JDSF Newsletter
Jackson Demonstration State Forest
State of California Dept. of Forestry P.O. Box 1185 Fort Bragg, CA. 95437

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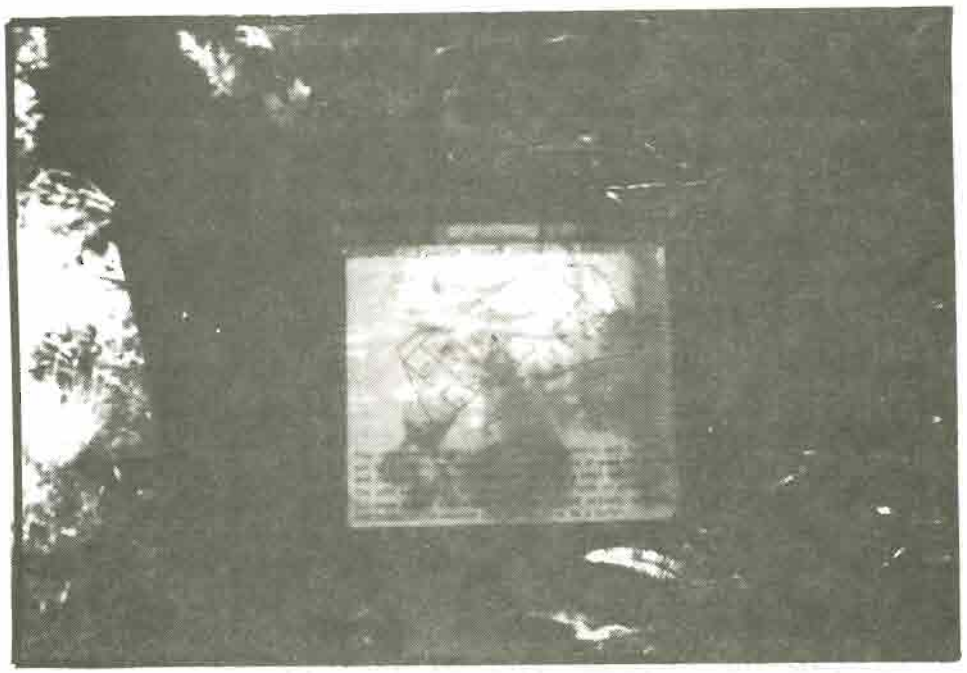
EARLY GROWTH AND YIELD THREE YEARS AFTER PRECOMMERCIAL THINNING IN "THIRD GROWTH" REDWOOD

Norm Henry[1]



In the June 1982 newsletter (No. 7), the author reported on the establishment of a thinning study in a then twenty year-old stand of redwood and Douglas-fir. For those readers who do not have the earlier report, a little background is in order.

The study started out as a cooperative study between the California Department of Forestry and U.S. Forest Service (PSWFRES). One of their research foresters, Jim Lindquist, was the principle investigator in this study. Jim has since retired from the research station but still actively works with us on monitoring the study. This report is based on field data collected this last spring which Jim has compiled and summarized.

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[1] Forester II, JDSF, Fort Bragg, CA. 95437

Briefly, eighteen plots were installed in a twenty year old clearcut block that was part of an earlier study. The site, which had supported an eighty year-old second growth stand prior to the clearcutting in 1961, had a dense stand of primarily redwood sprout regeneration. Subsequent to the harvest, one half of the 14 acres was burned. The plots, which are 0.4 acres in size, cover both portions of the burned and unburned areas. The primary objective of the study is to determine optimal spacing so that the majority of of the trees are of merchantable size when the stand is ready for the first commercial thinning.

The criterion used in this study is the number of stems per acre. The densities range from 100 stems to 300 stems per acre in increments of 50. The crop tree selection favors, first, the dominent redwood sprout regeneration, second, redwood seedlings, and third, the Douglas-fir and other associated species. The spacing is weighted to allow for retention of multi-stem clumps with a minimum of two feet between intra-clump stems.

Although the plan called for the first official remeasurement five years after thinning, we felt some preliminary information would be of interest for those who own or manage lands with this particular type of stand.

The two measurements taken this year were diameter at breast height on all trees and heights on selected trees. From these two measurements, Jim computed new stand volumes for cubic foot and board foot growth calculation. The emphasis of this article is to show the range of values for the various parameters displayed in Table 1 and 2 without calculating any statistically significant differences or trends.

Table 1 of this article shows a partial summary of the stand. Only the redwood component has been summarized as it accounts for over 90 percent of the cubic volume and all of the board foot volume. An idea of the contribution of the Douglas-fir can be gotten by comparing the difference between the treatment heading and the first column which is the stem count of the redwood followed by the plot number. Table 2 shows what the original stand values are in terms of number of stems per acre and basal area per acre in the two lower diameter classes. As can be noted, the proportion of Douglas-fir in the original stand averages 40 percent in the unburned portion (plots 6&7) and only 1 percent in the burned portion (plot 16). It was observed that burning did increase blueblossom invasion with subsequent reduction in Douglas-fir stocking. In later years, the dead and dying brush severly damaged or killed a portion of the fir stems coming up underneath when it fell over.

Comparing the #stem values in the two diameter classes shows that over half of the stems were under 4.5". These stems generally were all severly suppressed redwood sprouts that contributed little to the stand basal area as can be seen from the second column in each strata.

Table 1. Redwood growth and yield three years after being thinned to five different levels of stocking.

STEMS >		1.5" DBH				STEMS >	10.5" DBH		
ARW-PLOT	YEAR	BA (SQ.FT.)	DBH (IN.)	C.V.	#STEMS	BA (SQ.FT.)	DBH (IN.)	B.F. VOL (SCRIBNER)	M.A.I.
100 STEMS/ACRE									
75-3	1981	47.96	10.8	689	35	30.33	12.6	1791	
75-3	1984	68.19	12.9	1123	60	60.31	13.5	4098	
		20.23	2.1	431	25	29.98	0.9	2307	769
85-9	1981	51.93	10.5	686	35	30.72	12.6	1680	
85-9	1984	78.55	13.0	1261	70	70.25	13.5	4530	
		26.62	2.4	575	35	39.53	0.8	2850	950
75-14	1981	62.43	12.3	946	30	52.77	13.9	3277	
75-14	1984	100.96	15.7	1996	70	98.50	16.0	8664	
		38.53	3.3	1050	20	45.73	2.1	5386	1795
	X	28.46	2.6	685	26	38.41	1.3	3514	1171
150 STEMS/ACRE									
135-2	1981	73.75	10.0	916	60	55.41	12.7	1740	
135-2	1984	113.65	12.4	1714	110	103.63	13.1	6107	
		39.90	2.4	797	70	68.22	0.4	4366	1455
85-11	1981	61.84	11.5	848	60	47.60	12.0	2444	
85-11	1984	101.55	14.7	1588	85	101.33	14.7	6619	
		39.71	3.2	739	25	53.73	2.7	4005	1335
150-17	1981	127.91	12.5	2089	105	113.00	14.0	7623	
150-17	1984	185.79	15.1	3608	130	178.30	15.8	15314	
		57.88	2.6	1519	25	65.30	1.8	7691	2563
	X	45.83	2.7	1019	40	62.42	1.6	5354	1784
200 STEMS/ACRE									
165-5	1981	64.10	8.4	730	20	14.23	11.4	748	
165-5	1984	105.84	10.8	1635	85	72.04	12.4	4488	
		41.74	2.4	854	65	57.81	1.0	3740	1246
150-12	1981	62.61	8.8	964	25	18.31	11.6	1223	
150-12	1984	95.13	10.8	1744	65	55.06	12.4	4323	
		32.52	2.0	780	40	36.75	0.9	3100	1033
130-18	1981	48.19	8.2	618	20	18.29	13.0	1040	
130-18	1984	82.00	10.8	1360	55	52.70	13.3	3655	
		33.81	2.6	741	35	34.41	0.3	2615	871
	X	36.02	2.3	791	46	42.99	0.7	3151	1050

STEMS >		1.5" DBH				STEMS >	10.5" DBH		
ARW-PLOT	YEAR	BA (SQ.FT.)	DBH (IN.)	C.V.	#STEMS	BA (SQ.FT.)	DBH (IN.)	B.F. VOL (SCRIBNER)	M.A.I.
250 STEMS/ACRE									
200-1	1981	125.78	9.4	1851	65	51.42	12.0	2905	
200-1	1984	178.05	11.2	3204	170	147.10	12.6	10747	
		52.27	1.8	1352	105	95.68	0.6	7842	2614
150-8	1981	69.69	9.2	826	45	39.79	12.7	1887	
150-8	1984	104.11	11.3	1636	70	72.62	13.8	4769	
		34.22	2.1	809	25	32.83	1.1	2882	960
180-13	1981	129.17	11.5	1985	100	99.21	13.5	6251	
180-13	1984	185.42	13.7	3566	150	175.87	14.2	14638	
		56.25	2.2	1580	50	76.66	1.2	8387	2795
	X	47.58	2.0	1247	60	68.39	0.9	6370	2123
300 STEMS/ACRE									
230-4	1981	110.27	9.4	1366	55	55.04	13.6	2923	
230-4	1984	170.12	11.7	2567	115	124.02	14.1	7797	
		59.85	2.3	1200	60	68.98	0.5	4874	1624
135-10	1981	66.73	9.0	881	45	35.12	12.0	1846	
135-10	1984	97.79	10.8	1642	75	67.22	12.8	4700	
		29.06	1.8	761	30	32.10	0.8	2854	951
255-15	1981	97.05	8.4	1302	40	35.37	12.7	2110	
255-15	1984	146.31	10.3	2452	105	97.46	13.3	6917	
		49.26	1.9	1150	65	62.09	0.4	4807	1602
	X	46.05	2.0	1037	51	54.39	0.5	4178	1392
CONTROL									
440-6	1981	138.18	7.6	1567	80	59.06	11.6	2921	
440-6	1984	181.67	8.7	2719	130	110.65	12.5	7340	
		43.49	1.1	1152	50	51.59	0.9	4419	1473
545-7	1981	106.29	6.0	972	15	11.10	11.7	582	
545-7	1984	131.55	6.7	1710	65	47.64	11.6	3227	
		25.26	0.7	738	50	36.54	-0.1	2645	881
745-16	1981	140.18	5.9	1322	55	48.24	12.7	3030	
745-16	1984	197.00	7.0	2590	125	113.67	12.9	8168	
		56.82	1.1	1268	70	65.43	0.2	5138	1712
	X	41.85	0.9	1053	56	51.18	0.3	4067	1355

Table 2. Control standcharacteristics in the>1.5" and>4.5" classes

	STEMS > 1.5"		STEMS > 4.5"	
PLOT	YEAR	#STEMS(%DF)	BA(%DF)	#STEMS(%DF)	BA(%DF)
6	1981	870(49.4)	153.8(10.1)	310 (1.6)	134.0(0.7)
6	1984	870(49.4)	207.4(12.3)	380(14.5)	187.4(5.5)
7	1981	790(31.0)	125.6(13.2)	385(11.6)	99.2 (6.6)
7	1984	785(30.6)	157.4(15.1)	430(20.9)	139.2(11.2)
16	1981	760(1.9)	140.8	320	122.5
16	1984	760(0.5)	198.2	355(1.4)	129.9(0.3)

Site indexes for each replication block of six plots were calculated from the height trees measured in each plot. These trees were increment bored at the time of the first measurement to establish their age. The block one site index was calculated to be 165; block II was 168.5; and block III was 179 with an overall average site index equal to 171.8.

Values in Lindquist and Palley's Bulletin 831, " Prediction of Stand Growth in Young Redwood" are similar to actual mean annual increment values. The actual mean annual basal area increment was 11.2 sq. ft. compared with a tabular value of 9.9 sq. ft. Actual cubic foot increment was calculated at 350 c.f. versus a tabular value of 312 c.f. The >10.5" volumes averaged 1355 b.f. compared to Bulletin 831's value of 1360 b.f. To make these comparisons, Bulletin 831's table values were converted to the Scribner rule from the International 1/4 and periodic values were converted to an annual basis.

Table 1 is constructed so that the stand averages for all stems over 1.5" are shown and within that the over 10.5" diameter class is stratified and shown separately. The effects of ingrowth and the individual tree diameter growth are combined in this summary. The movement of the redwood stems into the inventory can be traced by looking at the #stems column. The mean annual increments as shown in the last column of Table 1 reflect the rapid ingrowth occurring on all of the plots. The increment ranges from a low of 1050 b.f./acre on the 200 stems/acre treatment to a high of 2123 b.f./acre on the 250 stems/acre treatment. The basal area for all stems over 1.5" increased almost 50 square feet in three years with an increase of 1247 cubic feet in that same time period. The over 10.5" class accounts for most of this growth and achieved a higher gain at almost 70 square feet/acre with an increase of 6370 board feet/acre. Ingrowth of 60 stems/acre over 10.5" coupled with an average stand diameter growth of 0.9" account for this high increment. The lowest amount of ingrowth occurred on the 100 stems/acre treatment. The severity of the thinning reduced much of the potential ingrowth. However, the wide spacing has accelerated the diameter growth such that this treatment and the 150 stems/acre treatment have the highest diameter growth averages. Many of the differences in growth and yield between plots at present are due to initial differences in the stand characteristics of each plot after thinning. However, when the majority of ingrowth into the larger diameter classes is past and the crowns have substantially responded to their new spacing, analysis will be done to determine if any significant differences exist between treatments.

In subsequent remeasurements, continued height growth measurement will be needed to monitor changes in form due to the treatments. This is an important variable in board foot yield on the different treatments. The most severe thinnings may set back full utilization of the site too long as well as impair form and lumber quality. However, new sprout growth under these open conditions will probably be the most vigorous. Although this is not a primary consideration at this point in the study, continued stocking of the site through another harvest will need to be evaluated.

Although the Douglas-fir component has been deemphasized in this report, future measurements will show this species to play an increasingly important role in the stand. At rotation age on this site, it will account for a substantial portion of the stand volume.

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BILLIONTH BOARD FOOT CEREMONY

On July 16th the California State Forest system celebrated the cutting of one billion board feet of forest products. The celebration was held on Jackson State Forest at the site of Caspar Lumber Company's old Camp 20. The significance of this clelbration is even more pronounced considering the fact that today's timber inventories on California's state forests equal or exceed the inventory at the time of purchase. This means that the State Forest system has not only produced enough lumber to build 100,000 single-family residences, but that the growing stock is still at the same level and producing at a better rate than it was when the State acquired the lands.

To help clebrate this event Gordon Van Vleck, California's Secretary for Resources, and California Department of Forestry Director Jerry Partain were present. In addition, past Director of the Department of Conservation DeWitt Nelson and retired Deputy State Forester (and the first JDSF Manager) Tobe Arvola joined the crowd. DeWitt Nelson spoke on the acquisition of JDSF.

Representatives from State Senator Barry Keene's office and Assmblyman Dan Hauser's office were also present. A group of touring foresters from the World Forestry Congress representing the countries of Turkey, France, Bulgaria, Spain, and Mexico joined the activities and shared a fire camp lunch served by Chamberlain Conservation Camp. Representatives of the forest industry provided many displays and lent their support to the activities.

After the program Secretary Van Vleck and Director Partain toured JDSF, reviewing the timber sale program, recreation facilities, Conservation Camp projects, and the Caspar Creek Watershed experimental project.

We would like to thank all who attended for their participation and we look forward to growing and producing the next billion board feet of timber.

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STAFF NOTES

Thanks to forestry aides **Rosemary Loveall, Adam Wyman,** and **Joe Chavez** for their invaluable help this summer.

Jeff Albright has worked this summer on soil typing and sediment routing aspects of the Caspar Watershed study. Good luck to Jeff as he returns to Humboldt State University where he is a graduate student in the Watershed Management program.

Finally, good-bye and good luck to **George McCaskill,** who has decided to return to grad school. He worked at JDSF for the past 15 months, primarily on the Caspar Watershed project.

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REDWOOD REGION CONSERVATION COUNCIL'S

ANNUAL FOREST MANAGEMENT CONFERENCE

Friday, October 11, 1985

9:30 a.m. Meet at Jackson Demonstration State Forest, Conf. Room 802 Main St., Ft. Bragg, CA (1.5 hrs drive from Ukiah)

Opening Remarks by Forest Tilley, JDSF Forest Manager

10:00 a.m. Depart for Railroad Gulch Demonstration Project
Location: about 5 miles east of the town of Mendocino

Organizers are attempting to arrange bus transportation but private cars can negotiate all the roads if it becomes necessary to travel by caravan.

10:30 a.m. Railroad Gulch Trail: Participants should be prepared to walk a half mile trail over varying terrain. Sturdy shoes are advised. Trail is steep in places but there will be ample stops along the way.

Participants will view two alternative methods of harvesting and managing a young growth redwood forest. Stand logged in 1983 using single tree and group selection methods with different levels of cutting.

Items for discussion will include tree marking criteria, spacing, skid trail design, redwood sprouting response, animal damage and weed problems, soil erosion, seedling regeneration, tree growth response, next reentry time, visual effects, etc. Prof. John Helms, UCB, Trail Guide

Study area was specifically designed to address the management problems of small Tree Farmers who want to harvest trees periodically but still maintain a visibly-pleasing stand of trees between the harvest entries.

1:00 p.m. Return to trail's starting point. LUNCH TIME !!
Bring your own sack lunch. Hot and cold beverages will be supplied compliments of the RRCC.

2:00 p.m. Leave Railroad Gulch and proceed to next stop.

3:00 p.m. Whiskey Springs Thinning Project.
Location: 9.5 miles east of Ft. Bragg on Hiway 20.

A short walk into project area. Plots were thinned in 1970 to three stocking levels, 25%, 50%, and 75% of the original young growth redwood and Douglas-fir stand. We will view the results of seedling and sprout regeneration under varying light conditions and 15 years.

4:00 p.m. Depart Whiskey Springs for Ukiah

5:15 p.m. Arrive in Ukiah, free time, check into motels, etc.

7:00 p.m. Attitude Adjustment Hour. Broiler Steak House, 8400 Uva Dr. Redwood Valley. 7 miles north of Ukiah, off Hw. 101

8:00 p.m. NO HOST DINNER (several choices) $10.00 inc. tax/tip

9:00 p.m. Banquet Speaker- Woodland owner, Ed Phillips
Multiple-use management means wood, hunting, & cattle.

IMPORTANT

It's important that reservations be made early to assist in the planning of transportation, lunchtime beverages and the evening dinner. Please notify the RRCC as to how many in your party will be attending. There is no registration fee but your cooperation is most appreciated. REDWOOD REGION CONSERVATION COUNCIL
589 Mendocino Avenue, Room 6
Santa Rosa, CA 95401 (707) 578-7377

The REDWOOD REGION CONSERVATION COUNCIL has been the regional sponsor of the Tree Farm Program for many years. The annual Forest Management Conference has been a traditional educational event for small woodland owners (Tree Farmers) since 1968. Any timberland owner is invited to participate in these annual field meetings. An important benefit from the Conference is the opportunity to meet with local experts in forestry and get questions about markets, management, and multiple-use answered.

On Saturday, October 12, 1985, the FOREST LANDOWNERS OF CALIFORNIA will be sponsoring their annual fall seminar in Ukiah. The theme of that one-day meeting will be "There's Big Bucks in Wildlife". The program will provide an understanding of how forest landowners can generate annual income to help pay property taxes, management costs, and other expenses, through wildlife programs such as fishing, hunting, and recreation.

The morning program starts at 9:30 a.m. at the Palace Hotel in Ukiah. Special rates of $29 double, $26 single, are available at the restored Victorian hotel; reservations: (707) 462-2300.

Program Chairman, George Hollister of Comptche, has invited several experts on wildlife management, hunting club leasing, etc. for the morning session. An afternoon field trip to the University's Hopland Field Station, 10 miles south of Ukiah, will allow participants to see the results of game management in a typical oak-grass woodland type. There will be a registration fee for this FLOC meeting. Contact: FOREST LANDOWNERS OF CALIF.
3814 Auburn Blvd., Suite 60
Sacramento, CA 95821 (916) 972-0273

Landowners wishing to optimize their educational experience can take advantage of the two different programs on Friday and Saturday that have been coordinated to save travel time and expenses.