

MANIPULATION OF WOODY COVER STUDY
PLACER COUNTY

	Untreated		Treated	
	N	W	N	W
Total Herbaceous ground cover (Density)	23	47	60	80
	35		70	
Botanical Composition				
Annual grasses	34	28	46	48
	31		47	
Erodium botrys	-	22	-	34
Erodium cicutarium	18	8	6	6
Medicago hispida	6	14	6	4
	10		5	
Other forbs	42	28	42	8
	35		25	

N - North = facing slope
W - West = facing slope

Sampled 2/27/57

WATERSHED MANIPULATION STUDY
PLACER COUNTY

	A	B	C
Total Herbaceous ground cover (Density)	5.5	5.0	9.0
Botanical Composition:			
Annual grasses	29.5	35.0	30.5
Trifolium spp.	2.5	9.0	7.0
Erodium botrys	-	2.0	1.5
Total	<u>2.5</u>	<u>11.0</u>	<u>8.5</u>
Brodiaea spp.	28.5	21.5	9.5
Galium spp.	8.0	12.5	6.5
Other forbs	<u>31.5</u>	<u>20.0</u>	<u>45.0</u>
Total Undesirable forbs	68.0	54.0	61.0
Total grasses	29.5	35.0	30.5
Total Forbs	70.5	65.0	69.5

Sampled: 2/27/57

PLACER COUNTY -- STUDY OF SOILS IN 3 WATERSHEDS

Statistical analysis of soil depth.

Watershed	Av. Depth Inches	Standard Deviation s	Standard Error E	Unbiased s^2	Number of Samples	% Auburn Exchequer White Rock		
						A 59.2Ac	21.5	6.24
B 34.0Ac	21.5	8.60	2.22	79.6	15	40	53	7
C 15.5Ac	<u>18.3</u>	<u>6.45</u>	<u>1.79</u>	45.0	13	54	31	15
ABC	20.7	7.02	.97					

Comparisons btw watersheds	Standard Error of Difference E_d	Difference D	D/E_d	F_x	$F_{5\%}$	$F_{1\%}$
A-B	0	0	0	1.96	2.17	2.93
A-C	2.19	3.2	1.46	1.10	2.51	3.80
B-C	2.85	3.2	1.12	1.77	2.64	4.05

Since D/E_d is smaller than E_d in all comparisons, there is no significant difference between the average depths on the 3 watersheds.

Since the F test shows F_x less than F at both the 5% and 1% level, it can be assumed that there is no significant differences between the frequency distributions of soil depth on the three watersheds.

Thus the average depth of the combined watersheds may be used for all computations.

Street

VEGETATIVE COMPOSITION
PLACER COUNTY EXPERIMENTAL WATERSHEDS

May 14, 1959

The annual forage sampling was made by James E. Street, Agronomy Department. There are eight transects, each 150 feet long, in each watershed. Step-pointing was done so that a point was made each five steps, a record of the overhead tree canopy was made at the same points, and a density estimate was made each 10 steps. Therefore each transect had 10 ground cover points, 10 canopy observations, and five density estimates, or a total of 80 ground cover points, 80 canopy observations, and 40 density estimates for each watershed.

It should be noted that in all 240 points, no filaree was observed. The same was true in the sampling of June 4, 1957. It is felt that this is a result of relatively late sampling as far as forage drying is concerned, since filaree was noted in the original sampling of February 27, 1957.

Density estimates are considerably above previous records, although the relationship between watersheds is about the same as in previous samplings. Young, low-growing poison oak was considered in the density estimates, and this may account in part for the higher density estimates. It is also possible that the amount of young poison oak has increased.

Following is the summary of all watersheds and the detailed records of the individual watersheds.

	A	B	C	ALL
Amount of open canopy, %	25	12	29	22
Desirable grasses, %	6	6	13	8
Desirable legumes, %	3	10	11	8
Undesirable forbs & weeds, %	61	44	45	50
Undesirable grasses, %	30	40	31	34
Density of ground cover	15	15	22	17

PLACER A

TRANSECT	1	2	3	4	5	6	7	8	All
	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %
Density									
1.	1 10	1 10	4 40	1 10	1 10	1 10	1 10	0 0	10
2.	5 50	2 20	6 60	1 10	2 20	2 20	1 10	0 0	19
3.	1 10	0 0	1 10	0 0	0 0	2 20	0 0	0 0	4
4.	2 20	2 20	6 60	3 30	3 30	1 10	0 0	3 30	20
5.	1 10	1 10	0 0	1 10	2 20	3 30	0 0	0 0	8
Total & Ave.	10 20	6 12	17 34	6 12	8 16	9 18	2 4	3 6	61 15.3
Canopy: Open	4 40	1 10	2 20	1 10	3 30	8 80	1 10		20 25
Blue Oak	2 20	1 10		2 20		1 10			6 8
Live Oak	4 40	8 80	8 80	5 50	7 70	1 10	9 90	10 100	52 64
Digger Pine									
Black Oak				2 20					2 3
Perennial brome	1 10		2 20						3
Wild oats					1 10				1
Soft chess						1 10			1
Stipa									
Blue Wild Rye									
Sub	1 10		2 20		1 10	1 10			5 6
Bur clover									
Trifolium					1 10		1 10		2
Annual lotus									
Sub					1 10		1 10		2 3
Poison oak	1 10	2 20	1 10	1 10	1 10			3 30	9
Klamath weed					1 10				1
Geranium									
Weedy legume									
Undesirable forb	6 60	3 30	4 40	5 50	3 30	7 70	6 60	5 50	39
Sub	7 70	5 50	5 50	6 60	5 50	7 70	6 60	8 80	49 61
Ripgut		5 50	3 30	1 10	2 20	1 10	3 30	2 20	17
Red brome	1 10				1 10				2
Spanish brome									
Annual fescue				1 10					1
Briza minor									
Nitgrass				1 10					1
Hairgrass	1 10			1 10		1 10			3
Melic									
Sub	2 20	5 50	3 30	4 40	3 30	2 20	3 30	2 20	24 30

PLACER B

TRANSECT	1	2	3	4	5	6	7	8	All
	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %	no. %
<u>Density</u> 1.	0	2 20	2 20	1 10	3 30	2 20	1 10	2 20	13
2.	1 10	1 10	0	3 30	1 10	2 20	2 20	3 30	13
3.	1 10	2 20	1 10	1 10	1 10	1 10	1 10	1 10	9
4.	0	5 50	2 20	0	0	2 20	1 10	2 20	12
5.	2 20	2 20	1 10	1 10	1 10	2 20	1 10	1 10	11
Total & Ave.	4 8	12 24	6 12	6 12	6 12	9 18	6 12	9 18	58 14.5
<u>Canopy: Open</u>	1 10		1 10			7 70	1 10		10 12
Blue oak		3 30	7 70		1 10	3 30	3 30		17 21
Live oak	8 80	5 50	1 10	10 100	9 90		4 40	10 100	47 59
Digger Pine	1 10						2 20		3 4
Black oak		2 20	1 10						3 4
Perennial brome	1 10		1 10	1 10					3
Wild oats							1 10		1
Soft chess			1 10						1
Stipa									
Blue Wild Rye									
Sub	1 10		2 20	1 10			1 10		5 6
Bur clover			1 10			1 10	1 10		3
Trifolium						2 20			2
Annual lotus						3 30			3
Sub			1 10			6 60	1 10		8 10
Poison oak	1 10	2 20	2 20	1 10	4 40			1 10	11
Klamath weed				1 10			1 10		2
Geranium									
Weedy legume									
Undesirable forb	4 40	5 50	1 10	3 30	4 40	1 10	2 20	2 20	22
Sub	5 50	7 70	3 30	5 50	8 80	1 10	3 30	3 30	35 44
Ripgut	3 30	3 30	3 30	4 40	1 10		2 20	3 30	19
Red brome						1 10	2 20	1 10	4
Spanish brome									
Annual fescue						1 10	1 10	2 20	4
Briza minor									
Nitgrass									
Hairgrass	1 10		1 10		1 10	1 10			4
Melic								1 10	1
Sub	4 40	3 30	4 40	4 40	2 20	3 30	5 50	7 70	32 40

PLACER C

TRANSECT	1		2		3		4		5		6		7		8		All	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Density: 1.	3	30	1	10	2	20	3	30	2	20	5	50	2	20	1	10		19
2.	1	10	2	20	3	30	3	30	2	20	1	10	3	30	3	30		18
3.	3	30	2	20	2	20	3	30	2	20	2	20	2	20	0			16
4.	2	20	2	20	1	10	4	40	2	20	3	30	2	20	2	20		18
5.	1	10	1	10	1	10	4	40	4	40	1	10	2	20	1	10		15
Total & Ave.	10	20	8	16	9	18	17	34	12	24	12	24	11	22	7	14	86	21.5
Canopy: Open	8	80			2	20	3	30	4	40	3	30	2	20	1	10	23	29
Blue oak	1	10	3	30	4	40	7	70	2	20	5	50	1	10	3	30	26	33
Live oak	1	10	7	70	4	40			3	30	2	20	7	70	5	50	29	36
Digger pine									1	10							1	1
Buckeye															1	10	1	1
Perennial brome													1	10				1
Wild oats									1	10								1
Soft chess	2	20	1	10	1	10			1	10	1	10						6
Stipa					1	10												1
Blue Wild Rye											1	10						1
Sub	2	20	1	10	2	20			2	20	2	20	1	10				10 13
Bur clover					1	10	2	20	2	20	1	10						6
Trifolium	1	10																1
Annual lotus			1	10			1	10										2
Sub	1	10	1	10	1	10	3	30	2	20	1	10						9 11
Poison oak									1	10	2	20			1	10		4
Klamath weed					1	10												1
Geranium					1	10	1	10			1	10						3
Weedy legume															1	10		1
Undesirable forb	4	40	5	50	2	20	1	10	5	50	1	10	7	70	2	20		27
Sub	4	40	5	50	4	40	2	20	6	60	4	40	7	70	4	40		36 45
Ripgut			1	10			3	30			1	10	1	10	6	60		12
Red brome					2	20	1	10										3
Spanish brome	1	10	2	20	2	20												3
Annual fescue																		
Briza minor	1	10																1
Nitgrass																		
Hairgrass	1	10			1	10	1	10			2	20	1	10				6
Melic																		
Sub	3	30	3	30	3	30	5	50			3	30	2	20	6	60		25 31

VEGETATIVE COMPOSITION
PLACER COUNTY EXPERIMENTAL WATERSHEDS
May 19, 1960

The annual forage sampling was made by Charles Walker, Agronomy Department. There are eight transects, each 150 feet long, in each watershed. Step-pointing was done so that a point was made each five steps and a density estimate was made each 10 steps. Therefore, each transect had 10 ground cover points and five density estimates. The totals for each of the three watersheds are 80 points and 40 density estimates.

Transects have been identified and located by means of wooden stakes driven into the ground. Location has been difficult at times. For further identification, strips of colored plastic tape were hung from trees near the start and finish of each transect. Red tape marks the start, yellow marks the finish.

DENSITY OF GROUND COVER

Density is about the same as last year, considering all watersheds. However, there was variation in individual watersheds compared to a year ago. The density on "A" increased markedly, while "C" decreased a similar amount. One reason for "A" increasing may be an increase in young, low growing poison oak. Nevertheless, density of ground cover remains low in all watersheds.

	A	Watershed		All
		B	C	
Density of ground cover, %	20.5	12.8	16.5	16.6

BOTANICAL COMPOSITION

The botanical composition of the ground cover present is shown below.

	A	Watershed		All
		B	C	
Desirable grasses, %	10.8	8.9	16.3	11.7
Desirable legumes, %	8.8	10.0	10.0	9.6
Undesirable grasses, %	22.6	37.6	36.4	32.1
Undesirable forbes and weeds, %	58.9	43.9	37.6	46.7

WATERSHED COVER

A more realistic measure of forage production would be to consider the botanical composition in its relation to the entire watershed, rather than to the 15 or 20% of the area covered by low growing vegetation. Such a consideration is found in the table below.

	A	Watershed		All
		B	C	
Desirable grasses, %	2.05	1.14	2.69	1.94
Desirable legumes, %	1.80	1.28	1.65	1.59
Undesirable grasses, %	4.63	4.81	6.01	5.33
Undesirable forbes and weeds, %	12.07	5.62	6.20	7.75
Bare of ground cover, %	79.45	87.15	83.45	83.39

From this it is seen that over all watersheds, only about $3\frac{1}{2}\%$ is covered by desirable forage, both grasses and legumes, while $96\frac{1}{2}\%$ of the ground is either devoid of low growth or is supporting undesirable forage plants.

Walker

VEGETATIVE COMPOSITION
PLACER COUNTY EXPERIMENTAL WATERSHEDS
May 16, 1961

The annual forage sampling was made by Charles Walker, Agronomy Department. There are eight transects, each 150 feet long, in each watershed. Step-pointing was done so that a point was made each five steps and a density estimate was made each 10 steps. Therefore, each transect had 10 ground cover points and five density estimates. The totals for each of the three watersheds are 80 points and 40 density estimates.

Transects have been identified and located by means of wooden stakes driven into the ground. Location has been difficult at times. For further identification, strips of colored plastic tape were hung from trees near the start and finish of each transect. Red tape marks the start, yellow marks the finish.

DENSITY OF GROUND COVER

Density is 10% higher than for any previous year. The excellent feed year for the area may have caused an increase in this figure. Placer C, with a more open canopy, returned to its place as having the highest density. Placer C has always shown the greatest density of ground cover, except for the 1960 reading.

	<u>Watershed</u>			<u>All</u>
	<u>A</u>	<u>B</u>	<u>C</u>	
Density of ground cover, %	26.3	18.0	37.0	27.1

BOTANICAL COMPOSITION

The botanical composition of the ground cover is shown below.

	<u>Watershed</u>			<u>All</u>
	<u>A</u>	<u>B</u>	<u>C</u>	
Desirable grasses, %	8	6	13	9
Desirable legumes, %	14	14	18	15
Undesirable grasses, %	35	40	41	39
Undesirable forbs and weeds, %	44	40	29	38
Total desirable, %	22	20	31	24
Total undesirable, %	79	80	70	77

The percentage of desirable grasses is in the same range as previous years. The percentage of desirable legumes showed more than a 50% increase over previous years, possibly due to the type of season. Undesirable grasses increased, and weeds decreased.

WATERSHED COVER

Applying the density estimate to the botanical composition provides information on the actual cover of low growing vegetation on the watersheds.

	<u>Watershed</u>			<u>All</u>
	<u>A</u>	<u>B</u>	<u>C</u>	
Desirable grasses, %	2.1	1.1	4.8	2.4
Desirable legumes, %	3.7	2.5	6.7	4.1
Undesirable forbs & weeds, %	11.6	7.2	10.7	10.3
Undesirable grasses, %	9.2	7.2	15.2	10.6
Total desirable, %	5.8	3.6	11.5	6.5
Total undesirable, %	20.8	14.4	25.9	20.9
Bare of ground cover, %	73.7	82.0	63.0	72.9

Using these figures, the desirable grasses increased by about 25%, the desirable legumes more than doubled, the undesirable grasses doubled, and the weeds increased by about 50% as compared to a year ago.

The total of desirable forage almost doubled, while the total of undesirables increased about 50% from a year ago.

PLAGER A

Transect

		1		2		3		4		5		6		7		8		All	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
<u>Density</u>	1.	4	40	1	10	1	10	2	20	6	60	4	40	1	10	0	0		
	2.	2	20	1	10	2	20	2	20	5	50	7	70	0	0	1	10		
	3.	2	20	3	30	1	10	1	10	0	0	4	40	1	10	2	20		
	4.	2	20	4	40	6	60	3	30	6	60	6	60	0	0	0	0		
	5.	2	20	2	20	1	10	3	30	6	60	8	80	2	20	1	10		
Total & Ave.		12	24	11	22	11	22	11	22	23	46	29	58	4	8	4	8	105	26.3
<u>Composition</u>																			
	Soft chess							1	10			3	30					4	
	Wild oats									1	10							1	
	Woodland brome					1	10											1	
	Sub total					1	10	1	10	1	10	3	30					6	8
	Bur clover	1	10	1	10	2	20			1	10			2	20			7	
	Annual trifolium	1	10					2	20	1	10							4	
	Sub total	2	20	1	10	2	20	2	20	2	20			2	20			11	14
	Ripgut	2	20	6	60	3	30	2	20	3	30	1	10	4	40	3	30	24	
	Brisa minor			1	10			1	10									2	
	Hairgrass									1	10	1	10					2	
	Sub total	2	20	7	70	3	30	3	30	4	40	2	20	4	40	3	30	28	35
	Klamath weed	1	10											2	20			3	
	Poison oak	1	10			1	10							1	10	1	10	4	
	Brodiaea					2	20	1	10			1	10	1	10	3	30	8	
	Other weeds	4	40	2	20	1	10	3	30	3	30	4	40			3	30	20	
	Sub total	6	60	2	20	4	40	4	40	3	30	5	50	4	40	7	70	35	44

PLACER B

Transect

	1		2		3		4		5		6		7		8		All		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
<u>Density</u>																			
1.	0	0	1	10	2	20	1	10	1	10	4	40	2	20	2	20			
2.	0	0	3	30	1	10	1	10	2	20	2	20	3	30	2	20			
3.	1	10	1	10	3	30	1	10	3	30	5	50	3	30	1	10			
4.	1	10	3	30	3	30	2	20	1	10	2	20	4	40	1	10			
5.	0	0	1	10	1	10	2	20	0	0	2	20	2	20	2	20			
Total & Ave.	2	4	9	18	10	20	7	14	7	14	15	30	14	28	8	16	72	18	
<u>Composition</u>																			
Soft chess											3	30	1	10					4
Calif. melic															1	10			1
Sub total											3	30	1	10	1	10			5 6
Bur clover					1	10			2	20	2	20	2	20	1	10			8
Annual trifolium			1	10	1	10													2
Lotus											1	10							1
Sub total			1	10	2	20			2	20	3	30	2	20	1	10			11 14
Ripgut	3	30	3	30	2	20	4	40	3	30	1	10	7	70	4	40			27
Briza minor			1	10	1	10	1	10							2	20			5
Sub total	3	30	4	40	3	30	5	50	3	30	1	10	7	70	6	60			32 40
Klamath weed					1	10													1
Poison oak			1	10					1	10					1	10			3
Brodiaea	3	30	1	10			2	20											6
Other weeds	4	40	3	30	4	40	3	30	4	40	3	30			1	10			22
Sub total	7	70	5	50	5	50	5	50	5	50	3	30	0	0	2	20			32 40

PLAGER G

Transect

		1		2		3		4		5		6		7		8		All			
		no.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
<u>Density</u>	1.	1	10	2	20	4	40	6	60	5	50	5	50	3	30	2	20				
	2.	3	30	3	30	4	40	8	80	7	70	4	40	3	30	5	50				
	3.	4	40	4	40	3	30	3	30	6	60	3	30	3	30	1	10				
	4.	2	20	5	50	3	30	2	20	7	70	8	80	2	20	1	10				
	5.	3	30	3	30	2	20	8	80	3	30	2	20	3	30	2	20				
	Total & Ave.	13	26	17	34	16	32	27	54	28	56	22	44	14	28	11	22	148	37		
<u>Composition</u>																					
	Soft chess	3	30	1	10	5	50			1	10								10		
	Sub total	3	30	1	10	5	50			1	10								10	13	
	Bur clover	1	10			1	10	3	30	2	20	3	30	2	20	1	10			13	
	Annual trifolium									1	10									1	
	Sub total	1	10			1	10	3	30	3	30	3	30	2	20	1	10			14	18
	Ripgut	2	20	5	50			4	40	1	10	2	20	3	30	4	40			21	
	Brisa minor	1	10			1	10	1	10							1	10			4	
	Hairgrass	2	20			1	10					3	30							6	
	Annual fescue															1	10			1	
	Unknown grass													1	10					1	
	Sub total	5	50	5	50	2	20	5	50	1	10	5	50	4	40	6	60			33	41
	Brodiaea					1	10													1	
	Other weeds	1	10	4	40	1	10	2	20	5	50	2	20	4	40	3	30			22	
	Sub total	1	10	4	40	2	20	2	20	5	50	2	20	4	40	3	30			23	29

Five Year Review

Density and botanical composition records have been maintained over the five year period of 1957-1961, with the exception of 1958.

Density estimates for each watershed for this period are shown for each watershed.

<u>Watershed</u>	<u>Year</u>			
	<u>1957</u>	<u>1959</u>	<u>1960</u>	<u>1961</u>
A	5.5	15.3	20.5	26.3
B	5.0	14.5	12.8	18.0
C	9.0	21.5	16.5	37.0
Ave.	6.5	17.1	16.6	27.1

The average density of ground cover for all watersheds for the four year period was 16.8%.

Botanical composition records are shown for the similar period with all watersheds grouped together.

	<u>Year</u>				<u>1957-61</u>
	<u>1957</u>	<u>1959</u>	<u>1960</u>	<u>1961</u>	
Annual grasses	31.7	-	-	-	-
Desirable grasses	7.0*	8	11.7	9	8.9 *
Desirable legumes	6.2	8	9.6	15	9.7
Desirable forbs	1.2	-	-	-	.3
Undesirable grasses	24.6*	34	32.1	39	32.4*
Weeds	61.0	50	46.7	38	48.9
Total desirable plants	14.4*	16	21.3	24	18.9*
Total undesirable plants	85.6*	84	78.8	77	81.3*

*estimated

The improved density and quality of the forage in 1961 may be a result of what has been considered as an "excellent grass year."

Applying the average density of the period to the average botanical composition for the period shows the watersheds to have the following covering of low growing vegetation.

<u>Cover</u>	<u>%</u>
No vegetation	83.2
Desirable grasses	1.5
Desirable legumes	1.6
Desirable forbs	.1
Undesirable grasses	5.4
Weeds	8.2
Total desirable forage	3.2
Total undesirable forage	13.7