THESIS

on

GRAZING SURVEY OF PRIVATE LANDS OF EASTERN OREGON

CARRYING CAPACITY ESTIMATES

Submitted to the

OREGON STATE AGRICULTURAL COLLEGE

School of Forestry

In partial fulfillment of
the requirement for the
Degree of

BATCHELLOR OF SCIENCE

by

C. Douglas Hole

May 1, 1937

REPORT ON GRAZING SURVEY OF PRIVATE LANDS--OREGON

Object of project:

To determine the carrying capacity and trend of plant succession on private ranges adjacent to the National Forests of Eastern Oregon.

Method of procedure in field

The sample plot method of estimating density as worked out by the Intermountain Forest and Range Experiment Station was used to determine Forage Acre Factors of all types. This method of survey consists, essentially, of marking out a circular area containing 100 square feet and estimating the number of square feet of plant cover for each species within the circle. After the sample plot was obtained, the procedure was a matter of measurements. Therefore, the precision of the survey was no greater than the accuracy of choosing the sample transect as representative of the type as a whole. At the outset of the survey it was evident that the time allowed to complete the field work was limited, and accordingly, large but representative areas averaging forty to fifty thousand acres, especially in the sagebrush land, were typed. In order to pick a representative transect of each of these types it was necessary to travel throughout the area to ascertain by eye the average of a type as a whole. Small areas within the types platted consisting of extremely low density of plant cover, such as driveways, were

avoided as well as areas of extremely high densities due to inaccessibility or some unnatural cause. At all times it was the object of the surveyor to bring a cross section picture of the range land in an unprejudiced form in order to estimate the actual carrying capacity of what the ranges will support at this time and still produce forage year after year, providing normal climatic conditions prevail.

To avoid personal bias in selecting the sample plots a rock or stick was thrown in the air. The center of the first 100 square foot circle plot is at the point it fell. The remaining 9 samples in the transect are then placed in order at mechanical intervals. On this survey the interval between plots varied as to the size of the area to be applied. In large types the interval in some cases was as far as .2 of a mile (16 chains). The shortest interval was 1 chain between plots. After the first sample had been worked, the remaining samples were selected by pacing in a straight line either by compass or in line with a tree through the transect to be estimated. Each sample is equidistant and on a straight line.

Laying out the plot:

A stick (5.65 feet - 5' 7.8") is used to mark the boundary of the circle by holding one end against the exact center; the other end would be the outer limit of the plot which was inscribed in the soil. Considerable care was exercised in laying out each plot as an error of a few

inches in the length of the radius would tend to throw the surface area out of line and thus reduce the accuracy of the transect. Each plot was measured and the densities carefully estimated.

Estimates of density:

In order to gain the most accurate data possible, the larger portion of the plots were measured as to their vegetative composition. After the plot had been located and laid out, a catalogue was made of all the species of vegetation found on it. An estimate of the density was made by eye and then each species was measured. The "square foot" is the unit of measure of plant cover. If a square foot of a certain species was growing in the plot, it would mean that 1 square foot of ground was completely covered by that plant when viewed from above. A wire frame one foot square was constructed and used to measure the plant cover. If the species grew in scattered small stands of less than one square foot per plant, the density was estimated as the sum of individual plants within the plot and was recorded in the column for density by species.

Grasses: In estimating densities of grasses, only the present year's growth was considered. If the herbage was lying down, it was raised to an angle of about 60° from the horizontal before the estimate was made. Many of the grasses grew in small nearly erect stands and required several plants to produce density enough to

record. This was especially true of many of the grasses in the sagebrush areas.

Weeds: Large weeds which had been knocked down or bent over were raised to an angle of 45° before estimating. Rosette types of weeds were estimated as full coverage.

Shrubs: Density estimates of shrubby species consisted of current year's twig growth and the leafage present on the tree, trunks or heavy branches being included. In estimating density of shrubs for sheep, leaves and twigs within 30" of the ground were taken as available, and 60" for cattle; 54" for both classes of stock.

Explanation of Write-up Sheet

Location: As to Section, Township and Range or local landmark. All locations of transects were shown on the field map.

Transect No.: Series number of examiner.

Protected or Grazed: Used when making depletion estimates.

Vegetation Type: Grasses - weeds - browse.

Type or Range: Ten type designations as outlined in "Instructions for Grazing Surveys on National Forests".

1. Grassland other than meadow.
2. Meadow
3. Weed
4. Sagebrush
5. Browse

6. Forage under conifer timber.

7. Waste range.

8. Barren

9. Juniper

10. Aspen

Used by: Class of stock using the range. This was noted by use and by questioning of local ranchers. Many cases of common use were noted, but the dominant user was listed.

Ownership: Private-Public Domain - National Forest.

Erosion: (Kind, degree, evidence)

1. It is assumed that a normal sheet erosion is going on all the time and unless some sign of acceleration was observed this erosion was classed as "A".

2. Severe sheet erosion, by either wind or water, but where no gullying has occurred was classified as "B".

3. Erosion that develops into "shoestrings" or small gullies was classified as "C".

4. Erosion that develops into severe gullying, washouts, etc, classified as "D".

Topography: (General character). Rolling, steep, broken, level, etc.

Elevation: Approximate if not known.

Depletion trend: (Evidence) It was found that there was very little if any range of eastern Oregon that has not

been depleted in some way either from overgrazing, drought, improper management, fire or some other unnatural reason of range retrogression. Range depletion was determined from observations at old cemeteries, fence corners, and other protected areas so that the depletion trend was checked by actual measurements. Indicator plants of plant succession were noted and depletion trends were indicated by certain plants' absence or presence in a range type.

In the column of Plot Number, the 10 columns numbered 1 - 10 represent the 10 sample plots of 100 square feet in each. The total density of each plot is recorded under the plot number and opposite the word "Density". The density is recorded in square feet of vegetation cover. The column "Total Density" is the sum of the densities of each plot in square feet. The "Average Density" is the total area of vegetation divided by the actual area of all the plots (for 10 plots the actual area being 1,000 sq. ft. Thus, if the total density for 10 plots was 428.5 sq. ft., the average density would be .4285.)

The species density for each plot was listed under the plot number so that the sum of the species would equal the total density of the plot. Densities from .25 to .74 square feet were recorded as .5; from .75 to 1.24 as 1.0 etc. Densities under .25 were not counted but listed as a trace (T).

Total and average densities of each species are

figured similar to the total and average of the transect.

In order to arrive at a Forage Acre Factor (F.A.F.) the average density per species must be applied to a palatability rating. In this survey the Ochoco palatability table (attatched) was used as per Letter of Instruction, G-Surveys, July 14, 1936. As each F.A.F. is figured it is set down in the space to the right of the column of average densities. The sum of the Forage Acre Factors per species is the Forage Acre Factor of the transect.

Palatability Table (Ochoco): The Ochoco palatability table used in this survey has been compiled from observations over a long period of years and is the best judgment of Forest officers in charge of Range Management on the Forest and the Portland Regional Office. "Palatability", as outlined in "The Instructions for Grazing Surveys on the National Forests" is the degree to which the annual growth of herbage within easy reach of stock is grazed when a range is properly utilized under the best practical management. The percentage of the readily accessible annual growth of species that is grazed when the range is properly utilized determines the palatability of the species. As the palatability of individual species will vary with conditions, in order to determine the average palatability of a type, one should first estimate the palatability of each important species within that particular type--the class of stock, the composition of the vegetation,

and the proper time for using the range as a whole all being considered. The palatability figure should then be multiplied by the proportion of the stand represented by the species. The addition of the resultant figures for all species will give the palatability of the type. This method is much more accurate than making a guess at the average palatability of the type. The percentage should not be in excess of what may be grazed under proper use and still allow the important palatable forage plants to maintain their stand and vigor year after year".

Many plants, especially those of desert habitat, are given very little, if any, palatability rating in this list. We know that range animals now on this type of range will graze these low rated plants to a much larger percentage than rated here; in fact, they depend on them for a large portion of their feed. From stories by old settlers of the conditions of these ranges as they were in the past and from range depletion studies, we know that this type of range is capable of producing considerable and more palatable forage.

When stock eat less palatable vegetation it is evidence that the plants of higher forage value have been grazed previously and in order to survive, the animals will eat the less palatable forage. In other words, stock are similar to human beings in their likes and dislikes about food. They will eat the food that tastes best which usually is high in nutritive value, and as the supple of this diminishes

they will be forced to eat the less palatable foods which are generally of less nutritive value.

Approximately, 50% of the area typed in this survey is now classified as sagebrush range. The palatability rating of sagebrush (Artemesia tridentata and A. tripartita) in the Ochoco and in all Forest Service palatability tables of Region 6 is 0% for both classes of stock. This low rating for sagebrush has been a subject of much discussion between some stockmen and Forest Service officials. In the long run, ranges that have been adjusted as to carrying capacity estimates through the disregard for sagebrush as a forage plant have revegetated themselves so that more palatable plants are now found on them, forage value has increased and sagebrush is being gradually crowded out by the better forage plants.

To illustrate how sagebrush is now dominating the range, one of the types is analyzed. The boundaries are roughly--Summer Lake on the north, Chewaucan Marsh on the east, Fremont Forest on the west, and the rim south of Valley Falls and Lake Albert on the south. Three sample transects (Field Sheets 33,34,35--pages10,11,12,13), representing 95,040 surface acres, were made in this type. By giving sagebrush a 10% palatability, the carrying capacity is increased 52% for the type (See Table I). The figures encircled in red are the F.A.F. if using 10% palatability for Artemesia species. The Ochoco Palatability Table for Range Plants follows: (Pages _____)

SAMPLE PLOT-Transect

Location: Sec. 31 - T35S - R 21 E (Valley Falls) Date 8/3/36

Transect No1 33 Protected or Grazed: Grazed Examiner: D. HOLE

Vegetation type: Browse-Grass

Type of range: 4- Used by: C&H

Ownership: Private

Erosion: (Kind, degree, evidence) Serious wind erosion-all browse plants set out on little mound. Area between plants blown out and sand deposited in base of snrubs. -B-

Topography: (General character) Level Elevation: 4300'

Depletion trend: (evidence) Range is now depleting and has depleted considerably in last 50 years. IV

Plot number	1	2	3	4	5	6	7	8	9	10	Total Dens.	Aver. Dens.	F.A.
Density	13.5	13.0	13.0	18.0	12.0	15.0	10.5	13.0	22.0	10.5	140.5	.1405	.0149
Species													
Bromus Sp.	.5	.5	T		1.0						2.0	.002	.0010
Elymus condensatus	2.5	.5	1.0	2.0	1.0	3.0	1.0	1.0	4.0	2.0	18.0	.018	.0126
Stipa sp.	.5	.5	.5	.5	.5					.5	3.0	.003	.0009
Agropyron spicatum		T	.5		T			T			.5	.0005	.0004
Salsola	3.0								1.0		4.0	.004	---
	By using 10% pal. for artemesia ap. (.0199)												
Chrysothamus sp.	7.0	5.5	8.0	5.0	5.5	8.0	.5	2.0	10.0	7.0	63.5	.0635	---
Artemesia tridentata		6.0	3.0	10.5	4.0	4.0	9.0	5.0	7.0	1.0	49.5	.0495	.0050

SAMPLE PLOT-Transect

Location: Sec. 36 - T 34 S; R 19E Date: 8/3/36

Transect No.: 34 Protected or Grazed: Grazed Examiner: Hole
If grazed, compare with protected transect number

Vegetation type: Browse

Type of range: 4- Used by: C & H

Ownership: Private

Erosion: (kind, degree, evidence) Surface cover composed of small gravelly lava. Little erosion other than normal noted. -A-

Topography: (General Character) Hilly Elevation: 4400'

Depletion trend: (evidence) Probably holding own although some dead sagestumps noted. III

Plot number	1	2	3	4	5	6	7	8	9	10	Total Dens.	Aver. Dens.	F.A.
Density	6.0	14.5	15.0	5.5	4.0	10.0	4.0	8.0	7.5	6.0	80.5	.0805	.0011
Species													
Bromus tectorum	.5	T		T	.5	.5	.5	.5		1.0	3.5	.0035	.0004
Annual weeds (10% pal.)	2.0	.5	.5	.5	.5	T	1.0	.5	.5	1.0	7.0	.0070	.0007
Amsincka	.5	T		.5		T	.5				1.5	.0015	—
	By using 10% pal. for artemesia sp.											(.0066)	
Chrysothamus	2.0	4.0	.5	1.0	1.0	3.5	2.0				14.0	.014	—
Artemesia tridentata	1.0	10.0	14.0	3.5	2.0	4.0		7.0	7.0	4.0	54.5	.0545	.0055

SAMPLE PLOT- Transect

Location: Sec. 34; T 31 S -R 16 E (Summer Lake) Date: 8/3/36

Transect No. 35 Protected or Grazed: G. Examiner: Hole
If grazed compare with protected transect no.

Vegetation type: Browse - grass

Type of range: 4- Used by: C& H

Ownership: Private

Erosion: (kind, degree, evidence) Some deep gullying has occurred and heavy shoestring erosion on slopes that have been denuded of grass .-D-

Topography: (General character) Hilly Elevation 4200'

Depletion trend: (evidence) Some depletion occurring along slopes and erosion resulting therefrom. IV

Plot Number	1	2	3	4	5	6	7	8	9	10	Total Dens.	Aver. Dens.	F.A.F.
Density	50.0	43.0	40	53	7.0	20.5	33.0	7.0	16.	18.0	19.0	284.0	.284	.01412
Species													
Stipa sp.		2.0	3.0		1.0					.5	6.5	.0065	.0020
Bromus tectorum	26.0	8.0	16.0	25.0	16.0	24.0	2.0	7.0	8.0	6.0	138.0	.1380	.0138
Elymus condensatus			1.0		1.0	3.5					5.5	.0055	.0039
Phleum		1.0									1.0	.0010	.0007
Sitanion hystrix				.5	.5		.5		5.0		6.5	.0065	.0013
Poa sp.		10.0	2.0								12.0	.0012	.0084
Hordeum sp.		2.5	T								2.5	.0025	.0010
Linanthus						2.0	2.0		4.0	5.0	13.0	.0130	—
Lactuca	.5	T	T								.5	.0005	—
Lithospermum				1.5						1.0	2.5	.0025	—
Bursa bursa	1.0	T	.5			1.5	1.5				4.5	.0045	—
Annual weed (10% pal.)	1.5	.5	1.0	1.5	1.0	.5			1.0		7.0	.0070	.0007

(cont. next sheet)

(Continued from previous sheet.)

Plot Number	1	2	3	4	5	6	7	8	9	10	Total Dens.	Aver. Dens.	F.A.F.
Trifolium	.5	3.0									3.5	.0035	.0028
Sophia sp.			1.0	.5		1.0					2.5	.0025	.0003
Leontodon sp.	.5	.5	3.0								4.0	.0040	.0020
Wyethia sp.				1.0						2.0	3.0	.0030	.0012
Aster		3.0									3.0	.0030	—
Lupine		1.0		1.0	1.0					4.0	7.0	.0070	.0014
Achillea													
Artemesia tridentata								6.0			6.0	.0060	.0006
Rosa sp.		4.0		2.0							6.0	.0060	.0012
Chrysothamus sp.	20.0	6.0	12.5	4.0			1.0	3.0		.5	47.0	.0470	—

By using 10% pal. for Artemesia sp. .0418

Table I

Comparison of Carrying Capacity Estimates of a Sagebrush Type With 0% & 10% Palatability for Artemisia sp.

	Transect #33			Transect #34			Transect #35			Weighted Average		
	Palatability Sage 0%	Palatability Sage 10%	% Increase	Palatability Sage 0%	Palatability Sage 10%	% Increase	Palatability Sage 0%	Palatability Sage 10%	% Increase	Palatability Sage 0%	Palatability Sage 10%	% Increase
F.A.F.	.0149	.0199	-	.0011	.0066	-	.0412	.0418	-	.0089	.0136	-
S.A.	12,160	12,160	-	68,480	68,480	-	14,400	14,400	-	95,040	95,040	-
F.A.	181	241	-	75	452	-	593	602	-	849	1,295	-
Est. An. Unit Months	452.5	602.5	-	187.5	1,130.0	-	1,482.5	1,505.0	-	2,122.5	3,237.5	-
A/An. Unit Month	26.9	20.2	33%	365.2	60.6	600%	9.7	9.5	.2%	44.7	29.3	52%

F.A.F. - Forage Acre Factor

S.A. - Surface Acres

F.A. - Forage Acres (F.A.F. x S.A.)

Est. An. Unit Months - (F.A. x .4 (F.A. requirement for Cattle)

A/An. Unit month - (S.A. Est. An. Unit Months) or Acres required per animal unit month.

Area Covered

The survey was started July 21, 1936, and covered the major portion of the privately owned and other open range lands adjacent to the National Forests totaling 7,870,120 acres. The route of travel in the following sections is described.

Bend: North of Sisters to the Metolius River, thence south between the Deschutes River and the Deschutes National Forest and into the Crescent area.

Fort Rock to Lakeview: South along the fringe land between the Fremont Forest and the Oregon Grazing District No. 2 to the California line.

Warner Valley: East from Lakeview into head of Warner Valley and thence to Drake Peak and return.

Lakeview to Bly: West around Drews Reservoir over Quartz Valley summit to Bly.

Bly, Bonanza, Klamath Falls: South from Bly to Bonanza, Malin, Merrill, Klamath Falls, and return via Dairy and Beaty to Bly, thence north to Shakes Butte and return.

Cabin Lake Ranger Station to Prineville: North around east edge of the Deschutes Forest to Millican, thence into the Powell Butte area and Prineville.

Prineville to Hay Creek: North over Foley Bitte into Hay Creek area and return via Grizzly.

Prineville to Maury to Izee: East from Prineville around south and west sides of Maury Mountains, thence east

up Crooked River to Paulina and Suplee and into South John Day River watershed at Izee, returning to Prineville.

Prineville to Mitchell: East up Ochoco Creek and north into Mitchell country, north on Beaver Creek, south to Badger Guard Station, and north to Richmond.

Mitchell to John Day: East on Ochoco Highway to Dayville and then up south John Day River returning and thence east to John Day.

John Day - Long Creek: North from John Day to Fox, Long Creek, and Ritter.

Long Creek to John Day: West from Long Creek to Hamilton, south into Court Rock area, west to Monument, Kimberly, south to Johnny Kirk Springs and return to John Day.

John Day to Prairie City: East up John Day River to Prairie City working out all private land in the surrounding area and return to John Day.

John Day to Burns: South up Canyon Creek and into BearValley, Seneca, Silvies Valley, and into Burns.

Burns to Allison Ranger Station: West along south boundary of Ochoco Forest, across forest to Allison Ranger Station, and then west and south along west boundary of the Snow Mountain District to Fife and return to Burns.

Burns to Drewsey: North and east along south boundary of Malheur Forest to a point where the survey was tied in with the Beulah Project of the Soil Conservation Service.

Ironsides to Baker: North from Ironsides area to

Unity, Burnt River Valley, Hereford, Bald Mtn, Sumpter Valley, and into Baker.

Baker to Medical Springs to Homestead: North and east from Baker across the Powder River Valley to Medical Springs, then south and east to Keating, Richland, Halfway, and along Snake River slopes to Homestead returning to Baker via Sparta.

Baker to La Grande: North from Baker along east boundary of Whitman Forest to Haines and North Powder. North Powder to Telocaset, returning and then north down Clover Creek and Ladd Creek to La Grande.

La Grande to Elgin: North and east across Grande Ronde Valley to Cove and north along sough side of Minam Division to Elgin.

Elgin to Enterprise: East over Minam summit to Enterprise via Wallowa and Lostine.

Enterprise to Imnaha: Via Zumwalt, return via Joseph.

Enterprise to Troy: North from Enterprise to Flora andParadise, then west into Grande Ronde River at Troy.

Troy to Wallowa: South over Powwatka Ridge into Tope Creek and then to Wallowa.

Wallowa to Wenaha: North from Wallowa to Maxville, returning and into Wenaha via Howard Meadows and return.

Wallowa to east side of Umatilla Forest: West from Wallowa to Elgin and working out east side of Umatilla Forest south to Mt. Emily and La Grande.

Starkey: South and west from La Grande to Hilgard and Starkey, returning and to Pendelton.

Umatilla County: Data from "Economic Survey of Umatilla County, 1936" by E. E. Birkmaier and E. B. Hurd.

Heppner: Along north side of Umatilla Forest in Morrow and Gilliam Counties and south across the forest.

Spray to Fossil: South out of forest at Top along south boundary via Monument, Kimberly, Spray, Service Creek, and north to Fossil.

Fossil to Hardman: East from Fossil into Kinzua, thence north to Lone Rock and east to Hardman tying in with the north end survey.

Hardman to Portland: via Arlington on September 10, 1936.

It was anticipated that the east side of the Mt. Hood forest might be covered in this survey, but owing to unforseen circumstances this part of the project was postponed until a later date.

Maps used:

Major type boundaries were mapped in the field on ½ inch to mile scale, forest base maps of the various National Forests included. In addition, 1 inch to the mile scale resource survey maps prepared by the Pacific Northwest Forest Experiment Station of the counties available were used. By using the latter maps the accuracy of field-mapping was greater as timber types are shown directly on

them, and, to a certain extent, the grazing types will follow. In the former maps of 1½" scale the field location of large grazing types were platted as nearly as possible from topographic and cultural designations.

The locations of all transect samples were platted on the maps with the symbols representing transect number, forage acre factor, and class of stock using the range.

The final map was prepared on a State of Oregon 1" to 12 miles map by compiling the types of range with the use, by calss of stock. The carrying capacity figure shwon on this map is a weighted average of the individual transects within the large type.

Compilation of Data:

Compilation in the field consisted of checking each sample plot and transect for error and then computing the forage acre factor for each type. This was done to obtain greater accuracy in the survey and to show the actual forage on the type by closely correlating the "ground work" and the "paper work".

Compilation of surface acres of types was accomplished in the office by an estimate of the count of sections and portions of sections and then multiplying by 640 acres per section. This method of estimating was chosen over the planimeter method because of greater speed. The difference in accuracy was deemed to be negligible.

Forage acres of types were computed by multiplying the

surface acres by the forage acre factor. All data has been entered on a form toshow by transect number, the area and forage acres by county, class of stock, depletion trend, erosion trend, and type of range.

Converting Factors Used:

The grazing or carrying capacity of a range will be the number of stock that unit can support in good, thrifty condition during the grazing season as established by the requirements of the vegetation itself and without impairing the sustained productivity of the range and forest growth. The grazing type map and the forage acres shown give a picture of the palatable vegetation on the ground. However, to apply the forage acres to what range a sheep or cow will require for any given time is dependent upon actual use. Thus, the forage acre requirement per class of stock is based on what a given range will support and still be maintained in a productive state. It should be noted here that grazing capacity depends on the amount of palatable vegetation the soil will produce--not what condition the animals are in when they come off the range. To arrive at a general figure representing the forage acre requirement for class of stock the best method is an actual use survey after the forage acres are computed. This procedure requires the knowledge of the actual number of stock being run on a known surface area which has been previously surveyed for forage acres. By checking the degree of use and at a time

when the stock have grazed the palatable forage to the maximum allowance and have still left sufficient vegetation for regrowth (the point of diminishing returns) they should be taken off, count made, and days feed computed. By dividing the number of animal days use into the known forage acres on the area we can arrive at a definite figure for a forage acre requirement. This method, while more accurate than any known method, is limited by types of range, kind of vegetation, water available, salting, fencing, and other forms of range improvement. In order to arrive at an average figure for any large region a weighted average of forage acre requirements for each type, locality, accessibility, etc., must be made.

Forage acre requirements in use on the national forests vary from .3 forage acres per month per sheep to less than .1 forage acre per month per sheep and 1.0 forage acre per month per cow to less than .5 forage acre per month per cow. After considerable discussion and weighing of averages the forage acre requirements for this survey were agreed upon at .075 and .4 forage acres per month per sheep and cow respectively. These figures are lower than any Forest Service estimate in Region 6; however, they are justified by the fact that all previous surveys of ranges were made by ocular estimate and the tendency is to overestimate densities as proved out when estimating first by eye and then checking by actual measurements of vegetation.

According to "Instructions for Estimating Densities of Vegetation by the Square Foot Method", all species having less than .25 square foot per sample plot should be dropped and only recorded as a trace as stated previously in this report. By so doing, a fair amount of palatable forage is not accounted for and therefore lost as far as available forage on the ground is shown. This will tend to underestimate to some degree the forage acres estimated. Therefore, in order for this loss the forage acre requirement has been lowered accordingly.

Estimates of Carrying Capacity in Animal Unit Months:

In order to convert the two classes of stock to a common figure, the ratio of 5 sheep to 1 cow has been used. This converting factor has been standardized over a long period of time by animal husbandrymen, rancher, and other range managers and is based on studies of feeding ratios. Other things being equal, 1 cow will eat as much as 5 sheep.

An animal unit month, as used in this study, is one cow month and is therefore equal to five sheep months. This combining of the two classes of stock is used for the purpose of convenience in computing figures for carrying capacity over a large area such as that covered by this survey.

The method of making an estimate of carrying capacity is to ascertain the amount of vegetation on a given area (Forage Acres) and then apply the amount of vegetation that

one animal unit requires per month (Forage Acre Requirement). Thus, if we had 200 Forage Acres in a unit of range that is used by sheep we would divide this number by .075 (the Forage Acre Requirement for sheep) and have a total of 2,666 sheep months estimated carrying capacity. To convert to animal unit months we divide by 5 (the ratio described above) and receive the product of 533 which is the animal unit months (cow basis) that this unit of range will support in any year during season of best use.

The season of best use of any given range is based on its actual carrying capacity with regard to range readiness, weather conditions, and availability. Therefore, in order to figure the number of animal units that a given range will support during its season of best use we will divide the total animal unit months by the length of the season in months. By using the above figure of 533 animal unit-months (cow basis) and dividing by an estimated season of 4 months we would have 133 animal units (cow basis) or by converting back to a sheep basis we would have a total of 665 sheep units that the above range unit would support in a 4 month season.

Carrying capacity figures are given as the amount of surface acres per animal unit month or season. Hence, if in the above range unit which has 200 Forage Acres and say 6,000 Surface Acres, we wish to know the Surface Acres per animal unit month we divide the total Surface Acres (6,000)

by the total animal unit months computed (533) and have a carrying capacity estimate of 11.3 surface acres per animal unit per month. Converting back to the original sheep basis we divide by 5 and have a carrying capacity figure of 2.26 surface acres per sheep per month. To estimate the number of surface acres required to support an animal unit for a given season of best use we would multiply the surface acres required per animal unit per month by the season in months. Thus, by using the above figure of 11.3 surface acres and a 4 month season, the total surface acres required to support an animal unit for the season would be 45.2 surface acres and again converting back to a straight sheep basis (5:1) we have a total of 9.02 surface acres required per sheep per season.

Summary of Tables

By using the method heretofore described, Table II represents carrying capacity estimates by counties and class of stock. The class of stock was determined by any available information as to present use and also by indications on the ground. Surface acres were determined by estimates of the area of types. Percent Column 4 shows the amount of acreage used by class of stock on each county. Forage acres were computed by applying the forage acre factor to the surface acres. Columns 6 to 10 inclusive are converted to cow basis. Column 6 is the estimate of animal unit months feed by class of stock in each county. Column 7 is the

percent of forage value per county for class of stock. Column 8 is the estimated surface acres required per animal unit for one month. Column 9 is the estimated carrying capacity for a blanket period of 7 months for spring and fall season. This figure is derived by dividing the number of animal unit months estimated by 7. Column 10 is the estimated surface acres required per animal unit for a 7-month season, derived by multiplying the surface acres required per animal unit month by 7.

Survey figures show that the average number of acres of private range required to support one animal unit for one month is 13.9 acres and 97.3 acres for a 7-month season of average best use. The average acreage of designated cattle and horse range is 11.0 acres per cow per month and of sheep range is 16.6 acres (cow basis) or 3.3 acres per sheep per month.

Table III is a summary by counties combining both classes of stock into an animal unit figure based on forage required per cow month.

Column 2 is the total surface acres by counties. Column 3 is the percent of the total acreage surveyed. Column 4 is the total Forage Acres by counties. Column 5 is the sum by counties of the animal units for both classes of stock . Column 6 is the percent of forage value as compared to the whole; should be weighed with column 3. Column 7 is the estimated surface acres required for one

animal unit per month. This is an index of the forage value by counties. Column 8 is the carrying capacity figure for a 7-month season of best use. Column 9 is the number of acres required to support one animal unit for a 7-month season.

Table IV represents a summary of estimates by types of vegetation per class of stock. Forage type classifications are based on the general aspect of the range. Thus, an untimbered range might support sufficient sagebrush to give the landscape a general sagebrush aspect. The sage might not be the most abundant species in the type, yet because of its conspicuous habit the area supporting the sage would be classified as a sagebrush type.

In this table, 5 majority types are recognized of which the meadow type is small and almost negligible compared to the total area mapped, being only .1% of the total 7,870,120 acres.

The purpose of this table is to show the relative present value of therange land as classified into types. The compilation method of columns 2 to 12 have been discussed previously in the explanation of Table II.

Seasonal use of range types varies as to its forage value and accessibility. Ordinary use in sage, juniper, and grassland types is for spring and fall range averaging 7 to 8 months all told. Therefore, the total number of animals that can be grazed on these types is based on a

Table II. Carrying Capacity Estimates by Counties and Classes of Stock, All Types

1. County	2. Class Stock	3. Surface acres	4. % Total by County & Class	5. Forage Acres	6. *Animal Unit Months	7. % Total by County & Class	8. **Surface acres per Animal Unit Month	9. *Total carrying capacity for 7-month season	10. Surface acres** per Animal Unit per Season
	S	573,200	84	13,824	36,864	94.3	15.5	5,266	108.5
Deschutes	C&H	110,080	16	858	2,145	5.7	51.3	306	359.1
	S	204,800	68	3 823	10,194	43.4	20.0	1,456	140.0
Jefferson	C&H	98,560	32	5,316	13,290	56.6	7.4	1,899	51.8
	S	521,320	93	7,057	18,818	97.2	27.7	2,688	193.9
Klamath	C&H	42,240	7	232	580	2.8	72.8	83	509.6
	S	388,160	48	5,692	15,178	60.0	25.5	2,168	178.5
Lake	C&H	405,440	52	4,019	10,047	30.0	40.3	1,435	282.1
	S	481,280	47	7,541	20,109	35.2	23.9	2,873	167.3
Crook	C&H	560,640	53	14,844	37,110	64.8	14.8	5,301	103.6
	S	397,360	38	7,613	20,301	16.9	19.5	2,900	136.5
Grant	C&H	633,520	62	40,275	100,687	83.1	7.4	14,384	51.8
	S	466,720	72	9,002	24,005	76.0	19.4	3,429	135.8
Wheeler	C&H	183,040	28	3,038	7,595	24.0	24.1	1,085	168.7
	S	890,720	100	17 176	45,802	100.0	15.0	6,543	105.0
Harney	C&H								
	S	412,800	69	9,069	24,184	70.2	17.0	3,455	119.0
Baker	C&H	186 240	31	4,140	10,350	29.8	17.9	1,479	125.3
	S								
Malheur	C&H	69,760	100	3,078	7,695	100.0	9.0	1,099	63.0
	S	263 680	52	9,248	24,656	48.8	10.6	3,522	74.2
Union	C&H	241,280	48	11,163	27,907	53.2	8.6	3,987	60.2
	S	193,920	29	8,081	21,549	29.3	8.9	3,078	62.3
Wallowa	C&H	473,600	71	20,797	51,992	70.7	9.1	7,427	63.7
	S	210,560	98	7,766	20,709	86.4	10.1	2,958	70.7
Morrow	C&H	4,480	2	1,333	3,332	13.6	1.3	476	9.1
	S	46,720	100	3,133	8,354	100.0	5.5	1,193	38.5
Gilliam	C&H								
Total	S	4,851,240	61.6	109,023	290,723	51.6	16.6	41,529	116.2
Total	C&H	3,018,880	38.4	109,093	272,730	48.4	11.0	38,962	77.0
Total	All	7,870,120	100.0	218,116	563,455	100.0	13.9	80,490	97.3

*Columns 6 and 9, all figures cow basis. To convert to sheep basis, multiply by 5.
**Columns 8 and 10, cow basis. To convert to sheep divide by 5.

S = sheep. C&H = cattle and horses.

Table III Total Carrying Capacity estimates by counties, all types, all classes.

1	2	3	4.	5.	6.	7.	8.	9.
County	Surface Acres	% Total Acreage	Forage acres	Animal Unit Months	% Total	Surface acres per animal unit mo.*	Total carrying capacity for 7-month* season	Surface acre per animal unit per season*
Deschutes	683,280	8.7	14,682	39,009	6.9	17.5	5,573	122.5
Jefferson	303,360	3.8	9,139	23,484	4.3	12.9	3,355	90.3
Klamath	563,560	7.2	7,289	19,398	3.4	29.0	2,771	203.0
Lake	793,600	10.1	9,711	25,225	4.5	31.4	3,604	219.8
Crook	1,031,920	13.1	22,385	57,219	10.1	18.0	8,174	126.0
Grant	1,050,880	13.4	47,888	120,988	21.4	8.7	17,284	60.9
Wheeler	649,760	8.2	12,040	31,600	5.6	20.6	4,514	144.2
Harney	690,720	8.8	17,176	45,802	8.1	15.1	6,543	105.7
Baker	599,040	7.6	13,209	34,534	6.1	17.3	4,933	121.1
Malheur	69,760	.9	3,078	7,695	1.4	9.1	1,099	63.7
Union	504,960	6.4	20,409	52,563	9.4	9.6	7,509	67.2
Wallowa	667,520	8.5	28,878	73,541	13.0	9.1	10,506	63.7
Morrow	215,040	2.7	9,099	24,041	4.3	8.9	3,434	62.3
Gilliam	46,720	.6	3,133	8,354	1.5	5.6	1,193	39.2
Total	7,870,120	100.0	218,116	563,455	100.0	13.9	80,492	97.3

* Cow basis.

7-month season. In the range under conifer timber the average use if for 4-months during the summer season and the figure of total carrying capacity per season in this type is based on a 4-months season. The total carrying capacity figure per season is raised from 80,492 animal units on a straight 7-month season to 99,909 animal units on a season adjusted by types.

It is signigicant to note the estimate of carrying capacity for the sagebrush and juniper types. Understory vegetation of the juniper is very similar to the sage type. If the increase of 52% in forage value due to the allowance of 10% palatability for sagebrush (Artemesia sp.) is applied to all sage and juniper types, we would have an increase in total carrying capacity from 563,459 animal unit months to 654,792 animal unit months. Also, we would have a decrease in the number of surface acres required per animal unit per month from 13.9 acres to 11.9 acres, or a 27.8% decrease in surface acres required. This increase in animal unit months if spread over a 7-month season would raise the total estimated carrying capacity from 99,909 to 112,242 animal units. It should be kept in mind that this increase of 12,333 animal units is brought about by increasing the palatibility of sage in two types from 0% to 10%.

Table V represents a correlation between carrying capacity and the degree of depletion between the different range types.

Depletion trend estimates as explained previously in this report were based on observations of protected and unprotected areas plus the presence or absence of indicator plants. For the purpose of compiling data these trends have been classified into the following four types:

I - Moderate - in which the depletion ranges from 0% or high type of range to 25%. This latter figure means that 25% of the original stand has disappeared.

II - Material - Depletion trend in this class is 26% to 50% of the original stand.

III - Severe - 51% to 75% of the original stand has disappeared.

IV - Extreme - 76% to 100% of the original stand has disappeared.

In compiling this table the sum of surface and forage acres of all range types by depletion trend classes has been listed. The estimated animal unit months has been worked out by assuming that one class of stock is using the total range. Previous tables have broken the surface and forage acres into class of stock and the forage acre requirements were .075 and .4 forage acres per month respectively for sheep and cattle. These converting factors have been worked out and are used to base the actual carrying capacity figures. The figures in this table are meant to show thevalue of the various types by depletion trend, and accordingly, one converting factor is used for all

Table IV. Estimates of Carrying Capacity by Class of Stock and Types. Private Land, Eastern Oregon.

1. Type	2. Class Stock	3. Surface acres	4. Percent of type by class	5. % of Total	6. Forage Acres	7. Animal Unit Months	8. % of Type by Class	9. % of Total	10. Surface acres per animal unit month	11. Total carrying capacity for 7-month season	12. Surface acres per animal unit season
1.	S	368 000	34.5	4.7	15,682	41,819	21.7	7.4	8.7	5,974	60.9
	C&H	902,160	65.5	11.4	60 434	151,085	78.3	26.8	5.9	21,584	41.3
	All	1,270,160	100.0	16.1	76,116	192,904	100.0	33.2	6.5	27,558	45.5
2.	S	1,920	33.3	.04	284	757	18.5	.1	2.5	108	17.5
	C&H	4 480	66.7	.06	1,333	3,332	81.5	.6	1.3	476	9.1
	All	6,400	100.0	.1	1,617	4,089	100.0	.7	1.5	584	10.5
4.	S	2,358,960	61.5	30.0	35.596	94,922	58.0	16.8	24.8	13,560	173.6
	C&H	1,472,560	38.5	18.8	27,676	69,190	42.0	12.3	21.2	9,884	148.4
	All	3,831,520	100.0	48.8	63,272	164.112	100.0	29.1	23.3	23,444	163.1
6.	S	1,825,400	80.0	23.1	55,098	146,928	81.0	26.0	12.4	* 36,732	* 49.6
	C&H	454,080	20.0	5.7	13,713	34,283	19.0	6.1	13.2	* 8,571	* 52.8
	All	2,279,480	100.0	28.8	68 811	181,211	100.0	32.1	12.5	* 45,303	* 50.0
9.	S	296,960	61.5	3.8	2,363	6,301	29.8	1.2	47.1	900	329.7
	C&H	185,600	38.5	2.4	5,937	14,842	70.2	2.7	12.5	2,120	87.6
	All	482,560	100.0	6.2	8 300	21,143	100.0	3.9	22.8	3,020	159.6
Total by Class	S	4,861,240		61.6	108,023	290,727		51.5	16.6	**57,274	** 84.7
	C&H	3,018,880		38.4	109,093	272,732		48.5	11.0	**42,635	** 70.8
Total	All	7,870,120		100.0	218,116	363,459		100.0	13.9	**99,909	** 78.8

Type 1 = Grassland other than meadow.
" 2 = Meadow.
" 4 = Sage.
" 6 = Conifer timber.
" 9 = Juniper.

S = sheep
C&H = cattle and horses

Columns 7 to 12, cow basis.

*Average season in conifer types 4 months, June-September.
**Sum of types.

classes, being .4 of a forage acre per animal unit month. The estimated surface acres per animal unit month represents a weighted average by depletion trends of the area required to graze one animal unit per month.

It is signigicant to note the rise in the number of acres required per animal unit month as the depletion trend advances. This drop in value is shown in Figure 1 (Page 35)

Table VI shows the relation of erosion trend to carrying capacity. The method of figuring estimated animal unit months is the same as described in the discussion under Table V. The relation is worked out in a set of columns (Figure 2, page 36).

Table V. Correlation of Depletion Trend and Carrying Capacity by Ranges Typed

Degree of depletion	Surface Acres	% of Total Area	Forage Acres	Estimated An. Unit Months .4 forage acres per an. un. mo.	% of Total Estimate	Estimated surface acres per An. un. Month
I Moderate 0-25%	247,040	3.1	24,819	62,047	11.4	3.9
II Material 26-50%	737,920	9.3	40,470	101,175	18.5	7.3
III Severe 51-75%	142,080	1.9	7,508	18,770	3.5	7.6
IV Extreme 76-100%	143,120	1.9	3,319	8,298	1.6	17.1
Total grassland	1,270,160	16.2	76,116	190,290	35.0	6.7
I						
II	1,920	.04	284	710	.1	2.7
III	4,480	.06	1,333	3,333	.6	1.3
IV (Total meadow)	6,400	.1	1,617	4,043	.7	1.6
I	127,680	1.7	9,563	23,908	4.4	5.3
II	472,600	6.0	8,029	20,072	3.7	23.5
III	1,155,840	14.7	22,526	56,315	10,3	20.5
IV	2,075,400	26.3	23,145	57,885	10.6	35.8
Total sage	3,831,520	48.7	63,272	158,180	29.0	24.2
I	759,360	9.6	29,030	72,575	13.3	10.5
II	491,960	6.2	19,575	48,937	8.9	10.0
III	464,960	5.9	10,999	27,498	5.1	16.9
IV	563,200	7.2	9,207	23,018	4.2	24.5
Total conifer timber	2,279,480	28.9	68,811	172,028	31.5	13.2
I	22,400	.3	2,374	5,935	1.1	3.8
II	24,960	.3	664	1,660	.3	15.0
III	129,280	1.6	4,193	10,483	1.9	12.3
IV	305,920	3.9	1,069	2,673	.5	114.4
Total juniper	482,560	6.1	8,300	20,751	3.8	23.2
Total I	1,156,480	14.8	65,786	164,465	30.1	7.0
" II	1,729,360	21.9	69,022	172,553	31.6	10.0
" III	1,896,640	24.1	46,559	116,389	21.4	16.3
" IV	3,087,640	39.2	36,749	91,872	16.9	29.7
Total all degrees of depletion	7,870,120	100.0	218,116	545,290	100.0	14.4

Table VI. Relation of Erosion Trend and Carrying Capacity

	Degree of Erosion	Surface Acres	% Total	Forage Acres	Estimated Unit Months	%Total AnAn.Unit Months	Surfac Acres per a unitr
A	Normal sheet erosion, not accelerated	3,156,880	40.1	126,621	316,553	58.1	9.9
B	Severe sheet erosion, not gullying	2,584,720	32.9	62,164	155,410	28.5	16.6
C	"Shoestring" erosion small gullies	1,613,640	20.5	22,225	55,563	10.2	29.0
D	Severe gullies	514,880	6.5	7,106	17,765	3.2	30.0
	Total all degrees	7,870,120	100.0	218,116	545,291	100.0	14.4

FIGURE 1

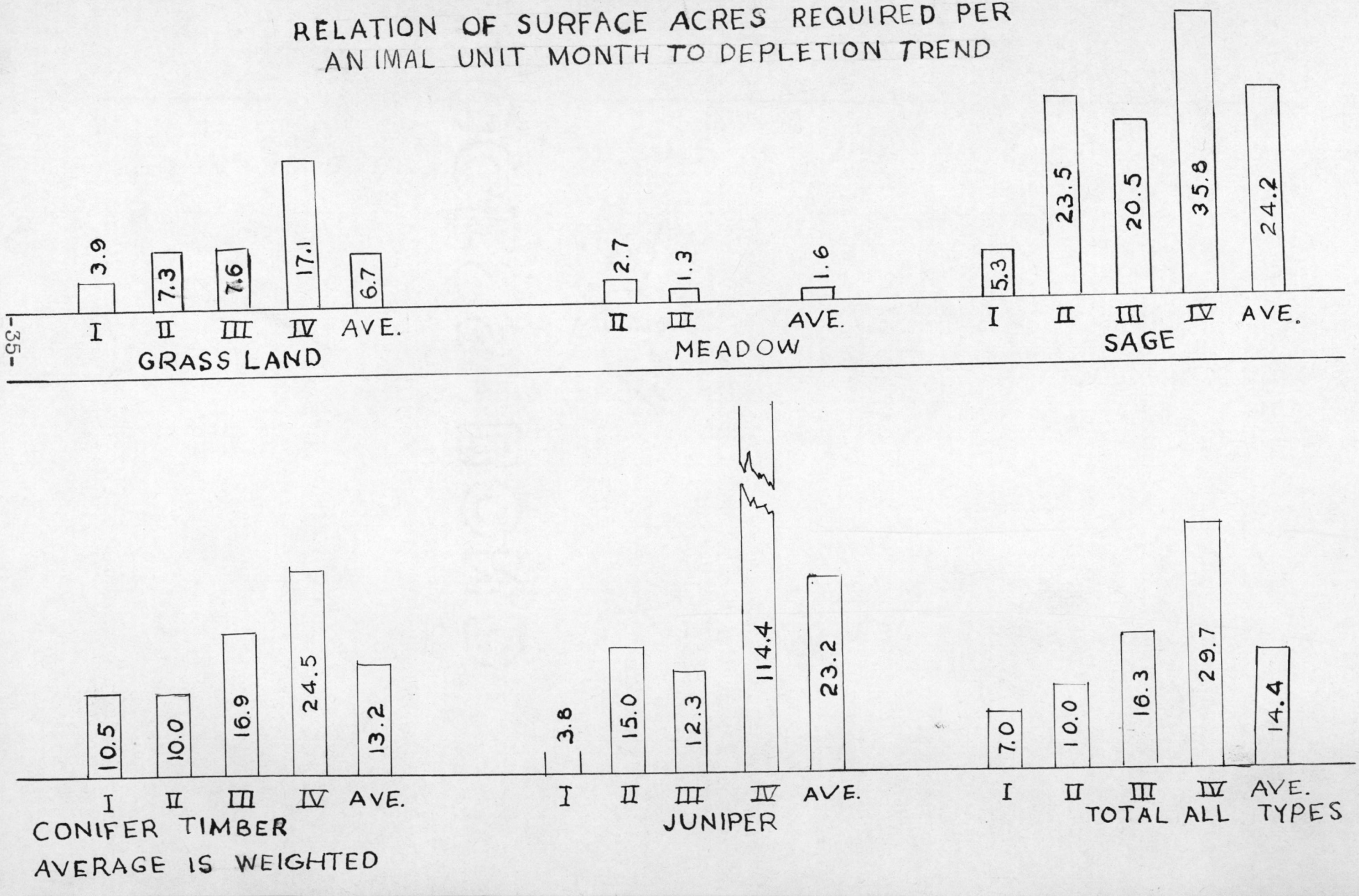
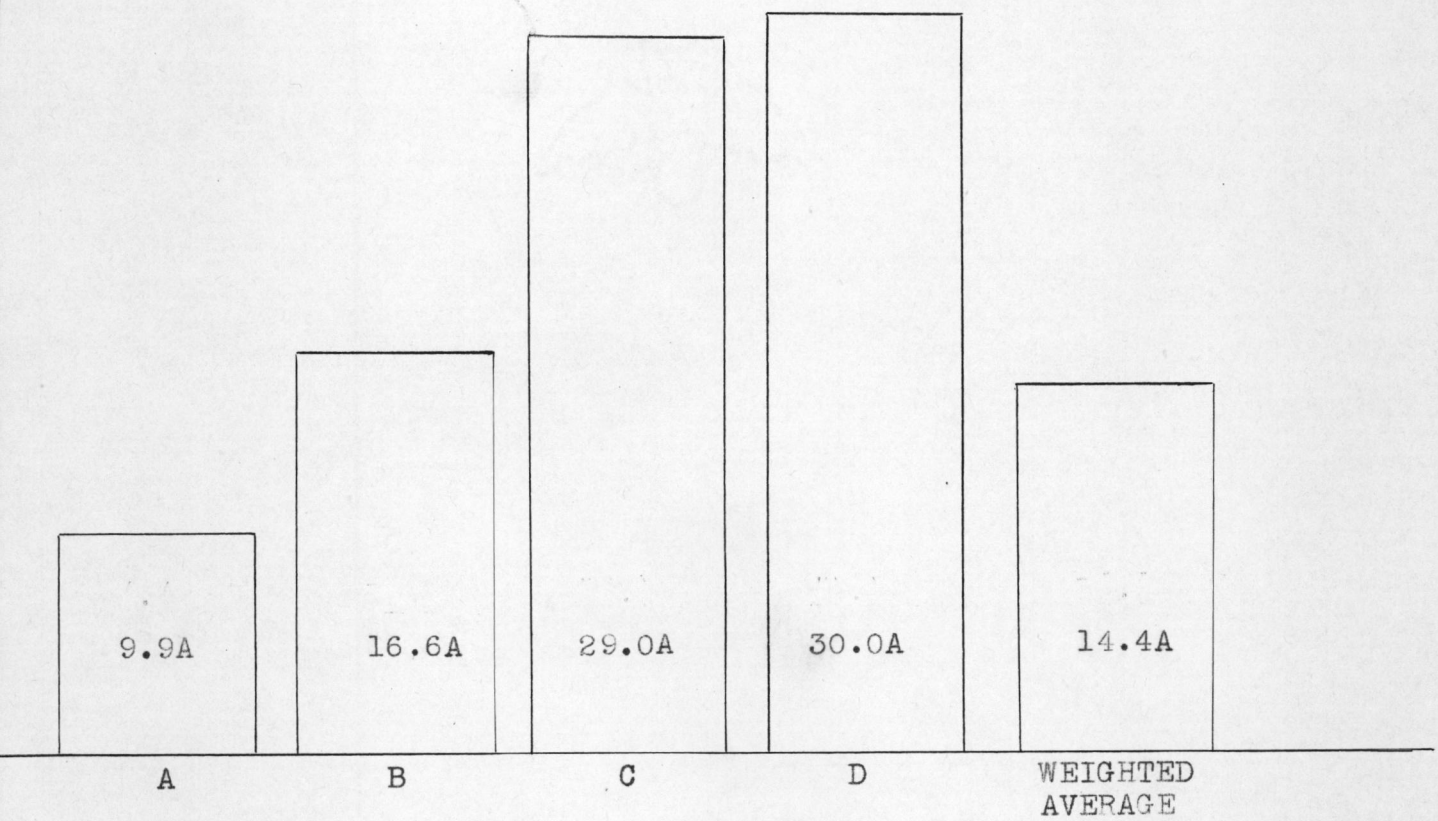

RELATION OF SURFACE ACRES REQUIRED PER ANIMAL UNIT MONTH TO DEPLETION TREND
3.9
7.3
7.6
17.1
6.7
I II III IV AVE.
GRASS LAND
2.7
1.3
1.6
II III AVE.
MEADOW
5.3
23.5
20.5
35.8
24.2
I II III IV AVE.
SAGE
10.5
10.0
16.9
24.5
13.2
I II III IV AVE.
CONIFER TIMBER
AVERAGE IS WEIGHTED
3.8
15.0
12.3
114.4
23.2
I II III IV AVE.
JUNIPER
7.0
10.0
16.3
29.7
14.4
I II III IV AVE.
TOTAL ALL TYPES

FIGURE II



SURFACE ACRES REQUIRED TO SUPPORT ONE ANIMAL UNIT MONTH AS RELATED TO EROSION TREND

A. Normal Sheet Erosion - not accelerated

B. Severe Sheet Erosion - not gullying

C. Shoestring Erosion - small gullies

D. Severe gullying

Respectfully submitted,

[redacted]

C. Douglas Hole

April, 1937

G
Surveys
Ochoco

STANDARD PALATABILITY TABLE
RANGE PLANTS - OCHOCO N. F. 1935

Timber Species

Scientific name	Common name	Abbrev.
Abies concolor	White fir	WF
" lasiocarpa	Alpine fir	AF
Juniperus communis	Dwarf juniper	DJ
" occidentalis	Western juniper	WJ
Larix occidentalis	Western larch	WL
Picea englemanni	Englemann spruce	ES
Pinus contorta	Lodgepole pine	LP
" ponderosa	Ponderosa	PP
Populus tremuloides	Aspen	Asp
" trichocarpa	Black cottonwood	BC
Pseudotsuga taxifolia	Douglas fir	DF

GRASSES

Scientific Name	Common Name	Abbrev.	% Palatable C&H	S&G
Agropyron caninum	Bearded wheatgrass	AGc	70	40
" dasystachum	Thickspike wheatgrass	AGd	70	40
" pseudorepens	Western couchgrass	AGps	70	40
" repens	Quack grass	AGre	60	30
" saxicola	Sitanion-like wheatgrass	AGsa	60	30
" spicatum	Blue bunch wheatgrass	AGs	70	40
" pauciflorum	Slender wheatgrass	AGp	70	40
Agrostis exerata	Spiked redtop	RTe	70	40
" hiemalis	Winter redtop	RTh	50	30
Beckmannia syzigachne	American slough grass	BEs	20	10
Bromus breviaristatus		Bbr	60	40
" brizaeformis	Rattlesnake grass	Bb	30	20
" ciliatus	Fringed bromegrass	Bc	60	40
" hordeaceus	Soft chess	Bh	50	30
" mollis	European soft chess	Bm	60	40
" tectorum	Downy brome	Bt	10	5
" vulgaris	Wild smooth brome	Bv	50	30
Calamagrostis canadensis	Bluejoint	Bj	60	70
" rubescens	Pinegrass	PG	40	20
Danthonia californica	California oatgrass	CO	70	30
Deschampsia caespitosa	Tufted hairgrass	HGc	70	40
" elongata	Slender hairgrass	HGe	70	50
Distichlis stricta	Desert saltgrass	DSG	20	10
Elymus aristatus		RGa	70	40
" condensatus	Giant ryegrass	RGc	70	10
" glaucus	Blue wild rye	RGg	40	20
" triticoides	Beardless wild rye	RGt	70	40
Eragrostis cilianensis	Stinkgrass	ERc	20	10
Festuca idahoensis	Idaho fescue	Fi	60	40
" megalura	Foxtail fescue	Fm	50	30
" occidentalis	Slender fescue	Fo	70	40
" rubra	Red fescue	Fr	70	40
" subulata	Bearded fescue	Fs	70	40
Holcus lanatus	Velvet grass	VG	60	30
Hordeum boreale	Alpin barley	Hb	40	30
" nodosum	Meadow barley	Hn	40	30

GRASSES - (continued)

Scientific name	Common name	Abbrev.	% Palatable C&H	S&G
Koeleria cristata	Junegrass	JG	70	50
Melica bella	Bell-shaped oniongrass	OGb	60	40
" fugax	Little oniongrass	OGf	80	40
" purpurescens	False melic	OGp	50	30
" spectabilis	Purple oniongrass	OGs	60	40
" subulata	Alaska oniongrass	OGsu	60	40
Muhlenbergia arenacea	Muhly	Ma	60	40
" filiformis	Pull-up muhly	Mf	50	30
" squarrosa	Mat muhly	Ms	60	40
Oryzopsis hymenoides	Indian ricegrass	ORh	40	30
Panicularia nervata	Fown mannagrass	PAn	40	20
Phleum alpinum	Alpine timothy	AT	70	40
" pratense	Timothy	T	70	30
Poa annua	Annual bluegrass	POan	60	40
" ampla	Big bluegrass	POa	70	60
" brachyglossa		POb	70	60
" canbyi	Canby bluegrass	POc	70	60
" compressa	Close panicle bluegrass	POco	70	60
" epilis	Skyline bluegrass	POe	70	60
" idahoensis	Idaho bluegrass	POi	60	40
" leptocoma	Bog bluegrass	Pol	70	60
" nervosa	Wheeler bluegrass	POn	70	60
" pratensis	Kentucky bluegrass	POp	70	60
" scabrella	Pine bluegrass	POs	70	60
" secunda	Sandberg bluegrass	POse	70	60
Puccinellia distans	Puccinellia	PUd	40	30
Sitanion hauserii	Hauser squirreltail	STh	20	10
" hystrix	Squirreltail	ST	20	10
" jubatum	Big squirreltail	STj	20	10
Sporobolus asperifolius	Dropseed	SP	20	30
Stipa comata	Needle and thread	NGn	30	10
" lemmonii	Lemons needlegrass	NGl	30	20
" minor	Small needlegrass	NGm	30	10
" thurberiana	Thurbers needlegrass	NGt	40	30
Trisetum canescens	Tall trisetum	TRt	40	15
" spicatum	Spiked trisetum	TRs	50	30
" wolfi	Wolfs trisetum	TRw	40	15

GRASSLIKE PLANTS

Scientific name	Common name	Abbrev.	% Palatable C&H	% Palatable S&G
Carex disperma	Sedge	CXd	50	30
" festiva	"	CXfe	50	30
" festivilla	Ovalhead sedge	CXf	50	30
" geyeri	Elk sedge	CXg	50	40
" gymnoclada	Naked stem sedge	CXgy	40	20
" hoodii	Hoods sedge	CXh	50	30
" laeviculmus	Smoothstem sedge	CXl	50	30
" nubicola	Sedge	CXn	50	30
" reynoldsii	Reynolds sedge	CXre	50	30
" rossii	Ross sedge	CXr	40	20
" tenella	Sedge	CXt	50	30
" varibilis	Variable sedge	CXv	50	30
Eleocharis palustris	Spike rush	ELp	0	0
Juncoides campestris	Woodrush	ERc	40	30
" comosum	"	WRco	40	10
" parviflorus	"	WRp	50	40
Juncus brachyphyllus	Rush	JUb	40	20
" bufonius	Road rush	JBu	30	20
" confusus	Rush	Jc	30	10
" ensifolius	Rush	Je	30	20
" parryi	Parry's rush	Jp	30	30
Scirpus validus	True rush	SCp	10	0

WEEDS "A"

Scientific name	Common name	Abbrev.	%Palatable C&H	S&G
Achillea lanulosa	Yarrow	Y	20	30
Aconitum columbianum	Monkshood	MH	30	60
Actaea arguta	Baneberry	ACTa	0	0
Agastache urticifolia	Horsemint	HMu	20	50
Agoseris glauca	Wht. Mountain dandelion	MDw	60	80
" heterophylla	Tiny " "	MDl	60	80
Alhyssanus pusillus		ATHp	10	30
Allium cusickii	Wild onion	ONe	20	40
Alsine longipes	Chickweed	ALSl	0	10
Amsinckia intermedia	Fiddleneck	FN	0	10
Antennaria lazuloides	Slender-leaf pussytoes	Ph	0	0
Aplopappus lanuginosus	Aplopappus	AP	10	30
Apocynum ambigens	Indian hemp	AP	10	20
Aquilegia formosa	Sitka columbine	AGf	20	30
Arabis cusickii	Rock cress	CRc	10	30
" glabra	Tower rockcress	CRg	10	30
" holbcelli	Rock cress	CRh	10	30
" microphylla	Rock cress	CRm	10	30
Arenaria capillaris	Sandwort	SWCa	0	0
" congesta	Tall sandwort	SWC	0	0
" nuttallii	Sandwort	SWN	0	0
Arnica cordifolia	Heart-leaf arnica	ARc	10	20
Atriplex rosea	Australian saltbush	ATr	10	20
Astragalus complexus	Milkvetch	LOc	—	—
" hoodianus	Loco	LOho	—	—
" hookerianus	Hooker milkvetch	LOh	—	—
" malacus	Loco	LOm	—	—
" martini	Loco	LOma	—	—
" sonneanus	Loco	LOs	—	—
" stenophyllus	Milkvetch	LOst	—	—
" reventus	Milkvetch	LOr	—	—
Aster			20	30

WEEDS "B"

Balsamorhiza sagittata	Arrowleaf balsamroot	BA	40	60
" terebinthaceae	Balsam root	BAt	40	60
Barbarea americana		BAa	10	20
Betrachinum trychophyllum		BE	0	10
Bistorta bistortoides	Bistort	BIS	10	30
" calophylla	Bistort	BISc	10	30
Blepharipappus glandulosa		BGg	0	0
" scaber	Slender-leaf blepharipappus	BPs	0	0
Boisduvalia densiflora	Boisduvalis	BOI	10	20
Bursa bursa			10	30

WEEDS "C"

Scientific name	Common name	Abbrev.	% Palatable C&H	% Palatable S&G
Calchortus macrocarpus	Mariposa lily	MLm	0	0
Capnorea pumila	Snowflower	CAP	0	0
Capsella (bursa)[2] pastoris	Mustard	CAP	10	20
Cardamine angulata	Angular cardamine	CAa	10	30
" brewerii	Cardamine	CAb	10	30
Carum gairdneri	Gairdners carum	CA	60	80
Castilleja miniata	Indian paintbrush	IPm	0	20
" primosa	" "	IPp	0	20
Cerastium vulgatum	Chickweed	CERv	0	10
Chaenactis douglasii	Douglas chaenactis			
Chamaenerion angustifolium	Fireweed	FW	30	60
Cheiriana aspera	Cheiriana	CHa	0	10
" repanda	Waby-leaved wall flower	CHr	0	10
Cicuta capitatum	Big-headed hemlock	CIc	0	0
" lilinum	Water hemlock	CIl	0	0
Circaea pacifica	Enchanter's night shade	EN	10	30
Cirsium undulatum	Wavy-leaf thistle	THu	20	20
Clarkia pulchella	Clarkia	CLp	10	20
" rhomboidea	Rhomboid clarkia	CLr	10	20
Cleome platycarpa	Rocky Mt. Beeflower	CLEp	0	30
Cleomella oocarpa	Cleomella	CLAO	0	30
Claytonia lanceolata	Lanceleaf spring beauty	CTl	0	0
Clintonia uniflora	Clintonia	CLI	0	0
Cogswelia ambigua		COa	40	70
" circumdata	Cogswelia	COc	40	70
" grayi		COg	40	70
" leptocarpa		COl	30	60
" macrocarpa		COm	40	70
" vaguata		COv	40	70
Collinsia parviflora	Little blue-eyed Mary	COLp	0	0
" tenella	Blue-eyed Mary	COL	0	0
Collomia grandiflora	Big-flower collomia	BFC	0	0
" linearis	Slender-leaf collomia	SLc	0	0
Corallorhiza inaculata	Coral root	COi	0	0
Coringia orientalis	Coringia	CONo	0	10
Crepis acuminata	Hawksbeard	HKa	70	80
" intermedia	"	HKi	60	70
" occidentalis	"	HKo	70	80
Cryptanthe toneyana	Cryptanthe	CRYt	0	0
Cypripedium parviflora	Lady slipper	LSp	0	0

WEEDS "D"

Delphinium columbianum	Columbian low larkspur	LLc	0	30
" depauperatum	Low larkspur	LLd	0	30
" multiflorum	Low larkspur	LLm	0	30
" parviflorum	Small-flowered larkspur	TLp	0	30
" pauciflorum	Low larkspur	LLpa	0	30
" simplex	" "	LLs	0	30

WEEDS "D" (continued)

Scientific name	Common name	Abbrev.	% Palatable C&H	% Palatable S&G
Disporum trachycarpum	White fairbells	FB	0	0
Distegia involucrate	Distegia	DI	0	0
Dodecatheon conjugens	Shooting star	SSc	0	0
" pauciflorum	" "	SSp	0	0
" tetrandrum	" "	SSt	0	0
Draba lutea	Draba	DRl	0	10
" nemosa	"	DRn	0	10
Drymocallis fissa	Drymocallis	DRYf	10	20
" glandulosa	"	DRYg	10	20

WEEDS "E"

Epilobium minatum	Small willow herb	EP	10	20
Erigeron linearia	Fine-leaf fleabane	ERIl	30	80
" nevadensis	Nevada fleabane	ERIn	30	60
" poliospermus	Little hairy fleabane	ERIp	10	20
" speciosus	Common fleabane	ERIs	10	80
Eriogonum caespitosum	Buckwheat	EROc	10	20
" heracleoides	"	EROh	10	20
" sphaerocephalum	"	EROs	0	10
" vineum	"	EROv	10	20
Eriophyllum caespitosum	Headed wooly-leaf	WO	0	0
Erodium cicutarium	Alfalaria	AL	60	80
Erythonium parviflorum	Small dogtooth violet	DV	0	0
Eunanus nanus	Small eunanus	EU	0	10

WEEDS "F"

Floerkea prosperpinacoides	Floerkea	FL	0	20
Fragaria bracteata	Strawberry	FRb	10	40
" californica	"	FRc	10	40
" platypetala	"	FRp	10	40
Frasera nitida	Elkweed	EW	0	0
Fritillaria pudica	Yellowbell	YB	0	0

WEEDS "G"

Galium aparine	Bee bedstraw	BSa	0	10
" boreale	Alpine bedstraw	BSb	0	10
Geranium incisum	Cutleaf geranium	GEi	20	40
" richardsonii	Richardsons geranium	GEr	20	40
" strigosum		GEs	20	50
" viscosissimum	Geranium	GEo	20	40
Gilia aggregata	Scarlet gilia	GIa	0	0
" graciilis	Blue gilia	GIg	10	20
" pulchella	Pale gilia	GIp	0	0
Gnaphalium palustre		GWp	0	0
Grayia spinosa	Hop sage	GRs	0	10
Greeneocharis circumcissa	Round ball	GRE	0	10
Godetia epiloboides	Godetia	GO	20	60

WEEDS "H"

Scientific name	Common name	Abbrev.	% Palatable C&H	S&G
Hieracium			50	80
Heuchera glabella	Alum root	HEUg	0	10
" pentandra		HEUp	0	10
" stenopetala		HEUs	0	10
Horkelia fusca	Horkelia	HOR	0	0
Hydrophyllum capitatum	Ballhead waterleaf	WLc	10	10
Hypericum scoulerii	Scoulers St. Johnswort	SJs	0	0
Hydrophyllum occidentale	Waterleaf	WLo	10	10
Helianthus			50	80

WEEDS "I"

Iris missouriensis	Iris	I	0	0

"J"

"K"

WEEDS "L"

Lactuca			0	10
Lappula diffusa	Scattered stickseed	LAP	0	10
" occidentalis	Stick seed	LAPo	0	10
Lathyrus obovatus	Oval-leaf peavine	PVo	40	60
" pauciflorus	Peavine	PVp	40	60
" rigidus	Stiff-leaved peavine	PVr	40	50
Lepidium perfoliatum	Pepper grass	LEPp	40	50
Leptotaenia multifida	Leptotaenia	LEP	20	20
Leucocrinum montanum		LEU	0	0
Lewisia rediviva	Bitterroot	LE	0	0
Linanthus androsaceus	Thread plant	TPa	0	10
Linum lewisii	Prairie flax	LIN	0	0
Lithophragma bulbifera	Bulbous stonebreaker	LIb	0	10
Lupinus aridus tarreyi	Lupine	LUt	20	30
" columbianus	Columbian lupine	LUc	20	30
" laxifolius silvicola		LUl	20	30
" leucophyllus		LUle	50	50
" lyallii		LUly	20	30
" saxosus		LUsa	20	40
" sulphureus	Yellow lupine	LUs	20	50
Lithospermum ruderale			0	0
Leontodon			50	80

WEEDS "M"

Madia glomerata	Tarweed	TWg	0	0
Malva rotundifolia	Mallow	MA	10	20
Medicago lupulina	Black medic	BM	40	60
Mertensia brevistyla	Short style bluebell	MEb	50	80
Marrubium vulgare	Hairy mint	MAR	0	20
Mimulus longsdorfii	Longstem monkeyflower	MF	0	10
" moschatus	Tiny monkeyflower	MFn	0	0
Mitella stamppetala	Mitella	MIt	0	10
Moehringia latifolia	Sandwort	MOE1	0	10
" macrophyllum	Trailing sandwort	MOE	0	10

WEEDS "M" (continued)

Scientific name	Common name	Abbrev.	% Palatable C&H	S&G
Monardella odoratissima	Pungent pennyroyal	MONo	10	20
" pennyroyal	Pennyroyal	MONp	10	20
Monolepis nuttalliana	Pigweed	MON	10	20
Montia chamissonis	Big miners lettuce	MOc	10	20
" fontana	Dwarf miners lettuce	MOf	5	20
" linearis	Miners lettuce	MOl	5	20
Micranthes fragosa	Micranthes	MYf	5	10
" arguta	"	MYa	0	10
Myosurus aristatus		MYa	0	0

WEEDS "N"

Nemophila brioflora	Waterweed	NEb	0	0
" sepulata	"	NEs	0	0
Nitrophila occidentalis		NI	0	10

WEEDS "O"

Oenothera hookeri	Evening primrose	OE	10	20
Orogenia linearifolia	Trail potato	TRp	0	0

WEEDS "P"

Paeonia brownii	Browns paeonia	BP	10	40
Parrya menziesii		PA	0	10
Pedicularis racemosa	Lousewort	PED	0	10
Pentstemon fruticosus	Shrubby pentstemon	PNf	0	0
" glaber		PNg	10	20
" glandulosus	Tall pentstemon	PNgl	10	20
" organus		PNo	10	30
" procerus	Dwarf pentstemon	PNp	10	30
" richardsonia	Richardsons pentstemon	PNr	10	30
Peramium aecipians	Rattlesnake plantain	RP	0	0
Peraphyllum ramosissimum		PE	0	0
Petalostemon ornatus	Petalostemon	PET	—	—
Phacelia heterophylla	Phacelia	PHh	0	0
" linearis	Long phacelia	PHl	0	0
" ramosissima		PHr	0	0
Phlox stansburyi	Phlox	PX	0	0
Plantago lanceolata	Lance-leaf plantain	PLl	0	0
Platyspermum scapigerum	Flatpod	FP	0	0
Polemonium micranthum	Minute jacobs ladder	JLm	0	0
Potentilla pulcherrima	Beautiful fivefinger	Pp	10	30
" viridescens	Fivefinger	PV	10	20
Prunella Spp.	Prunella	PR	0	0
Pteryxia foeniculacea	Fennel	PT	0	10
Ptilocalis nutans	Ptilocalis	PTn	20	40
Pyrola picta		PYp	0	0
" secunda	Pyrola	PYs	0	0

WEEDS "Q"

Quamasia esculenta	Camas	QE	0	10

WEEDS "R"

Scientific name	Common name	Abbrev.	% Palatable C&H	S&G
Ranunculus cremogenes	Buttercup	RAc	10	30
" cymbalalana	"	RAc	10	30
" douglassii	"	RAd	10	30
" glaberrimus	"	RAg	10	30
" occidentalis	"	RAc	10	30
Rudbeckia occidentalis	Western coneflower	WCF	20	30

WEEDS "S"

Salsola pestifer			20	
Sanguisorba anima	Annual sanguisorb	SGa	10	20
" annua	" "	SGan	10	20
" officialis		SGo	10	20
Sanicula septentrionales	Sanicle	SAN	0	0
Saponaria vaccaria	Saponaria	SAv	10	20
Saxifraga hieracifolia	Hawkweed saxifrage	SXh	10	20
Scutellaria angustifolia	Scutellaria	SCU	10	30
Sedum douglasii	Stonecrop	SC	10	30
" ovalifolia	"	SCo	10	20
" stenopetalum	"	SCs	0	10
Senecio canus	White butterweed	BWca	10	20
" columbianus	Butterweed	BWc	10	20
" serra	Serrate	BWs	80	80
Sibbaldia procumbens		SIB	5	10
Sidalcea oregana	Oregon mallow	Mo	0	10
" spicata	Spiked mallow	Ms	0	10
Silene columbiana	Columbian catchfly	SIc	0	0
" lyallii	Small catchfly	SIl	0	0
" mueticouli	Catchfly	SIm	0	0
Sisymbrium nasturtium		Sn	10	20
Sisyrinchium douglasii	Blue-eyed grass	BEd	0	0
" " grandiflorum	Bug grass	BEg	0	0
Solidago elongata	Creek goldenrod	GRe	0	10
Sophia filipes	Mustard	SOf	10	20
" longipedicellata	"	SOl	10	20
Sphaeralcea munrovana	Scarlet mallow	SPH	0	10
Smelowski fremontii		SMf	0	0
Stellaria longipes	Star flower	ST	0	10
Sieversia			0	10

WEEDS "T"

Taraxia heterantha	Taraxia	TAh	0	10
" tanacetifolia	Tarweed	TAt	0	10
Thalesia uniflora	One flowered cancerroot	CRu	0	0
Thalictrum nemulosum	Meadowrue	MRn	0	10
" occidentalis	Western meadowrue	MRm	0	10
Thelypodium intergrifolia		THE	0	10
" lacineatum		THEl	0	10
Thermopsis montana	Thermopsis	TH	10	20
Thysanocarpus elegans		THY	10	20
Tissa rubra	Tissa	TIr	0	0

WEEDS "T" (continued)

Scientific name	Common name	Abbrev.	% Palatable C&H	% Palatable S&G
Townsendia florifer	Townsendia	TO	0	10
Trifolium eriocephalum	Clover	CLe	80	80
" latifolium	Broadleaf clover	CLl	80	80
" longipes	Longroot clover	CLlo	80	80
" kingii	Clover	CLk	80	80
" macrocephalum	Bigleaf clover	CLm	80	80

WEEDS "V"

Vaccaria vaccaria	Cow cockle	VV	0	0
Vagnera amplexicaulis	False solomonseal	VAa	0	0
Valeriana sitchensis	Sitka valerian	VAs	20	50
" cerathophylla	Valerian	VAc	20	50
Verbascum thapsus	Mullen	MU	0	0
Veronica americana	Speedwell	Va	0	0
Vicia truncata	Bluntleaf vetch	VIt	60	80
Viola adunca	Violet	VOa	0	0
" auree		VOau	0	0
" beckwithii	Beckwiths violet	VOb	0	0
" drepanopora		VOd	0	0
" Glabra	Smooth violet	VOg	0	0
" purpurea	Purple violet	Vop	0	0
Veratrum			10	20

WEEDS "W"

Osmorhiza occidentalis	Sweet anise	SA	40	80
Wyethia amplexicaulis	Shiny mulesears	WY	40	30
" helianthoides	Big mulesears	WYh	20	30

WEEDS "Z"

Zygadenus elegans	Mountain death camas	ZYe	0	0
" paniculatus	Foothill death camas	ZYp	0	0
" venenosus	Death camas	ZYv	0	0

SHRUBS

Scientific name	Common name	Abbrev.	% Palatable C&H	S&G
Acer douglassi	Douglas maple	Ac	10	20
Alnus oregona	Red alder	ALo	10	20
" tenuifolia	Mt. alder	ALt	10	20
Amelanchier florida	Pacific serviceberry	SB	40	60
Arctostaphylos urvi ursi	Kinnikinnick	KK	0	0
" pungus platyphylla		APP	0	0
Artemisia tridentata	Big sagebrush	SGt	0	0
Betula fontinalis	Water birch	BFU	5	10
" glandulosa	Birch	BGg	5	10
Ceanothus prostratus	Low ceanothus	CEp	0	0
" velutinus	Snowbrush	CEv	0	0
Cercocarpus ledifolius	Mt. mahogany	MM	0	0
Chimaphila umbellata	Prince's pine	CH	0	0
Chrysothamnus bloomeri	Big-bloom rabbit brush	RB	0	0
Clematis lingusticifolia	Clematis	CLl	0	0
Cornus stolonifera	Red-osier dogwood	DWs	0	0
" occidentalis	Western dogwood	DWo	0	0
Crataegus californica	Black hawthorne	Hd	0	10
Dasiophora fruticosa	Bush cinquefoil	DAS	0	10
Grossularia inermis	Whitestem gooseberry	GB	10	30
" velutina	Shiny-stem gooseberry	GBv	10	30
Lepargyrea canadensis	Buffalo berry	BB	0	0
Lonicera ciliosa	Redflower honeysuckle	HBc	0	0
" involucrata	Bearberry	HSi	0	0
Menziesia ferruginea	Rusty menziesia	MEN	0	0
Odostemon repens	Creeping hollygrape	OG	0	0
Pachystima myrsinites	Pachystima	PA	0	10
Philadelphus lewesii	Lewis mockorange	MO	10	20

SHRUBS - (Continued)

Scientific name	Common name	Abbrev.	% Palatable C&H	S&G
Populus tremuloides	Aspen	Asp	20	40
Prunus demissa	Bitter cherry	CC	40	60
" emarginata	Chokecherry	CCe	40	60
Purshia tridentata	Bitterbrush	KU	50	60
Ribes aureum	Golden currant	RIa	10	30
" cereum	Squaw currant	RIc	10	30
" lacustre	Swamp currant	RIl	10	30
" montigenum	Black currant	RIm	10	30
" petiolare	Long-stem currant	RIp	10	30
" viscosissimum	Sticky currant	RIv	10	30
Rosa spauldingii	Spaulding rose	Rs	20	40
Rubus parviflorus	Thimbleberry	RUp	5	20
Salix bebbiana	Willow	Wb	20	40
" pseudocordata	False heartleaf willow	Wp	20	40
Sambucus glauca	Smooth elderberry	EGb	80	80
Sorbus scopulina	Mountain ash	MA	0	0
Spiraea discolor	Spirea	SPd	0	20
" lucida	Small hardhack	SPl	0	20
" menziesii	Red pyramid spirea	SPm	10	20
" sericotheca	Spirea	SPs	10	20
Symphoricarpos racemosa	Racemose snowberry	SYr	10	30
" rotundifolia	Roundleaf snowberry	SYro	10	30
Tetradymia inermis	Spineless horsebush	TET	0	0
Vaccinium scoparium	Grouse huckleberry	SHB	0	10

R(G)
Cooperation, AAA
Program Planning

LEGEND

Survey of Private Range Lands - Eastern Oregon 1936, National Forest Land.

Boundary of Taylor Grazing Districts

Boundary of Other Public Reservations

Boundary of Range Types

Type 1 - Grassland other than meadow. Spring and Fall season average 7 months.

Type 4 - Sagebrush range. Spring and Fall season average 7 months.

Type 6 - Range under conifer timber. Summer season average 4 months.

Type 9 - Pinon juniper. Spring and Fall season average 7 months.

S&G — Sheep range

C&H — Cattle and horse range

7.0A — Surface acres required to support one animal unit one month in entire type.

13.9A — Surface acres required to support one animal unit per month. Weighted average of all types.

TAYLOR DISTRICT NO.1

TAYLOR DISTRICT NO.2

TAYLOR DISTRICT NO.3

TAYLOR DISTRICT NO.4

TAYLOR DISTRICT NO.5

TAYLOR DISTRICT NO.6

Baldock Project S.C.S. 24A-Season Hay & Pasture

LEGEND

- NATIONAL FORESTS (CORRECTED TO JUNE 1, 1936)
- NATIONAL FOREST IN ADJACENT REGIONS
- NATIONAL PARK
- NATIONAL MONUMENT
- INDIAN RESERVATIONS
- COUNTY BOUNDARY
- AREA SUBJECT TO SELECTION FOR EXCHANGE
- COUNTY SEAT
- SUPERVISORS HEADQUARTERS
- STATE HIGHWAYS
- OTHER IMPORTANT ROADS
- RAILROADS (COMMON CARRIERS)
- NATIONAL FOREST BOUNDARY

Original compiled as a Forest Survey base map at Regional Office, Portland, 1934, from U. S. G. S., G. L. O., Forest Service, and other surveys.
Revised and reproduced from original maps June 1, 1936.

U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
F. A. SILCOX, CHIEF
T. W. NORCROSS, CHIEF, DIVISION OF ENGINEERING

NATIONAL FORESTS
REGION 6
1936

Scale 1 inch = 12 miles

30 0 30 60 90 120 150 Miles
30 0 30 60 90 120 150 Kilometers

LAMBERT PROJECTION

Note: No attempt has been made to show forest lands in tracts less than 40 acres. Full information on location of national forest lands obtainable from forest supervisors.

WILLIAMS & HEINTZ CO. WASH. D. C.

8/19/1936