

THE HARVEY VALLEY DEMONSTRATION ALLOTMENT

Forest Service  
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## INTRODUCTION

The Harvey Valley range allotment on the Lassen National Forest is being used to test and demonstrate on a practical scale, a new system of grazing management and various range practices designed to increase the grazing capacity of mountain bunchgrass type summer ranges in California and elsewhere.

The grazing system tentatively called the 5-unit grazing system, was developed and tested from 1936 to 1951 at the Burgess Springs Experimental Range, a field unit of the California Forest and Range Experiment Station located in the northeast corner of the Harvey Valley Allotment. (See attached map 1)

This system calls for subdivision of the range into five units, some of which are rested and others grazed in rotation over a 5-year cycle. During rest periods the forage species are given a chance to recover vigor, produce seed and establish new plants, thus building up grazing capacity.

Artificial reseeding, chemical weed control and similar practices are being demonstrated on the allotment. These are based on studies carried out at Halls Flat Meadow, Grass Valley and Harvey Valley and other areas since 1945. (See map for location of areas)

Cooperators participating in the original research program and in the present demonstration include the California Forest and Range Experiment Station, the Lassen National Forest, the Lassen County Farm Advisor, several Lassen Forest grazing permittees, and the Forest Service Regional Office. As a result of reorganization in the U. S. Department of Agriculture, research on artificial reseeding, weed control and range fertilization, formerly handled by the Forest Service, is now being carried on by the Forage and Range Section of the Agricultural Research Service. This agency too is cooperating in the work at Harvey Valley.

## Description of Harvey Valley Allotment

### Principal vegetation types:

<u>Name</u>	<u>Acres</u>	<u>Percent</u>
Grassland	505	1.5
Meadow	1,322	4.1
Sagebrush	4,105	12.7
Conifer	14,713	45.5
Waste	<u>11,707</u>	<u>36.2</u>
Total	32,352	100.0

Usable Range 20,645

General type of vegetation . . . Bunchgrass  
Class of livestock . . . . . Cattle  
Type of operation . . . . . Usually cow and calf  
Grazing capacity (1951) . . . . . 500 animal units  
Grazing season . . . . . June 1 to  
September 30

### Status of the Demonstration Project

To provide the necessary livestock control, the Harvey Valley Allotment has been fenced and additional stock water developed. Unit 1 was completed and placed under management in 1952. All the remaining units have been developed sufficiently now to be placed under management. Unit 1 is receiving its fourth season of planned management this year, units 2 and 3 their third, and units 4 and 5 their second. Unit 1 was carried to the seedling production state in 1954 and unit 3 in 1955.

The cultural work carried out to date includes reseeding of introduced grasses and spraying of sagebrush as follows:

<u>Year and Season</u>	<u>Treatment</u>	<u>Acreage</u>
1951		
Fall	Reseeding, smooth brome grass	132
Fall	Reseeding, crested wheatgrass and smooth brome grass	25
1952		
Spring	Spraying 2,4-D on big sagebrush	1,700
Fall	Reseeding, intermediate wheatgrass and crested wheatgrass	74
1953		
Spring	Reseeding, smooth brome grass, mountain brome grass and crested wheatgrass mixture	106
Fall	Reseeding, intermediate wheatgrass	48
Fall	Reseeding crested wheatgrass and mountain brome grass mixture	23
1954		
Spring	Spraying 2,4-D on sagebrush	100
Fall	Reseeding, smooth brome grass	42
Fall	Reseeding, tall wheatgrass	9

#### DESCRIPTION OF THE GRAZING SYSTEM

The timing of grazing and resting in this system is based on the growth and maintenance requirements of the key forage species on the range--in this case Idaho fescue, a species that is highly susceptible to grazing injury. Grazing management that provides for the maintenance of this species, therefore, also provides for the maintenance on the range of all other plant species that are less susceptible to grazing injury. (This includes most of the forage species.)

The range is subdivided into five units of equal grazing capacity. Three units are grazed each year and two rested so as to get 33 percent use of the total herbage production on the allotment. This level of use is moderate and is estimated to provide adequately for the 500 animal units grazed on the allotment at the present. The permitted number on the allotment has been 500 animal units for many years. No reduction in numbers has been necessary to put the present grazing plan into operation. Application of the planned grazing management and cultural practices is expected to double grazing capacity in 20 years or less.

During a 5-year period each of the range units receives five treatments, as shown in Table 1. Heavy grazing (60 to 70 percent herbage use) is employed the first season to insure full use of the available herbage. Rest is provided the second season and half of the third to permit the grazed plants to recover vigor and produce seed. Heavy grazing during the latter half of the third season provides for getting as much seed as possible trampled into the soil. Complete rest the fourth season gives the young seedlings a chance to become established. Moderate grazing (30 to 35 percent herbage use) is provided during the first half of the fifth season to give the young plants further opportunity to become established. Grazing at this time in the fifth season is necessary also to make the plan work; that is, to permit stocking the pastures at given intensities and moving the livestock about as required. The grazing schedule for five units during a 5-year cycle is shown in Table 2. This sequence of grazing is repeated every five years.

The grazing intensity desired in each unit in a given season is obtained as follows: (refer to first year in Table 2). At the beginning of the grazing season 60 percent of the animals to be grazed on the entire range are placed in unit 1 and the remaining 40 percent are placed in unit 5. In mid-season two-thirds of the animals in unit 1 and all of those in unit 5 are moved to unit 3. In this way units 1 and 3 are grazed heavily, unit 5 moderately, and units 2 and 4 are rested. Should the range herbage in the heavily grazed units--those receiving treatments A and C in Table 3--be inadequate for the livestock in any given season because of low production, the livestock can be moved to units receiving treatments B and E. Only in extreme cases should the unit receiving treatment D be opened to grazing.

### Other Range Treatments

The grazing capacity of the Harvey Valley allotment is being increased by artificial reseeding, chemical weed control, drainage improvement and logging as well as by management of grazing, and is expected to be about doubled in 20 years. Approximately 44 percent of the increase is expected to result directly from management of grazing, 42 percent from artificial reseeding, spraying and drainage improvement, and 14 percent from logging. It should be appreciated, however, that the maintenance of grazing values developed by cultural measures is dependent entirely on proper management of grazing.

Table 1.--Schedule of grazing for any one unit during a 5-year cycle

Year	Treatment	Character of treatment	Main purpose of treatment
1st	A	Heavy use season-long	Maximum herbage utilization
2nd	B	Rest season-long	Recovery of plant vigor
3rd	C	Rest until mid-season Graze heavily second half of season	Permit plants to ripen seed Trample seed into the soil and herbage utilization
4th	D	Rest season-long	Aid establishment of new reproduction
5th	E	Graze moderately until mid-season Rest second half of season	Aid establishment of new reproduction Permits completion of grazing schedule

Table 2.--Schedule of grazing of five units during a 5-year cycle

Year	Range unit				
	1	2	3	4	5
	<u>Treatment</u> <sup>1/</sup>				
1st	A	B	C	D	E
2nd	B	C	D	E	A
3rd	C	D	E	A	B
4th	D	E	A	B	C
5th	E	A	B	C	D

<sup>1/</sup> See A to E in Table 1.

STATUS OF GRAZING IN THE VARIOUS ALLOTMENTS

The grazing use of the five units from the time the allotment test was started until 1960, is shown in Table 3. In the 1955 season, unit 1 is scheduled to be grazed moderately, units 2 and 4 heavily. Units 3 and 5 are being rested.

Table 3.--Grazing schedule for Harvey Valley Allotment<sup>1/</sup>

Year	Range unit				
	1	2	5	4	3
(Stocking - (Animal units) )					
1952	B Rest	Rest C 400	D Rest	200 E Rest	300 A 100
1953	Rest <sup>2/</sup> C 400	D Rest	200 E Rest	300 A 100	B Rest
1954	D Rest	200 E Rest	300 A 100	B Rest	Rest C 400
1955	200 E Rest	300 A 100	B Rest	Rest C 400	D Rest
1956	300 A 100	B Rest	Rest C 400	D Rest	200 E Rest
1957	B Rest	Rest C 400	D Rest	200 E Rest	300 A 100
1958	Rest C 400	D Rest	200 E Rest	300 A 100	B Rest
1959	D Rest	200 E Rest	300 A 100	B Rest	Rest C 400
1960	200 E Rest	300 A 100	B Rest	Rest C 400	D Rest

<sup>1/</sup> Treatments above the dotted line were not applied in the years indicated because management facilities, particularly fences, were not completed.

<sup>2/</sup> Top figure or comment indicates stocking or treatment during first two months of the season, and bottom figure or comment indicates stocking or treatment during last two months of the season.

CHARACTER OF GROWING SEASONS SINCE START OF ALLOTMENT TEST

Precipitation in the 1955 season was about 53 percent of normal, as shown in the following table:

Season ending	Precipitation :(Inches):	Estimated vegetation production :(Percent of 20: year average)	Estimated vegetation production			
			Upland types (Herbage)	Upland types (Seed)	Bottom land types (Herbage)	Bottom land types (Seed)
1952	24.86	141	Fair	Light	Fair	Fair, light
1953	19.94	113	Fair	Light	Excellent	Excellent, heavy
1954	17.06	96	Poor	Light	Fair	Fair, light
1955	9.41	53	Fair	Light	Poor	Fair, light
20 yr. av. 1935-55 (Sept. 1 to Aug. 30)	17.68					

Air temperatures during the growing season were low, vegetation development was two to three weeks late and herbage production only about 50 percent of normal. Conditions for seedling establishment have been poor. Flower stalk and seed production are both light.

The 1954 season was also poor in terms of herbage and seed production and conditions for seedling establishment. In 1953 herbage and seed production in the upland types were light and heavy, respectively, in the bottom land types. Production in the 1952 season was light on all sites.

Thus conditions have been unfavorable for seedling establishment in the 1954 and 1955 seasons when the first two pastures were brought to the seedling production stage. In spite of these handicaps, some natural seedlings became established in favorable soil types and where livestock trampling was heavy. Grazing capacity has been increased appreciably by grazing management and the cultural work to date.

WHERE TO SEE RESULTS IN THE FIELD

Stop 1, (Unit 1), Two-year-old natural grass reproduction.--  
Seedlings of perennial bunchgrasses--squirrel tail (*Sitanion*  
*hystrix*), Nevada bluegrass (*Poa nevadensis*) and June grass  
(*Koeleria cristata*)--evident here were encouraged and established  
 by the 5-unit grazing system. These seedlings are in their second year of growth. The unit is scheduled to be grazed moderately till mid-season. (See table 3) Note the close use of the seedlings on this particular site. Some were pulled up by grazing this season.



Stop 2, (Unit 2), Sagebrush spraying with 2,4-D.--Big sagebrush, a relatively poor grazing species, can be killed with the chemical 2,4-D. Grasses, on the other hand, are not affected materially. Thus, 2,4-D kills the sagebrush and provides more room for growth of the grasses.

The effect of 2,4-D on big sagebrush is shown here. The increased growth of grass--mainly needlegrass (Stipa occidentalis)--on the sprayed area is evident.

Date of spraying . . . . .	June 11-16, 1951	
Plant growth stage . . . . .	New twigs 2.5 inches long	
Method . . . . .	Fixed wing airplane flying 10-20 feet above the ground	
Chemical . . . . .	2,4-D butyl ester	
Formulation per acre . . . . .	2,4-D	2 pounds
	Diesel oil	0.5 gallons
	Emulsifier (Antarox A-400)	0.1 gallons
	Water	9 gallons
	Total solution per acre	10 gallons
Cost per acre. . . . .	Chemicals and materials	\$2.65
	Application (airplane)	<u>.35</u>
	Total	\$3.00

Stop 3, (Unit 1), Establishment of natural reproduction on heavy soil types.--Here grass seedlings have become established in cow tracks made when the soil was wet and in other sites where extra litter and moisture favored seedling germination and growth.

Stop 4, (Unit 1), Artificial reseeding, smooth brome grass (Bromus inermis) stand in fourth season of growth.-- This stand was planted in October 1951 at the rate of 10 pounds of seed per acre. The ground was plowed twice with a Towner offset plow and smoothed with a roller ahead of drilling. The seed was drilled 0.5 to 1.0 inch deep.

Cost per acre . . . . .	Ground preparation	\$7.50
	Seed	3.00
	Planting	<u>1.50</u>
	Total	\$12.00

The yield was estimated to be about 1,500 pounds per acre in the second year (1953) under favorable growing conditions. This year the yield is less because of the dry season.

Stop 5, (Unit 3), Natural grass reproduction in the first year of growth. --Most of the seedlings here are Nevada bluegrass (Poa nevadensis). Notice how lightly the seedlings are rooted and how easily they can be pulled up and trampled out. This unit will not be grazed until next season so the seedlings will have a chance to become better rooted before being grazed.

Stop 6, (Unit 3), Reseeding intermediate wheatgrass (Agropyron intermedium) and crested wheatgrass (Agropyron cristatum), third year of growth. --This stand was grazed heavily last year and is being rested this season to restore plant vigor and seed production capacity.

Light plant establishment was obtained on eroded areas and where the ground was not disked deeply enough to remove the existing plant competition--biscuit root (Cogswellia sp) primarily.

Stop 7, (Unit 3), Continuous seasonal grazing harmful to reseeded stand. --The area both north and south of the fence was seeded with a mixture of crested wheatgrass and smooth brome grass in the spring of 1953. The area on the north was grazed continuously since planting whereas the area on the south was treated as shown in Table 3, --rested the entire first growing season and the first half of the second season, grazed heavily the second half of the second season and rested in the third growing season. This grazing schedule is apparently maintaining the stand and encouraging reproduction.

Stop 8, Artificial reseeding, intermediate wheatgrass and crested wheatgrass, second season of growth. --The seedlings on this area are well rooted and will be grazed heavily in the second half of the season this year.

Cost per acre . . . . .	Ground preparation and drilling	\$8.00
	Seed (8 pounds per acre at 60 cents per pound)	<u>4.80</u>
	Total	\$12.80

EXPERIMENTAL RESEEDING AND SPRAYING WORK

Cultural practices.--The main experimental work on artificial reseeding and chemical spraying leading to the applications on Harvey Valley may be seen at Halls Flat Meadow and Grass Valley (see map).

Halls Flat Meadow

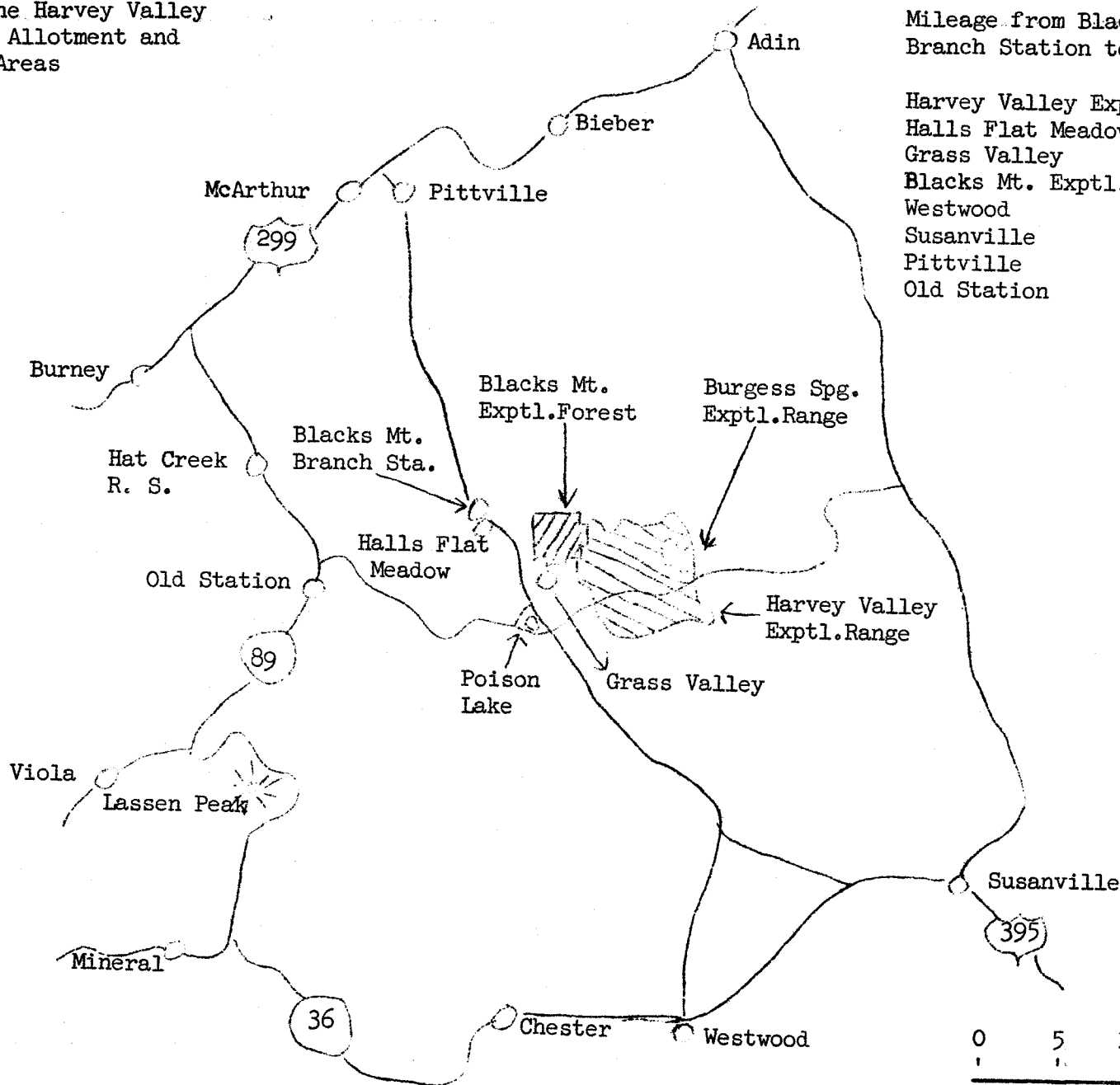
Adaptation tests of more than 100 introduced and native grasses and legumes are being conducted here. Some of the points that are checked on each species

include seed viability, seedling emergence rate, seedling vigor, palatability, herbage yield, and seed production. The more promising species are later tested on larger field plots under grazing use.

### Grass Valley

Here, tests are made of artificial reseeding and weed control methods, of soil fertilization and of the effect of season on the growth and development of planted and sprayed areas. This area includes stands of big sagebrush, black sagebrush and silver sagebrush--three of the most widespread weed species in northeastern California.

Location of the Harvey Valley  
 Demonstration Allotment and  
 Experimental Areas



Mileage from Blacks Mt. Branch Station to:

Harvey Valley Exptl. Range	13
Halls Flat Meadow	1/4
Grass Valley	4
Blacks Mt. Exptl. Forest	4
Westwood	44
Susanville	46
Pittville	25
Old Station	22

Map 1

HARVEY VALLEY EXPERIMENTAL RANGE

A to K Gate or cattle guard.  
Marked in field with  
letters.

Map 2

