UNITED STATES DEPARTMENT OF AGRICULTURE

# FOREST SERVICE

RR
Pine Ranges
Burgess Spring

LOGGING - FORAGE

1937 FIELD METHODS

Burgess Spring Experimental Range

By

G. T. Turner
Junior Forester

California Forest and Range Experiment Station

M—5123

U. S GOVERNMENT PRINTING OFFICE: 8—7417

RR
Pine Ranges
Burgess Spring

George Turner
August 12, 1937

LOGGING-FORAGE

Object.

To determine by means of randomized transect lines the relative amount of logging disturbance on six 1½-acre plots in Pasture 2, Burgess Spring Experimental Range.

Methods.

To sample adequately the "logging-damage" plots it was decided to subdivide each into ten blocks. Thus each block corresponded to the area lying between two north-south columns of subplots which were established in 1935. Through every block were run two transect lines, the locations of which were determined by the random-block method.

Capsules numbered from 1 to 33--a number for each foot of width of the block-were placed in a small box. From this container were removed, without bias, two capsules. The first number drawn from the box represented transect "A" and the second one transect "B". This simple task was repeated for each block. All distances were measured from the west side of each block by means of a steel tape.

Having driven wooden stakes in their respective locations along the south boundary of a plot, the process was repeated on the north boundary. To facilitate the stretching of string between stakes at the ends of a transect, each stake was numbered. Following this procedure, transect lines were laid out with the aid of a staff compass.

Ground cover was classified into three general types, namely--that area apparently undisturbed by logging operations; the area skidded and practically or entirely bare; and that area covered by logging debris. To be considered "debris-covered" an area necessarily must have been at

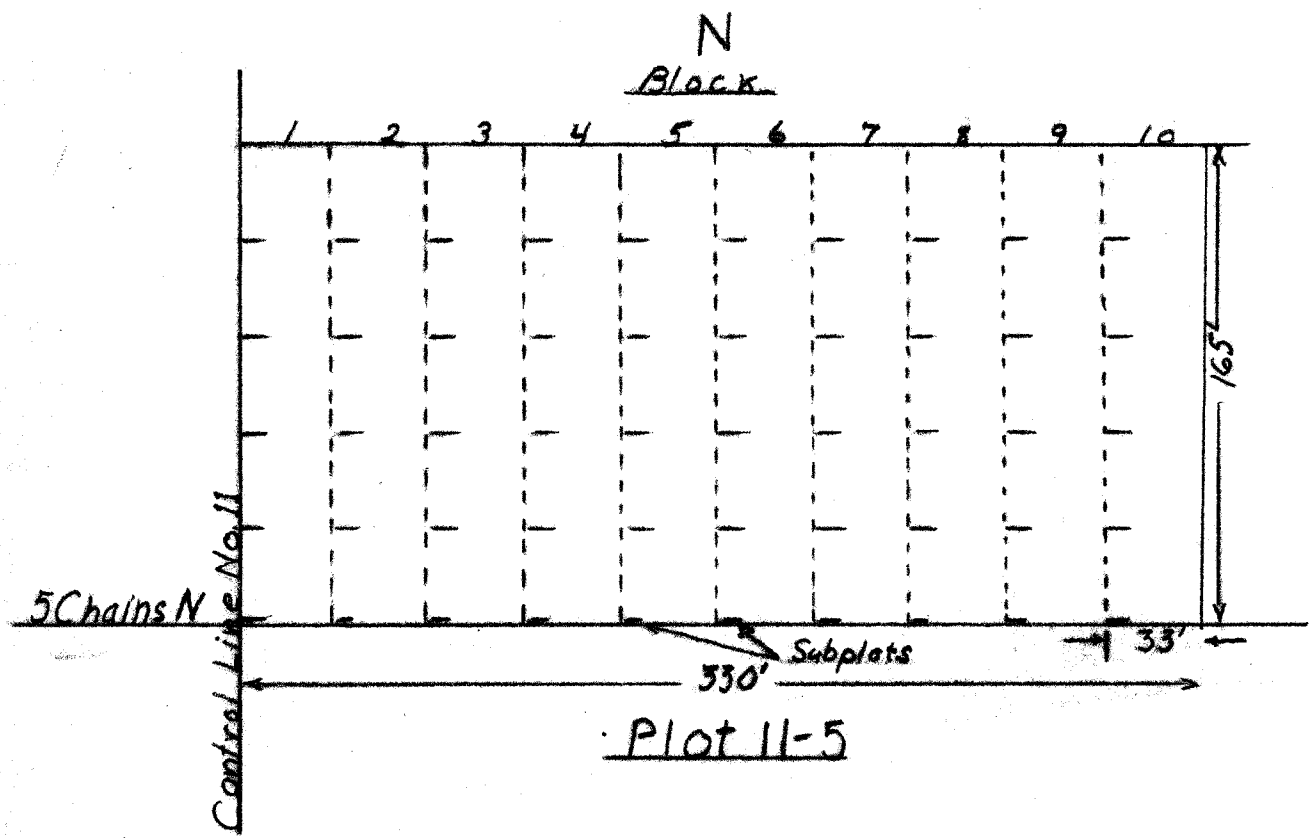
least fifty per cent covered with slash or logging litter. Unless logging debris was on or within a short distance of the ground it was not measured, except when it made the area inaccessible to cattle; then it was recorded separately.

An arbitrary minimum typing unit of one square foot was chosen as it was thought to be the most satisfactory, both for the plot and subplot. Also, to be measured as a distinct type an area had to be at least one-tenth foot wide at the point of intersection with the transect line.

Two men measured with a fifty-foot tape the types of ground cover as they occurred along the line transect. One man acted as head-chainman and actually measured the distance across a type, while the other man acted as rear-chainman and recorded data. To minimize mistakes in subtraction all measurements were recorded directly as read from the tape. Thus, to obtain the net distance across a given type occurring along the transect line, the measurement recorded for the preceding type must be subtracted from that recorded for the given type.

Before starting to measure distances along the transects, the three men who acted as head-chainmen discussed characteristics of the three types of ground cover and determined their limitations. Areas on which slash and logging litter had been burned were measured and recorded separately from unburned debris. A large portion of the burned area, including an undetermined amount of burned old litter, was practically barren. Inaccessibility of an area to cattle was considered only when it occurred as a result of logging operations.

Between August 2 and August 11, 1937, eight men spent thirty man-days on this phase of the logging disturbance study. A total of 122 transect lines, 165 feet in length, were measured by cover types, and the amount of inaccessible area was recorded.



RR
Pine Ranges
Burgess Spring

G. T. Turner
July 31, 1937

# Logging Disturbance

I. Object.

The object of this study is to determine the character and amount of disturbance by caterpillar logging to vegetation and other ground-cover in the eastside-pine region of California.

II. Previous Work.

During the summer of 1935 six plots, 2½ X 5 chains, were established in Pasture 2 at Burgess Spring experimental range. Each of these was bounded on the west by control line No. 11 and on the east by line No. 12. North of the southern boundary of the pasture the plots were located at 5, 15, 25, 35, 65, and 75 chains. In each plot were laid out fifty ½-mil-acre rectangular subplots (79.2.x 19.8 inches) by the gridiron method. Wooden stakes were driven in each corner for semi-permanent location, and the one on the southwest corner was painted white to facilitate relocation. To aid in recording the various species of plants and measuring the types of ground-cover, the subplots were divided into four square quadrats of equal size.

For each quadrat was recorded in square inches the area of individual grasses, sedges, and other perennial plants, as well as that of the remaining rock, bare soil and litter. All annual plants were counted by species, and their average height and number of fascicles was obtained.

During the summer of 1936 Pasture 2 was logged by caterpillar tractors which skidded entire tree-lengths to the landing. Following this operation the displaced corner stakes of the subplots were replaced with the aid of witness marks and notes, great care being taken to place t them in their proper location.

III. Methods.

Certain arbitrary rules and specifications were chosen to facilitate the measurement of the various types of logging disturbance and to make the results more consistent. Thus, a definition of the following terms as used in the study seems advisable.

Logging litter:--includes all needles, twigs, and chips under one inch in diameter which have fallen on the subplot as a direct result of logging.

Slash:--includes all limbs, chips, or old wood over one inch in diameter which have fallen or have been dragged onto a subplot as a result of logging.

Disturbed litter:--is that old litter which has been shifted and disarranged from its former structure by skidding or other factors attributable to logging.

New litter:--includes all needles or plant remains which have fallen on bare soil caused by logging.

Burned litter:--is that burned organic material under one inch in diameter which remained on the subplots after partial slash disposal had been practiced.

Burned slash:--is that burned or badly charred woody material over one inch in diameter left on the area after slash disposal.

Bare soil:--is that area on which no plant was growing (excluding rock) and which was covered by a negligible quantity of organic matter.

Starting at the southwest corner of a plot and running north and south, each of the subplots was examined. The four quadrats in each subplot had been lettered A,B,C, and D, always starting at the west end. Thus individual perennial plants were readily located or accounted for by comparing

the record of 1935 with that of the present groundcover. Straight, narrow wooden sticks were used to delimit the boundary of each quadrat, and these proved to be very suitable with the exception of a few subplots heavily covered with slash/

As specific changes in the vegetation and types of groundcover due to logging were sought, it seemed more desirable to record as "plus" the present quantity of any item which did not occur in 1935, or which occurred in greater amount, rather than to record the present area of all items. Similarly, all items which had been reduced in area or entirely eliminated were recorded as "minus". Thus, for each quadrat the sum of "plus" area necessarily equaled the "minus" area.

To determine the area occupied by the various kinds of ground-cover required a considerable amount of ocular estimation, although, whenever practical, measurements were taken with a 12-inch ruler. On the back of this was a specially-prepared diameter rule for measuring circular areas. Some objects were measured as rectangles, some as squares, and others as triangles. Although slash surmounted several subplots, it was not measured or otherwise taken into account if it was/a distance sufficiently high above the ground to be non-detrimental to plant growth. This distance was usually assumed to be two inches if in the open, or as much as six inches if the slash was more or less completely surrounded by logging litter.

As well as measuring on each quadrat the types of ground-cover, all annual plants were counted by species, their average height determined with a centimeter rule, and for those plants whose individuals are difficult to separate, the fascicles were counted. Fascicles of mule ears (Wyethia mollis) and balsam root (Balsamorhiza sagittata) were considered to belong to separate plants if they were over six inches apart, and

these of lupine (Lupinus calcaratus) and Monardella spp. if over three inches apart. These arbitrarily chosen distances were used in the 1938 plot-examination also.

If slash and litter surrounded plants making them inaccessible to cattle, the fact was noted on the field sheets. However, because of the relatively small number thus observed the results are likely to be misleading.

Two men, G. Turner, Junior Forester, and E. Woodfin, Junior Asst. to Technician, were employed to collect data on the 305 subplots (there were five extra subplots in Plot 12-35) in 1937. All field work was completed between July 13th and 28th, requiring a total of 24 man-days. From the completion of seven subplots the first day, familiarity with the work enabled the men to increase the number to forty on the last day of the job. Woodfin made all measurements of ground-cover, while Turner recorded data and determined species of plants. Plots 11-65 and 11-75, relatively free from logging disturbance, were found to support a much larger number of annual plants than the disturbed areas. All subplots which had been in no way disturbed by logging were examined for annual plants only, thus greatly expediating the work.

Note:--In this study no attempt was made to classify the logging disturbance other than that given in the report.

EW. ORF

# BURGESS SPRING EXPERIMENTAL RANGE

Random drawing to determine location of transect lines

| Block No. | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Transect | A | B | A | B | A | B | A | B | A | B | A | B | |
| Plot No. | Number of feet from west edge of Block. | | | | | | | | | | | | |
| 11-5 | 31 | 7 | 27 | 24 | 32 | 26 | 16 | 5 | 15 | 32 | 2 | 15 | |
| 11-15 | 22 | 10 | 7 | 29 | 8 | 24 | 22 | 12 | 19 | 6 | 19 | 7 | |
| 11-25 | 18 | 20 | 14 | 10 | 8 | 2 | 5 | 6 | 29 | 31 | 9 | 7 | |
| 11-35 | 10 | 21 | 9 | 18 | 17 | 19 | 15 | 26 | 15 | 21 | 13 | 1 | |
| 11-45 | 24 | 8 | 18 | 21 | 23 | 26 | 28 | 17 | 23 | 14 | 13 | 2 | |
| 11-75 | 30 | 24 | 14 | 4 | 30 | 4 | 17 | 12 | 15 | 19 | 28 | 23 | |
| | 40 | | | 2 | 35 | | | | | | | | |

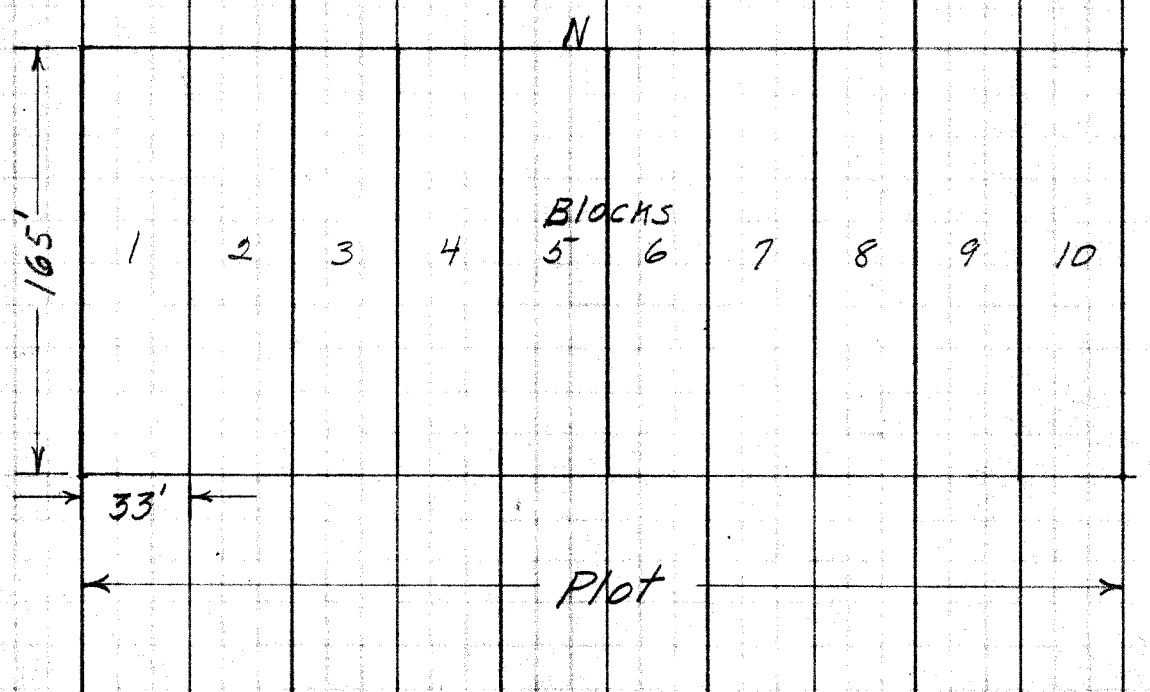
Continued on next page →

File Copy

GT-E.W.

BSER. Random Transect Lines for Logging Disturbance Study 1937

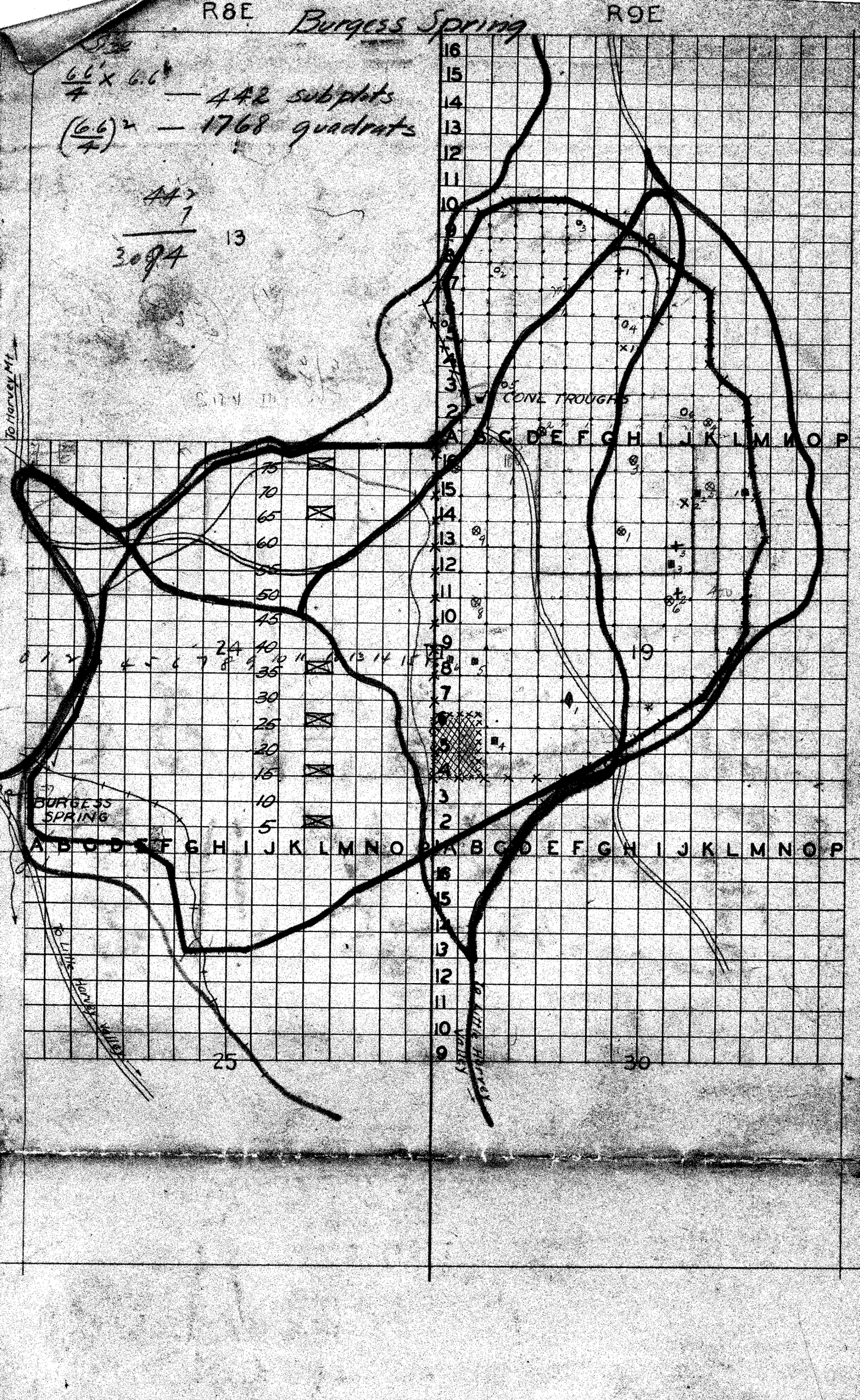
| Block No. | 7 | | 8 | | 9 | | 10 | | 11 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Transect Plot No. | A | B | A | B | A | B | A | B | | | | | |
| | (Feet from S.W. corner of Block) | | | | | | | | | | | | |
| 11-5 | 15' | 7 | 22 | 14 | 31 | 14 | 32 | 5' | | | | | |
| 11-15 | 5' | 31 | 9 | 15' | 5' | 22 | 11 | 25' | | | | | |
| 11-25 | 26 | 30 | 7 | 29 | 15' | 30 | 20 | 15' | | | | | |
| 11-35 | 6 | 24 | 8 | 24 | 29 | 11 | 30 | 3 | 3 | 4 | (In Plot 12-35) | | |
| 11-65 | 9 | 6 | 31 | 30 | 14 | 7 | 14 | 21 | | | | | |
| 11-75 | 27 | 21 | 14 | 12 | 26 | 5' | 31 | 6 | | | | | |



G.T.-E.W.

B.S.E.R. Random Transect Lines for Logging Dist. Study 1937

| Block No. | 7 | | 8 | | 9 | | 10 | | 11 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Transect Plot No. | A | B | A | B | A | B | A | B | | | |
| | (Feet from S.W. corner of Block) | | | | | | | | | | |
| 11-5 | 15 | 7 | 22 | 14 | 31 | 14 | 32 | 5 | | | |
| 11-15 | 5 | 31 | 9 | 15 | 5 | 22 | 11 | 25 | | | |
| 11-25 | 26 | 30 | 7 | 27 | 15 | 30 | 20 | 15 | | | |
| 11-35 | 6 | 24 | 8 | 24 | 29 | 11 | 30 | 3 | 3 | 4 | (In Plot 12-35) |
| 11-65 | 9 | 6 | 31 | 30 | 14 | 7 | 14 | 21 | | | |
| 11-75 | 27 | 21 | 14 | 12 | 26 | 5 | 31 | 6 | | | |




BURGESS SPRING EXPERIMENTAL RANGE

CALIFORNIA FOREST & RANGE EXPERIMENT STATION

LASSEN NATIONAL FOREST