CRAFTS

Annual Report 1991-92

FOREST RESEARCH LABORATORY
OREGON STATE UNIVERSITY

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CRAFTS

Coordinated Research On Alternative Forestry Treatments & Systems

JULY 1992

Forest Research Laboratory
Oregon State University

HIGHLIGHTS 1991-92

This report describes the twelfth year of activity by the CRAFTS Cooperative on forest vegetation management. Highlights of the past year include:

- New research to investigate Douglas-fir interactions with herbaceous vegetation was initiated on two sites in the Cascade foothills.
- Sampling protocols were developed and field work initiated to begin filling a target data matrix of site and species variables that supports development of the Regional Vegetation Management Model.
- Will Schneider and Eric Hanson have joined our staff to coordinate data collection for the herbaceous vegetation research and the Regional Vegetation Management Model.
- The CRAFTS Prospectus was revised to more clearly describe the direction of the cooperative during the next five years.

CRAFTS COOPERATORS

Members

Boise Cascade Corporation
British Columbia Ministry of Forests
Bureau of Land Management
Cavenham Forest Industries
Champion International Corporation
International Paper Company
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Lone Rock Timber Company
MacMillan Bloedel Limited
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INTRODUCTION

This year, CRAFTS launched a new research program to investigate interactions between young conifers and herbaceous vegetation. A series of studies are being installed to look at how stands develop following herbaceous vegetation manipulation that includes removal via herbicides and introduction via seeding. Measurements of plant responses will be similar among studies, permitting comparisons of results and use of the data for developing the Regional Vegetation Management Model.

High quality data is essential for estimating the parameters of the Regional Vegetation Management Model. This year, through cooperator assistance, we began installing permanent plots throughout the region to provide an ongoing source of data. A tremendous enhancement to our database has been the recent contribution of research data from several cooperators.

At this year's meeting, the Policy Committee will decide a number of significant issues that affect the direction and leadership of CRAFTS. A five-year plan to consider "new perspectives" in forest vegetation management has been drafted. The Prospectus has been revised to more clearly reflect CRAFTS scope and objectives. In addition, a more active and participatory form of leadership is being considered for CRAFTS.

Forest vegetation management is in the midst of a renaissance in which harvesting and regeneration practices are shifting away from even-aged management. To maintain a viable program in research and technology transfer, the CRAFTS Cooperative must anticipate information needs, take a proactive stance, and aggressively begin to answer the questions that are vital to forestry in the Pacific Northwest.

Tim Harrington

CHANGES IN PERSONNEL

This past year, two faculty research assistants joined CRAFTS staff:

- Eric Hanson began a one-year appointment in September to coordinate CRAFTS research on interactions between conifers and herbaceous vegetation. Eric, who received his M.S. in weed science last year at the University of Colorado, is pursuing a doctorate degree in forest ecology with Steve Radosevich.
- Will Schneider, a recent M.S. graduate from Virginia Polytechnic Institute, arrived in January. He will be coordinating field data collection for the Regional Vegetation Management Model and for a new project on conifer seedling mortality in southwestern Oregon.

RESEARCH

The CRAFTS program addresses three key research areas of forest vegetation management:

- **Interactions between conifers and associated vegetation**: quantifying the survival and growth of various vegetation components in young forest stands.
- **Techniques for managing associated vegetation**: testing of new techniques for managing the vegetation associated with young conifers.
- **Fundamental studies**: providing a detailed look at the mechanisms driving biological responses in managed stands.

Conifer and Associated Vegetation Interactions

An integral part of CRAFTS research centers on characterizing forest stand responses to vegetation management treatment.

The Regional Vegetation Management Model

During the past year, the emphasis in the Regional Vegetation Management Model (**RVMM**) project has been to evaluate existing data and to test stand and individual-tree modeling approaches. Bob Shula has found that existing data has originated from a variety of independent vegetation management studies that were undertaken to compare vegetation treatments and resultant effects on tree survival and development. Unfortunately, these studies were not coordinated, nor were they aimed at the development of a growth and yield model. As a result, the various datasets lack comparable data, such as stem diameter, percent cover, and vegetation height, which are crucial for modeling the development of trees and associated vegetation.

During the next five years, Bob Shula and Steve Knowe will be extending the database to include new growth monitoring plots with information that will support both stand and individual-tree modeling approaches. This major undertaking has required the development of a dataset matrix and standardized protocol for field sampling. The objective is to fill data gaps that exist regarding plant interactions, effects of vegetation management and precommercial thinning, stand dynamics during age 10 to 25 years, and the representation of major species and physiographic regions of the Pacific Northwest.

Each of the cells in the dataset matrix (Figure 1) represents a 0.10- to 0.15-acre Douglas-fir measurement plot (PMP) that contains four 0.01-acre competition measurement plots (CMP). Initial plot measurements will be followed by remeasurement two years later. This year, about 50 Douglas-fir measurement plots (PMP's) were installed in the Coast Range and Siskiyou Mountains.

Each hardwood within a CMP will be measured for crown width and stem diameter (at 15 or 137 cm heights). Additional measurements on all Douglas-fir and on a subset of hardwoods include height, and height to crown base. All Douglas-fir in a PMP will be measured for stem diameter,

Region[0]	Plant assoc.[1]	Height class[2]	Site preparation & conifer release[3]				Replication	Cells/ region
			Y/Y	N/N	Y/N	N/Y		
3	3	7	4				3	252

[0] Coast Range, southwestern Oregon, and Western Cascades
[1] e.g., Coast Range: TSHE/RUSP/ACCI (most productive)
TSHE/POMU (intermediately productive)
TSHE/GASH (least productive)
[2] 0 to 25 feet in five - 5 foot classes, 25 to 45 feet in two - 10 foot classes
[3] Site preparation and conifer release (including PCT): yes/no combinations

Figure 1. The dataset matrix to support development of the Regional Vegetation Management Model.

and a subset of trees will be measured for height, height to crown base, and crown width. Some conifers and hardwoods will be tagged to follow individual tree growth. On each CMP quadrant, crown cover of shrubs and herbs will be assessed by species with both visual and line-transect estimates.

This year Steve Knowe and Bob Shula developed a stand table projection system to incorporate desirable features of stand and individual-tree modeling approaches using data from the Coast Range Competition Release Study (CRAFTS Technical Report: Knowe and Shula, 1991). When information on an existing young stand is available, for instance, after a regeneration survey or an examination of an area being evaluated for conifer release, a stand table projection system is appealing. Among its advantages are that the functional form of the diameter distribution (e.g., Weibull function) does not have to be assumed, multimodal distributions can be reproduced, and information on initial stand structure is used. In contrast to diameter distribution prediction methods (CRAFTS Technical Report: Knowe and Harrington, 1990) that provide estimates of tree size at specified ages, projection models provide estimates of future size from growth added to current size.

The two components of the stand table projection system were projection equations for quadratic mean diameter (QMD) and relative size, defined as the ratio of individual-tree diameter to QMD. Using the function for predicting QMD in the diameter distribution method, we derived a compatible projection equation that also incorporated the effects of timing and intensity of vegetation treatments. Diameters of individual trees were projected as the product of projected relative size and projected QMD. This ensured that the projected stand had the same QMD as obtained from the projection function. Accuracy in reproducing observed diameter distributions decreased as the projection period increased. Plans are to integrate auxiliary functions for dominant height, woody cover development, and individual-tree height into our stand table projection system.

The goal of the **RVMM** is to provide reliable growth predictions of Douglas-fir through age 25 years for the full range of even-aged silvicultural regimes being practiced in the CRAFTS region. Cooperation among CRAFTS staff and members is essential to achieving this goal.

Interactions of young conifers with herbaceous vegetation

CRAFTS herbaceous vegetation research began this spring with the installation of two fully-replicated studies on Weyerhaeuser Company land near Springfield, Oregon and Vail, Washington. In February, following completion of fencing to exclude deer and elk, Douglas-fir seedlings were planted at a 3-m spacing, and their initial sizes were measured. On one experimental treatment, blue wild rye (*Elymus glaucus*), a native grass, was seeded. The grass was reseeded in late April due to poor initial germination. On other treatments, hexazinone herbicide was applied at rates of 1.0, 1.5, and 2.0 lb/acre to provide a range of herbaceous cover levels for the development of competition thresholds for Douglas-fir. In May, cooperators applied glyphosate herbicide to ensure complete removal of herbaceous species on plots with this vegetation level.

Glyphosate and triclopyr ester herbicides will be applied this fall to remove shrubs and hardwoods on specific treatments.

In July, associated vegetation will be assessed on a maximum of nine subplots, 1/229-acre size, located within each 0.28-acre treatment plot (Figure 2). Line-transect methods of cover estimation will be used to calibrate visual estimates. First-year measurements of each Douglas-fir within a 0.11-acre measurement plot will be taken this fall.

Studies are now being installed on Oregon Department of Forestry (ODF) land near Tillamook and Coos Bay,

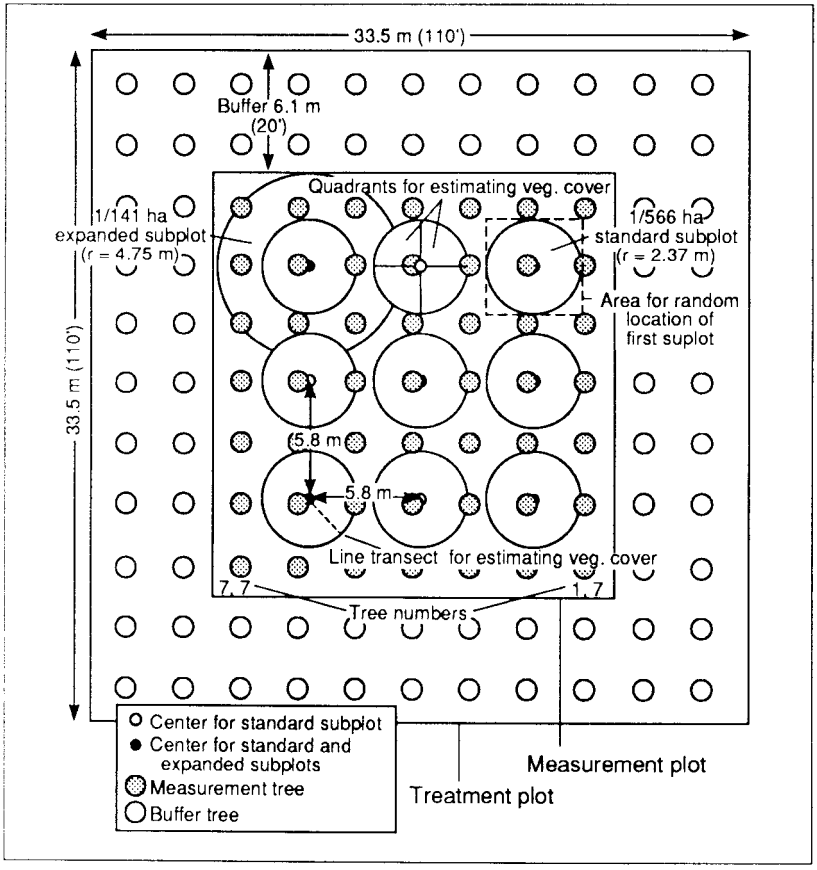

Figure 2. Diagram of treatment plot for research on interactions between conifers and herbaceous vegetation.

Oregon. These new studies will include comparisons of elk-forage seeding with the vegetation-removal and grass-seeding treatments described above. Another ODF study near Forest Grove is planned. British Columbia Ministry of Forests, Boise Cascade Corporation, and Starker Forests, Inc., also have expressed interest in installing studies on their lands during 1992-93.

Other Forage-Seeding Research

In a study to be funded by the Willamette National Forest, Tim Harrington and Eric Hanson will investigate the compatibility of elk forage seeding with Douglas-fir regeneration. Development of Douglas-fir and associated vegetation will be compared between two mixtures of grasses and legumes seeded at the time of and one year after conifer planting. Seeding will be accomplished with and without application of fertilizer, principally phosphorus. These comparisons will be conducted on three sites that have been broadcast-burned for slash removal. Data collected from the study will be compatible with CRAFTS herbaceous vegetation research because plot sizes and sampling protocols will be identical.

In a related study, Eric Hanson and Will Schneider are conducting a retrospective analysis to quantify effects of forage seeding on Douglas-fir plantations. Stocking-survey data from the Siuslaw National Forest are being analyzed for paired seeded and unseeded sites to determine if differences exist in Douglas-fir survival, size, and degree of damage from animals. Effects of site physiography, stock and planting characteristics, forage seeding and fertilization information, and abundance of associated vegetation on conifer performance are also being investigated.

Conifer seedling mortality in southwestern Oregon

In cooperation with the Bureau of Land Management, Tim Harrington and Will Schneider initiated a CRAFTS Special Project this spring to investigate mortality of planted Douglas-fir and ponderosa pine seedlings on

dry, low-elevation sites in southwestern Oregon. The principal objective was to develop a monitoring system for predicting conifer mortality within ten years after planting, from indicators of vigor (e.g., morphology, color, and growth rate), competing vegetation abundance, and the presence or absence of competition-release treatments, such as paper mulch, manual cutting, and scalping. The study will be replicated on 24 sites in order to be representative of the diversity of edaphic and climatic conditions of southwestern Oregon.

When completed, the monitoring system will be applied operationally to similar sites to determine whether or not treatments are needed to maintain adequate conifer stocking. The research has been designed so that the data will be compatible for use in the **RVMM**.

Douglas-fir and western hemlock responses to different vegetation management regimes

In research funded by Weyerhaeuser Company and DowElanco, Mike Newton and associates continued to investigate responses of Douglas-fir and western hemlock to various vegetation management regimes. Treatments applied thus far include complete removal of all competing vegetation and competition release in years one, two, and both. Preliminary analysis of the second-year data indicate significant reductions in height and stem volume growth of western hemlock as a result of overtopping woody cover.

Severe elk damage (over 95% browsing) on one of the Douglas-fir sites near Springfield, Oregon has compromised the ability to assess effects of first-year competition on the seedlings. However, the data will be valuable for determining the interaction between competition and elk browsing on seedling growth.

Update on CLUMP

CLUMP, a computer model developed by CRAFTS for predicting survival and height growth of 1- to 20-year-

old stands of Douglas-fir and bigleaf maple, was completed this winter. The model estimates the overtopping cover of bigleaf maple based on crown projections of clumps located randomly throughout the stand. The overtopping cover that occurs within the neighborhood of an individual Douglas-fir modifies its height growth and activates a mortality counter if it reaches a pre-defined threshold. A given Douglas-fir dies if *n* years (pre-defined) pass without overtopping cover decreasing below the threshold. The model compiles stand statistics at the end of the simulation, and it permits the user to run multiple iterations for a given set of initial stand parameters. Copies of **CLUMP** were sent to twelve reviewers for comment. Currently Tim Harrington is writing a user manual that will be submitted this summer for publication by the Forest Research Laboratory.

Coast Range competition release study

Last summer, data was collected to assess stand responses for the tenth year following treatment on three of the sites for the Coast Range competition release study. The remaining data will be collected this summer. The CRAFTS Subcommittee on Precommercial Thinning will meet this summer to decide on methodologies for thinning the research plots.

Tim Harrington has found that none of the release treatments have demonstrated significant differences in survival of Douglas-fir relative to the untreated control through the tenth year after treatment. However, Douglas-fir survival on some of the plots is showing a steady decline due to competition from overtopping red alder. To provide an integration of differences in survival and growth, Douglas-fir volume index was calculated for each treatment as follows:

proportion surviving X 1076 trees/hectare X average of [(diameter)^2 X height]

In the absence of competing vegetation, Douglas-fir volume index was about four times the value estimated for

the untreated control (Figure 3). Douglas-fir volume index following the glyphosate treatment was highly variable among plots, but it averaged about twice that estimated for the untreated control. This magnitude of variation among treatment plots has prevented the detection of a statistical difference in tree response between the operational treatments and the untreated control. A complete analysis of the data from this study will be summarized in a CRAFTS Technical Report this fall.

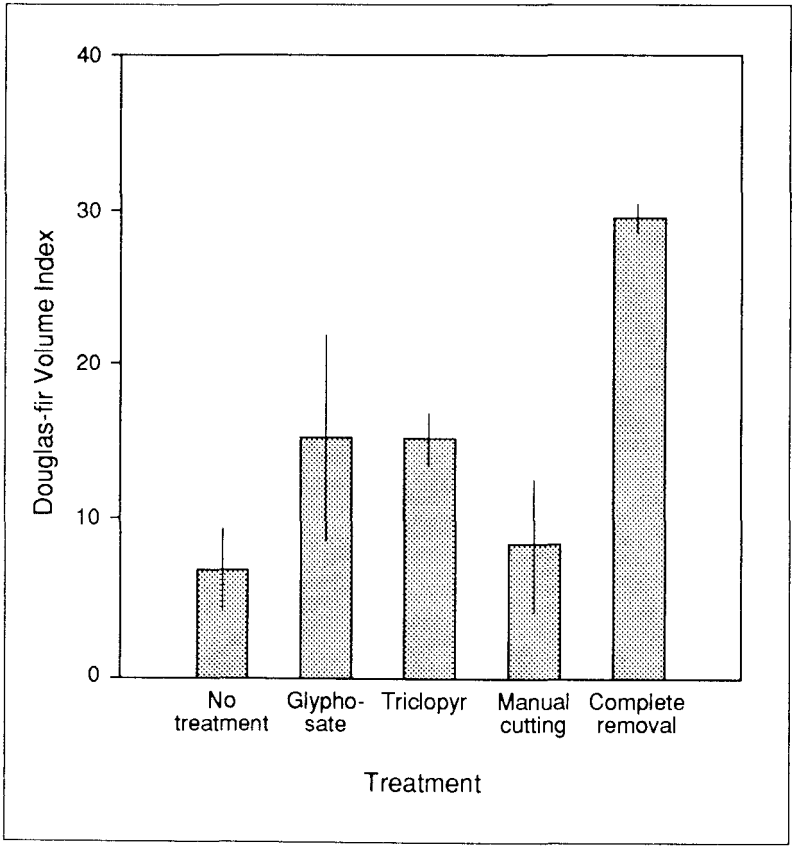

Figure 3. Douglas-fir volume index in the tenth year following several competition-release treatments in the Oregon and Washington Coast Range. These preliminary results are based on data from three of the six study replications.

Techniques for Managing Associated Vegetation

Vegetation managers need effective and inexpensive techniques for managing associated vegetation in young forest stands. To supplement CRAFTS research, we continue to rely on the scientific expertise of Mike Newton and Elizabeth Cole to test and refine new vegetation management treatments.

Herbicide combinations for control of red alder and vine maple

Combinations of herbicides have the potential to increase the selectivity and spectrum of species controlled. A response surface analysis can be used to identify herbicide rates and combinations that have maximum efficacy and minimum cost. The approach involves establishing a factorial combination of treatment rates and analyzing vegetation responses with regression procedures. The resulting model can be used to estimate peak efficacy rates or to compare treatment costs. This information can be used to update and expand treatment databases, like those in **VEGPRO**—CRAFTS software for selecting among vegetation management treatments.

Steve Knowe conducted a response-surface analysis of data from several herbicide screening trials installed between 1988 and 1990, in the Coast Range and the Cascade foothills, by Mike Newton and Elizabeth Cole. The treatments included glyphosate-imazapyr combinations applied in July, August, or September and triclopyr ester-imazapyr combinations applied in July.

In general, the best results were achieved with July applications in the Cascade foothills or with August or September applications in the Coast Range. The best control of red alder in the Coast Range was obtained with 0.05 to 0.09 lb/acre imazapyr, depending on the application date and glyphosate rate (Figure 4). The additive effect of glyphosate was more important in the July application than

in the August application. For vine maple, the peak efficacy rates occurred outside the range of rates studied. When combined with imazapyr, the effect of glyphosate varied from none to slightly additive, and from slightly antagonistic to additive for triclopyr ester.

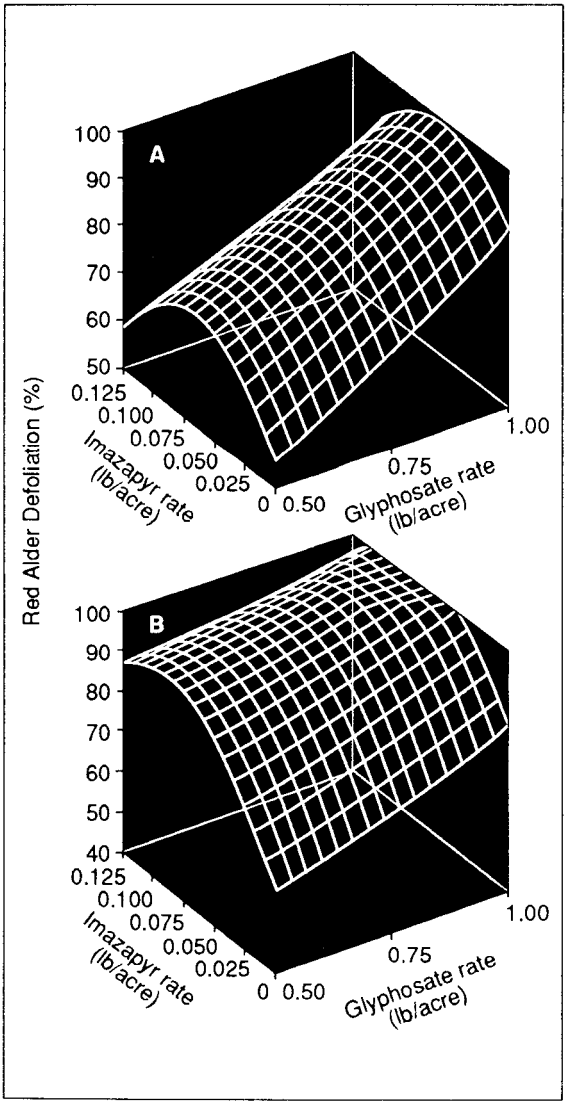

Figure 4. Response surfaces for defoliation of red alder following a) July and b) August applications of glyphosate and imazapyr in the Oregon Coast Range.

Comparing hexazinone rates and formulations for control of herbaceous vegetation

To provide guidelines for establishing a range of levels of herbaceous competition for the new CRAFTS research (see "Interactions of young conifers with herbaceous vegetation"), Tim Harrington and Eric Hanson compared solid (Pronone 10G®) and liquid (Velpar L®) formulations of hexazinone herbicide. Four application rates were applied at cooperator sites located near Corvallis (OSU), Mapleton (Champion International Corporation), and Sweet Home (Willamette Industries, Inc.), Oregon: 0, 0.4, 0.8, 1.2, 1.6, and 2.0 lb/acre. Responses of herbaceous cover and Douglas-fir growth to treatment were assessed during the summer.

A preliminary analysis of the combined data detected no differences between solid and liquid hexazinone formulations for the negative linear relationship of herb cover to herbicide rate ($R^2 = 0.63$). In addition, only the regression intercepts (i.e., herb cover in the untreated control) and not the regression slopes (i.e., the rate of decrease in herb cover with increasing herbicide rate) varied significantly by site. Douglas-fir growth did not vary significantly among the treatments. These results imply that a range of herbaceous competition levels can be created on sites dominated by this type of vegetation simply by varying hexazinone rate. The liquid formulation of hexazinone was selected for use in the new CRAFTS research because it was easier to apply than the solid formulation.

Dormant, early foliar, and late foliar treatments on red alder and *Rubus* species

A series of herbicide trials for releasing Douglas-fir from red alder, blackcap raspberry, and thimbleberry were established near Alsea, Oregon by Mike Newton and Elizabeth Cole. Treatments included triclopyr ester at three timings (March, May, and September), 2,4-D at two timings

(May and September), and glyphosate at one timing (September). Most of the treatments resulted in excellent control of red alder. Except for the 2,4-D treatments, May and September treatments resulted in good control of blackcap raspberry. Results on thimbleberry were highly variable, and generally showed minimal control. The best treatments for all three species were the glyphosate treatments; however, they caused some stunting of Douglas-fir growth. Triclopyr ester as a thinvert mixture was much less effective than as a mixture with straight diesel fuel.

Foliage spray treatments on bigleaf maple clumps

Mike Newton and Elizabeth Cole tested several herbicide treatments for controlling one-year-old bigleaf maple sprout clumps near Blodgett, Oregon. Treatments applied as foliage sprays included triclopyr ester, imazapyr, high rates of glyphosate, and mixtures of triclopyr plus imazapyr, triclopyr plus glyphosate, and glyphosate plus imazapyr. High rates of glyphosate were applied in June and September; all other treatments were applied in June only. The high rates of glyphosate (7.5 and 10 lb/acre) in June and September and the high rate of imazapyr (0.375 lb/acre) decreased crown volume relative to pretreatment size; the remaining treatments only caused decreases in maple growth rate. Results suggest that herbicide uptake by one-year-old clumps may not be sufficient for effective translocation to the often large root systems, but that some degree of control can result.

Release treatments for controlling vine maple

Mike Newton and Elizabeth Cole compared dormant treatments of triclopyr ester and fluroxypyr to foliar treatments of glyphosate and imazapyr for releasing Douglas-fir from vine maple. Plots were located in the Cascade foot-

hills near Cascadia, Oregon. Most of the treatments resulted in similar levels of crown reduction (55 to 60%). Stem dieback was higher when higher rates of triclopyr ester and fluroxypyr were applied. Although seedlings in the triclopyr ester treatments showed major signs of injury during the first growing season after treatment, seedlings began recovering in the second year. In other treatments, some top dieback still occurred, and seedlings began recovering more slowly.

Fundamental Research

Fundamental research is a critical branch of the CRAFTS program because it provides useful explanations for many of the observed responses of vegetation following treatment. Funding for the research is obtained form supplemental sources.

Growth and nitrogen responses of Douglas-fir in association with red alder

At a coastal site near Lincoln City, Oregon, Laura Fuentes (M.S. student) and Tim Harrington are studying how red alder affects the growth and foliar nitrogen of Douglas-fir. In a replacement-series experiment (fixed spacing of 3 m and changing species proportions), sixth-year average biomass of Douglas-fir was found to be slightly greater in stands composed of 10% red alder than in pure Douglas-fir stands. However, as the proportion of red alder increased, the average biomass of Douglas-fir steadily declined.

To identify the mechanisms underlying these growth responses, we are quantifying nitrogen accretion as a result of red alder presence and studying relationships of foliar nitrogen to soil nitrogen to quantify effects on Douglas-fir nutrition. In addition, we will test the hypotheses that low densities of red alder benefit Douglas-fir by suppressing

herbaceous vegetation and by forming a partial barrier that reduces deer browsing.

Effects of nitrogen availability and competition on three forest herbs

Eric Hanson initiated doctorate research to investigate the population biology of wood groundsel (*Senecio sylvaticus*), foxglove (*Digitalis purpurea*), and fireweed (*Epilobium angustifolium*). The research project consists of three parts: a population dynamics model, an intensive plot study, and an extensive vegetation survey. A population model will be developed to simulate the interactive effects of competition for nitrogen on the population dynamics of the three species. The intent of the model is to determine what aspect of a species' life history is limiting to its population growth.

Two separate experiments comprise the plot study. The first experiment tests the effects of nitrogen and competition (presence or absence of other herbs) on biomass allocation and reproductive output. The second experiment evaluates the effects of nitrogen and competition on plant establishment, population density and dynamics, and succession. A vegetation survey of forest stands of various ages will quantify relationships of time since disturbance, aspect, elevation, and plant community composition on herbaecous population levels.

TECHNOLOGY TRANSFER

CRAFTS disseminates its research information to cooperators and others in a variety of ways.

CRAFTS Research Directory

Eric Hanson published the first CRAFTS Quarterly Research Directory in December. The report is intended to inform CRAFTS cooperators, as well as other interested

groups, about research activities in vegetation management for the CRAFTS region. An electronic version of the directory has been made available to users of Internet. The fall issue of the directory included research information from COPE, Wilbur-Ellis Company (herbicide distributors), the University of British Columbia, and the British Columbia Ministry of Forests. Material contributed ranged from studies on herbicide efficacy to effects of associated vegetation on tree regeneration.

Technical Reports and Presentations to Cooperators

Six technical reports (see "Progress Reports and Newsletters") and 14 presentations (see below) in 1991-92 provided the Technical Committee with current research and approaches in vegetation management.

- The CRAFTS Research Directory. D.E. Hanson. October 1991.
- Preliminary tenth-year results from the Coast Range competition release study. T.B. Harrington. October 1991.
- Predicting development of mixed Douglas-fir and bigleaf maple stands with **CLUMP**. T.B. Harrington. October 1991.
- CRAFTS herbaceous vegetation research. T.B. Harrington and D.E. Hanson. October 1991.
- Stand table projection method. S.A. Knowe. October 1991.
- Sampling and data collection protocols for the Regional Vegetation Management Model. R.G. Shula. October 1991.
- Comparison of hexazinone rate and formulation for control of herbaceous vegetation. D.E. Hanson. March 1992.
- Update on vegetation assessment techniques for CRAFTS herbaceous vegetation research. T.B. Harrington. March 1992.
- Discussion of potential research topics for CRAFTS five-year plan. R. Heninger. March 1992.

- Response surfaces for glyphosate-imazapyr and triclopyr-imazapyr combinations. S.A. Knowe. March 1992.
- Summary of previous meeting of Modeling Subcommittee. S.A. Knowe. March 1992.
- Update on herbicide screening trials. M. Newton. March 1992.
- Tree-level modeling, competition indices, and extension of the Regional Vegetation Management Model database. R.G. Shula. March 1992.
- Effects of four diluents on uptake and efficacy of triclopyr in basal applications on several southern hardwood species. W.G. Schneider. March 1992.

A complete list of publications and presentations by CRAFTS personnel is provided later in this report.

Visits with Cooperators

CRAFTS personnel often make contacts with field foresters of cooperating organizations. Such contacts ensure direct application of research results.

- Approaches for developing a Regional Vegetation Management Model: discussion with Weyerhaeuser Company staff. R.G. Shula, S.A. Knowe, T.B. Harrington, and S.R. Radosevich. Corvallis, Oregon. June 1992.
- Installation of growth monitoring plots in support of the Regional Vegetation Management Model: individual discussions with staff from Starker Forests, Inc., Willamette Industries, Inc., International Paper Company, Lone Rock Timber Company, Champion International Corporation, ITT-Rayonier, Inc., Simpson Timber Company, and Boise Cascade Corporation. R.G. Shula and S.A. Knowe. June 1992.
- Conifer establishment under partial forest canopies: a case of gap dynamics. 1992 Reforestation Conference, Oregon Department of Forestry. T.B. Harrington. Astoria, Oregon. June 1992.

Continuing Education

The tenth OSU workshop on forest vegetation management dealt specifically with non-herbicide techniques. The program, directed by Tim Harrington with sessions being moderated by CRAFTS staff, had over 170 participants. Session topics included prescribed fire, mechanical site preparation, animal grazing, grass and legume seeding, mulches and grubbing, and manual cutting. As a project initiated by the Oregon Department of Forestry, four public forestry agencies have pledged a total of $8,000 in funding to publish the proceedings from the workshop. The proceedings will be available in early 1993. The theme of next year's workshop (February 24-26, 1993) will be Forest Vegetation Management with Herbicides.

ORGANIZATIONAL ACTIVITIES

Cooperators have direct participation in the planning, installation, and review of CRAFTS research. During 1991-92, CRAFTS committees and subcommittees met seven times.

Policy Committee

The Policy Committee met in June 1991 to review the status of the cooperative. Tharon O'Dell (Simpson Timber Company), Executive Officer, led the meeting. Accomplishments included formulation of a policy for members whose dues becomes delinquent, a reaffirmation of the need for a 5% contingency fund, and the decision to proceed with revision of the Prospectus and development of a new five-year plan.

This meeting completed Tharon O'Dell's second term as Executive Officer and CRAFTS would like to thank him for his service. CRAFTS is pleased to have Bill Voelker (Oregon Department of Forestry) as the new Executive Officer of the Policy Committee.

Technical Committee

The Technical Committee met in October 1991 and March 1992. At the October meeting in Corvallis, preliminary results were presented from the Coast Range Competition Release Study, representing the tenth year since treatment. Updates were presented on the herbaceous vegetation research and on the status of the **RVMM**. During the afternoon session, cooperators visited a CRAFTS experiment at OSU's Dunn Forest that compares rates and formulations of hexazinone for use in the herbaceous vegetation research. Later, Mike Newton led a comprehensive tour of the silvicultural activities he is practicing on his tree farm near Philomath, Oregon.

At the March meeting, cooperators discussed potential research topics for the next five-year planning horizon. They also reviewed the methodology for vegetation assessments in the herbaceous vegetation research. Presentations were made on the revised dataset matrix for the **RVMM** and on a response-surface analysis for identifying herbicide rates and combinations with highest efficacy.

Subcommittees

The Prospectus Revision Subcommittee met three times to revise CRAFTS' Prospectus and to develop a five-year plan. The subcommittee identified key areas for future research that had been discussed at the spring meeting of the Technical Committee.

The Advisory Subcommittee for the **RVMM** met once this year to technically review the sampling and data collection protocols and the stand-table projection modeling approach. This subcommittee will continue its ongoing effort to review data acquisition and modeling methodology for field sampling and model building.

PUBLICATIONS AND PRESENTATIONS

CRAFTS personnel prepared the following publications and presentations during 1991-92:

Refereed Publications

Capo-Arteaga, M. and M. Newton. 1991. Survival and growth of five species of *Pinus* seedlings after different approaches to competition control: bridging studies between Oregon and Mexico. New Forests 5:219-238.

Coates, K.D., W.H. Emmingham, and S.R. Radosevich. 1991. Conifer-seedling success and microclimate at different levels of herb and shrub cover in a Rhododendron - *Vaccinium* - *Menziesia* community of south-central British Columbia. Canadian Journal of Forest Research 21:858-866.

Harrington, T.B., J.C. Tappeiner II, and T.F. Hughes. 1991. Predicting average growth and size distributions of Douglas-fir saplings competing with sprout clumps of tanoak or Pacific madrone. New Forests 5:109-130.

Harrington, T.B., J.C. Tappeiner II, and R. Warbington. 1992. Predicting crown sizes and diameter distributions of tanoak, Pacific madrone, and giant chinkapin sprout clumps. Western Journal of Applied Forestry (in press).

Helgerson, O.T., M. Newton, and D. McNabb. 1992. Site preparation. P. 232-256 *in* Reforestation Practices in Southwestern Oregon and Northern California (S.D. Hobbs et al., eds.). Forest Research Laboratory, Corvallis, Oregon. 477 p.

Knowe, S.A. 1991. Comparison of expressions for crown size of woody competitors in herbicide efficacy studies. Forest Science 37:1664-1670.

Knowe, S.A. 1991. Simultaneous prediction of the development of loblolly pine and woody competitors in young plantations. New Forests 5:175-193.

Knowe, S.A. 1992. Basal area and diameter distribution models for loblolly pine plantations with hardwood competition in the Piedmont and upper Coastal Plain. Southern Journal of Applied Forestry 16:93-98.

Knowe, S.A. 1992. Predicting the impact of interspecific competition in young loblolly pine plantations with diameter distribution models. Forest Ecology and Management (in press).

Knowe, S.A., T.B. Harrington, and R.G. Shula. 1992. Incorporating the effects of interspecific competition and vegetation management treatments into diameter distribution models for Douglas-fir saplings. Canadian Journal of Forest Research (in press).

Knowe, S.A., B.D. Shiver, and W.N. Kline. 1992. Fourth-year response of loblolly pine following chemical and mechanical site preparation in the Georgia Piedmont. Southern Journal of Applied Forestry 16:99-105.

Newton, M., E.C. Cole, and D.E. White. 1992. Tall planting stock for enhanced growth and domination of brush in the Douglas-fir Region. New Forests (in press).

Newton, M., E.C. Cole, D.E. White, and M.L. McCormack. 1992. Young spruce-fir forests released by herbicides I. Responses of hardwoods and shrubs. Northern Journal of Applied Forestry (in press).

Newton, M., E.C. Cole, M.L. McCormack, and D.E. White. 1992. Young spruce-fir forests released by herbicides II. Conifer responses to residual hardwoods and overstocking. Northern Journal of Applied Forestry (in press).

Shainsky, L.J. and S.R. Radosevich. 1992. Mechanisms of competition between Douglas-fir and red alder seedlings. Ecology 73:30-45.

Shainsky, L.J., M. Newton, and S.R. Radosevich. 1992. Effects of intra- and inter-specific competition on root and shoot biomass of young Douglas-fir and red alder. Canadian Journal of Forest Research 22:101-110.

Shainsky, L.J., B.J. Yoder, T.B. Harrington, and S.S. Chan. 1992. Physiological characteristics of red alder: photosynthesis and water relations. *In* Hibbs, D.E. (ed.), The Biology and Management of Red Alder. Forest Research Laboratory, Corvallis, Oregon (in preparation).

Shiver, B.D., S.A. Knowe, M.B. Edwards, and W.N. Kline. 1991. Comparison of herbicide treatments for controlling common Coastal Plain flatwoods species. Southern Journal of Applied Forestry 15:187-193.

Tappeiner II, J.C., M. Newton, P. McDonald, and T.B. Harrington. 1992. Ecology of hardwoods, shrubs, and herbaceous vegetation: effects on conifer regeneration. P. 136-164 *in* Reforestation Practices in Southwestern Oregon and Northern California (S.D. Hobbs et al., eds.). Forest Research Laboratory, Corvallis, Oregon. 477 p.

Wagner, R.G. and S.R. Radosevich. 1991. Interspecific competition and other factors influencing the performance of Douglas-fir saplings in the Oregon Coast Range. Canadian Journal of Forest Research 21:829-835.

Wagner, R.G. and S.R. Radosevich. 1991. Neighborhood predictors of interspecific competition in young Douglas-fir plantations. Canadian Journal of Forest Research 21:821-828.

Progress Reports and Newsletters

Cole, E.C. and M. Newton. 1992. Dormant and foliar treatments for controlling vine maple. *In* Western Society of Weed Science, 1992 Research Progress Report.

Cole, E.C. and M. Newton. 1992. Site preparation treatments for control of vine maple. *In* Western Society of Weed Science, 1992 Research Progress Report.

Harrington, T.B. 1991. Principles of competition release. Northwest Woodlands 7(3):14-15.

Harrington, T.B. 1991. Competition limits Douglas-fir morphology and physiology: a case of double trouble. FIR Report 13(1):8-9.

Harrington, T.B., S.A. Knowe, R.G. Shula, S.R. Radosevich, and M. Newton. 1991. CRAFTS annual report 1990-91. Forest Research Laboratory, Oregon State University, Corvallis, Oregon.

Harrington, T.B., W. Voelker, G. Johnson, and R. Heninger. 1992. A prospectus for CRAFTS: cooperative research and technology transfer in forest vegetation management. Forest Research Laboratory, Oregon State University, Corvallis, Oregon (in preparation).

Knowe, S.A. 1992. Comparison of objective estimators of treatment efficacy for bigleaf maple. CRAFTS Technical Report, Forest Research Laboratory, Oregon State University, Corvallis, Oregon. 10 p.

Knowe, S.A. 1992. Expressing hardwood competition effects in Douglas-fir plantations. CRAFTS Research Note, Forest Research Laboratory, Oregon State University, Corvallis, Oregon. 5 p.

Knowe, S.A. and R.G. Shula. 1991. A stand table projection system for young Douglas-fir plantations. CRAFTS Technical Report, Forest Research Laboratory, Oregon State University, Corvallis, Oregon. 12 p.

Newton, M., E.C. Cole, and S.A. Knowe. 1992. Control of red alder and vine maple with glyphosate-imazapyr and triclopyr-imazapyr combinations. CRAFTS Technical Report, Forest Research Laboratory, Oregon State University, Corvallis, Oregon. 17 p.

Shula, R.G. and S.A. Knowe. 1991. Regional Vegetation Management Model: Recommended dataset matrix, and sampling and data collection protocols. CRAFTS Technical Report, Forest Research Laboratory, Oregon State University, Corvallis, Oregon. 15 p.

Shula, R.G. and S.A. Knowe. 1992. Regional Vegetation Management Model: revised dataset matrix, and sampling and data collection protocols. CRAFTS Technical Report, Forest Research Laboratory, Oregon State University, Corvallis, Oregon. 5 p.

Proceedings and Abstracts

Gjerstad, D.H., M.L. McCormack, Jr., and T.B. Harrington. 1992. Vegetation management practices in forests of the southeastern, northeastern, and Pacific Northwest United States and eastern Canada. *In* Proceedings, International Conference on Forest Vegetation Management. Auburn, Alabama (in preparation).

Harrington, T.B. 1991. Long-term effects of forest vegetation management. P. 6-8 *in* Proceedings, University of British Columbia and Monsanto Vegetation Management Symposium. Maple Ridge, British Columbia.

Harrington, T.B. 1991. **VEGPRO**: computerized treatment selection in forest vegetation management. P. 39-40 *in* Proceedings, Washington State Weed Conference, Yakima, Washington.

Harrington, T.B. and S.S. Chan. 1992. Conifer adjustments to microenvironment changes: physiology and morphology. *In* Proceedings, Forest Vegetation Management Workshop, College of Forestry, Oregon State University, Corvallis, Oregon (in preparation).

Knowe, S.A. and R.G. Shula. 1992. Stand- and tree-level approaches to modeling the effects of interspecific competition on early growth and development of Douglas-fir plantations. *In* Proceedings, International Conference on Forest Vegetation Management, Auburn, Alabama (in preparation).

Radosevich, S.R., S.A. Knowe, and R.G. Shula. 1992. Approaches and interpretation of experiments in forest vegetation management. *In* Proceedings, International

Conference on Forest Vegetation Management, Auburn, Alabama (in preparation).

Schneider, W.G. 1992. Site preparation in the Southeast. *In* Proceedings, Forest Vegetation Management Workshop, College of Forestry, Oregon State University, Corvallis, Oregon (in preparation).

Schneider, W.G., B.H. Cazell, J.R. Seiler, S.M. Zedaker, K.M. Bourke, and R.E. Kreh. 1992. Effect of soil moisture content on absorption and translocation of triclopyr in oak seedlings. *In* Proceedings, International Conference on Forest Vegetation Management. Auburn, Alabama (in preparation).

Schneider, W.G., S.M. Zedaker, J.R. Seiler, F.N. Keeney, and L.J. Samuelson. 1992. Uptake and translocation of triclopyr in saplings following basal application. *In* Proceedings, Southern Weed Science Society (in press).

Graduate Thesis

Kelly, Linda S. 1992. Early competitive interactions between red alder and salmonberry in the Oregon Coast Range. M.S. Thesis. Oregon State University, Corvallis, Oregon. 61 p.

Other Presentations

CRAFTS silvicultural decision systems. T.B. Harrington. Poster and computer demonstration at the Oregon Forestry Family Exposition. Glide, Oregon. May 1992.

CRAFTS research and technology transfer in forest vegetation management. T.B. Harrington and S.A. Knowe. Poster presented at the International Conference on Forest Vegetation Management, Auburn, Alabama. April 1992.

Research on mixed stands of Douglas-fir and red alder. T.B. Harrington. Field tour for Annual meeting of the Oregon Society of American Foresters. Lincoln City, Oregon. April 1992.

Demonstration of **VEGPRO** and **PSME**. T.B. Harrington. Software Showcase '92, Public Domain Software for Natural Resource Managers. Portland, Oregon. January 1992.

Predicting hardwood stand development with the microcomputer models, **PSME** and **CLUMP**. T.B. Harrington. Silviculture Institute, Module 2, Oregon State University, Corvallis, Oregon. November 1991.

Impacts of competing vegetation on survival and growth of young conifers. T.B. Harrington. Washington State University Extension, Pesticide Recertification Program, Olympia, Washington. November 1991.

Research approaches in forest vegetation management. T.B. Harrington. Lecture to Current Topics in Forest Science, Oregon State University, Corvallis, Oregon. October 1991.

Importance and ecology of forest weeds. T.B. Harrington. Lecture to Integrated Forest Protection class, Oregon State University, Corvallis, Oregon. October 1991.

Sampling and data collection protocols. R.G. Shula and S.A. Knowe. USFS Regional Vegetation Management Model Steering Committee Meeting. Portland, Oregon. October 1991.

CRAFTS young-stand growth and yield modeling/Northwest Tree Improvement Cooperative (NWTIC) collaboration. R.G. Shula and S.A. Knowe. NWTIC Meeting. Oregon State University, Corvallis, Oregon. December 1991.

Sampling and data collection protocols for the Regional Vegetation Management Model. R.G. Shula and S.A. Knowe. Siuslaw National Forest Silviculturists Meeting. Corvallis, Oregon. April 1992.

CRAFTS: The Regional Vegetation Management Model. R.G. Shula. Poster presented at the Annual Meeting of Western Mensurationists, Harrison, British Columbia, June 1992.

FINANCIAL STATEMENT: SUPPORT RECEIVED

Cooperators

Boise Cascade Corporation	$8,000
British Columbia Ministry of Forests	8,000
Bureau of Land Management	8,000
Cavenham Forest Industries	8,000
Champion International Corporation	8,000
International Paper Company	8,000
ITT-Rayonier, Inc.	8,000
Lone Rock Timber Company	4,000
MacMillan Bloedel Limited	8,000
Oregon Department of Forestry	8,000
Simpson Timber Company	8,000
Starker Forests, Inc.	4,000
Washington Dept. of Natural Resources	8,000
Weyerhaeuser Company	8,000
Willamette Industries, Inc.	8,000
Subtotal	$112,000
Forest Research Laboratory, Oregon State University	135,235
Subtotal	$247,235

Other Sources[1]

Regional Vegetation Management Model. USDA, Forest Service[2]. (Radosevich and Harrington 1991-92)	$124,400
Conifer mortality in southwestern Oregon. BLM, Oregon State Office[2]. (Harrington and Knowe 1991-92)	45,605
Proceedings of vegetation management workshop. B.C. Ministry of Forests, Oregon Department of Forestry, BLM, and USDA Forest Service. (Harrington 1991-92)	8,000
Reforestation decision system. COPE[2] (Knowe 1991-92)	30,000
Subtotal	$208,005
Total	$455,240

[1]Project leaders in parentheses.
[2]Includes university overhead.


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