FIR Report

SPRING 1984

VOL. 6 NO. 1

The Southwest Oregon Forestry Intensified Research Program (FIR) is a cooperative effort between the College of Forestry at Oregon State University and the Pacific Northwest Forest and Range Experiment Station of the USDA Forest Service. It is designed to assist foresters and other resource management specialists in solving complex biological and management problems endemic to southwest Oregon. FIR specialists organize, coordinate, and conduct educational programs and research projects specifically tailored to meet the needs of this area.

Established in October 1978, the FIR Program is supported jointly by Oregon State University, the Bureau of Land Management, USDA Forest Service, O&C Counties, and the southwest Oregon forest products industry. It represents a determined effort by the southwest Oregon forestry community and county governments to find practical solutions to important forest management problems.

The "FIR REPORT" is one of the principal methods of reporting recent technological advances and research results pertinent to southwest Oregon, and alerts area natural resource managers to upcoming continuing education opportunities. Comments and suggestions concerning the content of "FIR REPORT" are welcome and encouraged. The report is prepared quarterly and is mailed free on request by contacting us at this address: FIR REPORT, 1301 Maple Grove Drive, Medford, OR 97501.

For the FIR Staff,

John W. Mann
Forest Engineering Specialist

Inside

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Adaptive FIR

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For specifics on the overall FIR program, contact Jack Walstad, FIR Program Leader, Forestry Sciences Laboratory, 3200 Jefferson Way, Corvallis, OR 97331, (503)757-4617; or Steve Hobbs, Adaptive FIR Project Leader at the Medford address.

Because of space limitations, results appear as extended abstracts. Readers who are interested in learning more about an individual study are encouraged to contact the principal investigator or wait for formal publication of more complete results.

EDITOR'S COMMENTS

With this issue, editorial responsibility shifts from Ole Helgerson to me. Many thanks to Ole for his conscientious and effective work over the past year.

In taking over the job of FIR REPORT editor, I want to stress that our objective in preparing this newsletter is to share among our readership the best and most current information on forest management issues in southwest Oregon. Prompt reporting of research results and operational technique innovations have made this quarterly a valuable tool to natural resource managers in southwest Oregon and throughout the Pacific N.W. But it is your, the readers', participation and assistance that is the key to continued success in maintaining and upgrading the usefulness of the FIR REPORT. Please keep us informed of research results, administrative or operational study developments, ideas and observations of how to do things better in the field, nursery and laboratory, and your concerns that might be discussed in this important technology transfer forum. I'll be counting on your help over this next year, and beyond.

John W. Mann

Current Research

SELECTIVE RESPONSE OF PONDEROSA PINES AND GREENLEAF MANZANITA TO HERBICIDES

A study conducted in the Sierra-Nevada Mountains at the University of California Blodgett Research Forest addressed the problem of how to release ponderosa pine from greenleaf manzanita with herbicides with minimal damage to the pine. The investigators, Sandra Paley and Steve Radosevich, looked at the relationship of herbicide damage to the growth rate and physiological status of these two species to develop a more accurate system for selecting herbicide application dates. They assessed the effects of triclopyr amine, 2,4-D LV ester, and glyphosate applied at different times of the year to five year old ponderosa pine and manzanita.

They observed that herbicide sensitivity was correlated to plant growth and physiological status. Both species demonstrated similar response trends. Damage was reduced with a late September application when water stress was greatest. An exception was the pines' response to triclopyr. This treatment caused more than 80 percent damage per plant, regardless of time of application or plant status.

Analyses of percent damage vs. moisture stress illustrated that as moisture stress increased from -10 bars to -26 bars, pine damage decreased from nearly 90 percent to under 10 percent for gyphosate, and from over 90 percent to under 40 percent for 2,4-D. Manzanita treated with glyphosate suffered 80 percent damage for a moisture stress range of approximately -7 bars to -23 bars, but suffered about 40 percent damage at -35 bars. 2,4-D treated manzanita exhibit about 80 percent damage from about -6 bars to nearly -35 bars.

Based on these results, the monitoring of moisture stress in pine and manzanita may offer a practical way to maximize control of brush while minimizing damage to pine when using herbicides for brush control.

A full report of this study is scheduled to appear in the March issue of Weed Science (Vol. 32, No. 2). Additional information can also be obtained from the investigators. CONTACT: Sandra M. Paley, Department of Botany, University of California, Davis, CA 95616, (916)752-0617; or Steven R. Radosevich, Department of Forest Science, OSU, Corvallis, OR 97331, (504)754-2244.

O.H.

Adaptive FIR

PERFORMANCE OF 1-0 AND 2-0 BAREROOT PINE

In 1980 Tom Williams, formerly assistant nursery manager at J. Herbert Stone Nursery in Medford, suggested that I compare the performance of 1-0 and 2-0 bareroot ponderosa pine seedlings on a droughty, low elevation site. This was undertaken in the spring of 1981 when 160 seedlings of each stocktype were planted on a south aspect just outside of Ruch in southwestern Jackson County. A more detailed site description and discussion of site preparation method used have appeared in a previous issue of the FIR REPORT (4(3):3-4).

At the beginning of this experiment, the 2-0 seedlings were considerably larger than the 1-0 stock (Table 1).

Table 1. Mean seedling height, diameter, and shoot-root ratio at the time of planting for 1-0 and 2-0 bareroot ponderosa pine seedlings.

Stocktype	Height (cm)	Diameter (mm)	S:R
1-0	7.8	3.7	1.1
2.0	10.9	5.3	2.1

Despite this initial size advantage, however, survival rates for both stocktypes were comparable after three years of observation (Table 2).

Table 2. Survival (%) of 1-0 and 2-0 bareroot ponderosa pine seedlings for the first three years after planting.

Stocktype	1981	1982	1983
1-0	99	99	99
2-0	99	97	97

I was particularly surprised by the high survival of the 1-0 stock at the end of 1981 as this was an unusually hot, dry summer even for Jackson County. Frankly, I had anticipated higher mortality in the 1-0 stock because of their smaller root systems and stem diameters.

Mean annual height growth was essentially the same for both stocktypes over the three year period (Figure 1). Height growth was relatively slow during 1981, which probably reflects the combined effects of transplant shock and the severity of the weather that summer. Height growth more than doubled, however, during 1982 and then doubled again in 1983.

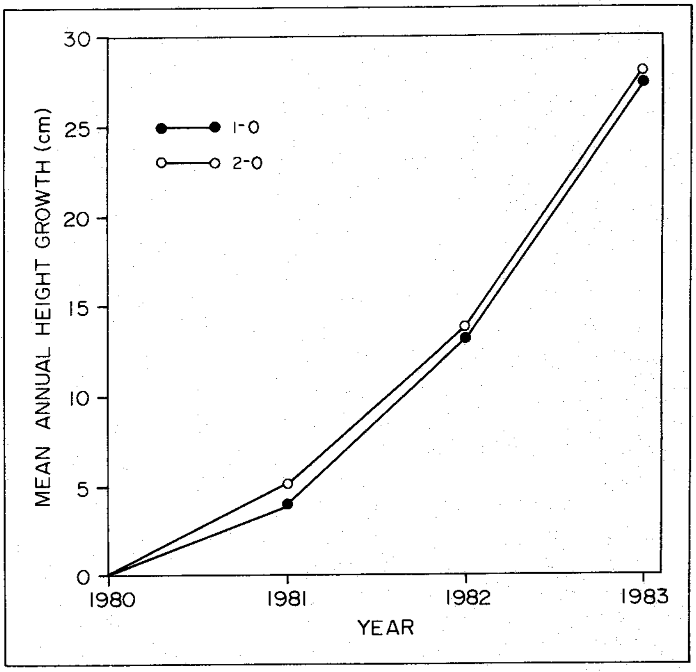

Figure 1. Mean annual height growth (cm) of 1-0 and 2-0 bareroot ponderosa pine seedlings over a three year period.

Annual diameter growth also had the same pattern of increase over the three year period (Figure 2).

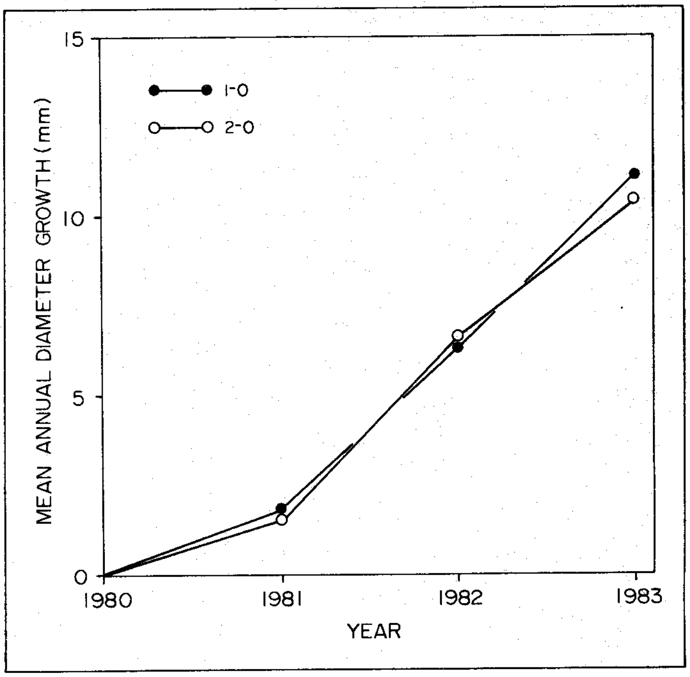

Figure 2. Mean annual diameter growth (mm) of 1-0 and 2-0 bareroot ponderosa pine seedlings over a three year period.

Judging from the survival and growth rates of both stocktypes it is evident that the physiological condition of these seedlings was superb. This performance was undoubtedly enhanced by the fact that competing vegetation was not allowed to reoccupy the test site because of several herbicide applications. How the 1-0 seedlings would have fared under increased soil moisture competition is unknown. Another question that should be asked is why plant 2-0 stock when similar results can be obtained with 1-0 stock? Obviously, the answer to this question should not be drawn from the results of a single set of test conditions. Nonetheless, these results are encouraging and I suggest that it might be useful for foresters to set out both stocktypes in small-scale field trials (100 seedlings of each stocktype) over a variety of site conditions.

S.H.

FIRST YEAR SPROUTS DO AFFECT SEEDLING ROOT AND SHOOT GROWTH

As this article is being written the controversy over the use of herbicides in southwest Oregon forests continues. A court-ordered injunction is in effect preventing application of herbicides on federally managed forest land and some citizens are encouraging managers of state and privately owned forests to voluntarily abide by the injunction. Meanwhile, researchers and land managers are analyzing the effect that the loss of herbicides will have on plantation establishment and future growth. What are the alternatives to herbicides? Are they effective in reducing competition? What are the costs in both a biological and economic sense?

Some useful information regarding these questions is beginning to emerge from the Adaptive FIR study located on Negro Ben Mountain near Ruch.

In March 1983, Douglas-fir seedlings were planted among four levels of sprouting greenleaf manzanita and canyon live oak brush to study the effects of this competition on conifer survival and growth. The study area is at 3600 feet elevation on a 66 percent west-facing slope. The soil is a skeletal Xerochrept with a surface mantle of ravel. The installation of the brush treatments was discussed in an earlier FIR REPORT (5(1):5), with a summary of treatments as follows:

1. Brush removed, first year sprouts killed in late spring (maximum soil moisture, no shade).

2. Two-year sprouts killed (maximum soil moisture, some dead shade).

3. First-year sprouts (reduced soil moisture, some live shade by late summer).

4. Fourth-year sprouts (minimum soil moisture available to seedlings, live shade immediately).

In the last issue of the FIR Report (5(3):3), I reported that after one relatively mild growing season seedling survival was about 90 percent for all treatments, even in the area with fourth-year sprouts. This result is encouraging to those who support less intensive vegetation management measures. However, we found substantial reductions in seedling height growth and, in particular, diameter growth as the level of sprout competition increased.

In December 1983, seedlings were excavated from each treatment area to measure root and shoot biomass after one growing season. The impact of sprout competition was impressive! Root biomass decreased markedly as the amount of competition increased. Average root weights for seedlings planted in treatment 2 (dead sprouts) were 5.08 grams (dry weight), treatment 3 (first-year sprouts) 1.98 grams, and treatment 4 (fourth-year sprouts) 1.56 grams. Similar differences were found for average shoot weights: treatment 2 was 4.13 grams; treatment 3 was 1.95 grams; and treatment 4 was 1.73 grams. Treatment 1 data were not included in the analysis because of minor herbicide damage which confounded the results of that treatment.

I think the most impressive finding in this experiment is the major reduction in both root and shoot biomass of seedlings associated with the first-year sprouts. Both root and shoot biomass were reduced by more than 50 percent in the presence of sprouts. The two replications of this treatment were carefully hand-slashed in February 1983, and the brush was removed from the site. In May 1983, there was an estimated 2 percent cover of canyon live oak averaging 12 inches in height, and 4 percent cover of greenleaf manzanita averaging 16 inches in height. The site appeared fairly clear, above ground. By October, sprout recovery resulted in 18 percent cover of canyon live oak averaging 19 inches in height, and 11 percent cover of greenleaf manzanita averaging 12 inches in height.

Two points are worth special note. Sprouting is rapid; total cover from brush sprouting increased from 6 to 29 percent in one growing season. In addition, even though cover was negligible early in the growing season, the fact that the site was fully occupied below ground with living root systems apparently had a major effect on resources available for seedling root and shoot growth.

It is too early to draw final conclusions and make treatment recommendations from this study. It will be interesting to watch seedling growth and vigor during 1984 to see if the present differences continue to be important. This study should provide some useful information on the biological costs associated with the treatment of competing vegetation in this type of plant community.

S.T.

Fundamental FIR

THE MOUNTAIN HEMLOCK AND SHASTA RED FIR SERIES OF THE SISKIYOU REGION OF SOUTHWEST OREGON

This is the third report in a collection of brief articles that describe woodland and forest vegetation in terms of recognizable communities found in southwest Oregon. Previous reports include a description of the Jeffrey Pine Series (FIR REPORT 5(4):7) and a summary of the series that are found in the study region (FIR REPORT 4(4):6).

Our objective is to classify and describe forest and woodland vegetation based primarily on species composition. A series, the highest level in the hierarchy, is defined as a collection of plant associations that have the same characteristic dominant or codominant trees species. An association, a more site specific classification level, is a collection of stands that have a characteristic floristic composition, uniform physiognomy, and respond similarly to management practices. An association derives its name from the series and characteristic understory species.

The vegetation described in these reports is based on 1642 plots sampled in the Siskiyou region, arbitrarily defined as being south of Cow Creek and west of I-5. Approximately two thirds of the plot data were collected from the Siskiyou National Forest, and the Applegate and western portion of the Ashland Ranger Districts of the Rogue River National Forest. This data was analyzed by the USDA Forest Service, Area 5 Ecology Program under the supervision of Dr. Tom Atzet. The other one third of the plot data were collected from appropriate portions of the Jackson and Josephine Planning Units of the Medford District BLM and contiguous private forest holdings, and analyzed by the FIR vegetation classification group under the supervision of Dr. Jerry Franklin of the USDA Forest Service, PNW Forest and Range Experiment Station. The series and associations depicted in this report are found primarily at elevations above 1311 m (4300 ft); sites which support mountain hemlock and Shasta red fir forests. These results are based on 63 plots, 90% of which represent land administered by the Forest Service.

Distribution and Ecology of Mountain Hemlock and Shasta Red Fir

Mountain Hemlock. Mountain hemlock is a widely distributed species, found principally at subalpine elevations along the Selkirk-Cascade-Sierran Cordillera from southeastern Alaska to central California. The range of mountain hemlock is characterized by long, cold winters and short, cool growing seasons. Much of the precipitation occurs as snow.

Siskiyou populations of mountain hemlock range from 1220 to 2134 m (4000 to 7000 ft) in elevation and are generally confined to cool, north-facing, cirque-like topography. These populations do not form extensive stands like those in the Cascades because suitable habitat is found only on the highest peaks in the Siskiyous. The lower limits of mountain hemlock are governed by higher temperatures and competition with Shasta red fir.

Shasta Red Fir. Shasta red fir is found at high montane and lower subalpine elevations in the Klamath Mountains, Southern Oregon Cascades, and northern California; it may also be found at the southern end of the Sierra Nevada. Its range is characterized by long winters and deep snowpacks. It requires a longer growing season compared to mountain hemlock and appears to tolerate somewhat drier sites.

Shasta red fir is morphologically intermediate between red fir and noble fir. The ecological role and silvicultural requirements, however, are similar to the red fir of California. The Siskiyou populations of Shasta red fir have an elevation range from 1067 to 2134 m (3500 to over 7000 ft). At its lowest elevations Shasta red fir is confined to northerly exposures. Where both Shasta red fir and mountain hemlock occur, Shasta red fir dominates all but the coldest sites.

Composition of the Mountain Hemlock Series. The Mountain Hemlock Series is found at the highest forested elevations in the Siskiyou Mountains (Figure 1).

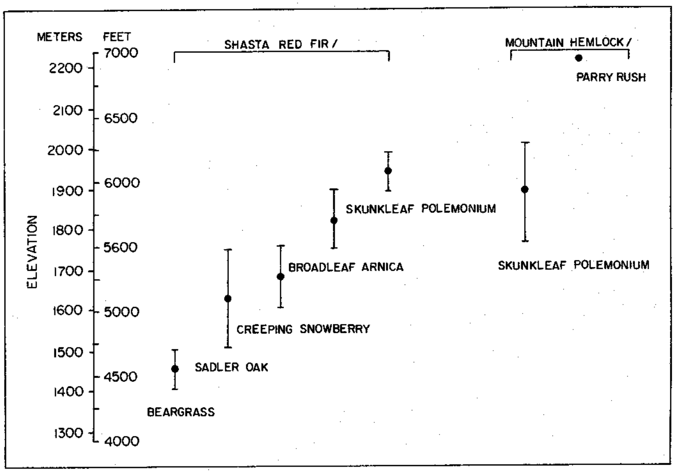

Figure 1. Distribution of Mountain Hemlock and Shasta Red Fir plant associations in the Siskiyou Mountains of southwestern Oregon. Mean distribution is indicated by the dot while bars indicate the 95% confidence interval.

Plots representing this subalpine series occur above 1707 m (5600 ft), but are limited in geographical distribution. This Series is typically found on north slopes and cirque topography where snow collects and remains well into summer. The growing season is short and soil temperatures are cool. The poorly developed soils are shallow and very stony.

There are two associations in the Mountain Hemlock Series: the Mountain Hemlock/Parry Rush Association and the Mountain Hemlock/Skunkleaf Polemonium Association. Both associations are low in species diversity, as are most other mountain hemlock associations in the Pacific Northwest. Stands are characteristically open and have sparse herbaceous layers that produce little or no forage. Mountain hemlock is the dominant species in both the overstory and reproductive layers. All stands are low in productivity (Table 1) and are difficult to regenerate within the five year guidelines using present technology.

The Mountain Hemlock/Skunkleaf Polemonium Association occurs on upper slope positions from 1707 to 1951 m (5600 to 6400 ft.). Schists and granodiorites are common parent materials found in soil profiles. The Association is characterized by a dense, but sometimes patchy, overstory of mountain hemlock and lesser amounts of Shasta red fir. Mountain hemlock reproduction is generally quite abundant, but there is little Shasta red fir. The understory has a low total cover. The dominant herb is skunkleaf polemonium. Other common herbs are Sitka valerian and long stolon sedge. Sticky currant is the sole shrub.

Table 1. Mean values for selected productivity and environmental characteristics of the Mountain Hemlock and Shasta Red Fir Associations.

	Associations						
	Mountain Hemlock/		Shasta Red Fir/				
	Skunkleaf Polemonium	Parry Rush	Skunkleaf Polemonium	Broadleaf Arnica	Creeping Snowberry	Sadler Oak	Beargrass
Number of Plots	6	1	12	11	18	11	3
Productivity Characteristics							
Height (m)	---	---	---	37	69	---	29
Basal Area (m^2 ha^{-1})	44	36	35	52	39	32	86
Age (yr)	200	150	135	203	160	200	107
Site Characteristics							
Elevation (m)	1891	2225	1936	1832	1683	1642	1470
Aspect (degrees)	39	0	340	18	299	333	7
Slope (percent)	31	43	32	31	37	32	22
Soil Depth (cm)	100	76	99	89	120	91	---

The Mountain Hemlock/Parry Rush Association is described from one plot. It is rare in the Siskiyous but occurs more frequently in the Cascades. Mountain hemlock is the sole tree species in both the overstory and reproduction. Understory cover is very low and is composed of such herbs as Parry rush, western yarrow, and pussypaws.

Management considerations. Management opportunities for this Series are quite limited. The deep, persistent snow pack, short cool growing season, and poorly developed soils make regeneration difficult and productivity low. Other aspects of management include use of the Series as thermal cover and refuge for wildlife, watershed protection, and recreation. When mountain hemlock stands are managed for timber production the following silvicultural considerations are important (derived in part from an unpublished manuscript by Dr. J. Means, PNW Exp. Sta., Corvallis).

1. Advanced regeneration and subsequent natural regeneration may provide the most reliable source for a new stand in five years. Protection during harvest is essential. Damaged regeneration is very susceptible to rot.

2. Natural regeneration after harvest establishes sooner in small openings than large openings and is often most rapid on the shaded south edges of clearcuts. Keeping clearcuts small to maximize these edge effects will probably speed regeneration but it may still be unsatisfactory in five years. Limited experience indicates the shelterwood system can provide adequate regeneration in five to ten years. However, as with advance regeneration, young trees must be well protected during overstory removal.

3. Planting has been relatively ineffective on these cold, snowy sites. Timing is critical for artificial regeneration. Plant soon after snow melt.

Composition of the Shasta Red Fir Series. The Shasta Red Fir Series occupies the elevational band immediately below the Mountain Hemlock Series (Figure 1). Environments are generally warmer and drier than the Mountain Hemlock Series. Plots representative of this Series range in elevation from 1311 to 2317 m (4300 to over 7600 ft). This Series is not confined to any particular topographic position.

There are five associations in the Shasta Red Fir Series. The upper, subalpine associations have open canopies, low shrub cover, and generally sparse herbaceous layers. At middle to lower elevations, the overstory is more complete and the shrub and herb cover also increases proportionally. Productivity varies greatly within the Series (Table 1). The upper elevation associations are slower growing with lower yields. All associations except one have northerly exposures; the Shasta Red Fir/Creeping Snowberry Association has a more westerly exposure.

The Shasta Red Fir/Skunkleaf Polemonium Association occupies the coolest sites within this Series. It occurs on upper-slope positions and ranges from 1677 to 1921 m (5500 to 6300 ft) in elevation. Soils are shallow, poorly developed and derived primarily from granodiorite rock. This Association is characterized by a moderately dense overstory of Shasta red fir. White fir, western white pine, and mountain hemlock are minor canopy members. Regeneration is comprised of Shasta red fir in moderate amounts, with small amounts of white fir and mountain hemlock. Siskiyou gooseberry and sticky currant dominate the sparse shrub layer. The herb layer is quite variable in total cover and has a high diversity of species. Important herbs are skunkleaf polemonium, bigleaf sandwort, starry Solomon-plume, Sitka valerian, and arrowleaf groundsel.

The Shasta Red Fir/Broadleaf Arnica Association is found on middle to upper slope positions that range from 1524 to 1921 m (5000 to 6300 ft) in elevation. This Association is characterized by a moderately dense overstory and small amounts of natural regeneration. Shasta red fir is the typical overstory dominant, although a few stands may be dominated by mountain hemlock. A sparse, moderately rich shrub layer is dominated by baldhip rose and big huckleberry. The herbaceous layer is characterized by a generally high cover of broadleaf arnica. Other conspicuous herbs include Sitka valerian, one-sided pyrola, bigleaf sandwort, and white hawkweed. Although soils are shallow and stony, this Association is the second most productive within the Series.

The Shasta Red Fir/Creeping Snowberry Association represents the drier environments on upper to middle slope positions in the eastern Siskiyou Mountains. This environmentally variable Association has the largest elevational distribution within the Series, from 1311 to 1890 m (4300 to 6200 ft). Within this range it is associated with a variety of environmental conditions. Slopes vary from gentle to moderately steep and aspects range from south to northwest. Although these soils are the deepest in the Series, they are poorly developed and have a high coarse fragment content. Soils are derived from either granodiorites or metavolcanic rock. This Association is characterized by the dominance of Shasta red fir in the overstory with white fir occurring as a codominant. Douglas-fir and incense-cedar occur in most stands and mountain hemlock can be found on the coldest sites. Western white pine, Port-Orford-cedar, and sugar pine are infrequent associates. The high constancy and moderate cover of creeping snowberry in the shrub layer distinguishes this Association. The herbaceous layer is the most diverse within the Series and has a low total cover. The most common herbs are white hawkweed, starry Solomon-plume, three-leaf anemone, and bigleaf sandwort.

The Shasta Red Fir/Sadler Oak Association is found on upper slopes and ridges above 1311 m (4300 ft) in elevation. Soils are shallow and rocky with metavolcanic parent materials, or occasionally granodiorites. Stands are characterized by a moderately dense canopy, a relatively high shrub cover, and a low herbaceous cover. In the overstory and reproductive layers Shasta red and white fir are dominant and codominant respectively. Other common trees are Douglas-fir, mountain hemlock, western white pine, sugar pine and Brewer spruce. High constancy and moderate cover of Sadler oak distinguishes the understory and indicates shallow and rocky soils. As a subalpine forest component Sadler oak also reflects a moderately lighted, cool, damp shrub layer. One-sided pyrola dominates the sparse herb layer; white hawkweed and vanillaleaf are also common.

The Shasta Red Fir/Beargrass Association is found on cold benches or upper slope positions near the Brewer Spruce Research Natural Area. Elevations are close to 1524 m (5000 ft). The shallow soils originate from metavolcanics and are stony. This Association is characterized by a moderately dense overstory and a depauperate understory. Shasta red fir and white fir codominate both the canopy and reproductive layers. A number of other tree species are also found, including western white pine, Douglas-fir, Brewer spruce, Pacific yew, golden chinkapin and canyon live oak. Basal area, hence stocking, is the highest of all the Shasta Red Fir Series, yet height growth and therefore overall productivity are relatively low. Beargrass is the most conspicuous component of the understory which also includes one-sided pyrola, rattlesnake plantain and white trillium.

Management considerations. The Shasta Red Fir Series has more management opportunities and alternatives to choose from than the Mountain Hemlock Series. Regeneration of cutover stands within this Series is also slow, due to late snow melt, cold soils, and short growing season. The following guidelines are suggested for managing stands in this Series:

1. Large openings can be planted with Shasta red fir while smaller openings may be better suited for mountain hemlock regeneration. The choice depends on site specific environmental conditions as indicated by the species present.

2. Gooseberries or currants (Ribes spp.) are common in many associations and represent possible sources of western white pine blister rust, thus restricting the reforestation potential of western white pine.

3. Stands growing on granitic soils present regeneration problems due to the poor heat retention and water holding capacities associated with these soils. Care should be taken to maintain an intact litter layer which acts to moderate extremes in soil moisture and temperature; other benefits include increased organic matter, more fertility, and reduced surface erosion. Soils derived from granitics are exceptionally prone to surface erosion and mass wasting.

4. Competition may be a consideration in the regeneration of some associations in this Series. Sadler oak may present a physical barrier to planting efforts in the Shasta Red Fir/Sadler Oak Association. Dense beargrass cover may inhibit or reduce regeneration success on the Shasta Red Fir/Beargrass Association. Possible strategies to cope with these problems include timing of planting, mechanical scarification, or treatment with herbicides.

If you have any questions, please contact us at the Siskiyou National Forest, Grants Pass, OR 97526, (503)479-5301 or at the Forestry Sciences Lab, 3200 Jefferson Way, Corvallis, OR 97331, (503)757-4361.

Tom Atzet, Siskiyou NF
David Wheeler, Siskiyou NF
Gregg Riegel, OSU
Brad Smith, OSU
Jerry Franklin, PNW

Continuing Education

NOTE: Many of these programs may count toward SAF-CFE certification. Contact your local SAF Scholarship Committee Chairman or the program organizers for details.

FOREST WEED CONTROL FOR SOUTHWEST OREGON

July 17-19, 1984. Riverside Motel Conference Center, Grants Pass, OR. Sponsored by Adaptive FIR. An indoor session the first day will emphasize recent developments in the applied aspects of weed control. Three field trips on subsequent days will allow participants to practice on-site problem analysis and prescription. Two field trips are planned for the Medford area and one is planned for the Roseburg/Glendale locale. Enrollment for the first day will be limited to 180. Enrollment for any field trip will be limited to 50. Fee: $25 for the first day only; $35 for the first day and one field trip. This program is being submitted to the Oregon Department of Agriculture for determination of pesticide license recertification credits and will count for SAF-CFE credits. More specific information on credits, enrollment and fees will be sent in program announcements. CONTACT: Elaine Morse or Ole Helgerson, Adaptive FIR. (503)776-7116.

FOREST FERTILIZATION IN SOUTHWEST OREGON

September 18-19, 1984. Roseburg and Medford, respectively. Sponsored by Adaptive FIR. The same workshop will be presented at each location. The objective of this workshop is to provide participants with current information on the response of Douglas-fir stands to nitrogen fertilization and methods of evaluating response. A detailed program announcement will be mailed this summer. CONTACT: Dave McNabb, Steve Tesch, or Elaine Morse, Adaptive FIR. (503)776-7116.

EVALUATING SEEDLING QUALITY

October 16-17, 1984. Corvallis. This two-day workshop will present state-of-the-art information on the various tests used to evaluate seedling quality. It will review the principles, procedures, and predictive abilities of tests for frost hardiness, carbohydrates, and root growth capacity. Presentations will be incorporated into a proceedings to be published immediately following the workshop. The registration fee will be $125 per person. For further program information contact: Mary Duryea, Department of Forest Science (503)754-2244, or Conference Assistant (503)754-2004, Oregon State University, Corvallis, OR 97331.

Recent Publications

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PROCEDURES FOR ESTABLISHING AND MAINTAINING PERMANENT PLOTS FOR SILVICULTURAL AND YIELD RESEARCH, by R. O. Curtis. 1983. USDA Forest Service, General Technical Report PNW-155, Pacific Northwest Forest and Range Experiment Station, Portland, OR. 56 p. This paper reviews procedures for establishing and maintaining permanent plots for silvicultural and yield research; discusses purposes, sampling, and plot design; points out common errors, and makes recommendations for research plot designs and procedures for measuring and recording data. This is an excellent source of information for anyone considering any type of study requiring permanent plots, even if the period of remeasurement is short. Actually, much of the basic information is applicable to temporary sample plots as well. Following these procedures will help ensure that the information gathered is truly useful. (1)

DESIGNING DOUBLE-TREE INTERMEDIATE SUPPORTS FOR MULTI-SPAN SKYLINE LOGGING, by John W. Mann. 1984. Oregon State University Extension Service publication EC-1165. Multispan skyline systems are becoming increasingly important in mountainous areas of the country. This paper describes the various methods of rigging intermediate supports for a skyline and details a field design procedure to simplify this work on the double-tree type support. Copies available for 75¢ each. (2)

DESIGNING STABLE BUFFER STRIPS FOR STREAM PROTECTION, by Ivars J. Steinblums, Henry A. Froehlich, and Joseph K. Lyons. 1984. J. For. 82:49-52. Stability of streamside buffer strips in the Cascade Mountains of western Oregon was found to be a function of vegetation and topographic variables. Shade provided by buffer strips was related to three characteristics of the buffer strip and slope of the adjacent clearcut. Prediction equations were developed from these relationships to aid assessment of stream protection needs in proposed harvest designs and to aid rapid evaluation of design modifications. (3)

THE HEALTH RISKS OF HERBICIDES IN FORESTRY: A REVIEW OF THE SCIENTIFIC RECORD, by J. D. Walstad and F. N. Dost. 1984. Forestry Research Laboratory Special Report 10, Oregon State University, Corvallis. 60 p. OSU specialists have prepared a thorough scientific review of the health risks associated with herbicide use in forestry. It is a detailed analysis and synthesis of the information compiled on this subject over the past two decades. The review focuses on the phenoxy herbicides 2,4,5-T and 2,4-D, but other herbicides used in forestry are also evaluated. Toxicologic methods of determining a safe dose and the regulatory mechanisms involved in herbicide registration are explained. The conclusions of numerous scientific and medical reviews of herbicide safety are cited, indicating that proper use of these materials is unlikely to harm people, other animals, or the environment in general. Single copies are available free; multiple copies are $2 each which includes postage and processing costs. Checks should be made payable to the College of Forestry. (3)

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