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PRELIMINARY RESULTS
OF TILLING THE JAMES CREEK 1983 TIMBER SALE

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JDSF Newsletter No. 13 (February 1984) reported on trial tilling plots in the James Creek drainage. During the past year a more extensive study was undertaken to broaden our knowledge about how compacted skid trails can be effectively tilled using conventional rock rippers and medium-sized crawler tractors. Tilling was conducted in conjunction with the logging of the James Creek 1983 Timber Sale.

The forest in the sale area is characterized as residual old-growth redwood and Douglas-fir. Most of the stand's volume was removed by large crawler tractors in a 1958 timber sale. In the 1984 harvest, all trees larger than 22 inches diameter-breast-height (dbh) were removed, resulting in an average per-acre harvest of 18,000 board feet.

Soils are included in the Yellowhound-Kibesillah complex, and have surface horizon textures classified as very gravelly loams, with clay loam B horizons. Areas that were logged by tractor had slopes ranging from 15 to 70 percent, with an average of 43 percent. Approximately 135 acres were logged with tractors, and the average skidding distance was about 350 feet. Another 81 acres were logged with skyline cable.

METHODS

All skid trails and landings used were mapped. Approximately 12 percent of the tractor logged area was found to be occupied by skid trails. This figure corresponds closely to that reported by Ziemer (1981) for the South Fork of Caspar Creek (10 percent). And where contractual requirements limit skid trail spacing to a minimum interval of 100 feet, no more than 11 to 13 percent of a logged area should be covered by skid trails in a single entry (Cole 1983).

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The tractor-logged area in the James Creek 1983 Sale was divided into three compartments. Skid trails in compartments A and B were to be tilled after completion of logging, while compartment C was to be left untilled as a control. Furthermore, only compartment C was to be waterbarred. Prior to tilling sample plots were located along primary skid trails at 300-foot intervals. Ten plots were established in each compartment. While we had hoped to till the trails when soil moisture levels were at their lowest, this was not accomplished due to harvesting delays and early rains.

Compartment A was tilled in mid-October using a Caterpillar D-6D crawler tractor equipped with a five-tine, 24-inch rock ripper. Part of the unit was tilled under very dry conditions; the remainder was tilled after some rainfall had occurred. The average soil moisture content was 12 percent. Both primary ridge trails and secondary lateral trails were tilled using a zigzagging technique in an attempt to shatter the compacted layer to a depth of 18 inches. Compartment B was not tilled due to excessive rainfall.

At each of the plots established in compartments A and C soil moisture and soil density measurements were made with a Troxler nuclear density gauge. At each location we laid out ten-foot-wide transects across the skid trails. We set the nuclear density gauge at three equally-spaced positions along the transects and made readings at a depth of six inches. Additionally, two sites were chosen on undisturbed soils as near as possible to each plot for control measurements.

RESULTS

Density measurements were approximately 20 percent higher on compacted skid trails in compartments A and C than on the undisturbed plots. Mean dry density on the trails was 1.49 g/cm^3 , compared to a mean of 1.24 g/cm^3 for the undisturbed controls. This compares favorably with results reported by others (Froehlich 1976; Froehlich, et al. 1980). Based on a relationship developed by Adams and Froehlich (1981), such an increase in density could be expected to cause a 20 percent decrease in seedling height growth. This timber sale was planted during the winter of 1984-85, and seedling heights will be measured in the plot areas in both the tilled and nontilled compartments after two and five years.

No bulk density measurements were made after tilling compartment A. These measurements will be made during the summer of 1985, after an over-wintering period. Previous work by Froehlich (personal communication, 1983) in Oregon showed that there are too many macro-voids created by tilling to allow accurate nuclear density measurements immediately after ripping.

DISCUSSION

While density measurements are not available yet for the ripped skid trails, several points were learned through observation. It quickly became apparent that the D-6D crawler tractor had insufficient power to penetrate the rock rippers to 18 inches where skid trails were steepest. Because of this, the treatment did not fracture the entire trail and the compacted layer was not completely broken up. While this was not a problem on the lateral skid trails, it did cause some erosion to occur on the steeper primary skid trails. Runoff became channelized and carried loose soil that lay above the compacted layer down to the landings below. Similar results have occurred on

the Bureau of Land Management's Salem District (Froehlich 1985, personal communication). We immediately waterbarred the steep primary trails to stop further erosion from occurring. We recommend that any skid trails over 30 percent slope be waterbarred when tilled with a rock ripper.

An earlier study by Andrus (1982) in Oregon showed that, while rock rippers are readily available to foresters, they can produce highly variable success rates. He found that they fractured only 18 to 43 percent of the compacted layer, and typically created narrow V-shaped trenches. A much better tool--called a "Winged Subsoiler"--has been created at Oregon State University. It utilizes three 48-inch curved shanks with replaceable 19-inch-wide winged shoes. Pulled behind a D-6 crawler tractor, this tool fractured over 80 percent of compacted layers on Oregon sites (Froehlich and Miles 1984). It has been used on slopes up to 55 percent without initiating erosion. It is, however, a prototype and not easily obtained.

As more data become available, we will present further analyses in future Newsletters.

We would like to express our special thanks to **Mr. Robert Fallis** of the Eureka office of the California Department of Transportation for operating the nuclear density gauge.

LITERATURE CITED

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- Andrus, C. 1982. Tilling compacted forest soils following ground-based logging in Oregon. Unpublished M. S. thesis. Oregon State University, Corvallis.
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- Froehlich, H. A. 1976. The influence of different thinning systems on damage to soil and trees. Her Majesty's Stationery Office, London. For. Comm. Bull. 55. pp. 102-106.
- Froehlich, H. A., J. Azevedo, P. Cafferata, D. Lysne. 1980. Predicting soil compaction on forested land. Final Report to USFS-PNW and Missoula Equip. Development Center, Coop Agreement No. 228. Oregon State Univ. 120 p.
- Froehlich, H. A. and D. W. Miles. 1984. Winged subsoiler tills compacted forest soils. For. Industries, Feb: 42-43.
- Ziemer, R. R. 1981. Storm flow response to road building and partial cutting in small streams on northern California. Water Res. Research. 17(4): 907-917.

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PUBLICATIONS

The following is a list of State Forest Notes, California Forestry Notes, PSW Research Notes and other publications resulting from experimental projects on Jackson Demonstration State Forest. Individual copies can be obtained by writing to us at P. O. Box 1185, Fort Bragg, CA 95437.

<u>No.</u>	<u>Date</u>	<u>Title</u>	<u>Author</u>
6	1/61	Seasonal Diameter Growth in Trees on Jackson	Richard Bawcom, Robert J. Hubbell, David Burns
7	2/61	A Test of Variable Plot Cruising in Young Growth Redwood	Robert J. Malain
16	8/63	A Monterey Pine Planting - Frazier Plantation	J. E. Sindel
17	8/63	Sugar Pine Planting on Jackson State Forest	R. J. Malain, D. R. Burns, J. E. Sindel
29	4/66	Redwood Sprouts on Jackson State Forest	Brian B. Barrette
46	8/71	Grass & Fertilizer Selection for Road Spoil Erosion Control on Jackson State Forest	N. Stoneman
48	3/72	Use of Annual Ryegrass and Urea for Post Logging Erosion Control on Jackson State Forest	R. Jackman, N. Stoneman
57	12/74	Jackson State Forest - Caspar Orchard Eucalyptus Grove History and Volume Tables	Brian Barrette & Ray Jackman
58	4/75	Black Stain Root Disease in Douglas-fir on Jackson State Forest	Ray Jackman & Richard Hunt
61	4/76	"mini-yarder" Clears Streams on Jackson State Forest	Forest B. Tilley
64	11/76	Timber Sale Appraisals for Jackson State For.	Gary F. Ross
66	7/77	Caspar Creek Watershed Study - A Current Status Report	Forest B. Tilley
79	5/80	An Evaluation of the FMC Tracked-Skidder on Jackson State Forest	Delmer L. Albright
34	10/82	Effects of Thinning on Redwood Sprout Growth	Dana Cole
86	5/83	Skid Trail Pre-Construction: A Case Study of Logging Impacts and Productivity	Dana Cole
39	10/83	Observations of a Thirty-One-Year-Old Radiata Pine Plantation in Northern California	Roy Woodward & Joseph Ontiveros

91	3/84	The Evaluation of Formula and Decimal C Scribners: Are Conversion Factors Necessary to Provide Accurate Mill Scale Volumes from Forest Stand Cruises	Craig Anthony
93	9/84	Logging Residue Resulting from an Intermediate Harvest of a Second Growth Redwood Stand	Roy Woodward & Norm Henry
	5/73	PSW/Research Paper-93 "Road Construction on Caspar Creek Watersheds - 10 Year Report on Impacts"	J. S. Krammes David M. Burns
	8/79	PSW/Research Paper-140 "A Watershed's Response to Logging and Roads: South fork of Caspar Creek, California 1967 - 1976"	Raymond M. Rice Forest B. Tilley Patricia Datzman
	3/83	Journal of Forestry 81:148-157,"Redwood Sprout Growth Three Decades After Thinning"	Dana Cole
	9/84	Tree Planter's Notes, Vol. 35, No. 4, fall 1984 "Suppression of Sugar Pine by Douglas-Fir in a Northern California Plantation"	Roy Woodward & Henry Land

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TIMBER SALES - 1984

Total volume harvested from JDSF in 1984 was 26.6 million board feet, returning revenues to the state of \$4,970,700.47. That compares to 1983 figures of 30.9 million board feet harvested and returns of \$4.7 million. As in 1983, Class I sales (primarily firewood cutting permits) yielded an additional \$20,000.

JDSF sales activity generated \$74,450.50 in taxes for Mendocino County in 1984.

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NEW PUBLICATION

Former graduate student forestry aide **Roy A. Woodward** and recently retired Chief Sale Officer **Henry Land** recently published an article in "Tree Planter's Notes," Vol. 35, No. 4 (Fall 1984). The article is entitled "Suppression of Sugar Pine by Douglas-fir in a Northern California Plantation." The authors analyzed the success of a 56-year-old sugar pine plantation on JDSF and concluded that the species is not a suitable plantation species for this area. Competition from naturally invading Douglas-fir severely suppressed the sugar pine, and only 19 percent of the planted 3-0 stock remained. The average surviving tree was only 15 inches in diameter and 78 feet tall.

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STAFF NOTES

It was with great regret that we watched **Henry "Hank" Land** kick the dirt from his cork boots and hang up his CDF hard hat for the last time on Dec. 31. After 32 years with CDF--and 26 of those as JDSF's chief sale officer--Hank has retired.

During his tenure at JDSF Hank oversaw more than 80 timber sales on the State Forest, which returned to the state roughly \$60 million on an original investment of less than \$1.5 million. But more important than that, Hank has been a hardworking role model and inspiration to the hundreds of foresters and loggers who have been lucky enough to work with him over the years.

Thanks, Hank!

Our tenth staff profile concerns forester **Walt Decker**, who came to JDSF in 1982. Walt was born in Dayton, Ohio, where his dad was stationed during World War II. When Walt was young, his family moved to southern California. As he grew up, Walt watched the population boom. Soon he developed more and more of an appreciation for outdoor activities with his family, such as camping, backpacking and fishing. By the time he graduated high school, Walt had developed an interest in forestry as an alternative to traffic jams and smog.

Walt graduated from Humboldt State University in 1971 with a B.S. in Forest Management. While in school he worked summers as a gyppo logger and timber cruiser. He later did cruising for the US Forest Service in Gasquet and for the Del Norte County Assessor. He went on to Simonson Lumber Company, then to Arcata Redwood. He began as a staff forester, then progressed to stand management and reforestation supervisor. Later he worked as a consultant, preparing THP's, management plans, and contracts. Since 1982, he has been a JDSF timber sale officer with a special interest in silviculture.

Walt's intrests include bicycling, photography, and hiking. Building a new home south of Fort Bragg has kept him busy longer than he can remember.

In other news, **John Griffen** has been appointed to fill the new Operations Officer position at JDSF. Formerly Assistant Manager, John will now supervise all sales, resource management and engineering activities.

Kelly Keenan started working with us as a forestry aide two years ago, then later became a USFS watershed forester on the Caspar Creek study. Unfortunately for us, Kelly got an offer he couldn't refuse and is now a forester with Louisiana-Pacific in Ukiah.

The new face around the lab these days belongs to **Wes Marshburn**, a USFS geologist assigned to the Caspar Creek Watershed Study. Wes comes to us from the Redwood Sciences Lab in Arcata. He has a B. A. in Geology from Humboldt State University. Welcome, Wes!