SERVING SOUTHWEST OREGON THROUGH ADAPTIVE RESEARCH AND EDUCATION

fir report

forestry intensified research

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"FIR REPORT" is a quarterly publication containing information of interest to individuals concerned with forest management in southwest Oregon. It is mailed free on request. Requests should be sent to: FIR REPORT, 1301 Maple Grove Drive, Medford, Oregon 97501.

FIR REPORT communicates recent technological advances and adaptive research pertinent to southwest Oregon, and alerts area natural resource specialists to upcoming educational events. Comments and suggestions concerning the content of "FIR REPORT" are welcome and should be sent to the Maple Grove address.

The Southwest Oregon Forestry Intensified Research Program (FIR) is an Oregon State University, School of Forestry program designed to assist region foresters and other specialists in solving complex biological and management problems unique to southwest Oregon. FIR specialists organize, coordinate, and conduct educational programs and adaptive research projects specifically tailored to meet regional needs.

Established in October, 1978, the FIR project is a cooperative effort between Oregon State University, the Bureau of Land Management, U.S. Forest Service, O & C Counties, and southwest Oregon timber industries. It represents a determined effort by the southwest Oregon forestry community and county governments to find practical solutions to important forest management problems.

For the FIR Staff

David H. Lysne
Harvesting Specialist

inside...

Agriculture, Home Economics, 4-H Youth, Forestry, Community Development, and Marine Advisory Programs. Oregon State University, United States Department of Agriculture, and Oregon Counties Cooperating.

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current research

adaptive fir

PERFORMANCE OF CONTAINER-GROWN DOUGLAS-FIR

In 1979, Adaptive FIR and Medford District of the Bureau of Land Management initiated a study to evaluate the performance of one-year-old container-grown Douglas-fir seedlings on four hard-to-regenerate sites in northwestern Josephine County. Four steep sites with shallow, skeletal soils representing north, east, south, and west aspects were planted. One-half of the seedlings on each aspect were artificially shaded with 8- x 12-inch cardboard panels. A detailed description of the experimental design, study sites and first-year results are contained in the 1980 publication First-year performance of 1-0 containerized Douglas-fir seedlings on sites in southwest Oregon, by S. D. Hobbs et al., Forest Research Laboratory Research Paper 42, Oregon State University, Corvallis. The second-year survival and growth data have now been collected and statistically analyzed and offer some encouraging results.

Survival continued to decline on all aspects except on the north site (table 1). Between 1979 and 1980, survival percentages dropped by 6 and 7 percent, respectively, for shaded and unshaded seedlings on the east site and decreases of 3 and 14 percent were observed on the south site. While a 16 percent difference in survival existed between shaded and unshaded seedlings on the south site in 1979, at the end of 1980 the gap had widened to 27 percent. A decline of 4 and 7 percent was noted on the west site for shaded and unshaded seedlings for the two-year period.

Table 1. Percent survival of shaded and unshaded seedlings on all aspects.

Aspect	1979 Shaded	1979 Unshaded	1980 Shaded	1980 Unshaded
North	98	92	98	92
East	53	50	47	43
South	90	74	87	60
West	62	58	58	51

Mean growth differences between shaded and unshaded seedlings, based on 1980 data, were evaluated by Students t-test (table 2). Unshaded seedling height on the south site was significantly greater than that of the shaded seedlings although the percent survival for the latter was higher. The reverse was true on the west site, where shaded seedlings had significantly better height growth than those that were unshaded. No significant differences in diameter growth were detected.

Table 2. Effect of artificial shading on seedling growth within aspects based on 1980 growth data.

Aspect	Unshaded	Shaded	Probability $> \lvert t \rvert$
Mean height (cm)			
North	24.24	25.43	0.053
East	23.21	24.62	0.140
South	32.92	29.71	0.030*
West	31.50	35.67	0.030*
Mean diameter (mm)			
North	3.65	3.56	0.270
East	3.42	3.52	0.420
South	4.76	4.48	0.190
West	5.29	5.58	0.430

*Statistical significance with 8 Douglas-fir at the P = 0.05 probability level.

A subsample of 60 seedlings (30 shaded and 30 unshaded) was carefully excavated from each aspect in November, 1980 for biomass measurements. Surprisingly, a large number of seedlings had been naturally inoculated with ectomycorrhizae (table 3). A high percentage of the seedlings taken from the warmer south and west sites had been inoculated. It is difficult to evaluate the absolute impact of the ectomycorrhizae on seedling survival and growth because the study was not designed to accomplish this, but it is interesting to note that on those sites where growth response was the greatest, so was the percentage of seedlings with ectomycorrhizae.

Table 3. Percentage of subsample seedlings naturally inoculated with ectomycorrhizae two years after outplanting.

	Aspect			
	North	East	South	West
Shaded	47	24	97	80
Unshaded	50	33	100	85

This particular study of container-grown Douglas-fir performance on hard-to-regenerate sites in southwest Oregon has now been completed. The results have been analyzed, and a more comprehensive publication is being prepared that will include a closer evaluation of site variables and biomass production between treatments.

SH

COMPACTION OF SOUTHWEST OREGON SOILS - SHEAR STRENGTH

The compaction of soils is of concern to many individuals managing and operating on forest lands. Large areas of southwest Oregon have been, and will continue to be', harvested and managed with ground-based machines. Thus, an important concern is to determine which soils are most susceptible to compaction so that the productivity of the soil will not be impaired.

The potential for a soil to compact is often assumed from the density to which the soil will compact. Soils compacted by similar processes or machines to higher densities are assumed to be the most susceptible to compaction and, therefore, are in greater need of protective management; soils compacted to low densities are assumed to be less susceptible to compaction. But soil density is only a measure of the relative weight of solid particles per unit volume soil present. Density is an indirect measure of the changes occurring in soil physical properties affecting the biology of root systems. Soil aeration and mechanical resistance to root penetration, or shear strength, are the most important soil physical properties affected by density increases. Quantifying the relationships between shear strength and soil aeration and compaction is difficult because both variables are sensitive to changes in soil density and moisture content. Soil density change is the most widely used measure of soil compaction because of the relative ease with which it can be measured, insensitivity to moisture change, interpretation of soil engineering properties, and the associations between soil density and tree growth that have been developed.

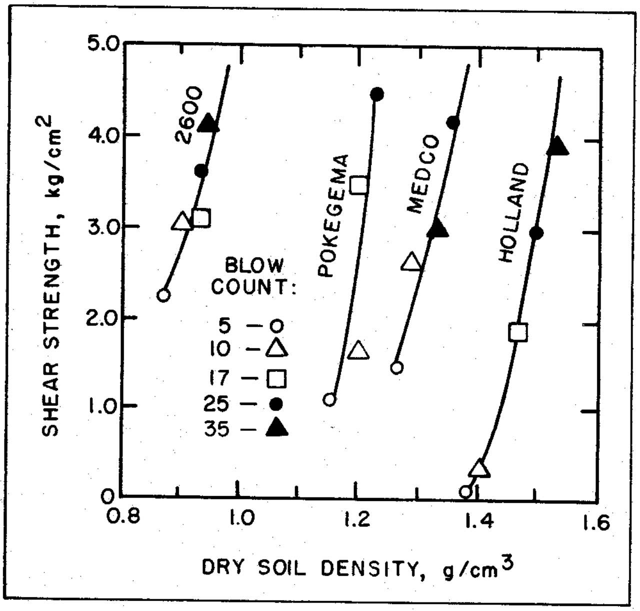
Shear strength of compacted soils can be an important factor limiting soil productivity, especially in the better drained soil classes where poor aeration is less apt to be a problem. Therefore, measuring the shear strength of soils compacted by the same process and at several moisture contents can provide insight to the potential for different southwest Oregon soils to compact.

An Adaptive FIR research project was initiated to determine which southwest Oregon soils were most susceptible to compaction. The project included the measurement of both soil shear strength and soil density. Area soil scientists participated in the selection of soils and sites for sampling. George Badura, Rogue River National Forest, and Steve Shade, Medford District, Bureau of Land Management, were particularly helpful in the initial selection of soil series to be sampled. Roy Meyer, currently of Trinity Consulting Service, conducted the tests at the Siskiyou National Forest Soil Testing Laboratory.

A total of ten southwest Oregon soils representing a range of soil textures and parent materials were tested, but the results of only four soils will be used in these illustrations. The four soils reported are: Soil 2600 (unmapped series, Rogue River National Forest), collected north of Union Creek, T.30 S., R. 3 E., Sec. 24--sandy loam ash with pumice coarse fragments; Pokegema (Pachic Cryoboroll), collected beside the Green Springs Highway, T.40 S., R. 5 E., Sec. 1--sandy loam/loam; Holland (Ultic Haploxeralf), collected beside the West Fork of Evans Creek, T.33 S., R. 3 W., Sec. 6--sandy loam; and Medco (Ultic Haploxeroll) collected near Lake Creek, T.37 S., R. 2 E., Sec. 17--clay loam. All legal descriptions are in reference to the Willamette Meridian.

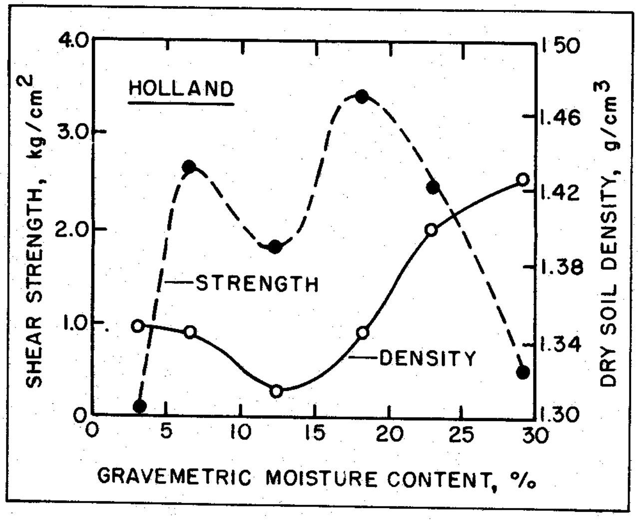
Soils were collected from the 10-30 cm depth at each site, air dried, and sieved to less than 19-mm (3/4-inch) diameter. Soil samples were then compacted in three layers in a 10.2-cm (4-inch) compaction mold with a mechanical compaction machine and a standard 2.5-kg (5.5-pound) hammer. A soil sample received either 5, 10, 17, 25, or 35 blows of the hammer per layer at each moisture content. Following compaction, the shear strength of the soil in the mold was measured with a laboratory shear vane (OSU Department of Civil Engineering) and dry density was determined. Each soil was tested at six to nine different moisture contents. A fresh soil sample was used for each moisture content and blow count test.

The shear strength of all soils increases rapidly as the compaction effort increases. The rate at which shear strength increases relative to changes in soil density is similar for all soils, indicating no major differences in soil behavior are apparent among soils. Thus, soil 2600 which is a matrix of ash and pumice coarse fragments, compacts to a high shear strength similar to the other soils even though its density remains low. Therefore, low density soils, such as ash-derived soils, respond to compaction by increasing their shear strength although only small changes in soil density may be occurring. The four soils illustrated represent nearly the full range of compacted soil densities and shear strengths to be expected in southwest Oregon. These results are for relatively dry soils. A rapid increase in shear strength at higher moisture contents exceeded the capacity of the vane shear and prevented making comparisons among soils.



The explanation for the similarity in soil shear strength increases among such a diverse group of soil textures and geologic material is relatively straightforward. Under unsaturated conditions (i.e., a soil containing solid particles, water, and air) a soil increases in density and shear strength when an external force is applied. The density continues to increase until the soil particles have gained sufficient strength to withstand further compaction, supporting the load applied. A further increase in the load will cause the soil to compact until it again develops sufficient strength to support the load.

At low compactive efforts, the shear strength of dry soil is relatively low, but generally increases with increasing moisture content until a maximum strength is reached. At even higher moisture contents, the shear strength again drops to a very low level. This type of shear strength-moisture content relationship is typical for all of the tested soils. The Holland soil is used here as an example. It is the only soil encountered which did not exceed the strength-measuring capacity of the shear vane at one or more intermediate moisture contents for the five-blow-count-test. At higher compaction efforts, the shear strength of soils exceeded the capacity of the shear vane at several intermediate moisture contents.



Since nearly saturated soils have little shear strength, pressure applied to soils in that condition leaves the soil in a puddled state. This condition is most obvious in the woods when the soil no longer supports skidding equipment and rutting occurs. At high compactive efforts, low shear strength occurs only near saturated soil conditions; however, at low compactive efforts, shear strength decreases at a much lower degree of saturation. In the case of the Holland soil, the shear strength begins to decline before maximum density for the five blow-count compactive test is reached. The peak in shear strength occurs at 50 percent saturation. Such a dramatic drop in shear strength at higher moisture contents while soil density continues to increase may first appear abnormal; however, this soil and others are apparently at moisture potentials higher than field capacity, i.e., low moisture tensions. Field capacity of undisturbed samples of this soil is approximately 20 percent moisture content. Since soil aggregates are most susceptible to shearing at low moisture tensions, the rapid increase in soil density is occurring as the result of aggregate destruction. Destruction of aggregates and their loss of strength is therefore responsible for the rapid decline in the soil's shear strength and its increased density.

Other research on soil compaction indicates that maximum destruction of aggregates occurs at different degrees of saturation and is influenced by clay content of the soil. Thus, the moisture potential at which maximum soil aggregate destruction occurs may also differ because of the amount and type of clay minerals, texture, and organic matter content of the soil.

In conclusion, at increasing compactive efforts, the shear strength of a diverse group of relatively dry southwest Oregon soils increases similarly. The shear strength of these soils increase regardless of their initial soil density. For soil moisture contents in the range of those found in the field, the shear strengths are much higher, even for the low compactive effort, five-blow-count test. Therefore, it is possible to compact and adversely affect the productivity potential of any soil in southwest Oregon. The force applied to the soil appears to be the most important factor affecting the compaction of soils at moisture contents below those necessary for aggregate destruction. Some soils are more sensitive to the moisture content at which they are compacted than others. This aspect of the study will be discussed in the future.

DM

fundamental fir

ANIMAL DAMAGE IN SOUTHWEST OREGON

Scientists for the USDI Fish and Wildlife Service recently completed a Fundamental FIR research project designed to determine the types and extent of animal damage to conifers in southwest Oregon. Concentrating on young stands, they systematically surveyed 138 areas representing 109 clearcut and 29 shelterwood plantations, the majority of which were less than 5 years old. Animal damage was encountered in all plantations. Over the entire five-country area of southwest Oregon, the most frequently encountered damage was attributed to black-tailed deer, followed in decreasing order of occurrence by elk, livestock, pocket gophers, hares and rabbits, mountain beavers, porcupines, grouse, and miscellaneous rodents. Reevaluation of 34 Cooperative Animal Damage Survey (CADS) plots in 1980 showed that the number of units sustaining damage by elk had increased by 71 percent over approximately the last 15 years. Over the same period, the mean percent damage to conifers by deer increased 76 percent, 367 percent for elk, and 133 percent for livestock. Animal interaction and plantation damage from more than one animal species were frequently recorded. For example, excessive feeding and trampling pressure by cattle, sheep, and elk often reduced the quantity of preferred forbs, thus increasing browse damage to conifer seedlings by deer.

Animal damage to conifer regeneration is more extensive in southwest Oregon than previously thought and represents a significant factor that should be addressed by further research and careful reforestation prescription planning. Copies of the U.S. Fish and Wildlife Service Job Completion Report, Survey of forest-animal damage in southwest Oregon, by J. Evans, et al., 1981, may be obtained by writing to: U.S. Fish and Wildlife Service, Forest Sciences Laboratory, 3625 93rd Ave. SW, Olympia, Washington 98501.

SH

continuing education

REGENERATION SYSTEMS WORKSHOP

June 8-11, 1981. FIR, southwest Oregon. The objective of the workshop is to bring foresters from southwest Oregon together so they can view and discuss successful regeneration practices and regeneration problems. Since there is a tremendous amount of regeneration expertise and experience among foresters in the region, we want to provide a mechanism by which foresters can learn from one another. The majority of time will be spent in the field, with one day spent in each of the Roseburg, Grants Pass, and Medford areas. The program will begin in Roseburg and end in Medford. A program announcement will be distributed in April. CONTACT: Ken Wearstler or Steve Hobbs, FIR.

VARIABLE PLOT SAMPLING

June 15-19, 1981. Oregon State University, Corvallis. Program to cover the variable plot and three-P aspects of variable probability sampling. Enrollment is limited to 50. CONTACT: Conference Assistant, School of Forestry, Oregon State University, Corvallis, OR 97331 (503)754-3709.

YOUNG PLANTATION MANAGEMENT

June 16-19, 1981. Oregon State University, Corvallis. Program is in the planning stage. CONTACT: Conference Assistant, School of Forestry, Oregon State University, Corvallis, OR 97331 (503)754-3709.

PLANT IDENTIFICATION SHORT COURSE

June 21-26, 1981. Oregon State University, H. J. Andrews Experimental Forest, Blue River. Program covers the visual identification of families and the use of Hitchcock and Cronquist's key, Flora of the Pacific Northwest, to identify genus and species of tree, shrub, and herbaceous plants. Enrollment is limited to 40. CONTACT: Conference Assistant, School of Forestry, Oregon State University, Corvallis, OR 97331 (503)754-3709.

AERIAL PHOTO/REMOTE SENSING

June 22-26, 1981. Oregon State University, Corvallis. Program to be similar to ones presented in past years. Enrollment is limited to 40. CONTACT: Conference Assistant, School Forestry, Oregon State University, Corvallis, OR 97331 (503)754-3709.

NORTHWEST FOREST SOILS COUNCIL SUMMER FIELD TRIP

July 22-24, 1981. Pacific Northwest Forest and Range Experiment Station and Umatilla and Wallowa-Whitman National Forests, LaGrande, OR. Northeast Oregon is the location of this year's field trip. Business meeting will be held the evening of the 22nd. Field trip subjects include comparison of harvesting systems, regeneration, soil fertility and review of the riparian research project. CONTACT: Mike Geist, Range and Wildlife Laboratory, "C" Avenue and Gekeler Lane, Route 2, Box 2315, LaGrande, OR 97850 (503)963-7122.

CALIFORNIA FOREST SOILS COUNCIL FIELD TRIP

July 31 and August 1, 1981. McCloud-Hilt, California. The topic for the first field trip is "Assessing Site Productivity." The tentative plan is to visit plantations and discuss the short- and long-term effects of a variety of site preparation methods. CONTACT: Gary Nakamura, Champion Timber Lands, P.O. Box 2317, Redding, CA 96001 (916)365-7631.

# of interest

GRASS CONTROL INCREASES SOIL MOISTURE

In August 1979, the Bureau of Land Management, Roseburg District, slashed and burned the 38-acre Shoestring Unit, then dominated by various brush species. The area is characterized by Beekman and Vermisa soil series, a west aspect, and an average elevation of 1,800 feet. The unit was outplanted with 1-0 container-grown and 2-0 bare-root Douglas-fir. Except for a centrally located 11-acre area, the entire unit was sprayed for grass control with Atrazine at a rate of 4 lbs per acre in March, 1980. By the end of June, annual grasses dominated the unsprayed area but were largely absent from the surrounding sprayed areas. Resprouting brush was abundant in both areas.

On July 30th, Jake Ritter, Jeff Davis, and Dave Roberts of the BLM, collected soil moisture samples from the unsprayed and sprayed areas. Soil samples were taken from each area at 66-foot intervals at a depth of 11 inches and analyzed with the Speedy Moisture Meter for percent moisture content based on dry weight. Statistical analysis of the data with Students t-test showed a significant difference in mean soil moisture content between treatments. The impact of grass control on this particular unit is obvious. At mid-summer, soil moisture content was significantly higher in the area where grass was eliminated as a competitor. Information of this type reinforces the need to control competing vegetation, particularly in southwest Oregon where moisture is frequently the limiting factor to successful reforestation.

Treatment	Mean	Standard Deviation	$\hat{t}$
Sprayed	9.07	1.75	-3.51*
Unsprayed	13.03	3.05	

*Significant at the P = 0.05 probability level.

THE LOG DRIVE

Follow-up on Koller Yarder Commercial Thinning--The last issue of the "FIR REPORT" (vol. 2 no. 4) contained a "Log Drive" article on a timber sale to be logged with a Koller skyline system. The timber sale is now (March, 1981) being logged, and, to date, the system is performing very well in the BLM commercial thinning with approximately 38 leave trees per acre. Intermediate supports probably will not be used because the terrain provides adequate single-span deflection. Reaches are varied, with the farthest reach approaching the machine's 1,000-foot capability.

The system being used is a Koller K300 yarder with self-contained diesel engine, a Koller 1-ton carriage, a John Deere JD440-B skidder for skidding yarded logs to a cold deck, and a United 7360 hydraulic loader to be moved to the sale in the near future. The machine's coowners are Rick Knight and Jack Carter. Jack's Progressive Pole and Timber Company of White City, Oregon, is receiving the logs. Jack hopes to continue to use the Koller system to log 25- to 60-foot utility and telephone poles as well as 7.5- to 20-foot posts. The posts may be as small as 4 inches inside bark on the small end. Further information on the system may be obtained from Jack at telephone number (503)826-5224.

Silver Peak Extensive Analysis Plan--The FIR Harvesting Specialist is Project Coordinator for the development of logging and transportation plan alternatives for a large unroaded area on the Siskiyou National Forest. The approximately 25-square-mile project area is located midway between Grants Pass and the Pacific Ocean, north of the present Kalmiopsis Wilderness boundary and east of the Illinois River. Three Forest Engineering graduate students currently enrolled in the Forest Service's Advanced Logging Systems Training Program at Oregon State University, as well as Siskiyou National Forest personnel, will assist with the project. Field work will be conducted during the summer, 1981. The process used to develop the Silver Peak Extensive Analysis Plan will be used in FIR Extension presentations as an example of how logging and transportation plans in general are developed.

Rock Blankets Used to Stabilize Granatic Cutbanks--The Galice Resource Area of the Medford District, BLM, has used rock "blankets" to stabilize cutbanks on granitic soils. The work was performed in February, 1981, by Ausland Construction, Incorporated, as required in a timber sale contract. The rock blankets were installed on cutbanks on the Snow Creek Access Road, number 32-3-5, an area of extensive granitic intrusions and frequent geologic contact zones.

The rock blankets were installed by first excavating a nearly vertical face in the cutbank to the height of the blanket and then backfilling with the blanket material. Unlike a buttress, the rock blankets were not "keyed in" at the base because the purpose of the blankets is to aid the granitic cutbank in attaining a stable angle of repose, thereby halting the frost heaving and ravelling characteristic of granitic cutbanks. Rock buttresses, on the other hand, would be used to prevent cutbank mass failures. A 4-foot-wide bench was installed at the top of the blankets to catch ravel and allow the uncovered cutbank above the blanket to attain a stable angle of repose. The blankets were installed to a vertical height of 15 feet, typically at a slope of 1/2:1. Blanket thickness was not specified. The rock for the blanket does not have to be of high quality but should be denser than the cutbank soil. While the Glendale Resource Area personnel have not been able to observe the performance of the blankets over a year's time, they are satisfied with the performance of the blankets to date.

CALIFORNIA FOREST SOILS COUNCIL FORMED

A Forest Soils Council is being organized in California similar to councils in other parts of the country. The philosophy and purpose of the California council is: (1) improve transfer of useful soils information to working foresters, forest land owners, and users; and (2) encourage development of forest soil science and integration with other resource information. Membership is open to individuals in the western United States and Canada who are interested in the interrelationships between forest soils and forest land management.

The council held an organizational meeting in January and has a summer meeting and field trip planned for July 31 and August 1, 1981. The field trip will be in the McCloud-Hilt area. For more information on the organization, contact:

Sherman Finch
U.S.D.A. Soil Conservation Service
2828 Chiles Road
Davis, CA 95616

recent publications

For copies of the publications cited, mail your requests to the appropriate address as indicated by the number following each summary. Requests should be sent to:

1 Forest Research Laboratory
Oregon State University
Corvallis, OR 97331

2 College of Forest Resources
University of Washington
Seattle, WA 98195

3 Publications
Pacific Northwest Forest and Range Experiment Station
809 NE 6th Ave.
Portland, OR 97232

4 Publications
Pacific Southwest Forest and Range Experiment Station
P.O. Box 245
Berkeley, CA 97401

<u>DWARF MISTLETOE AND HOST TREE INTERACTIONS IN MANAGED FORESTS OF THE PACIFIC NORTHWEST</u>, by D. M. Knutson and R. Tinnin. 1980. USDA Forest Service General Technical Report PNW-111. Pacific Northwest Forest and Range Experiment Station, Portland. 19 pp. Dwarf mistletoes in the Pacific Northwest infect true firs, larch, pine, Douglas-fir, and hemlock. Forty-one percent of all stands east of the crest of the Cascade Range and 10 percent of west-side stands are infected. General characteristics of dwarf mistletoe are discussed, including mortality and growth losses, rate of spread within a tree and within stands, relation of site class and growth loss, and the effect of management activities. Management activities that favor trees and are deleterious to dwarf mistletoe include: (1) Removing infected overstory from dense understory and thinning the understory, leaving the most mistletoe-free trees with good crowns for crop trees. (2) Maintaining mixed-species stands--whether or not cross-infections occur. (3) Favoring tree species that are immune when thinning mixed stands, or favoring species with the least amount of dwarf mistletoe. (4) Planting Douglas-fir under infected overstories of any other tree species. Douglas-fir is immune to all other mistletoes, and Douglas-fir mistletoe is never a serious problem on any other tree species. (5) Favoring shelterwood leave trees without infections in the upper half of the crown. (6) Maintaining tightly closed canopies in western hemlock stands. This causes death of lower branches, which are usually the most heavily infected. (7) Top-pruning, which allows infection-free crowns to develop. Management activities favorable to dwarf mistletoe include: (1) Partially removing the infected mature overstory. Mistletoe seed production will increase with improved nutrition of the infected leave trees. (2) Leaving trees with mistletoe plants high in the crown. These plants will produce many seeds situated for efficient distribution. (3) Spacing trees for optimum spread of mistletoe seeds between adjacent trees. **1**

<u>EFFECTS OF SLASH BURIAL ON STREAM WATER QUALITY</u>, by A. G. Larson and D. D. Wooldridge. 1980. Journal of Environmental Quality 9:18-20. A 3-year study investigated impacts of buried logging residue on stream water composition. Residue was buried in trenches adjacent to two small ephemeral streams on the western Olympic Peninsula of Washington. One trench was filled with logging slash, and the other with mill residues and covered with approximately 1.2 m of soil. Streamflow was diverted to flow through the burial pits, although less than one-half the flow passed through the mill residue. Chemical composition of stream water samples collected from above (pretreatment) and below (post treatment) the burial sites were analyzed and changes tested for significance using a paired Students t-test. With the exception of dissolved oxygen, stream water degradation resulting from burial was of no practical importance. Many ions decreased in concentration as water passed through buried residue. A significant change in ion concentration was limited to hydrogen, where pH decreased from 6.56 to 6.42. Oxygen depletion may be the most serious burial effect, with mean concentrations in the buried slash stream decreasing from 10 to approximately 8 mg/liter. **2**

MINERALIZABLE SOIL NITROGEN AS AN INDEX OF NITROGEN AVAILABILITY TO FOREST TREES, by R. F. Powers. 1980. Soil Science Society American Journal 44:1314-1320. Soil N mineralization during 14-day anaerobic incubation at 30°C is evaluated as an index of forest soil fertility and site productivity. Concentration of mineralizable N decreases exponentially with soil depth. Absolute variability in mineralizable N decreases with soil depth and increases with the magnitude of the soil test mean, but relative variability is constant. Mineralizable soil N determined under standard conditions (sampling depth is 18 to 22 cm) correlates significantly with N mineralized anaerobically for 6 months in the field, with site index and yield potential of ponderosa pine growing on volcanic, metavolcanic, and metasedimentary soils, and with foliar concentrations of N. Soils testing less than 12 ppm of mineralizable N are judged clearly deficient, but stands of pine and fir on soils testing as high as 16 ppm of N still may respond well to fertilization. Comparing ammonium produced during laboratory incubation with that mineralized over 6 months in the field shows that field soil temperature has a strong bearing on the interpretation of the laboratory test.

3

THE INTERNAL ELEMENT CYCLES OF AN OLD-GROWTH DOUGLAS-FIR ECOSYSTEM IN WESTERN OREGON, by P. Sollins, C. C. Grier, F. M. McCorison, K. Cromack, Jr., R. Fogel and R. L. Fredriksen. 1980. Ecological Monographs 50:261-285. Based on data from Watershed 10, H. J. Andrews Experimental Forest, information on primary production, decomposition, hydrology, and element cycling was integrated in annual budgets of accumulation and flux among components of a nature Douglas-fir forest ecosystem. Budgets were prepared for the major metallic cations, phosphorus and nitrogen. Water chemistry profiles showed that the biologically important elements nitrogen, phosphorus, and potassium increased in concentration as water passed through the canopy and litter layer but decreased as water passed through the rooted part of the mineral soil. Nitrogen appeared to be accumulating in the ecosystem and was the only element tightly conserved. Organic nitrogen and ammonium accounted for most of the nitrogen measured in solution; nitrate levels were low.

4

STREAMFLOW AFTER PATCH LOGGING IN SMALL DRAINAGES WITHIN THE BULL RUN MUNICIPAL WATERSHED, OREGON, by R. D. Harr. 1980. USDA Forest Service Research Paper PNW-268. Pacific Northwest Forest and Range Experiment Station, Portland. 16 pp. Three experimental watersheds in the City of Portland's Bull Run Municipal Watershed were used to determine effects of patch-cut logging on timing and quantities of streamflow. Two watersheds were harvested in small, clearcut patches. The total area harvested was 25 percent of each watershed's area. Annual water yields and size of instantaneous peak flows were not significantly changed, but low-flow volume decreased significantly after harvesting. The failure of annual water yields to change and low-flow volumes to increase during the summer months was unexpected since the results differ from those obtained from other watershed studies in the Oregon Cascades. Another study is underway to determine if these anomalies can be attributed to a reduction of fog drip over recently harvested lands.

3

SUMMARIZATION OF THE ECOLOGY AND GENETICS OF THE NOBLE AND CALIFORNIA RED FIR COMPLEX, by J. F. Franklin, F. C. Sorensen, and R. K. Campbell. 1980. Proceedings IUFRO Joint Meeting Working Parties, Vol. 1, pp. 133-139. B.C. Ministry of Forests, Information Service Branch, Victoria, B.C. Noble fir, California red fir, and Shasta red fir form an important complex in the subalpine forests along the Pacific Coast. This paper briefly summarizes the current knowledge of the ecological and genetic features of this complex.

3

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