JDSF Newsletter

Jackson Demonstration State Forest

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

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A NEW APPROACH TO MANAGING UNEVEN-AGED FOREST STANDS IN THE REDWOOD TYPE

N. Henry[1/]

An on-going study conducted by Dr. Edward Stone and doctoral student Janet Cavallaro now involves sampling some stands on Jackson Demonstration State Forest. These UC Berkeley researchers have evolved a new theory for uneven-aged management through the use of what they term structural-aggregations (non-overtopped groups of trees of a particular species, or growth-form and size that are within a specified distance of each other) and solitary-plants (all non-overtopped single trees not belonging to any structural-aggregation). Properly identified and controlled, these vegetation units can be used to maximize board foot volume growth/current net worth effectively. According to Ed, this new system will be the ideal solution for most small landowners who face the following problems in managing their land for timber production:

1. Their present forest consists of a mosaic of variously stocked areas.
2. They have too small a land base to practice even-age management.
3. They have objections to even-aged management because of the discontinuity of forest cover inherent in the method.

Past problems with applying uneven-aged management have been the lack of productivity relationships and a methodology for systematically identifying and controlling the even-aged groups which silviculturists generally recognize make up uneven-aged stands. Before this new structural-aggregation thinning method and uneven-aged management model can be implemented, however, a relationship must be established between the growing space of trees of a given size and their growth rates. They are taking three approaches to solving this problem.

First, they will measure the growth rate of trees they have located in stands on the North Fork of Caspar Creek, JDSF, that have particular size growing spaces. The selected trees are surrounded by 4 to 6 other trees of the same height and are separated from them by a given distance or small range of distances.

Second, they are collecting data from other stands on JDSF so they can use the CRYPTOS growth model to simulate the relationship between growing space and growth rate.

Third, they are developing a new more physiologically-based growth model which they expect to be particularly sensitive to the growing space of trees. Upon its completion, they will also use it to simulate the relationship between a tree's growing space and its growth rate.

1/Demonstration & Experiment Forester II, Jackson Demonstration State Forest.

Currently, greenhouse work on redwood growth is being done by the researchers in order to begin development of the physiologically-based growth model. This model will incorporate three variables which have been identified in many previous studies to be the primary variables affecting growth. These variables are leaf surface area (LSA), net assimilation rate or efficiency of the leaf surface (NAR), and growing season length (GSL).

Following this greenhouse phase, the model development will continue from data collected on trees growing in the field (JDSF). The research will quantify the above three variables for trees in various size/density groups. The total leaf surface area for each study tree will be determined by measuring the cross sectional area of the transmittable xylem of the bole at the base of the crown. This relationship has been established for other species and Ed and Janet are currently establishing it for redwood.

The next variable, leaf surface efficiency of a tree, will be determined through sampling the proportion of "light" versus "shade" needles. The light needles have lower surface area/weight ratios and higher photosynthetic capacities. Two variables, chlorophyll and soluble protein content, are now being considered for use in weighting the relative effectiveness of the "light" and "shade" needles.

Once Ed and Janet establish the relationship between the growing space of trees of a given size and their growth rates, silviculturists will be able to determine the growth rate that will enable them to achieve particular objectives and use the structural-aggregation approach to uneven-age management to implement stand manipulations. The growing space required to obtain the desired growth rates on trees of a given size can be translated into the upper limit of the spatial class used in defining a structural-aggregation type.

As a bonus, Ed and Janet also believe the model can be used to determine the fewest number of redwood sprouts to carry on isolated root crowns in order to maximize productivity.

REFERENCES

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Stone, E. C. and J. I. Cavallaro. 1982. Study proposal for funding field portion of NSF Research Project.

Stone, E. C. 1982. Study proposal for NSF funding: A tree growth model for predicting stemwood volume growth in coast redwood based on NAR, LSA and GSL.

Stone, E. C. and J. I. Cavallaro. 1981. Project proposal for CFIP funding: A proposal to demonstrate both a thinning method for second growth forests and the application of new models for uneven-age forest.

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SOME CONSIDERATIONS FOR FOREST HAUL ROAD CONSTRUCTION AND MAINTENANCE

Glen Pinoli[1/]

JDSF culvert and downspout installation guidelines (overleaf) have evolved during the past 35 years as our 360-mile forest haul road system has been developed. These guidelines are necessarily general, as each culvert installation has its own unique variables. Modifications of these guidelines may be required for a specific installation.

Examples of situations that normally require culvert installation are locations where a road must cross a natural drainage course or draw, and low spots or dips in a road where water might otherwise fail to drain. Typically, roads will require at least one culvert per 0.1 mile.

Some other concerns the landowner may have are the angle at which the culvert is placed across the road base, the clay content of the soil in which the culvert is placed, and whether a road is insloped or outsloped. Such considerations are site-specific and there are no universal solutions that will fit every situation.

Some generalizations can be made concerning road sloping. For example, where fill slopes may be unstable due to topography or soil type, it might be better to concentrate runoff in an inside ditch so that it can be drained from the road prism via culverts. A disadvantage to insloping a road is the risk that one or more culverts may become plugged, leading to possible road failure. For this reason, outsloping may be preferable in areas where water can be safely dispersed over the road fill. If even portions of a road are outsloped, fewer culvert installations may be necessary.

Areas with soils of high clay content may present problems for culvert installation. Such soils may experience excessive settling during the first winter period following culvert installation. This settling may result in the culvert bending to such a degree as to prevent water flow. This problem may be mitigated to a certain extent by increasing the amount of compaction on high clay road beds prior to culvert installation.

During heavy use, such as while logging operations are in progress, regular maintenance of haul roads is necessary. Depending on conditions, roads should be watered daily or as needed to keep dust down and maintain a good surface. The road should be bladed regularly (weekly is a good average) to keep ruts and surface irregularities to a minimum. Though expensive, it may be necessary to spread crushed rock on the surface of a haul road to allow use during wet weather. When rock is used, it is spread and compacted to a depth of 6 to 18 inches. Generally, the rock should be spread to a width of 14 feet on straight sections and 20 feet on curves and turnouts.

Where ditches are used, they are normally 18 to 24 inches deep and should allow water to flow from one culvert to the next in case one becomes plugged. In such a case, the next culvert can provide a backup measure of safety.

Road maintenance at the end of the logging season should consist of cleaning the ditches and cleaning out culvert sediment basins at the head of each culvert.

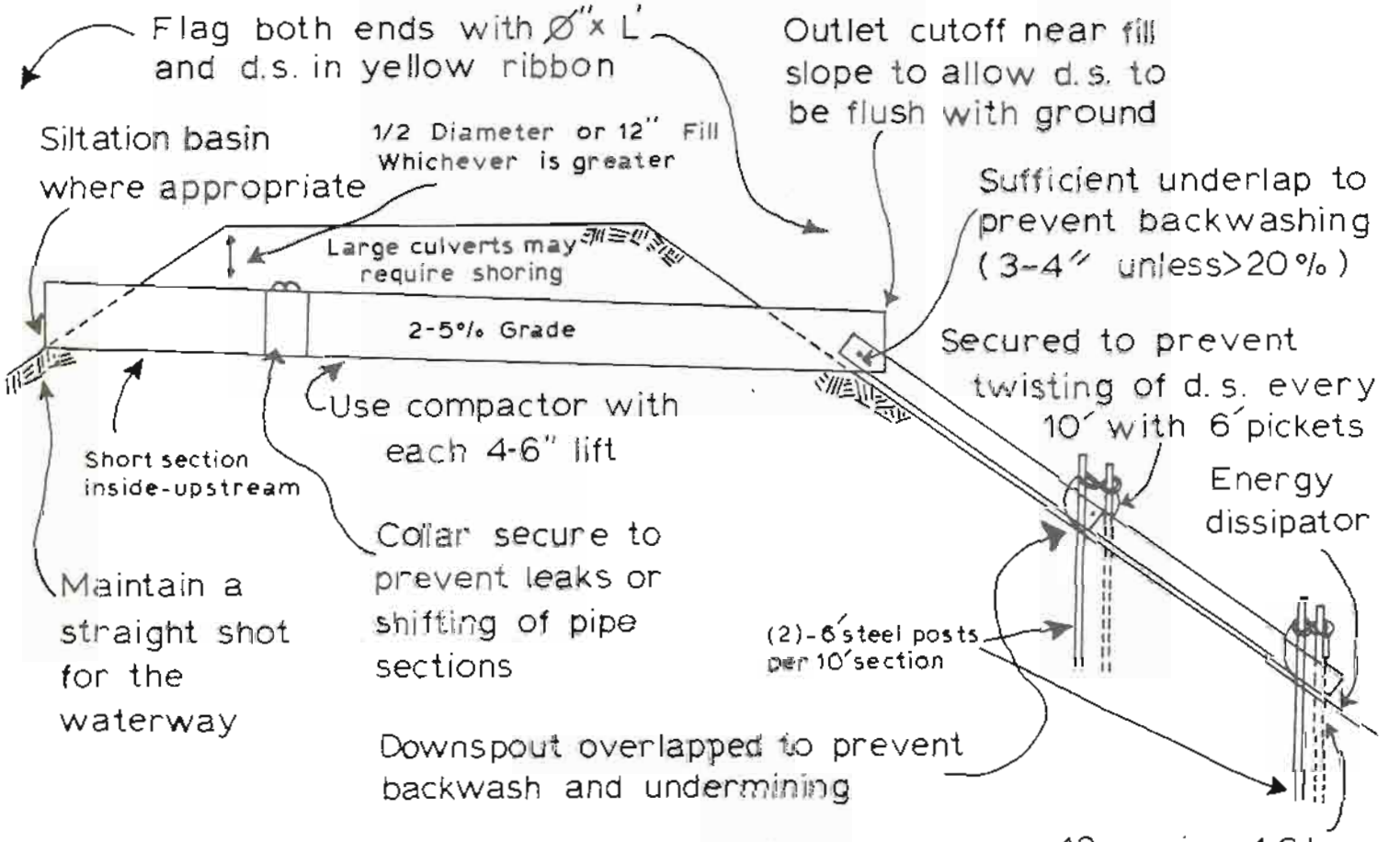
1/ Forester I, Jackson Demonstration State Forest

JACKSON DEMONSTRATION STATE FOREST

CULVERTS AND DOWNSPOUTS

(APPROXIMATELY EVERY 500',
1/10 MILE OR AS NEEDED)

LENGTH: 40' minimum in curves (inturns) where yarder will have to pass. Use drop inlets near steep, unstable banks.



All culverts shall be placed on an optimum grade of 3% (2% minimum – 5% maximum)

≈12 ga wire, 4-6 turns between posts and 2-3 turns under d.s. to "cradle" outlet

Use adequate d.s. to get the water off the fill.

TIMBER SALES

Although 1982 was one of the worst years in history for the wood products industry, there were four major timber sales on JDSF. A total of 29.4 million board feet of timber was harvested, resulting in gross receipts of nearly $5 million. Recently, contracts have been signed for four additional sales involving harvest of an estimated 36.5 million board feet. These should result in about $7 million in revenues.

Meanwhile, our timber sale foresters are busy laying out, cruising and mapping 1984 sales. These activities may be curtailed somewhat next month, however, as logging season gets under way and sale administration duties take precedence.

JDSF STAFF NOTES

Continuing with our staff profile series, next in line, seniority-wise, is Norm Henry. Norm has now been at JDSF one month short of ten years. He currently fills the D. & E. (demonstration and experimental) forester position, though his summer work is still mainly concerned with timber sales as he does all of our sample scaling. He should soon have more time to devote to his scientific work, however, because starting with our 1983 sales, JDSF will be going to third party scaling contracts. Norm will still get to do some check scaling under the new system, but this will amount to only a fraction of his past scaling responsibilities.

Norm came to JDSF as a Junior Forester after a year-and-a-half as a Forestry Graduate Trainee and Junior Forester in the Sonoma Ranger Unit. From an early age on through graduation from Humboldt State University, with a B. S. in Forest Management, Norm always wanted a career out of doors, so his graduation to JDSF was natural. He says he's really enjoyed the type and variety of work he's encountered working on the State Forest and feels the opportunities for developing and working on interesting and challenging projects are unsurpassed anywhere else.

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