



# JDSF Newsletter

Jackson Demonstration State Forest

State of California Dept. of Forestry P.O. Box 1185 Fort Bragg, CA. 95437

No. 9

December 1982

## GROWTH OF A REDWOOD STAND FOLLOWING COMMERCIAL THINNING

J. Lindquist<sup>1/</sup>

Commercial thinning of second-growth redwood/Douglas-fir stands is an option that foresters need to consider in management of these productive stands. A cooperative study of the United States Forest Service and the California Department of Forestry to compare response of three basal area thinning levels with the unthinned stand was established in 1970 in a 40-year-old redwood stand on the Jackson Demonstration State Forest. Remeasurements of the stands after five and ten years of growth has developed growth and yield rates that may now be analyzed to determine effects of stocking control on net and gross basal area, volume and diameter growth. These initial results are useful to evaluate the benefit of silvicultural practices in these stands.

Twelve .4-acre plots were established in a 40-year-old nearly pure redwood stand that averaged 401 square feet of basal area of trees larger than 4.5 inches DBH. Break-down of this basal area in 1970 was: redwood, 90.4 percent; Douglas-fir, 7.5 percent; and hardwoods, 2.1 percent. The site index of the stand of dominant redwood averaged 186 feet at 100 years (Lindquist and Palley, 1961). The stand is located at approximately 800 feet elevation about nine miles from the coast on an east to northeast facing slope of approximately 30 percent.

Uniformity of the pre-cut basal area was sought and was achieved with an average 401 ± 21.7 sq. ft. on the 12 sample plots. Treatment of plots was assigned at random so that there were three plots each in the control and treatments that removed 25, 50 and 75 percent of the stand basal area. Marking to remove the required basal area represented a low thinning modified to a crown thinning in the heavy cut plots in an attempt to leave a well distributed thrifty stand with at least half of the crop trees redwood. All hardwoods in the thinned plots were cut, but none were taken from the control plots. Residual trees on a central two-tenth-acre plot were tagged and measured at breast height. Total heights and age at breast height of some dominant redwoods on each plot were measured to provide the basis for the site index determinations, and subsequent volume computations. Remeasurements after the 1975 and 1980 growth seasons have been used to make the per-acre evaluations of basal area and volume growth and yield of each of the twelve plots.

Response of the stands to treatments as measured and computed in terms of basal area, cubic and Scribner volumes are shown in the following tabulation.

<sup>1/</sup> Until his retirement from the U. S. Forest Service earlier this year, Jim Lindquist had been a research forester for the past 12 years at the PSW Redwood Sciences Lab in Arcata. Before that, he worked for 9 years as a researcher at U. C. Berkeley's Agricultural Experiment Station. He has written numerous articles on redwood and has worked cooperatively with CDF on various JDSF projects over the past 10 years.

Table 1. Results of 10-year growth and yield measurements of a 40-year-old thinned redwood stand on Jackson Demonstration State Forest near Fort Bragg, CA.

	Residual basal area (percent)			
	Uncut	75	50	25
Site index	176.3	193.9	183.5	192.4 <sup>1/</sup>
No. trees	628.3	238.3	118.3	45.0 <sup>1/</sup>
Init. basal area	404.0	301.0	200.9	100.4
10-yr. BA growth	75.3	74.4	72.5	52.8
Init. cubic growth	11526.1	10164.5	6698.2	3398.2
10-yr. vol. growth	3694.2	2926.8	3467.6	2454.3 <sup>2/</sup>
Init. bd. ft. vol./acre	38404.7	45766.9	36987.9	19716.9 <sup>2/</sup>
10-yr. vol. growth	22416.7	26762.5	24132.4	17221.3
Bd. ft. vol. cut	0	5374.3	19353.1	31724.9
Gross yield bd. ft.	60831.4	77903.7	80473.4	68663.1

<sup>1/</sup> Trees + 4.5" DBH, the cubic stand.

<sup>2/</sup> Scribner Rule, trees + 10.5" DBH to a 6" top DIB.

An obvious important response is the rather uniform growth of the stand basal area. Only when 75 percent of initial stand is taken is there a growth fall off; the residual stand is not dense enough to capture the site potential. Perhaps the effect of the site index and number of stems per acre has had some influence on volume growth rates since the three lowest sites were all unthinned plots, while the three highest sites were in the 75 percent residual plots. The three unthinned plots also had the largest number of stems per acre and smallest average diameter in 1970.

Growth percentages of the cubic and board-foot units increased with the thinning level. However, for the board-foot stand (trees greater than 10.5" DBH) only the 25 percent residual shows much change over that of the uncut stand (6.1 percent periodic annual growth versus 4.5 percent, respectively). The amount of volume growth in the 25 percent residual shows a drop as a result of the reduction of the growing stock to a point below that of efficient use of the site. The reduction of the stand largely was concentrated in the smaller stems so that those stems that would not grow much in the unthinned stands have been removed, and the release effect is concentrated on the larger thriftier component of the stand. An important factor to consider in these results is the capacity of these stands to show good growth rates despite very heavy stocking reductions in the thinned condition. The study shows that young redwood stands are versatile and can be productive over a wide range of stocking conditions.

Lindquist, J. L. and M. N. Palley. 1961. Site curves for young-growth coastal redwood. Calif. Forestry and Forest Products 29.

## JDSF BYTES THE BIG APPLE

Joseph Ontiveros<sup>1/</sup>

For one year now, JDSF has had a special member on its staff. At first a mysterious fellow but now well acquainted with most of the staff, this new member has impressed us in his mathematical skills, a never-failing memory, and his ability to get the job done fast and efficiently. This new member is an Apple Computer System.

Purchased last December, the system consists of an Apple computer with 64K programmable memory, a TV monitor, printer, and two data storage devices. The first storage device is a floppy disk drive used to store information on plastic diskettes. The second device is a Corvus 5 megabyte hard disk. This device could permanently store virtually 5 million characters. The initial price of the system was roughly \$8,000.00. Since then accessories such as a numeric keypad used for fast numeric data entry, and a cooling fan have been added to the system.

The Apple system came to us complete with graphic and color capabilities. It can understand three different languages: BASIC, PASCAL, and FORTRAN (which is a language commonly used in the past by the forest industry for large computers).

The computer is a very versatile machine and has found many applications here on the State Forest such as record-keeping, word-processing, forest growth simulation, mathematical and statistical analysis, and graphical displays. Most of the programs used on the Apple have been developed here at JDSF.

One of the major projects on the system was adapting a forest growth simulation program for the coastal redwood region, CRYPTOS (Cooperative Redwood Yield Project Timber Output Simulator) written by Bruce Krumland and Lee C. Wensel (C) Wensel, 1982) of U. C. Berkeley. With some technical assistance from Humboldt State University the program is now operational on our system. The program allows the forester to create a representative forest stand and then "grow" or apply various cutting treatments to the stand. The program will display or print various growth and volume tables. Originally written for a large campus mini-computer, adaptation of this and other sophisticated programs to more "portable" microcomputers, such as ours, make their use very convenient and affordable to small landowners.

For the foresters working on timber sale preparation, computer programs have been written to give results in an hour or two that previously may have taken days to complete manually or with a hand-calculator. One program package, called SURVEY, will calculate acreages from closed traverse surveys of proposed timber sales. The package, created at JDSF, allows temporary or permanent storage of survey records which can be recalled and used at a later date. The package can also draw a rough graphic display of the line surveyed.

Another program used in timber sale preparation is the Timber Cruise Program. The forester enters the sampled information from a cruise into the computer. Data is taken right off of the timber cruise sheets the foresters use in the field. The program will compute stand composition, average stand parameters such as diameter and height, volume per acre broken down by species, and give statistical information about the cruise. A stand table can also be generated from this program. The cruise program has provided the greatest time savings of all programs used in timber sale preparation.

When large volumes of data need to be analyzed (a recent study had over 15,000 data entries), there is always the danger of making data entry errors by omission or commission. Performing computations by hand or calculator, data entry errors may be impossible to find or result in the time consuming task of re-entry from the start. With the computer, our foresters have been spared the burden of re-entering numbers because of such errors. A program has been written here at JDSF, called MICROTAB, which allows the user to enter values, review and edit these values, if desired, and perform simple statistics, mathematical translations, or even a linear regression on the data.

Not only is the system being used for statistical analysis and general number crunching, the system will also function as a word-processor. JDSF has purchased a word-processing program which is being used for writing and editing letters, reports, etc. It is also being used to write this newsletter. Text can be easily added, inserted, deleted, modified or moved in just seconds. With the use of the printer, hard copies can be made on paper for overnight editing, reviewing by others, or as a final product.

Other programs being developed here with forestry applications are a scale ticket program which calculates volumes from log measurements, a three-dimensional graphic display program for geographic data, and a program which determines site index based on tree diameter and height.

Visitors wishing to see our system in operation are welcome!

---

1/ Joe Ontiveros is a Forestry Aide at JDSF and a 1981 graduate of Humboldt State University. He has developed SURVEY, MICROTAB, Timber Cruise and several other useful computer programs.

\* \* \* \* \*

#### JDSF STAFF NOTES

In our last Newsletter we profiled Hank Land, our Chief Sale Officer. Beginning with this issue, we're going to introduce the other members of our staff, starting with Janice Tompkins.

Janice came to JDSF 15 years ago. While she is officially our "secretary," it's probably more accurate to call her our office manager. She also happens to be the best speller around.

Although she claims there is no pre-training available for working in the office of a State Forest, with its unique blend of business transactions, public service and politics, her 10 year's experience with Fairhurst Lumber Co. in Eureka prior to coming to Fort Bragg was helpful. She knows her way around the woods, so to speak.

Janice grew up in Humboldt County where, she says, "I thought about raising horses and dogs." But she met her future husband, Bruce, who was driving a truck for the firm she was working with in Arcata, and, "ended up raising kids instead." Although you'd never know it by looking at her, she's raised five, aged 16 to 31. Reflecting on motherhood, Janice says, "Why do you think I work? I can't stand being home!"

Seriously, though, it's impossible to imagine things running smoothly around here without Janice. If you don't believe it, come around sometime when she's on vacation.

The latest additions to our staff are Thom Sutfin and Walt Decker, our two newest timber sale foresters. They fill vacancies created by the promotion of Craig Anthony a year ago to Area Forester for western Mendocino County and the transfer of Dana Cole to JDSF research forester.

Thom comes to us from Oregon State University where he recently completed course work for his M. F. Walt previously was with Simonson Lumber Co. in Smith River where he was a staff forester for 7 years.

Two other recent additions to our staff are Mike Williams, our Heavy Fire Equipment Operator, who previously worked as a truck driver and equipment operator with various logging outfits. Eric Schramm is our new full time patrolman, a job he performed previously with the U. S. Forest Service in the McCloud area.

Finally, we are sorry to say goodbye to Pam Tonella, our Office Assistant II who is moving to Willits where she and Bruce will be opening a new business. Forestry Aides Fay Yee and Joe Ontiveros will also be leaving us at the end of January. Their talents and skills will be sorely missed but not forgotten!

\* \* \* \* \*

#### COMMUNITY EDUCATION

Miriam Clark of the Redwood Region Conservation Council has developed a set of 80 slides with a taped commentary entitled "Redwood - - Something For Everyone." The slides cover basic redwood facts and illustrate the species' unique qualities.

The set is available for two-week periods through the RRCC, 224 Rosenberg Building, Santa Rosa, CA 95404. JDSF has arranged to borrow the set and some of our staff will be making presentations to local schools and civic groups.

\* \* \* \* \*

