally as much as the actual values but density estimates do not.

It is essential to the primary calculation of grazing capacity that forage inventory, palatability, and percentage utilization be expressed in the same basic terms, preferably units of volume. By use of the weight basis, the amount of feed and forage preference per animal unit can be calculated.

With density estimates, abundant replication is facilitated by the rapidity with which weight estimates can be made. In the sagebrush-wheatgrass range type herbage, weight can be estimated by species on from 30 to 50 plots per man-day.

The weight estimate method for field use.

Estimates of productivity by the weight estimate method are made on plots located in a gridiron or patternized arrangement or on purely randomized plots. Yield and floristic composition of the total current growth of the entire aerial portion of the plant are recorded in units of green

or dry weight.

Plots.

The most suitable number, size, shape and manner of location of plots are dependent upon the type of vegetation to be studied and should be determined by trial before the study is initiated. Weight estimates can be used on any size or shape of plots.

Equipment required.

A set of spring scales sensitive to the nearest 10 grams and small enough to be placed in a pocket, a pair of scissors with a 4 to 6 inch blade, a cloth or paper sack, and the ordinary equipment needed for marking out the circular plots, recording data, and keeping direction as used in the Point Observation Plot Method.

Preliminary to field work.

Each estimator should spend several days checking estimates on the same type of vegetation upon which future work is to be done. Length of training prior to field work should be a week for entirely untrained individuals. Training individually or collectively doesn't make any material difference.

<u>How to estimate</u>. First estimate the weight of either one or several plants of a single species in grams. Then clip the herbage and determine the error of weight estimate by actually weighing. After each estimate the estimator should try to alter his estimate to conform with the actual weight. The estimators should train on one species at a time.

Actual field work.

Carry the same equipment in the field as was used during the training period. During the inventory of an area, each day all individuals should make estimates of herbage on the same temporary plots. From 10 to 20% as many plots should be estimated in this manner as are estimated by each individual per day. These plots are then clipped and a permanent record made of each individual's estimates and of the actual green weights. From these data can be calculated a regression by species for determining actual weights from estimated weight for any individual at any date or on any area. These regressions can be used to make adjustments for such differences that may be in excess of the percentage of accuracy desired by the survey.

Differences found in the adaptability of the weight estimate method: Herbage moisture content and the inaccuracies due to grazing of some of the herbage prior to the time of the estimate. Methods designed to overcome these differences are:

Herbage moisture content may be evaluated for all species by recording the green weight of herbage samples taken at the time of daily checking and the weights after the samples have been oven-dried. Use of air-dry weights may be substituted if an oven is not available. From these data the percentage moisture content of the herbage during the period of estimation can be calculated and the difference in estimated weights due to differences in moisture content can be adjusted between season, location or year.

On grazed areas two methods may be followed: (1) Estimate the herbage actually remaining on the ground and percentage utilization by weight. Adjustments in the forage inventory can then be made by the following formula: Weight herbage remaining times 100 divided by 100 minus percentage utilization by weight equals yield on the area if herbage was ungrazed. (2) Where work is extensive and it is deemed imperative that all possible accuracy be attained, it may be desirable to reconstruct ocularly the grazed portions and estimate as on ungrazed areas. Estimates on this type are not subject to absolute check, so they are more undesirable than the first mentioned method. However, they do speed up field work and lessen office compilation.

Summary.

The weight estimate method was tested in conjunction with square foot density estimates on grass and weed types of vegetation in the Upper Snake River plains of Idaho. Under test, estimates by the weight method proved definitely superior to estimates of square foot density in accuracy of indicating actual yield of different species or of different types of the same species.

Weight estimates are accurate, indicative of yield, subject to actual mechanical check, rapid, and thus suited for use with replicated randomly or mechanically located plots, and the technique is easily learned with a minimum of instruction.

Because data obtained by this method are comparable regardless of location, type of vegetation, or species, they will furnish a sound basis for stocking or management plans of any area.

Forage inventory, percentage utilization and palatability, the three standards in range investigation, are on an identical basis affording close correlation and integration vital in estimating grazing capacity.

The weight estimate method on plots of any limited size or shape located in patternized mechanical arrangements or purely randomized may provide an excellent instrument for use in vegetative studies. It should be considered for use where records of vegetative changes, due to climate or grazing, are being maintained or where carrying capacity studies are being made.

- "Instructions For Range Surveys as Formulated By The Inter-Agency Range Survey Committee and Adopted By The Western Range Survey Conference" - April 29, 1937.
- 2. Ewing, Carl

"The Range Conservation Program of The Agricultural Adjustment Administration In Oregon and Washington, 1937."

- 3. Pechanec, Joseph F., and Pickford, G. D. "A Weight Estimate Method For The Determination Of Range Or Pasture Production", Journal of the American Society of Agronomy, Vol. 29, No. 11, Nov., 1937.
- 4. Dayton, W. A.

Misc. Pub. 101, U. S. D. A.