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FOREST SERVICE

RR
Pine Ranges
Burgess Spring

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FORAGE COMPOSITION, UTILIZATION, AND YIELD
CLASSIFICATION OF QUADRAT COVER

Burgess Spring Experimental Range
1936

First Draft
Progress to Date

By

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FORAGE COMPOSITION, UTILIZATION, AND YIELD
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Burgess Spring Experimental Range

1936

Purpose

To develop a method of measuring composition, utilization, and yield. In this study to find the total number of plants of all species on the range before livestock grazing begins and the total number grazed during the season, also to find the weight of the average plant of each major species. From these results the amount of forage yield in pounds and also the amount grazed can be calculated.

Determination of the proper grazing capacity is one of the most difficult problems of range management and it is hoped that these studies will yield useful information concerning this problem. Accurate information on palatability will also be obtained.

Method

Composition and utilization — During the 1936 season 829 quarter-mile plots placed systematically over 537 acres were examined 4 times. At the first examination all perennial plants were counted on the entire quadrat. For a more accurate representation some of the perennials were divided into "large" and "small" plants, a "small" plant being defined as one having a basal area of one square-inch or less. A "unit" of Carex was a tuft $3/4$ inches in diameter. In the case of those plants growing in fascicles such as Wyethia mollis and Balsamorhiza sagittata, the total number of fascicles

were counted. The annuals were so abundant that only those occurring on the southwest square-foot were counted. The first examination was made from May 22 - June 2, then from June 15 - 18 just before the cattle arrived on the range. It was planned to make monthly examinations but the third, July 13 - 16, resulted in so few plants being recorded as grazed that only one more examination was made. This was from September 17 - October 13, after the cattle had left the range. At this time all plants were recounted.

The form on which the data was recorded provided for 4 entries at each examination for each species. The form of entry was as follows:

1	3
2	4

1. Number of plant units grazed
2. Number of plant units on quadrat
3. Percent forage used on grazed units
4. Part of plant eaten (leaves, stems, flowers, or fruits)

In the last two examinations the presence or absence of cattle as determined by tracks and other signs was recorded.

In the first two examinations, before the cattle entered, when a plant was found to be grazed a white sheet was inserted behind the blue composition form on which was entered the stage of development. Most plants found grazed at the first two examinations were attributed to deer. A summary will be found in the report on Deer Forage Preferences.

A compilation by species has been made but the detailed statistical analysis has not been completed.

A study of shrub composition and yield was conducted separate from this.

Quadrat cover classification

The composition and utilization quadrats were classified under 13 conditions. Their abbreviations were entered on the top line of the field sheets directly above "Examination No." The corresponding numbers, abbreviations, and classifications follow:

QUADRAT COVER CLASSIFICATION

Burgess Spring Experimental Range
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1. Skid Trail

Ma - major

Mi - minor

Tr - tractor trail

N - none

2. Soil Disturbance - Includes soil erosion

O - none

L - light

H - heavy

3. Rock - % - Includes all rock visible

4. Logs - % - Includes only % of logs preventing plant growth

5. % of quadrat available for plant growth

6. Trash

O, L, & H

B - bark

S - sticks

L - limbs

C - cones

7. Punky Debris

O = 0 - 1% covered

L = 1 - 25% "

H = over 25% "

8. Litter

O = less than 1% covered

L = 1 - 25% "

H = over 25% "

9. Burned %

10. Ceanothus prostratus

% or T - trace

11. Shaded

Y - yes

N - no

by

L - log

R - reproduction

B - brush

T - trees

AM - 8:00 A.M. - 12:00 noon

PM - 12:00 - 4:00 P.M.

Y - at least 20% of plot shaded 1/2 hour or more between 8:00 AM
and 4:00 PM for the greater part of the summer.

N - not shaded

12. Bed Ground

Y - yes

N - no

13. Quadrat Accessible

Y - yes

N - no

F - fenced

L - logs

Clipped yield

A total of 4,789 plants of 6 species were collected, each put in a separate bag, and numbered. For the herbs, the plants were selected at random over the entire area. For each¹⁶ plants collected the average stage of development was recorded, as was the approximate location of the place from which collected. Height was also recorded. Of this total collected, 615 were residue of grazed plants at the end of the season. The plants were air-dried, placed in a calcium chloride desiccator until brought down to a constant moisture percent and then weighed. Definitions of large and small plants and other plant units are the same as in the composition study.

Because of the nature of the shrubs and their importance yet relative scarcity as compared with the herbs and grasses, the measurement of their yield was approached in a different manner.

Plots a rod square were established around the 829 quarter-mil-acre quadrats. In the preliminary study of methods, Purshia tridentata was the only shrub used. In each plot the surface area accessible to livestock was measured in square inches. Then all current growth available to livestock was clipped from each shrub and put in a numbered bag. When the shrub had been clipped it resembled a Purshia closely grazed by livestock. The plot number was also recorded.

The vegetative material was air-dried, placed in a calcium chloride desiccator until a constant moisture content had been reached, and then weighed.

A total of 79 shrubs were treated in this way. The data has not yet been analyzed.

The clipping was done from October 20 - 21 and September 17 - 28, 1936, by Bentley.

The total number of plants of each species clipped are as follows:

CLIPPED PLANTS
BSER 1936

COLLECTION

<u>Species</u>	<u>Unit</u>	<u>No.</u>	<u>Dates (1936)</u>
<u>Clipped for total yield</u>			
<i>Festuca idahoensis</i>	Large plant	524	July 24 - Aug. 12
" "	Small "	524	" " " "
<i>Sitanion hystrix</i>	Large "	567	" " " "
" "	Small "	567	" " " "
<i>Wyethia mollis</i>	Fascicle	410	" " " 1
<i>Lupinus calcaratus</i>	Plant	703	" 13 - 19
<i>Carex (rosea?)</i>	Unit tuft	800	Aug. 11 - 27
<i>Purshia tridentata</i>	Current growth	79	" 21 - Sept. 30
<u>Clipped for residue of grazed plants</u>			
<i>Festuca idahoensis</i>	Large plant	525	October 6 - 15
" "	Small	90	" "
Total individual bags collected		4789	

Results

The following tables summarize the results of composition, utilization, and quadrat cover classification.

Data on composition and utilization of annuals has not been compiled.

The clipped plants have been weighed but not analyzed statistically.

836 ✓

CATTLE UTILIZATION AND FORAGE COMPOSITION ON 829 QUADRATS

Burgess Spring Experimental Range, 1936

Species	: Total No. of : Quadrats	: Total Units : <u>Grazed</u> : No.	: Ave. % : Taken of : Grazed : Unit
<i>Festuca idahoensis</i> ✓			
Large	1217	316 26.0	19.4
Small	830	43 5.2	34.0
	<u>2047</u>		
<i>Sitanion hystrix</i> ✓			
Large	402	121 30.1	29.6
Small	1085	129 11.9	21.0
<i>Bromus marginatus</i> ✓			
Large	56	30 83.3	10.7
Small	121	41 33.9	17.1
<i>Carex</i> ✓			
Units	1882	232 12.3	12.0
<i>Stipa occidentalis</i> ✓			
Large	40	13 32.5	34.8
Small	148	5 3.4	52.0
<i>Stipa elmeri</i> ✓			
Large	90	24 26.7	33.0
Small	464	29 6.3	38.7
<i>Stipa lemmoni</i> ✓			
Large	102	12 11.8	26.3
Small	93	8 8.6	35.0
<i>Poa sandbergii</i> ✓			
Large	227	65 28.6	19.8
Small	414	36 8.7	12.0

CATTLE UTILIZATION AND FORAGE COMPOSITION ON 829 QUADRATS

Burgess Spring Experimental Range, 1936

Species	: Total No. : : Units : : on all : : Quadrats :	: Total Units :		: Ave. % : : Taken of : : Grazed : : Unit :
		: : : : : : :	: : : : : : :	
		: No. :	: % :	
<i>Lupinus calcaratus</i> ✓				
Large	220	135	61.4	29.9
Small	434	40	9.2	29.4
<i>Wyethia mollis</i> ✓				
Unit	226	32	14.2	21.6
<i>Balsamorhiza sagittata</i> ✓				
Unit	127	21	16.5	7.2
<i>Senecio lugens</i>				
Large	149	11	7.4	23.5
Small	967	1	.1	32.0
<i>Crepis acuminata</i>				
Large	167	31	18.6	21.0
Small	650	27	4.2	15.2
<i>Crepis occidentalis</i>				
Large	452	13	2.9	23.5
Small	234	5	2.1	32.0
<i>Leptotaenia dissecta</i>				
Unit	166	35	21.1	44.4
<i>Eriogonum nudum</i>				
Large	49	13	26.5	10.8
Small	30	4	13.3	22.5

CATTLE UTILIZATION AND FORAGE COMPOSITION ON 829 QUADRATS

Burgess Spring Experimental Range, 1936

Species	: Total No. :		: Total Units :		: Ave. % :
	: Quadrats :	: No. :	: Grazed :	: % :	: Taken of :
					: Grazed :
					: Unit :
Scorzonella? (narrow)					
Large	102	2	2.0		2.6
Small	70	2	2.9		45.0
Scorzonella? (wide)					
Large	4	1	25.0		25.0
Eriophyllum					
Large	50	2	4.0		10.0
Small	28	0			
Zygadenus					
Unit	55	0			
Delphinium					
Large	37	0			
Small	46	0			
Fritillaria					
Large	68	4	5.9		54.3
Small	1	0			
Viola nuttallii					
Large	407	5	1.2		26.0
Small	17	0			
Kellogia galioides					
Unit	317	0			
Hydrophyllum capitatum					
Large	88	4	4.5		30.0
Small	137	0			

CLASSIFICATION OF QUADRAT COVER

829 Plots

Burgess Spring Experimental Range, 1936

Factor	Quads. Affected	% of 827 quads.	Av. % covered of affected quads.
1. <u>Skid Trail</u>			
None	662	79.9	80 20
Minor	107	12.9	
Tractor	40	4.8	
Major	18	2.2	
Railroad	2	.2	
2. <u>Soil Disturbance</u>			
None	548	66.1	34
Light	141	17.0	
Heavy	140	16.9	
3. <u>Rock</u>			
	237	28.7	12.2 <i>12% rock</i>
4. <u>Logs</u>			
	81	9.8	3.1
5. <u>Quadrat Available for Plant Growth</u>			
	827	100.0	93.0
6. <u>Trash</u>			
Light	503	60.7	
Heavy	193	23.3	
None	133	16.0	
Stocks	658	79.6	
Limbs	226	27.3	
Cones	174	21.0	
Bark	129	16.0	
7. <u>Punky Debris</u>			
None	807	97.2	
Light	15	1.8	
Heavy	7	.8	

CLASSIFICATION OF QUADRAT COVER

829 Plots

Burgess Spring Experimental Range, 1936

Factor	Quads. Affected	% of All quads.	Av. % covered of affected quads.
8. <u>Litter</u>			
Light	449	54.2	
Heavy	305	36.8	
None	75	9.0	
9. <u>Burned</u>	28	3.4	6.9
10. <u>Ceanothus prostratus</u>	333 ✓	40.3	14.8
11. <u>Shaded</u>			
Yes	662	79.9	
No	167	20.1	
AM	113	17.1	
PM	114	17.3	
AM - PM	433	65.6	
By Trees	488	73.9	
Reproduction	379	57.4	
Log	25	3.8	
Brush	16	2.4	
12. <u>Bed Ground</u>			
No	825	99.5	
Yes	4	.5	
13. <u>Quadrat Accessible</u>			
Yes	613	74.1	
No	214	25.9	
Fenced	208	25.2	
Logs	6	.7	

Conclusions

Composition and Utilization — The perennial grasses, Festuca idahoensis, Sitanion hystrix and the perennial sedge Carex are the dominant plants on the range.

Of the perennial herbs that are available forage all summer Lupinus calcaratus and Wyethia mollis dominate. Most abundant of the rapid drying perennial herbs are Crepis spp., Senecio lugens, and Viola nuttallii.

With the exception of Senecio lugens, poisonous plants are not abundant on the range. These are represented by Zygadenus and Delphinium. Senecio lugens is fairly abundant but as it is succulent only when there is an abundance of other more palatable vegetation, it causes no problem. Lupinus calcaratus, although heavily utilized, shows no poisonous qualities.

Of the grasses Festuca idahoensis far surpassed any other plant in the number of bunches taken. Sitanion hystrix was next, followed by Carex, Bromus marginatus, and Poa sandbergii. Of the herbs the only one taken to any great extent was Lupinus calcaratus, over 60% of the total bunches being grazed. This species was followed in preference by Leptotaenia dissecta, Wyethia mollis, and Balsamorhiza sagittata but the percentage taken of each was very low.

The most preferred of all species was Bromus marginatus of which 83% of all large plants were grazed to some extent by the cattle. Only the relatively low density prevented it from being more important as a forage plant.

Of the herbs the most preferred species was Lupinus calcaratus, 61% of all large plants being grazed to some extent.

Classification of quadrat cover

This study was made to furnish supplementary information of the conditions on the quadrat that would influence plant growth. No conclusions will be made until all data is fully analyzed.

Clipped yield

Weights have not been analyzed statistically and until this is done the results, for which the study was designed, cannot be determined.

R
Pine Ranges
Burgess Spring

COMPOSITION AND UTILIZATION

Pasture _____
Plot _____
Quadrat 578

Cover type	N	H	O	O	100	HCSB	O	H	O	3	PM YR	N	Y	Aspect		
Examination No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Examiner . . .	RS	TWD	LR	RLS												
Date	5/23	6/17	7/17	10/7												

Species	Composition and utilization ^{1/}															
FT	0	-														
	2	-														
BA _s	2	25	2	25												
	2	SFL	2	SF												
Se ①	0	-			3	75	4	75								
	4	-			4	LFS	4	LFS								
SI _h ③	0	-														
	2	-														
SN ①	0	-			2	65										
	2	-			2	FS										
SN ③	0	-														
	4	-														
V _n	0	-														
	1	-														
CRE ₀ ①	0	-														
	1	-														
Se ③	0	-														
	1	-														
EG _n ③	0	-														
	13	-														
GO (H ⁺)	0	-														
	1	-														
CS present absent																

^{1/} Form of entry

1	3
2	4

1 = number of plant units^{a/} grazed
 2 = number of plant units on quadrat
 3 = percent forage used on grazed units
 4 = part of plant eaten (L = leaves, S = stems, F = flowers or fruits)
^{a/} Units = Whole plants, fascicles, square inches, etc.