

**GRADUATE THESES PRODUCED FROM RESEARCH
CONDUCTED ON JACKSON DEMONSTRATION STATE FOREST**
Peter Cafferata

A primary goal for JDSF is to carry out research on the various aspects of forestry in the redwood region. One avenue to do this has been to encourage university forestry departments to do experimental projects here. Since 1980, funding for many researchers has been provided through CDF's Forest Resource Improvement Fund (FRIF). Each year, money is made available to the various State Forests for

Research projects which the Manager feel have the highest priorities. Graduate students have often been the actual principal field investigators and many theses have been produced. In addition, we have been able to Obtain special- funding from CDF for large scale projects. Most notably, this has occurred for the Caspar Creek Watershed Study, which we are jointly conducting with the US Forest

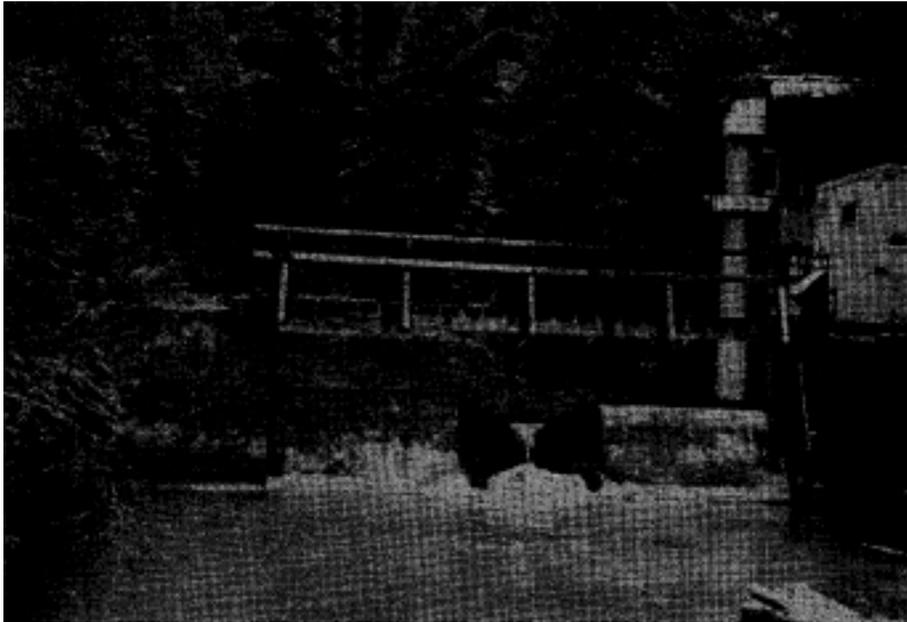


Fig. 1. The South Fork of Caspar Creek in the winter.

Service's Redwood Sciences Laboratory. Their close ties with Humboldt State University at Arcata has led to the production of numerous graduate theses.

While most of the research done on JDSF has resulted in various papers and notes, we are proud that seven masters theses and four Ph.D. dissertations have been produced from work done here over the past twenty years. As we move into the 1990's, we would like to encourage the departments which deal with natural resources at the various universities in California to consider conducting research here on JDSF. There are many areas of redwood silviculture, harvesting systems, watershed impacts, aquatic and terrestrial biology, and wildlife management which need further research. As the only large public holding in the redwood region which is harvesting timber, we offer a unique opportunity to the research community. A summary of the theses produced from work done here follows.

Watershed/soils

Hydrologic Properties of One Major and Two Minor Soil Series of the Coast Ranges of Northern California. Edward P. Wosika. 1981. M.S. Thesis Humboldt State Univ. Arcata. 150 pp.

The hydrologic properties of the primary soil series found in the Caspar Creek watershed were evaluated. The Hugo soil series (currently broken down into 12 different soil series) exhibited great variation in its hydrologic properties from one location to another. The Caspar and Mendocino series varied only slightly. The main factor producing differences with the Hugo series is the degree of colluvial mixing, which is closely related to loge position.

Effects of Timber Harvesting on the Lag Time of Caspar Creek Watershed. Karen H. Sendek. 1985. M.S. Thesis. Humboldt State Univ. Arcata, 46 pp.

This was the first of three Theses analyzing changes in runoff after road construction

and selective tractor logging in the South Fork of Caspar Creek. (See Fig. 1.) Hydrograph lag time, or the amount of time between the midpoint of precipitation and storm runoff, was computed for several storms before and after logging. After timber harvesting, the lag time was found to significantly decrease for large winter storms, indicating that runoff occurred sooner.

Changes in Storm Hydrographs After Roadbuilding and Selective logging on a Coastal Watershed in Northern California. Kenneth A. Wright. 1985. M.S. Thesis. Humboldt State Univ. Arcata. 55 pp.

The impact of compacting 15 percent of the South Fork of Caspar Creek through the construction of roads, landings, and skid trails on storm flow runoff was examined. Large winter storm peaks and volumes were not significantly increased by road construction or logging. Small storm peaks in the fall were increased following these activities, since less water in the soil was lost through evapotranspiration in the summer.

The Effects of Selective Logging on Low Flows and Water Yield in a Coastal Stream in Northern California. Elizabeth T. Keppeler. 1986. M.S. Thesis. Humboldt State Univ. Arcata. 137 pp.

Streamflow data for the North and South Forks of Caspar Creek was analyzed to determine the effects of harvesting on volume, timing and duration of low flows, and annual water yield. Significant increases in streamflow were detected for both the annual period and the low flow season following logging. Greater relative increases were observed for the summer 'low flow period, but they were short-lived.

Sediment Transport and Storage on the North Fork of Caspar Creek, Mendocino County, California. Michael Napolitano. M.S. Thesis. Humboldt State Univ. Arcata. In progress.

A sediment routing study was done on a 2,400-meter channel reach from above the North Fork weir to a partially collapsed 19th century logging dam. Fifty-six channel cross-sections were monitored between 1979 and 1988 to assess changes in sediment storage. Results showed that changes in sediment storage and yield were low. Most of the changes were concentrated within the active channel; valley fill terraces showed little variation.

Dynamics of Naturally occurring Subsurface Soil Pipes in North-Coastal California. Jeffrey S. Albright. M.S. Thesis. Humboldt State Univ. Arcata. In progress.

Subsurface soil pipes, or natural underground cavities, were studied at the heads of gullied channels in three small headwater drainages of the North Fork of Caspar Creek. Data recorders were used to monitor discharge. During storm events, nearly all the discharge observed from the sites came from pipeflow. Piping networks are a locally significant mechanism for routing water and sediment from steep upland watersheds.

Stream Ecology

The Effects of Logging Road Construction on Insect Drop into a Small Coastal Stream. Lloyd J. Hess. 1969. M.S. Thesis. Humboldt State Univ. Arcata. 58 pp.

Road construction on the South Fork of Caspar Creek caused very high suspended sediment levels immediately after construction in 1967. During this first year, most of the aquatic insects were

killed. The next year, chironomids (midge larvae) increased dramatically by filling the niches left by the organisms removed by the heavy sediment load.

The Response of Algal Communities in Streams to Timber Harvest Activities. Franklin K. Ligon. 1986. M.S. Thesis. Univ. of Calif., Berkeley. 58 pp.

Comparisons were made on the amounts of both filamentous and non-filamentous algae found in stream in a heavily logged watershed (Hare Cr.) and a stream in an unlogged second-growth watershed (North Fork of the South Fork of the Noyo River). Significantly more filamentous and less non-filamentous algae was found in Hare Creek. Increases in solar radiation, nutrient loading and suspended sediment from logging explained these differences.

Redwood Ecology/Silviculture

A Study of Uneven-aged Management Strategies in Young-Growth Redwood at Jackson Demonstration State Forest. Clifton E. Kennedy. 1983. M.F. Professional Paper. Univ. of Calif., Berkeley. 127 pp.

Three different methods of uneven-aged management were implemented on 240 acres in Railroad Gulch. Single tree selection, group selection, and a combination of these two methods were tested. The initial stages of designing and implementing the project are presented. Growth and yield projections, and economic evaluations are provided.

Early Changes in Coast Redwood (Sequoia sempervirens) Understory Vegetation Following Forest Harvest Activities. Roy A. Woodward. 1986. Ph.D. Dissertation. University of Calif., Davis. 139 pp.

Seven second-growth redwood stands on JDSF were sampled for understory vegetation species composition, frequency, and cover ten years after being partially harvested. A significant increase in understory vegetation was documented for all these sites. Redwood had poor initial establishment from seed, but sprouts arose from almost 100% of the stumps. Natural regeneration of conifers in partially cut stands can be sufficient to provide adequate stocking. It is doubtful that this will permit continued partial cutting with the intent to develop an uneven-aged stand, however, based on related research in this area.

Conceptualization and Preliminary Development of an Organismal Level Process Model for Simulating Tree and Stand Growth and Yield. Janet I. Cavallaro. 1989. Ph.D. Dissertation. Univ. of Calif., Berkeley. 101 pp.

Relationships were generated between a codominant coast redwood tree's growing space and its leaf surface area, its volume growth rate, its volume, stand growth, and stand yield. Optimal thinning treatments for even-aged wood stands were devised based on this model. Tree volumes and stand yields were projected for stands five years older.

Forest Entomology/Pathology

Factors Affecting the Abundance and Activity of Hylastes nigricornis, Steremnius carinatus and Other Insects in Roots of Douglas-fir Stumps. Jill W. Lowmbery. 1988. Ph.D. Dissertation. Univ. of Calif., Berkeley. 131 pp.

Black-stain root disease in Douglas-fir is caused by the fungus Leptographium wageneri, which is vectored by phloem feeding insects. Timber harvesting and road building create

stumps which attract the insects. Douglas-fir roots in mature stands which had been selectively logged, commercially thinned, and clearcut were examined.

Stand and Site Conditions Associated with *Leptographium wageneri* var. *pseudotsugae* in Douglas-fir Trees and Effects of Infection on Host Physiology. Thomas T. Lawson. 1988. Ph.D. Dissertation. Univ. of Calif., Berkeley. 168 pp.

The effects of the fungus causing black-stain root disease on water transport in and growth of Douglas-fir seedlings and pole-sized trees were evaluated. Terminal and radial growth rates of infected and uninfected trees were measured. Also, a study was made of 35,000 ha, almost half of which was on JDSF, to determine site and stand conditions associated with this fungus. A future article in this Newsletter will discuss the results.