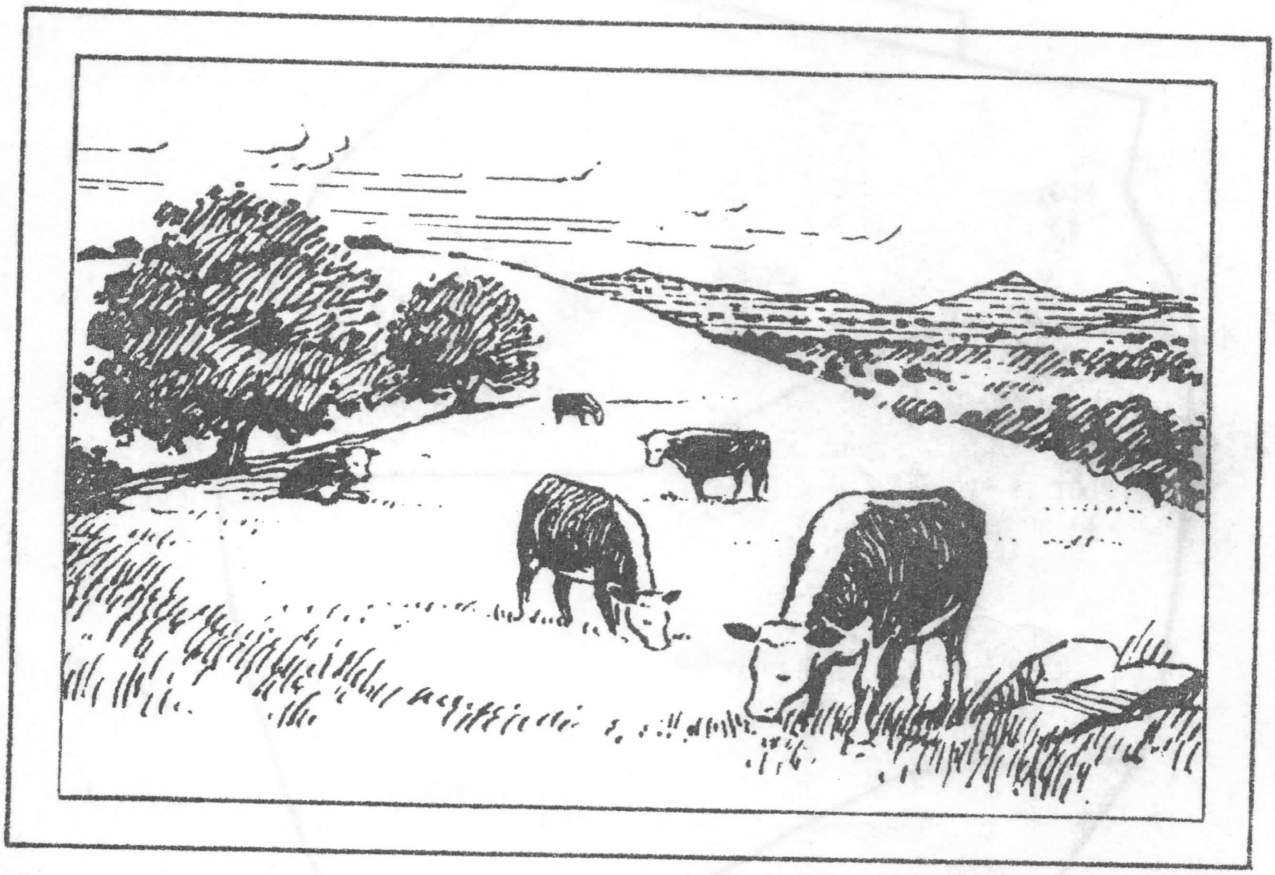
RANCHITA EXPERIMENTAL RANGE STUDY



A COOPERATIVE PROJECT

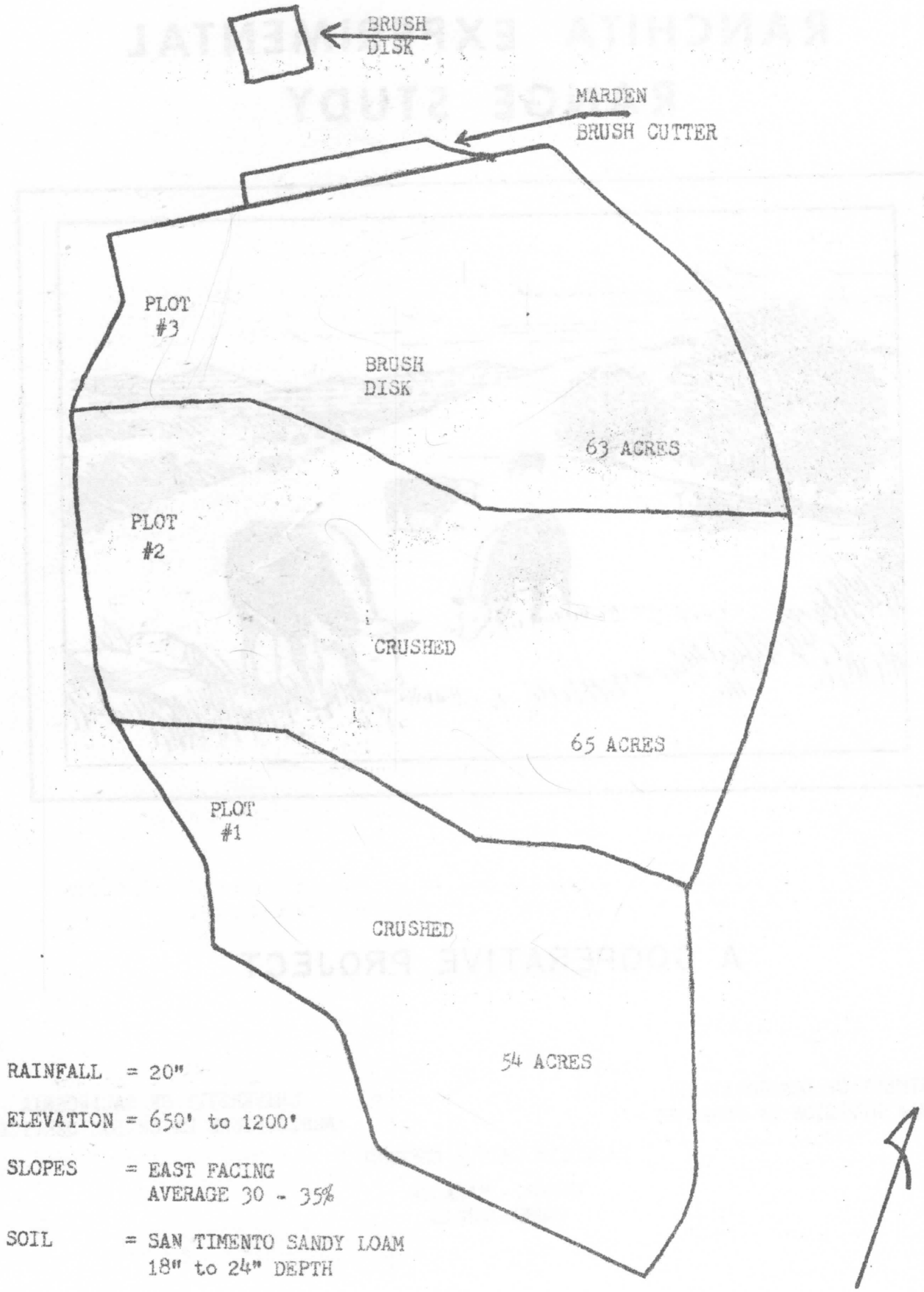
DEPARTMENT OF CONSERVATION
CALIFORNIA DIVISION OF FORESTRY

UNIVERSITY OF CALIFORNIA
AGRICULTURE EXTENTION SERVICE

RANCHITA CATTLE COMPANY

OWNER - MANAGER
HARRY CONLEY

PLOT LAYOUT



RAINFALL = 20"

ELEVATION = 650' to 1200'

SLOPES = EAST FACING
AVERAGE 30 - 35%

SOIL = SAN TIMENTO SANDY LOAM
18" to 24" DEPTH

THE RANCHITA RANGE STUDY

The Ranchita Range Study is a cooperative brush conversion project. It is being conducted by the California Division of Forestry, the Agricultural Extension Service and the Ranchita Cattle Company (Harry Conley, Managing Partner.) The purposes of the Study are: 1) to demonstrate brush range improvement techniques developed by research and 2) to determine and show the economic returns of the various treatments.

Work first began on the Study in February of 1960. At that time brush was crushed in preparation for burning on what are now Plots #1 and #2. (See Plot Layout). This was followed in the fall by burning and reseeding with perennial grasses. In the spring of 1961, the area treated was sprayed with chemicals for control of brush and weed regrowth. Since that time various treatments have been made to maintain and enhance the value of the Study, including yearly grazing trials after the second year. Aside from grazing trials no treatments have been undertaken on Plot #2 since May of 1962. Plans call for no further treatment on this Plot but continued grazing and study of vegetative composition changes.

There was an attempt to burn the standing brush on Plot #3 at the same time the crushed brush was burned; but, due to poor burning conditions little was accomplished. Until the spring of 1965 this Plot remained as only a comparison for the brush crushing done on the other two Plots.

Because of the excellent results obtained using a brush disk on a small trial Plot in 1960, conversion by disking was undertaken on the accessible slopes of Plot #3 in the spring of 1965. This area was disked again and reseeded in late October, 1965. Plans call for follow-up chemical treatment for the control of brush and weed regrowth, as needed, the following spring.

A summary of the treatments involved in this conversion, along with a breakdown of costs and returns, is presented in the remainder of this brochure.

BRUSH REMOVAL

BRUSH CRUSHING

Brush was crushed on Plots #1 and #2 in February, 1960, to secure a better and safer burn. Crushing was done with an anchor chain pulled by two tractors (TD-18's). Once techniques for handling the chain were worked out, an average of eight acres per hour was crushed in rolling country and four acres per hour on steep canyon sides.

The cost of crushing Plots #1 and #2:
95 acres @ $4.37 per acre:

Total $415.20

Results

Crushing was satisfactory on old brush stands of Plot #1 but young brush stands of Plot #2 didn't crush well. Work was planned for November of 1959 when brush was brittle; but, due to a long fire season, crushing was not done until February of 1960 when sap was up and brush was very limber.

FIRE LINE CONSTRUCTION

Firebreaks were constructed around Plots #1, #2 and #3 in February, 1960. Double lines were cleared about 75 feet apart with brush crushed between. The intervening strip was to be burnt as soon as the grass was dry; an economical method of providing wide fire lines with a minimum of soil disturbance. 'Dozer time - 13 hours.

Results

Results were not as satisfactory as desired. Since work was done when the sap was up and brush was limber, crushing was ineffective and the strip had to be cleaned with a 'dozer. Total 'dozer time - 26 hours.

The cost of fire line construction on Plots #1, #2 and #3:
182 acres @ $1.48 per acre: Total $269.88

BRUSH DISKING

After several years of inactivity, conversion efforts were renewed on Plot #3. Because of results obtained from disking the small test Plot adjacent to Plot #3 in 1960 (after five years Plot is still relatively free of brush), it was decided that brush disking should be tried on a larger scale. The objective will be to determine the costs and the effectiveness of disking as a method of brush removal in the chaparral type.

In May of 1965 approximately 25 acres of standing brush was disked, using a heavy brush disk pulled by a tractor (TD-20). 'Dozer time - 30 hours.

In late October, 1965, this plot was disked the second time to eradicate brush sprouts and to turn under remaining debris. 'Dozer time - 25 hours.

The cost of disking (twice:
25 acres @ $33.04 per acre: Total $826.00

Results

The first disking was very effective in knocking down and uprooting most of the brush. While some brush was turned under by the disk, considerable debris remained on the surface. Brush sprouts

appeared fewer and less vigorous than had the area been burned.

The second disking was generally effective in uprooting sprouting brush and turning under remaining debris, but some problems were encountered. In areas where heavy debris remained the disk became clogged or rode over the material. To alleviate this problem the heavy concentrations were burned. Following burning the disking operation went very smoothly.

The cost of spot burning:
25 acres @ $5.37 per acre: Total $134.24

OAK TREE TREATMENT

Work was done on about four acres at lower end of Plot #2. Trees were frilled and treated with brush-killer mix of 2, 4-D and 2,4,5-T. A total of 155 trees were treated requiring 4 man hours of work. One gallon of chemical was used costing $7.17.

The cost of treatment, including labor:
155 trees @ $0.10 per tree: Total $15.17

Results

Results of tree poisoning were poor. Some top kill was evidenced but most trees have subsequently recovered.

BRUSH BURNING AND RESULTS

Plots were burned on October 17, 1960. Poor burning conditions prevailed (humidity was never below 50%). A good burn was secured on heavy brush where chained down. Poor burn resulted on light brush even where chained. The standing brush on Plot #3 would not burn.

The cost of equipment and materials for burning:
182 acres @ $1.92 per acre: Total $349.79

R E V E G E T A T I O N

Approximately 34 acres of Plots #1 and #2 were seeded November 19 to 24 of 1960, using a small range drill pulled by a light tractor (TD-9). The 34 acres were drilled in 26 hours.

During the same period an additional 34 acres of the steep slopes in Plots #1 and #2 were seeded by hand. A total of 24 man hours were used in this operation.

The seed mixture used was:

Harding grass	3.2 lbs./acre
Perennial ryegrass	1.1 lbs./acre
Smilo	0.7 lbs./acre
TOTAL	5.0 lbs./acre

Approximately 69 acres of Plots #1 and #2 were hand seeded with a legume mixture December 5, 1961. (Roughly the same area seeded with perennial grasses.) The seed mixture of burclover and lana vetch was seeded at two rates: About one-half the area was seeded at 1½ lbs. burclover to 5 lbs: lana vetch, and the other half at 4 lbs. each of lana vetch and burclover. A total of 40 man hours was used for the operation.

The cost for drill seeding, including seed:
34 acres @ $14.38 per acre: Total $489.01

The cost for hand seeding, including seed:
34 acres @ $7.57 per acre: Total $257.38

The cost for legume seeding, including the seed:
69 acres @ $5.47 per acre: Total $377.20

Reseeding of Plot #3 was done following the second disking using a heavy 10-foot range drill pulled by a TD-20 tractor. It was planned that this operation be done concurrently with disking using a tandem setup. However, after several attempts this plan was given up as impractical.

Since no other equipment was available the heavy tractor was used to pull the drill; a smaller unit would have been more economical. The 25 acres were drilled in 12 hours.

The following seed mixture was used:

Harding Grass	4.0 lbs./acre
Smilo	0.5 lbs./acre
Lana vetch	4.0 lbs./acre
Burclover	2.0 lbs./acre
TOTAL	10.5 lbs./acre

The cost for drill seeding, including seed:
25 acres @ $14.35 per acre: Total $358.86

Results

The 34 acres drill seeded with perennial grasses (largely in Plot #1) did well. In April, 1961, these seeded grasses covered 15% of the total ground area. In spite of an estimated loss of 50% of seeded plants during the summer of 1961, they increased to cover 30% of the total ground area by March of 1962 and have continued to increase since.

Results of the 34 acres of perennial grass land seeded were only fair. In April of 1961 these seeded plants covered 1% of the total ground area and increased to 4% by March of 1962. Further increases have been observed yearly.

The legume seeding was almost a complete failure. The failure, we believe, was due largely to birds eating the uncovered seeds and severe competition from seeded and native grasses.

The results of drill seeding Plot #3 are not yet known.

F O L L O W - U P C O N T R O L

SPRAYING

Approximately 110 acres of Plots #1 and #2 were sprayed with a 2,4-D + 2,4,5-T herbicide mixture by helicopter on May 3, 1961. This spraying was done to control brush regrowth and competing weeds. Following is the mixture used and the application rate:

2,4-D + 2,4,5-T (4 lbs. acid equivalent)	1 gal. per acre
Diesel	1 gal. per acre
Water	8 gals. per acre
TOTAL	10 gals. per acre

The cost of spraying:
110 acres @ $9.57 per acre: Total $1,052.26

Results

Results of spraying were very good. Measurements taken in March of 1962 show a density decrease of brush sprouts of 73% and a density decrease of native forbs of 65%. Both the seeded grasses and native grasses showed a substantial increase over the area.

FOLLOW-UP SPRAYING

On May 23, 1962, approximately 68 acres of Plots #1 and #2 were spot sprayed with a herbicide mixture of 2,4-D and 2,4,5-T in an effort to kill the surviving brush sprouts. Both a backpack mist blower and hand operated spray cans were used for this follow-up work. Below is the herbicide mixture used for this follow-up work:

2,4-D + 2,4,5-T (4 lbs. acid)	1 gal.
Diesel	1 gal.
Water	3 gals.
TOTAL	5 gals.

The cost of follow-up spraying:
68 acres @ $3.67 per acre: Total $249.46

Results

Results of the follow-up spraying were very good on the area treated by the mist blower but only fair on the area treated by the hand carried spray cans. Additional follow-up treatment was necessary to maintain the area brush free.

SECOND FOLLOW-UP SPRAYING:

A second spot spraying was undertaken on 32 acres of Plot #1 in April of 1964 to control continuing brush encroachment. A 2,4-D + 2,4,5-T mixture was applied using backpack hand spray cans. The following are the mixture and application rates:

2,4-D + 2,4,5-T (4 lbs. acid equivalent)	0.25 gal./acre
Diesel	0.25 gal./acre
Water	0.75 gal./acre
TOTAL	1.25 gals./acre

The cost of spraying Plot #1:
32 acres @ $3.61 per acre: Total $115.45

Results

The results of the second follow-up spraying were good. It was estimated that 90% of the brush treated was eliminated following spot spraying.

EROSION CHECK DAMS

In early December of 1961, a system of 8 erosion check dams was constructed in the gullies of Plots #1 and #2 in an effort to check erosion, increase infiltration and halt soil deposition below the project. A small TD-9 was used for dam construction.

The cost of dam construction:
$9.30 per dam: Total $74.40

The cost of second year dam cleaning:
$6.12 per dam: Total $48.95

Results

Dams worked very well. All were nearly filled with silt after the heavy rains of early 1962. Only one dam washed out and the silt from it was collected in another dam below. Hardly any additional soil and silt were deposited below the project.

F E R T I L I Z A T I O N T R I A L S & T R E A T M E N T

FERTILIZER TRIALS

An exploratory fertilizer trial was established on Plot #1 October 15, 1963. The purposes were to : 1) determine soil deficiencies on the Study, 2) analyze the economic aspects of range fertilization and 3) follow-up the over-all plans for the Study.

The trial tested for deficiency of the elements Nitrogen, Phosphorus and sulphur. Multiple applications of these elements were made alone in combination at the rate of 60 pounds of desired element or elements per acre.

Results

Results obtained from measurements of this trial were inconclusive with respect to treatments. These disappointing results were attributed to three factors:

1) Low rainfall (12 inches)
2) Rodent Damage
3) Vegetative composition differences

Nevertheless it was felt that there was sufficient response to economically justify large scale Nitrogen fertilization.

FERTILIZATION:

December 2, 1964, 32 acres of Plot #1 was fertilized with Urea at the rate of 60 pounds elemental Nitrogen per acre. The application was made by fixed wing aircraft.

The cost of flying and fertilizing (133 lbs. Urea per acre):
32 acres @ $9.53 per acre: Total $304.91

Results

While it is not possible to evaluate the results of fertilization alone, the trials indicated that an approximate return of 109% of the investment could be expected under conditions which prevailed during the 1963 - 1964 season. Since conditions were much better during the 1964 - 1965 season, the net return from fertilization was probably far in excess of the 109% projected.

PROJECT COSTS SUMMARY

Chargeable Costs for the Conversion Work Done On 119 Acres of Plots #1 and #2

Plot #1

Total Chargeable Cost	$2,216.39
Average Cost Per Acre	41.04

Plot #2

Total Chargeable Cost	$1,588.24
Average Cost Per Acre	24.43

Chargeable Costs for the Conversion Work Done On 25 Acres of Plot #3

Total Chargeable Cost	$1,335.05
Average Cost Per Acre	53.40

GRAZING MANAGEMENT

PROCEDURE

Stocker cattle have been grazed on both plots beginning in the spring of 1962. No grazing was conducted in 1961, the first year after seeding, giving the seeded plants a chance to become established. Steers, heifers, or a mixture have been used, depending which happened to be available on the ranch at the time needed. In 1962, 1963, and 1964 grazing was done simultaneously on both Plots #1 and #2. In 1965 the same animals were rotated between the plots. Present grazing plans call for fall and winter grazing on Plot 1 and Plot 2 after the first of the year.

Grazing Procedures - Table 1

Year and Plot No.	No. Head	Date On	Date Off	Days Grazed	Average Weight On	Average Weight Off
1962 Plot 1	17 a	March 21	April 20	30	531	630
Plot 2	13 a	March 21	April 20	30	510	593
Plot 1	17 a	Aug. 15	Oct. 1	46	667	721
Plot 2	13 a	Aug. 15	Oct. 1	46	670	710
1963 Plot 1	19 b	April 15	August 5	111	572	748
Plot 2	12 b	April 15	August 5	111	578	742
1964 Plot 1	18 a	Feb. 14	May 16	91	654	766
Plot 2	12 a	Feb. 14	May 16	91	617	739
1965 Plot 1	30 c	Jan. 20	March 18	57	372	449
Plot 2	30 c	March 18	June 2	75	449	560
Plot 1	30 c	June 2	July 21	49	560	604

Footnote: a. replacement heifers
b. steers
c. mixed

RESULTS AND RETURNS

The cattle were brought from the plots to the scales and weighed at approximately 8:30 a.m. with no shrink. Animal Unit Month (AUM) data was based on average weight during the grazing period. The standard ranch practice is to sell cattle with a 3 per cent pencil shrink. It was felt the same procedure should be used to estimate grazing returns. Thus production weights were shrunk 3 per cent then and average price of $25/cwt was used for the years 1962, 1963, and 1965; in 1964 $18/cwt was used.

Grazing Results - Table 2

Plot 1 (54 acres)

Year	Total Production Pounds Beef	Total Production A.U.M.'s	Production/Acre Pounds Beef	Production/Acre A.U.M.'s
1962	2,600	27.6	48.1	.51
1963	3,350	47.5	62.0	.88
1964	2,020	38.2	37.4	.71
1965	3,620	51.0	67.0	.95
Total	11,590	164.3	214.5	3.05

Plot 2 (65 acres)

1962	1,600	21.2	24.6	.32
1963	1,970	28.8	30.3	.44
1964	1,470	24.6	22.6	.38
1965	3,330	38.8	51.2	.60
Total	8,370	113.4	128.7	1.74

Investment - Returns - Table 3

Plot 1

Year	Improvement Cost/Acre	Estimated Return/Acre*	% Recovered On Investment
1962	$29.90	$11.76	39.3
1963	--	15.04	89.6
1964	--	6.53	111.5
1965	11.14	16.26	120.8
Total	$41.04	$49.59	

Plot 2

1962	$24.43	$ 5.97	24.4
1963	---	7.35	54.4
1964	---	3.95	70.7
1965	---	12.42	121.6
Total	$24.43	$29.71	

* Return = 3% production weight x average price ($25/cwt - 1962, 63, 65 and $18/cwt - 1964.)

F U T U R E W O R K

LEGUME INOCULATION

Recent studies have shown ineffective inoculation a probable cause for failure in the establishment of legumes under range land conditions. This condition is probably more pronounced in arid areas prior to

rainfall. For this reason dry inoculation was tried on a portion of Plot #3 and a new pelleted inoculation technique was tested on the remaining portion of Plot #3. It is hoped that these inoculation techniques will enhance the chances of legume establishment.

FOLLOW-UP SPRAYING

Plot #1 and Plot #3 will be spot sprayed to control brush encroachment for the life of the project. The object being to determine the cost necessary to maintain a brush-free condition. A comparison will be made to determine the effect of brush removal techniques (mechanical versus burning) on follow-up spraying costs.

FERTILIZATION

Fertilization trials will be conducted for the life of the project to determine if further fertilization is economically justified. If trials show justification, fertilization will be continued on selected portions of this study.

S U M M A R Y A N D C O N C L U S I O N S

The study has been successful in demonstrating advanced methods of brushland conversion. It has also shown economic justification for attempting such a conversion with a 25 per cent per year return on the money invested. Some of the more important conclusions after five years' work on the Study are:

1. Brush crushing with an anchor chain is most effective in old stands of brush. A clean burn can be assured following crushing even in periods of very poor burning weather.

2. Perennial grasses can be best established by drilling where at all possible.

3. Competition from weed and brush regrowth can be controlled with chemical sprays.

4. Grazing management is important for continued high production of perennial grass plants.

APPENDIX

Itemized Chargeable Costs on Ranchita Project*

Plot #1 and Plot #2

	Plot #1 (54 Acres)		Plot #2 (65 Acres)	
Brush Crushing-1960	47 acres @ 4.37 =	$205.39	48 acres @ 4.37 =	$209.76
Fire Line Construction-1960	54 acres @ 1.48 =	79.92	65 acres @ 1.48 =	96.20
Oak Tree Poisoning-1960	-		155 acres @ .10 =	15.17
Burning-1960	54 acres @ 1.92 =	103.68	65 acres @ 1.92 =	124.80
Drill Seeding-1960	24 acres @14.38 =	345.12	10 acres @14.38 =	143.80
Hand Seeding-1960	15 acres @ 7.57 =	113.55	19 acres @ 7.57 =	143.83
Spraying-1961	50 acres @ 9.57 =	478.50	60 acres @ 9.57 =	574.20
Legume Seeding-1961	40 acres @ 5.47 =	218.80	29 acres @ 5.47 =	158.63
Erosion Check Dams-1961	7 each @ 9.30 =	65.10	1 each @ 9.30 =	9.30
Follow-up Spraying-1961	39 acres @ 3.67 =	143.13	29 each @ 3.67 =	106.43
Cleaning Check Dams-1962	7 each @ 6.12 =	42.84	1 each @ 6.12 =	6.12
Fertilization-1964	32 acres @ 9.53 =	304.91	-	
Follow-up Spraying-1964	32 acres @ 3.61 =	115.45	-	
TOTAL COSTS		$2,216.39		$1,588.24
AVERAGE COST PER ACRE		$41.04		$24.43

*Costs are based on actual expenditures for materials, equipment, and labor. Equipment and labor costs are based on standard C.D.F. rates.

APPENDIX

Itemized Chargeable Costs on Ranchita Project*

Plot #3

Brush Disking (first disking)-1965	25 acres @ 17.26 =	$ 431.40
Brush Disking (second disking)-1965	25 acres @ 15.78 =	394.50
Fire Line Construction - 1965	25 acres @ 2.52 =	63.12
Burning - 1965	25 acres @ 2.84 =	71.12
Drill Seeding-1965	25 acres @ 14.35 =	374.91
Total Costs		$1,335.05

Average cost per acre $53.40

* Costs are based on actual expenditures for materials, equipment, and labor. Equipment and labor costs are based on standard CDF rates.

APPENDIX

PHOTOGRAPHS OF RANCHITA RANGE STUDY
PLOT #1

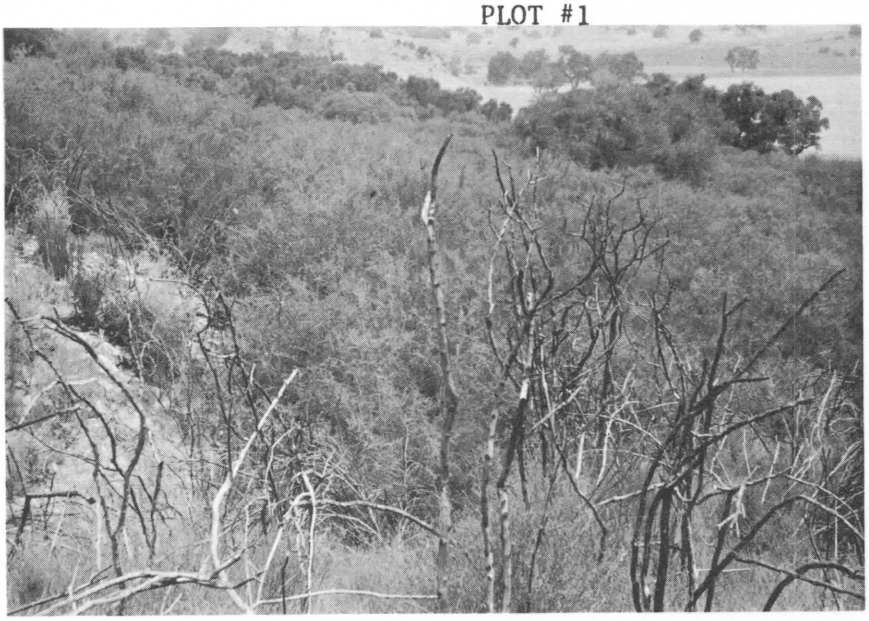


Photo #1
July 1959

Typical stand of brush on Plot #1 prior to brush removal.

Photo #2
October 1960

Same view as Photo #1 following crushing and burning.

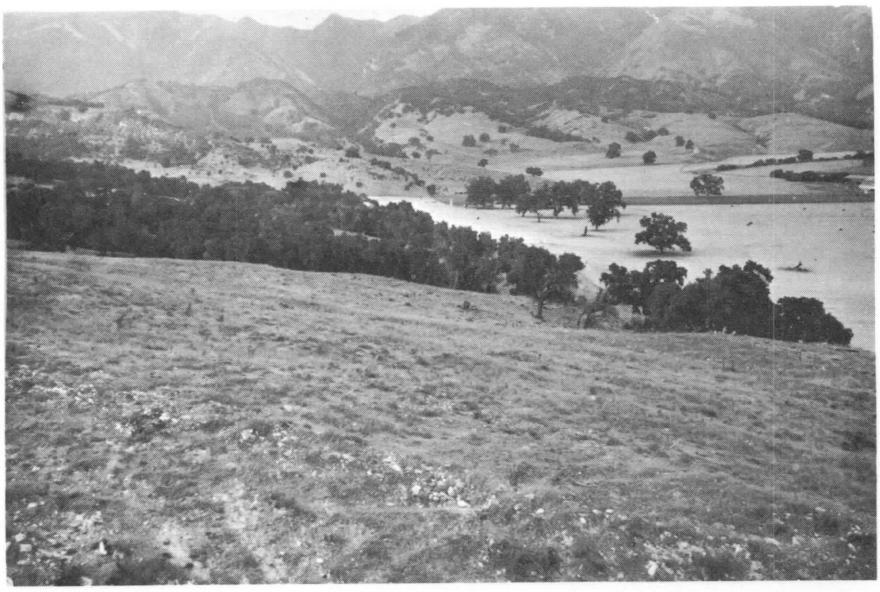
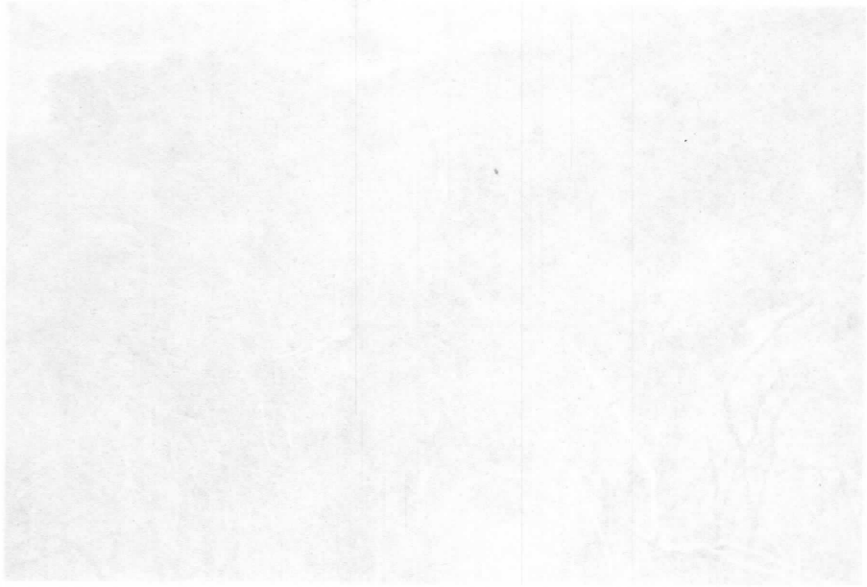


Photo #3
October 1965

Same view as Photo #1 five years after reseeding.



CURRENT RANCHITA RANGE STUDY - 1968

Included in Sections 23, 24; T31S, R15E MDB&M and
a portion of the Rancho Arroyo Grande Land Grant

Scale 4" equals 1 mile

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DEPARTMENT OF CONSERVATION
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