

Perry

POPULATION DYNAMICS OF YOUNG FOREST STANDS: ESTABLISHMENT REPORT FOR
LONG TERM ECOLOGICAL RESEARCH AT H. J. ANDREWS EXPERIMENTAL FOREST

Site Locations

Four sites with similar slope and elevation and occupied by similar Douglas-fir stands were selected for the study. Two sites are on north facing slopes [REDACTED] and two sites are on south facing slopes [REDACTED]. Their locations on the HJ Andrews Experimental Forest are indicated on Figure 1.

Thinning

At each site, three stocking levels were created by thinning in the spring of 1981. To accommodate variation in tree sizes between sites, the stocking levels were defined as fractions of maximum Stand Density Index (SDI). As formulated by Reineke, SDI is the number of trees per hectare that a stand would have if the means diameter was 25 cm. For Douglas-fir, its maximum is 1500.

The advantage of defining stocking levels by SDI is that tree size and density are linked in a single measure that is more meaningful than density alone. The same stocking level units (e.g. low stocking) on different sites may, therefore, have different numbers of trees, but this is compensated for by differences in the size of trees.

The stocking levels are:

Control (no thinning) - at or approaching 100% of maximum SDI

Medium - 25% of maximum SDI

Low - 15% of maximum SDI

Each level is represented graphically in Figure 2. Initial and post-thinning stocking levels are contained in Table 1.

Plot Layout and Initial Measurements

The experimental design has been specified previously in the study plan as a split-split plot design: pruning nested within fertilization nested within thinning. We, therefore, subdivided each stocking level into four plots. Treatments will be randomly assigned to each plot: -prune only, fertilize only, prune and fertilize, no additional treatment. Figures 3-6 are detailed diagrams of each of the four sites showing the location of the plots within each stocking level. Each plot is currently delineated with plastic flagging, but will be marked with stakes and aluminum tags to describe treatments during this year's field season.

Within each plot a central measurement plot was located containing 40 to 50 evenly spaced trees. The measurement plot boundaries are approximately square or rectangular and located at least 10 meters from the main plot boundaries.

Each tree within the measurement plots was numbered with a metal tag placed at breast height. In addition, each tree was painted with a band to facilitate future re-location. The diameter at breast height to the nearest 0.1 cm was measured for each numbered tree. Total height to the nearest 0.1m. was measured for a subsample of trees on each measurement plot. Trees for which height was measured were marked in the field to facilitate remeasurement in later years. The results of these initial measurements are summarized in Table 1.

Fertilization

In 1982, we will add nitrogen to the appropriate plots in the form of ^{slow} ~~slow~~ release fertilizer spikes. These spikes have a number of advantages that make them particularly well suited for our purposes. Uniform

and complete application of granular fertilizer by broadcasting would be difficult because of the large amounts of slash produced by thinning. Also, a potentially large portion of broadcast fertilizer would be volatilized, leached, or taken up by other plants. This is especially true on the low density plots where spacing between trees is wide. Fertilizer spikes can be placed near the trees for which they are intended. Because they release their contents slowly, few nutrients should be lost and frequency of application may be reduced. Our objective is to raise foliar nitrogen content to 2% and maintain it there. Note that, because plots differ in tree stocking density and size, the amount of fertilizer applied per unit area will vary.

The number of fertilizer capsules applied per tree will vary in direct proportion to tree basal area (exact numbers have not been determined yet).

Pruning

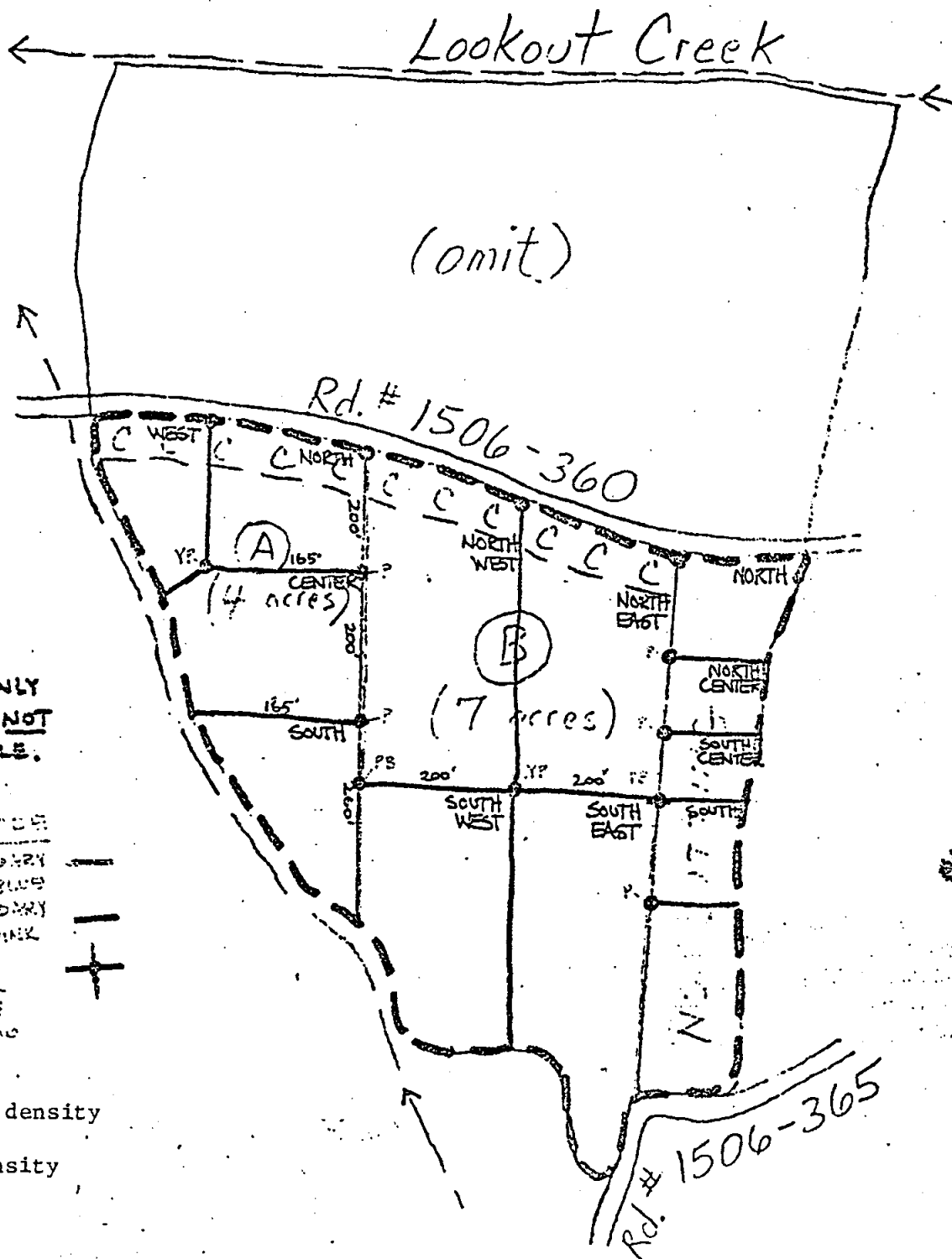
Pruning will be done during the 1982 field season according to the specifications detailed in the original study plan.

Data Storage and Documentation

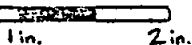
All data has been processed in conjunction with the Oregon State University Forest Science Data Bank. It has been keypunched and several copies are stored on magnetic tape to guard against loss. In addition, the data set is thoroughly documented to facilitate future use. The original study plan, maps, and supporting materials have been placed on file at the OSU Forest Research Laboratory library. All new data collected in the future will be documented and added to the data bank.

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Figure 1.



SCALE



32 in = 1 mi

1 in = 165 ft.

NOTE: THIS MAP IS ONLY APPROXIMATE. NOT DRAWN TO SCALE.

COLOR CODE

- TREATMENT BOUNDARY
- MARKED BOUNDARY
- TREATMENT BOUNDARY
- PAVED PINK
- FLAT CORNERS
- P - PINK
- B - BLUE
- Y - YELLOW

A - Medium density

B - Low density

Table 1. (continued)

Site	Stocking Level	Treatment	Initial Density (Trees/ha)	Post-thinning Density (Trees/ha)	\bar{X} DBH (cm)	\bar{X} Height (m)	Number of Height Trees
L107	Low	Fertilize	2620	365*	12.0	3.85	4
		Prune	2670	339*	12.7	3.99	2
		Prune & Fert	2470	347*	12.7	3.99	3
		Control	1280	347*	13.4	4.12	3
L111	Control	Fertilize	4820	No thinning	3.4	0.90	10
		Prune	2100	"	6.2	2.28	10
		Prune & Fert	2960	"	4.9	1.74	10
		Control	2590	"	6.3	2.32	10
Medium	Fertilize	Fertilize	1480	740*	8.1	2.91	8
		Prune	2050	792*	8.4	3.00	7
		Prune & Fert	1650	773*	9.5	3.29	7
		Control	2030	812*	8.1	2.91	7
Low	Fertilize	Fertilize	755	365*	10.8	3.60	9
		Prune	1520	424*	8.9	3.14	4
		Prune & Fert	1530	384*	10.6	3.56	5
		Control	1040	356*	11.9	3.83	3

Table 1. Data Summary

(* Denotes thinning objective not yet verified in the field.)

Site	Stocking Level	Treatment	Initial Density (Trees/ha)	Post-thinning Density (Trees/ha)	\bar{X} DBH (cm)	\bar{X} Height (m)	Number of Height Trees
L405	Control	Fertilize	1610	No thinning	7.2	2.64	10
		Prune	1980	"	6.8	2.50	10
		Prune & Fert	1850	"	7.2	2.64	10
	Medium <i>cutting -> Control</i>	Fertilize	740	"	4.5	1.50	10
		Prune	1040	545	11.2	3.69	10
		Prune & Fert	1110	715	10.6	3.56	10
	Low	Control	1280	570	12.5	3.95	10
		Fertilize	1630	640	10.5	3.15	10
		Prune	1120	335	11.4	3.73	10
	Control	Prune & Fert	1170	285	14.6	4.33	10
		Prune	975	320	12.5	3.95	10
		Control	840	285	12.7	3.99	10
L701	Control	Fertilize	1360	No thinning	15.0	4.39	10
		Prune	2100	"	12.9	4.03	10
		Prune & Fert	1360	"	16.8	4.67	9
	Medium	Control	1480	"	15.8	4.52	9
		Fertilize	1140	505*	17.2	4.73	10
		Prune	640	520	15.6	4.49	10
	Low	Prune & Fert	1015	505*	17.8	4.81	7
		Control	840	520	17.8	4.81	10
		Fertilize	1860	360	12.6	3.97	10
	Control	Prune	1220	245*	20.8	5.19	10
		Prune & Fert	1260	295	14.1	4.24	10
		Control	1330	299*	16.9	4.68	10
L107	Control	Fertilize	8150	No thinning	6.8	2.50	10
		Prune	4820	"	8.1	2.91	10
		Prune & Fert	4570	"	7.2	2.64	10
	Medium	Control	4690	"	9.1	3.19	10
		Fertilize	3300	753*	9.9	3.39	4
		Prune	1580	812*	10.0	3.47	8
Control	Prune & Fert	2590	833*	8.2	2.94	4	
	Control	2200	833*	8.8	3.11	7	

Total db. B

1982 BUDGET

Technician (14 person-months)	\$18,500
OPE 28.5%	5,258
Travel and per diem	7,000
Supplies (fertilizer, pruning shears, etc.)	2,500
Overhead (off campus - 19.5%)	<u>6,485</u>
TOTAL	\$39,743

ln aboveground biomass

