

FOREST RESEARCH LABORATORY  
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A Prospectus for  
**CRAFTS**

Cooperative Research and  
Technology Transfer in Forest  
Vegetation Management

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## **Acknowledgments**

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# **CRAFTS**

**Coordinated Research On  
Alternative Forestry  
Treatments & Systems**

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# **Table of Contents**

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- 1 Introduction**
- 2 Purpose and Scope**
- 2 Objectives**
- 3 Research Approach**
- 4 Relationships with Other Cooperatives**
- 4 Technology Transfer**
- 5 Organization**
- 6 Membership**
- 7 Funding**
- 7 Appendix 1: History of CRAFTS**
- 11 Appendix 2: Selected Publications**

# A Prospectus for CRAFTS: Cooperative Research and Technology Transfer in Forest Vegetation Management

## Introduction

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Much of the commercial forest land in Oregon must be intensively managed if projected demands for wood products are to be met.<sup>1</sup> Moreover, similar pressures are expected in other areas of the Pacific Northwest. Rehabilitation of underproductive forest land and manipulation of competing vegetation in established conifer stands are key elements of intensified forest management. A variety of vegetation management treatments are being used to reduce plant competition and animal damage; however, more information is required if forest managers are to select appropriate techniques and predict crop-tree yield responses and environmental impacts.

This Prospectus outlines a cooperative research and technology-transfer program designed to address information needs for forest vegetation management in the Pacific Northwest. The program, known as CRAFTS (**C**oordinated **R**esearch on **A**lternative **F**orestry **T**reatments and **S**ystems), is headquartered at Oregon State University (OSU) and involves participating organizations throughout the Northwest.

Since CRAFTS began in 1980, this dynamic organization has met the information needs of cooperators in the rapidly evolving field of forest vegetation management (Appendix 1). Periodically it is necessary to reassess the direction and to restate the purpose, scope, objectives, and approach of the CRAFTS program. This revised Prospectus is based on information presented in earlier versions of the document.<sup>2</sup>

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<sup>1</sup> Sessions, J. (Coord.). Authors: K.N. Johnson, J. Beuter, B. Greber, G. Lettman, and J. Sessions. 1991, revision. Timber for Oregon's Tomorrow: The 1989 Update. Forest Research Laboratory, Oregon State University, Corvallis. 184 p.

<sup>2</sup> Walstad, J.D., J.C. Gordon, M. Newton, and L.A. Norris. 1982. CRAFTS comprehensive research program in forest vegetation management. Department of Forest Science, School of Forestry, Oregon State University. 27 p.

Radosevich, S.R., J.D. Walstad, and M. Newton. 1986. CRAFTS cooperative research program in forest vegetation management: an updated prospectus. Department of Forest Science, College of Forestry, Oregon State University. 12 p.

## Purpose and scope

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The purpose of the CRAFTS program is to provide leadership in vegetation management research and technology transfer for commercial forest lands of the Pacific Northwest. Forest vegetation management manipulates competing plants and growing conditions to encourage survival and growth of young crop trees. The geographic scope of CRAFTS includes lands west of the crest of the Cascade Range in Oregon and Washington, and those with similar vegetation types in southern British Columbia and northern California.

To achieve this purpose, CRAFTS encourages participation by every forest land manager in the region. CRAFTS initiates and conducts research, develops educational activities, and accumulates and disseminates information. CRAFTS also provides a forum for the exchange of information among participating organizations and supplements work already underway.

## Objectives

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CRAFTS' objectives are to continue organizing and focusing research on forest vegetation management by:

- Assessing and quantifying the effects of associated vegetation and management tactics on tree survival, growth, and yield;
- Developing and evaluating promising manual, chemical, mechanical, and biological vegetation management techniques that are consistent with current and anticipated changes in forest practices;
- Accumulating and summarizing information on the techniques and silvicultural consequences of vegetation management;
- Developing a database and analytical framework to support the vegetation management decision-making of cooperators;

- Facilitating information exchange among participating organizations; and
- Stimulating investigation of other consequences of vegetation management, such as environmental impacts and human and forest health.

## Research approach

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Interactions among plants are mediated by a complex of resources (light, water, and nutrients) and environmental conditions (temperature and humidity). CRAFTS relies on the sciences of forest ecology and plant population biology to provide methodologies for the study of plant interactions in forest vegetation management. Because these interactions can result in negative, neutral, or positive responses of plant survival and growth, a systems-level approach is needed for clarification of underlying processes and mechanisms.

Analyses of plant interactions are complicated by the nature of tree responses to competition. In general, survival responses are more resilient than growth responses to competitive pressure. Over time, a tree develops morphological features that reflect the quality of its microenvironment. This morphological integration of growing conditions by the tree governs its long-term growth trajectory and its potential to become dominant in the stand.

Forest vegetation management alters plant interactions by shifting availability of resources to favor the desired crop species. This shift in resource availability facilitates morphological responses by the crop that promote its long-term dominance. Such principles of forest vegetation management have evolved from a long history of field research.

Through field research, many of the physical and biological sources of variation in crop response to forest vegetation management have been identified. However, detailed information on these sources of variation is rarely complete for areas being considered for forest vegetation management. Thus, analytical frameworks such as computer models are

required in order to extrapolate principles of forest vegetation management for predicting crop responses on individual sites.

CRAFTS' research goals are accomplished by:

- Conducting short-term experiments (less than five years) to test efficacy of vegetation management techniques;
- Conducting long-term experiments (longer than five years) on crop-tree and site responses to vegetation management;
- Modeling the long-term responses to vegetation management of tree survival, growth, and yield; and
- Conducting field and laboratory experiments to improve basic understanding of crop and non-crop interactions.

CRAFTS accomplishes these research goals by conducting independent research and by collaborating with other research organizations.

## **Relationships with other cooperatives**

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Where applicable, CRAFTS research work is designed to be compatible with other research organizations. Data from all of CRAFTS' long-term studies are available to be shared with the University of Washington Stand Management Cooperative for subsequent stand management research. Collaboration with other cooperatives and research organizations is constantly being explored.

## **Technology transfer**

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Staff members of CRAFTS allocate a significant proportion of their time to transferring new information, with the highest priority given to cooperators. Activities include:

- Preparing annual reports, technical papers, bibliographies, and journal articles (Appendix 2);

- Conducting periodic meetings and field tours for cooperators;
- Assisting cooperators in experimental procedures and techniques;
- Participating in workshops and scientific meetings relevant to forest vegetation management; and
- Providing technical support and instruction for academic and extension activities.

Since the formation of CRAFTS in 1980, more than 25 technical reports have been written exclusively for cooperators on such research topics as factors influencing efficacy of vegetation management treatments and the potential of such treatments to injure conifers, indicators of competitive stress for conifer seedlings, and methodologies for modeling effects of competition on tree growth.

## Organization

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The OSU Forest Research Laboratory provides leadership for the CRAFTS program, assisted by the cooperative's Policy and Technical Committees.

**The Policy Committee** consists of a representative from each member organization plus administrators from the OSU College of Forestry. Its function is to provide overall program guidance and support, which includes evaluating progress and ascertaining whether program objectives are being met, maintaining financial and logistical support, and providing periodic review and advice on matters of scope and direction.

**The Technical Committee** consists of another representative from each member organization, key faculty members from the OSU College of Forestry, and several ex-officio members with expertise in areas such as vegetation management, silviculture, statistics, toxicology, wildlife biology, and economics. This committee advises on priorities for research and technology transfer, design and implementation of experiments, and selection of treatments for testing. It also reviews the status



of current research, evaluates research results, and facilitates technology transfer.

CRAFTS Committees provide another important opportunity for sharing technical research information among cooperators. Since 1980 there have been forty-four meetings of the Policy and Technical Committees, twenty-one meetings of various task-oriented subcommittees (e.g., Research Directions, Prescribed Fire, and Prospectus Revision), and six field tours of CRAFTS research sites.

## Membership

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Effective research on forest vegetation management requires an interdisciplinary approach. This approach is reflected in the program's membership, which includes public and private forest management and research organizations and the OSU Departments of Forest Science and Forest Resources:

Boise Cascade Corporation  
British Columbia Ministry of Forests  
Cavenham Forest Industries  
Champion International Corporation  
International Paper Company, Inc.  
ITT-Rayonier, Inc.  
Lone Rock Timber, Inc.  
Oregon Department of Forestry  
Oregon State University  
Simpson Timber Company  
Starker Forests, Inc.  
USDI Bureau of Land Management  
Washington Department of Natural Resources  
Weyerhaeuser Company  
Willamette Industries, Inc.

The following are current liaison members of CRAFTS:

USDA Forest Service Pacific Northwest Research Station  
University of British Columbia, Vancouver, B.C.  
University of Washington, Seattle, WA

Other organizations are invited to participate in CRAFTS whenever their expertise or support is needed to meet research and technology transfer goals of the program. Those who wish to participate and be represented on organizational committees are asked to sign a formal Memorandum of Agreement.

## Funding

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Funding for the CRAFTS program comes from:

- Grants-in-aid (dues) provided annually by CRAFTS member organizations;
- Funds provided by the Oregon State Legislature to support educational and research activities at the OSU Forest Research Laboratory;
- Contracts or grants between OSU and clients who wish to support a particular project;
- Cooperative agreements between OSU and public agencies in need of technical and scientific expertise; and
- Gifts, fellowships, and scholarships.

## Appendix 1: History of CRAFTS

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- 1979-80 - John Gordon, Head of OSU Forest Science Department, receives state legislative support to create a new faculty position in forest vegetation management.
- A group of forest scientists and managers develop a prospectus for a cooperative research and technology transfer program in forest vegetation management.
- 1980-81 - Jack Walstad, a research scientist from Weyerhaeuser Company, is appointed Forest Vegetation Management Research Specialist at OSU.
- CRAFTS is formed from fifteen public and private forestry organizations.
  - Bob Wagner, a research forester from the University of Washington, is hired to coordinate CRAFTS research projects.

- Weyerhaeuser provides two-year funding to support post-doctorate research on glyphosate efficacy by Sue Conard.
  - CRAFTS completes its first year, and an annual report is distributed in June.
  - The first OSU workshop on Forest Vegetation Management is held.
  - Research protocols are developed for assessing conifer responses to competition release treatments.
- 1981-82
- CRAFTS membership increases to eighteen cooperators.
  - Three replications of the Competition Release Study are installed in the Coast Range and one in the Intermountain Region.
  - Research protocols are developed for treatment efficacy (A-level) trials.
- 1982-83
- CRAFTS co-sponsors a workshop on the role of *Ceanothus* in western forest ecosystems.
  - CRAFTS membership increases to nineteen cooperators.
  - Three additional replications of the Competition Release Study are installed in the Coast Range.
  - Research is completed on effects of overtopping vegetation on Douglas-fir growth and morphology.
- 1983-84
- Steve Radosevich, a weed scientist from the University of California at Davis, succeeds Jack Walstad as leader of CRAFTS.
  - Herbicide publications by Sue Conard and Bill Emmingham are published.
  - First-year results from the Coast Range Competition Release Study show that Douglas-fir growth increases only after complete removal of competing vegetation.
  - SAF Convention members tour the Tillamook site of the CRAFTS Competition Release Study.
- 1984-85
- Tim Harrington, a research forester from Oregon State University, is hired to coordinate CRAFTS research projects.
  - A study to compare effects of site preparation on ponderosa pine performance in south-central Oregon is completed.
  - The format and cover for CRAFTS Technical Reports are designed.

- 1985-86 - CRAFTS membership increases to nineteen cooperators.
- The CRAFTS Prospectus is revised.
  - Data collection begins for a growth model to predict effects of bigleaf maple sprout clumps on conifer stand development.
  - A treatment-efficacy screening trial on bigleaf maple is started.
- 1986-87 - An annotated bibliography on prescribed fire in Pacific Northwest forests is published.
- A poster on the objectives, structure, and current activities of CRAFTS is prepared.
  - The CRAFTS Policy Committee agrees to begin development of a Regional Vegetation Management Model (**RVMM**).
  - Third-year results from the Competition Release Study indicate that Douglas-fir trees under high levels of overtopping cover (>66%) prior to treatment show the greatest increases in growth.
- 1987-88 - Dan Opalach, a biometrician from the University of Washington, is hired to coordinate the **RVMM**.
- Coastal Oregon Productivity Enhancement (COPE) and Washington Department of Natural Resources provide substantial funding to accelerate development of the **RVMM**.
  - The first textbook on forest vegetation management, "Forest Vegetation Management for Conifer Production," edited by Jack Walstad and Peter Kuch, is published.
  - Various rates and timings for application of triclopyr herbicide are tested for controlling bigleaf maple.
  - Size of bigleaf maple clumps is found to be correlated with the height, diameter, and number of stumps from which the clumps have sprouted.
- 1988-89 - "Natural and Prescribed Fire in Pacific Northwest Forests," edited by Jack Walstad, Steve Radosovich, and Dave Sandberg, is published.
- Preliminary versions of three computer models are completed:
    - VEGPRO** ranks vegetation management treatments on the basis of cost and efficacy.
    - CLUMP** predicts development of mixed stands of bigleaf maple and Douglas-fir.

**ICIPS**, a prototype version of **RVMM**, predicts individual Douglas-fir growth in association with salmonberry, thimbleberry, vine maple, and red alder.

- By the fifth year of the Competition Release Study, complete removal of competing vegetation has caused a doubling of stem diameter and a three-foot increase in height of Douglas-fir relative to the untreated control.
- 1989-90
- A study to develop indices of interspecific competition for the Siuslaw National Forest is completed.
  - After nearly nine years of service, Bob Wagner leaves CRAFTS to become Vegetation Management Specialist for the Ontario Ministry of Natural Resources; Dan Opalach becomes Timberlands Planning Supervisor for Simpson Timber.
  - The Oregon Society of American Foresters Research Award is presented to Steve Radosevich and CRAFTS for outstanding contributions to forestry research.
  - The CRAFTS Technical Committee tours study sites for the Forestry Intensified Research (FIR) program in southwestern Oregon.
  - Data from the CRAFTS Competition Release Study is used to estimate parameters for **df et al.**, a preliminary version of **RVMM**.
- 1990-91
- **VEGPRO** is completed.
  - Region 6 of the USDA Forest Service agrees to provide five years of funding to complete the **RVMM**. Two biometricians, Steve Knowe and Bob Shula, join CRAFTS staff to continue **RVMM**'s development.
  - An annotated bibliography on the role of herbaceous vegetation in forests of the western U.S. is published.
  - The Auburn University Silviculture Herbicide Cooperative joins CRAFTS in Corvallis for a joint meeting and two-day field tour.
  - Tenth-year measurements of the CRAFTS Competition Release Study are taken.
  - Hexazinone rates and formulations are tested for manipulating herbaceous competition in a forthcoming regional study.
- 1991-92
- After eight years of service, Tim Harrington leaves CRAFTS to become Assistant Professor of Silviculture and Applied Ecology at the School of Forest Resources, University of Georgia.
  - The CRAFTS Technical Committee tours the Coos Bay site of the Competition Release Study in its tenth year since treatment.
  - The tenth OSU workshop on forest vegetation management, co-sponsored by CRAFTS, focuses on non-herbicide treatments.

- Sampling and data collection protocols are developed for extending the **RVMM** database.
- A regional study on herbaceous vegetation management is initiated on two sites in the Western Cascades.
- The CRAFTS Prospectus undergoes a second revision.
- Of the current sixteen cooperating organizations in CRAFTS, twelve were members at the time of the cooperative's formation in 1980.
- William Schneider, a research forester from Virginia Polytechnical Institute, is hired to coordinate CRAFTS research projects.

## Appendix 2: Selected publications

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- Cole, E.C., and M. Newton. 1987. Nutrient, moisture and light relations in 5-year-old Douglas-fir plantations under variable competition. *Canadian Journal of Forest Research* 16:727-732.
- Conard, S.G., and W.H. Emmingham. 1984. Herbicides for brush and fern control on forest sites in western Oregon and Washington. Forest Research Laboratory, Oregon State University, Corvallis, Oregon. Special Publication 8. 8 p.
- Harrington, T.B. 1987. The relative effects of herbicide exposure and competing vegetation on Douglas-fir growth in the Coast Range competition release study. CRAFTS Technical Report. Forest Resource Laboratory, Oregon State University, Corvallis, Oregon. 11 p.
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- Harrington, T.B., and R.G. Wagner. 1986. Three years of Douglas-fir growth and survival following six competition release treatments in the Oregon and Washington Coast Range. CRAFTS Technical Report.

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- Loucks, D.M., H.C. Black, M.L. Roush, and S.R. Radosevich. 1990. Assessment and management of animal damage in Pacific Northwest forests: an annotated bibliography. USDA Forest Service, Pacific Northwest Research Station, Portland, Oregon. General Technical Report PNW-GTR-262. 371 p.
- Loucks, D.M., S.R. Radosevich, T.B. Harrington, and R.G. Wagner. 1987. Prescribed fire in Pacific Northwest forests: an annotated bibliography. Forest Research Laboratory, Oregon State University, Corvallis, Oregon. 185 p.

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**Address Correction Requested**

