



# THE HIGH-SKILL APPROACH TO ECOSYSTEM MANAGEMENT: Combining Economic, Ecological, and Social Objectives

*A Preliminary Analysis of the  
Impacts of Selected  
Jobs-In-The-Woods Projects*

PUBLIC KNOWLEDGE, INC.  
SALEM, OREGON

AND

LABOR EDUCATION AND RESEARCH CENTER  
UNIVERSITY OF OREGON, EUGENE





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## Contents

<b>I</b>	<b>Preface</b> .....	<b>4</b>
<b>II</b>	<b>Executive Summary</b> .....	<b>6</b>
<b>III</b>	<b>Background</b> .....	<b>10</b>
<b>IV</b>	<b>Research Approach</b> .....	<b>12</b>
	Table 1: Benefits of Ecosystem Management .....	13
	1. Model Overview .....	13
	Figure 1: Impacts of the High-Skill Approach to Ecosystem Management .....	14
	2. Research Questions and Approach .....	16
	3. Selected Project Sites .....	17
	Table 2: Selected Project Sites Studied—Summary Table .....	18
	4. Caveats .....	20
	5. Summary of Approach .....	20
<b>V</b>	<b>Findings on Project Work and Workers</b> .....	<b>21</b>
	1. Policy and Management Objectives .....	22
	2. Project Design and Procurement .....	22
	3. Project Work and Worker Skills and Attributes .....	24
	Table 3: Two Types of Ecosystem Project Work .....	25
	4. Training and Experience: Resources Required for the High-Skill Approach .....	30
<b>VI</b>	<b>Findings on Economic and Other Impacts</b> .....	<b>36</b>
	1. Administrative Savings .....	36
	2. Other Economic Impacts .....	38
	3. Impacts on the Watershed .....	39
	4. Social Impacts .....	40
<b>VII</b>	<b>Summary of Key Findings</b> .....	<b>41</b>

**VIII Implications ..... 42**  
    1. Project Design and Procurement Alternatives ..... 42  
    2. Implications for the Marketplace ..... 44

**IX Conclusions ..... 46**

**X Recommendations from the Steering Committee ..... 49**

Appendix 1: References: Literature and Interviewees ..... 57

Appendix 2: Interview Protocol and Questions ..... 59

Appendix 3: Goals of the Ecosystem Workforce Project ..... 63

Appendix 4: Curriculum Summary of the Ecosystem  
    Workforce Project ..... 65

Appendix 5: Ecosystem Skills Checklist ..... 66

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# I Preface

The Northwest Forest Plan and the accompanying Northwest Economic Adjustment Initiative (NEAI) spawned many experiments in rural communities of the Pacific Northwest, experiments designed to benefit the residents and communities as well as achieve the ecological objectives of ecosystem management. This study examines five projects in California, Washington, and Oregon. Although created independently, these projects shared certain characteristics: they were designed to provide quality jobs for local residents, provide training for the workers, and explore new relationships and procurement arrangements with federal land management agencies.

This report is a preliminary assessment of the impacts of these projects—collectively dubbed the “high-skill” approach to ecosystem management—on agencies, communities and the workforce.

The goal of the research is to glean lessons from these experiments for future policy and management of the ecosystem. If the lessons of these projects indicate a strong potential for long-term benefits to communities, workers, land management agencies and landowners, and to the ecosystem itself, they can become the basis for new discussion about policy and practices of the ecosystem management industry and related contracting and procurement policies.

This research was funded by the Ford Foundation and directed by the Labor Education and Research Center (LERC) at the University of Oregon. LERC has been actively involved in several of the Oregon projects, collectively known as the Ecosystem Workforce Project (EWP). The authors would like to acknowledge the Northwest Area Foundation for providing three years of funding to support the Ecosystem Workforce Project, without which the present research would not have been possible. The EWP provided technical assistance to the projects and worked with the Oregon State University Extension Service to create a comprehensive curriculum for training ecosystem management workers. A report of the EWP is available through LERC.

In the interest of objectivity, research was conducted by an independent research firm under the guidance of a multidisciplinary steering committee. The members of the steering committee, listed below, have been critical in formulating the underlying analytical model and contributing to the final report.



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The primary author of this report is Gerry Brodsky, principal in the firm of Public Knowledge, Inc., Salem, Oregon. Secondary authors include staff from the Labor Education and Research Center: Margaret Hallock, Nancy Arbogast, and Charles Spencer.

This report benefited from a special symposium on March 2, 1998, at the University of Oregon, convening over fifty people to discuss the preliminary results and analysis. The symposium was structured to provide information on the research and facilitate discussion. Members of the steering committee actively participated by giving commentary and leading discussion.

The results of the symposium were integrated into the report where feasible. In addition, the steering committee wrote a summary of the implications and recommendations of the research, and this is included as the concluding section of this report.

# II

## Executive Summary

The winds of economic and ecological crises and change have swept through rural communities of the Pacific Northwest. In response, federal and state entities implemented policies designed to assist communities as part of ecosystem restoration. In the Pacific Northwest, the Jobs in the Woods (JITW) program launched several experiments and projects in communities to provide quality jobs for local residents as part of the restoration efforts.

This study examines a small sample of JITW projects that followed a “high-skill” approach to the restoration work. The underlying assumptions of this approach are that well-trained workers are a critical component of the emerging work necessary to restore watersheds and steward our ecosystems, and that quality jobs are necessary for healthy communities.

Ecosystem management, as defined here, is a collaborative process that strives to achieve economic and social as well as ecological objectives. The central focus of this research is to document the impacts of the high-skill approach, specifically to assess the benefits and impacts on agencies, communities, and the ecosystem itself. The intent is to glean lessons from these projects that can help inform the ongoing policy debate on how we manage our ecosystems, the role of community organizations, and the practice of designing and procuring ecosystem work.

The research was based on interviews with participants in the five projects. In the absence of hard data, we sought consensus, within and across projects, on the fundamental issues of training and impacts on agencies.

Our results concentrate on savings and other impacts on the agencies, costs of providing training, and, to a lesser extent, impacts on the watershed itself. Because of the small scale of the experiments, we were unable to test the presumed benefits of a stable and trained workforce on the community.



## Findings on Worker Skills and Attributes, Project Work, and Costs

- The high-skill approach uses a set of specific and general skills. The curriculum that was developed to train ecosystem management workers yielded a checklist of skills that was validated by workers and supervisors across these projects. Workers not only use these specific skills but demonstrate important attributes such as an understanding of the woods, and independence and flexibility in undertaking the work.
  - Land management agencies came to value these skills and attributes. They developed a high level of trust with these workers which in turn led them to reduce on-site supervision and monitoring of the work.
  - The nature of the project included both analysis and survey work as well as treatment or restoration work. There is some evidence that the project crews compare favorably in terms of cost and quality to the likely alternative workforce which would be employed for both types of work.
  - There are costs to providing a high-skill workforce. Training costs in these projects appear to average from \$3700 to \$4500 per worker, and “costs per success” are higher as many trainees either need additional training or left the industry. Perhaps the highest cost is to the workers themselves, as many expected to remain employed in a new ecosystem industry, but the jobs have not yet materialized.
- While the initial costs appear high, many of the costs would fall over time if the high-skill approach were to become more prevalent. Recruitment, screening, and training costs all would be reduced with time and economies of scale, and the costs to workers would be reduced with more ecosystem management activity and jobs.





### **Findings on Economic Impacts: Savings to Agencies**

- There is a strong consensus that savings to land management agencies occur when ecosystem work is designed for a high-skill workforce. Savings occur in project planning, implementation, and monitoring and evaluation. These savings come at a crucial time and can be reinvested in other agency functions.
- Agencies save during project planning and design because less administrative time is required when separate projects are bundled together with less detailed specifications.
- Agencies save from reduced supervision and guidance by contracting staff due to the project crew's ability to assess specific conditions "on the ground" and adjust tasks accordingly. Results can be sampled or spot-checked, and crews assist with accurate reporting.

- Efficiencies and improvements result when agency professionals, the "ologists," can directly interact with workers using common terminology and similar objectives. Other benefits include a less adversarial approach to contracting and a greater opportunity for mutual learning among all of the parties.

### **Impacts on the Watershed**

- While the data in this area are weaker, there is evidence that the work is of higher quality, and that this leads to more sustainable and durable restoration work. Crews reported finding and correcting previous ecosystem work.
- Some of the most significant costs in ecosystem management are related to acting on bad information. The crews in these projects collected information and conducted assessments more reliably, according to agency supervisors, thereby reducing this potentially sizable cost.

## Implications for Project Design, Procurement and Contracting

- The standard design and procurement model used by federal land management agencies emphasizes securing the lowest possible cost. The work is often designed for a workforce of unknown skill level, with discrete projects and detailed specifications.
- The standard model does not easily incorporate the multiple objectives of ecosystem management. Our research uncovered three additional models that could be used to encourage a high-skill approach:

*Best Value Contracting* incorporates additional objectives into the design criteria for awarding contracts. This model uses less agency staff time once the “best value” contract terms are specified.

*Service Agreement or Retainer Contracting* can reduce agency costs by selecting contractors according to qualifications and costs. Work is then contracted with task orders.

*Stewardship Contracting* features a multi-year arrangement awarded according to qualifications and ability to undertake planning, assessment, and treatment over time.

- There is no consensus within federal agencies on the best way to proceed with respect to contracting options. Many believe that an open market approach would best allow contractors to respond. Furthermore, the contracting marketplace itself could respond to changes in design and procurement in several different ways. What is clear is that the driving force is the “demand side” of the market—how work is designed and then implemented through contracting procedures. Decisions in this arena determine how the contracting market responds.

## Conclusions

There is an economic case to be made for the high-skill approach—it provides savings to the contracting agency and benefits to the watershed. Higher wages and longer duration contracts that might result from the related contracting options should also have beneficial economic and social impacts on the community. Thus the high-skill approach—with its collaborative process, skilled workers, and longer duration contracts—may be the focal point for securing economic, social, and watershed benefits that define ecosystem management.

*Linking social and economic and environmental impacts can be achieved. Our challenge is to now apply the lessons we've learned. Management must focus on end results and let implementation be determined locally.*

BLM MANAGER

# III

## Background

The forests and rural communities of the Pacific Northwest are in a period of transition, buffeted by the strong forces of environmental crises, technological change, public policy decisions, and fundamental economic change. At the same time, rural communities and land management professionals struggle to shift from a paradigm of traditional natural resource management to “ecosystem management,” a new approach that links economic, social, and ecological objectives.

These forces came together in the Northwest Forest Plan and the Northwest Economic Adjustment Initiative. The central purpose of these initiatives was to assist rural timber-dependent communities with the economic and ecological transitions that are underway, to find ways to achieve economic and

social goals of healthy communities as well as the goals of a sustainable and healthy ecosystem.

One key component of the Northwest Forest Plan was the “Jobs-in-the-Woods” (JITW) initiative, a source of funding dedicated to completing watershed restoration projects by capitalizing on the experience, skills, and availability of dislocated timber workers living in these rural communities. The intent is that restoration work, in supplementing or replacing large timber harvests, could benefit the communities.

This report examines five JITW projects—a small sample of all JITW projects. These projects in Oregon, California, and Washington were developed independently, but they share the common characteristics of:

- providing jobs for local residents, bringing community organizations into the ecosystem management system in a collaborative process;
- providing training for workers; and
- exploring new relationships and contracting arrangements with the Bureau of Land Management and the U.S. Forest Service.

It is the goal of creating quality jobs that makes the projects discussed here unique compared to other JITW projects. The community organizations that launched these efforts sought to train and employ local residents in the evolving ecosystem management industry.



These projects have been dubbed the “high-skill” approach to ecosystem management because of their explicit attention to training and the nature of the work. The key premise driving the high-skill approach is that ecosystem management is not a set of separate, unrelated tasks, but a complex and adaptive process that requires a skilled workforce to understand management objectives, the site, and the project, solve problems on the ground, and adapt to ever-changing circumstances. This requires, it is hypothesized, a trained workforce that resembles applied ecologists more than laborers.

It is important to understand that these projects were developed during a tumultuous period. Despite federal policy statements proclaiming the need for economic and social objectives along with ecological outcomes, there is still no consensus within agencies on how to accomplish these multiple goals. There remains a fair amount of debate on the operational implications of ecosystem management, its costs and benefits, and procedures and practices necessary to carry it out.

Thus these projects are intertwined with the turbulent changes in the forests and communities of the Pacific Northwest. They created new arrangements in the design and implementation of ecosystem work, and they paid explicit attention to the skills of workers in the new approach.

This report attempts to document the impacts of these efforts. The goal is not to evaluate these projects to determine the keys to success or failure. Rather, we seek to discover if there are differences in the nature of work and in the design and procurement process under the high-skill approach, the nature of any savings, the costs to produce these savings, and any improvements to the ecosystem that result.

We examine what happens when work is designed for a high-skill workforce. We thereby focus on the production and use of skills as the key common characteristic of these projects, although it is sometimes difficult to separate the effects of skills and training from the effects of other variables such as longer duration contracts and the collaborative process itself. Another way to state this is to acknowledge that the goal of these projects is *quality jobs*—stable, high-skill, relatively high-wage jobs for residents of timber-dependent communities. Quality jobs are examined through the lens of skill to determine if there are benefits when work is designed for a high-skill workforce.

*The USFS is not used to dealing with its social responsibility; we have to accept that it's OK to spend more money for additional objectives beyond our traditional ones . . . This is a big attitudinal shift.*

USFS OFFICIAL

# IV

## Research Approach

This section presents a definition of ecosystem management, a conceptual model that was developed to guide the research effort, the research questions, and the approach adopted to answer these questions.

The high-skill approach was developed in these projects to perform the on-the-ground work of ecosystem management. How ecosystem management is defined will determine the types of impacts to be assessed. However, we have found no universally accepted definition of "ecosystem management." For the purposes of this study, we chose to adopt a broad and inclusive definition, the definition developed by the Keystone National Policy Dialogue on Ecosystem Management (Final Report, October 1996). That effort had broad participation including private foundations, companies, landowners, and federal land management

agencies. The Keystone definition of ecosystem management is:

*A collaborative process that strives to reconcile the promotion of economic opportunities and livable communities with the conservation of ecological integrity and biodiversity.*

The Keystone report identified five goals that ecosystem management processes should seek to achieve:

- Maintain ecosystem integrity
- Sustain biodiversity and ecosystem processes at a regional scale
- Sustain vibrant, livable, and economically diverse communities
- Incorporate distinct community and stakeholder values into the design and implementation of ecosystem management initiatives
- Integrate the ecological, economic, and social goals of stakeholders in an ecosystem.

The three general goals of stakeholders—ecological, economic, and social—point to the areas of potential impacts of ecosystem management and are compatible with the general areas identified by other efforts. Table 1 presents the areas of impacts of ecosystem management proposed by other experts and organizations.



**Table 1: Benefits of Ecosystem Management**

Benefits			Source
Ecological	Economic	Social	FEMAT Jack Ward Thomas (Kohm and Franklin)
Environmental	Economic	Social	USFS and BLM MOU Nature Conservancy
Environment	Economy	Community	Naiman, et al.
Environmental quality	Economic conditions	Community health	Willapa Alliance (Naiman, et al.)

In our discussions with federal land management staff and our project steering committee, we recognized that ecosystem management represents a major paradigm shift for land management agencies. One consequence of that shift is that land management agencies are moving from a resource management philosophy to a philosophy that addresses ecological, economic, and social objectives. Further, the new paradigm recognizes that ecological, economic, and social objectives cannot be pursued independently—they are *interdependent*. That interdependence should be reflected in the design and procurement procedures that lead to on-the-ground work. That is, the way that the work is designed and contracted should incorporate economic and social, as well as ecological objectives.

That paradigm shift is in progress, and not all land management agency staff have come to embrace the new philosophy. As the paradigm shifts, we can

expect some lag time until established procedures, regulations, and practices are modified to reflect the new philosophy. Indeed, there may be a disconnect between the policy of ecosystem management with its multiple and interdependent objectives and the design and procurement practices that have served previous policies with more narrow objectives.

### 1. Model Overview

Following a review of relevant literature, including the sources listed above (Appendix 1), the researchers developed a model of the impacts of the high-skill approach to ecosystem management. The objectives of the model are to:

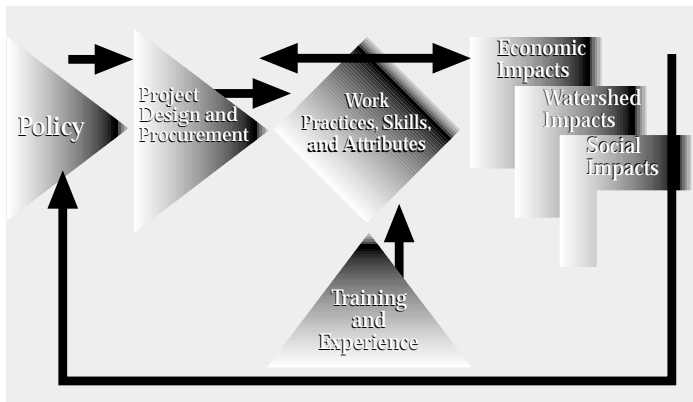
- Generally apply to any approach to ecosystem management
- Differentiate impacts, costs, and benefits unique to the high-skill approach
- Include both actual and estimated costs and benefits and both quantitative and qualitative information
- Be grounded in the actual experience of the selected JITW projects
- Guide data collection and analysis
- Provide a framework for future discussion
- Suggest implications for land management agency design and procurement practices.

We developed a general model of how project design affects the nature of work and final outcomes, and applied this model to the high-skill approach. Pictured in Figure 1 below, the model is designed to illustrate the components at work in a high-skill approach to ecosystem management, how they are interrelated, and the impacts they generate. It recognizes the influence of land management policy, the interaction between workers' skills, attributes, training and experience, and project design and procurement, and the feedback loop between process outcomes and management objectives and policies. The characteristics of each component and the manner in which they interact produce differing economic, watershed, and social impacts on the local community.

The components of the model are:

*Land Management Agency Policy* reflects the goals and objectives for the agency. In our model, we assume that the land management agencies' definition of ecosystem management is comparable to our working definition, and that ecological, economic, and social objectives will be part of all projects. The General Accounting Office (GAO) review of USFS decision-making revealed a top-down process, with policy set at the national level and implemented through regional, forest, and district level plans. Recently, in some states, this process has been opened to more collaborative planning through organizations such as watershed councils.

**Figure 1: Impacts of the High-Skill Approach to Ecosystem Management**



*Project Design and Procurement:* Land management agency policy is implemented through procedures, such as project design and procurement. How ecosystem projects are designed and services procured drives the skill level requirements of ecosystem workers, the wages paid to those workers, the manner in which the work will be performed, and perhaps indirectly, the relationship between land management agency officials and workers.

The standard design and procurement approach was developed to secure low costs to the government and prevent fraudulent relationships between federal personnel and contractors through open, competitive bidding. Work specifications were designed for “ghosts”, meaning that no assumptions could be made about who would perform the work and what skills they would have. Specifications for the work to be done were detailed and monitored through extensive on-site inspection, in part to prevent contract disputes. There was no incentive for contractors to develop highly-skilled workers, and contractors could increase profits only by reducing costs, including labor costs.

The JITW projects selected for this study featured alternative design and procurement arrangements. Experience with these arrangements leads to some implications about how design and procurement procedures could be modified with a high-skill workforce in mind. We show two-way arrows between this component and project work practices and attributes to highlight this interaction.

*Project Work Practices, Worker Skills, and Attributes:* This component of the model portrays the way ecosystem management work is organized, and the skills, attributes, and values of ecosystem workers. Workers’ skills, attributes, and values result from their *Training and Experience*. Their skills may allow on-the-ground work to be organized and carried out differently from the way work is done with lower-skilled workers. These practices and attributes, in turn, may lead to incremental impacts—that is, impacts beyond those that would be achieved with lower-skilled and lower-paid workers. These *incremental impacts* occur in the following areas.

*Economic Impacts:* These impacts include relatively shorter-term savings and benefits to the land management agencies resulting from higher-skilled workers, as well as longer-term benefits to the community that would result from the higher wages paid to community members.

*Watershed Impacts:* These ecological impacts would result from higher quality work done by skilled, trained workers and represent impacts beyond those obtainable with lower-skilled workers. We have chosen the term “watershed” to reflect the scale of impacts we seek.

*Social Impacts:* These are impacts on workers’ families and their communities that would result from higher wages and increased employment stability resulting from the value of their skills.

There is an ultimate feedback effect in the model, because the final impacts should be reflected as objectives in policies for managing the ecosystem.



## 2. Research Questions and Approach

The general question governing our study was:

*What are the economic, watershed, and social impacts of the selected Jobs-in-the-Woods projects?*

In order to proceed, we sharpened the focus of this question to the impacts of the high-skill approach to ecosystem management, or the impacts of what we have termed “quality jobs.” Quality jobs could be solely justified as essential to meet the social objectives of ecosystem management. Employing a transitory workforce and paying them low wages does not contribute to the sustainability of people or communities. Employing community members in year-round work at a living wage does contribute to individual and community sustainability.

Our approach was to investigate whether there is an additional justification for quality jobs. We focused upon the high-skill aspect of the work done in these JITW projects. First we wished to determine whether workers used the skills they learned in training in on-the-ground projects. Next, if these skills were used, did they lead to incremental economic benefits and watershed benefits? If so, then there is an economic case to be made for quality jobs—a value added that justifies a higher wage and longer-duration work and provides a return on the associated costs of training and redesigning procurement systems.

Our research focused on these questions:

- What are the costs associated with the high-skill approach to ecosystem management?
- What are the differences in the way work is performed by a highly-skilled, multi-skilled, and trained workforce?
- What are the actual and potential differences in federal agency planning, design, and procurement processes when the work is designed for a known, high-skill, trained workforce and/or contracting community? What are the potential benefits and savings? What key worker skills are influential in producing these differences? What other factors are considered?
- Is there a significant increase in the quality of the work performed by high-skilled, trained workers that produces:
  - savings through reduced rework or longer life of the restorations;*
  - higher quality information for planning, monitoring, and evaluation;*
  - greater benefits to the watershed?*

In sum, our research questions are designed to determine if there are incremental economic and social benefits to the community from a high-skill, more fully employable workforce.

The approach to answering these research questions was to objectively document the experience of selected JITW projects through on-site structured interviews and analysis of existing information. The purpose of the interviews and site visits was to document work practices and attributes, worker skill requirements, and the watershed, economic, and social impacts of these practices and attributes.

We interviewed project leaders and crew leaders at each site and conducted several site visits to interview crew members. We reviewed relevant information produced by the project, such as project descriptions, financial reports, or training materials. Land management agency supervisory staff were later interviewed in their offices or by phone. Each site identified individuals who were knowledgeable about the project and would be good candidates for interviews. Project staff and crew members also completed a checklist of ecosystem work skills used by workers.

In the interviews, we sought areas of consensus: in the likely absence of quantifiable data, the best approach to developing findings in which we had confidence was to seek consensus arising independently from multiple sites and multiple project participants. Interviews were conducted with project managers, project staff, crew leaders, trainees/workers, project graduates, federal land management personnel, and project steering committee members. We sought agreement within a project, for example, among land management agency personnel, crew leaders, and trainees, that trained workers require less supervi-

sion. We sought agreement across projects, for example, among participants at more than one project site, that trained workers require less supervision.

Originally, we intended to examine more comprehensively both the economic and social impacts of the high-skill approach on communities. However, the small scale of the projects made it unrealistic to assume that each local community would realize any demonstrable change in economic conditions or social indicators. For this reason, we did not interview community members and leaders other than those on the project steering committee.

### 3. Selected Project Sites

Not all JITW projects in the Pacific Northwest were included in our research. We reviewed ten sites against criteria that reflect success of the projects and selected five which demonstrated the best examples of the innovations and characteristics that are the subject of our study. (The criteria are listed in Appendix 3.) The Oregon sites are part of the Ecosystem Workforce Project (EWP) and are therefore well known to the writers.

The California and Washington sites selected for this study have participated in several EWP forums and have made numerous reports available to us. We examined relatively successful projects because we are interested in their impacts or outcomes. Table 2 details the agencies and organizations involved in each project and the dollar amount of project work completed.

**Table 2: Selected  
Projects Sites  
Studied—Summary  
Table**

PROJECT SITE	PARTNERS	PROJECT DOLLARS	COMMENTS
Sweet Home (OR)	USFS Willamette National Forest; BLM-Eugene and BLM-Salem; Skookum Reforestation, Inc.; E&S Environmental Restoration, Inc.	\$262K (1995)	<ul style="list-style-type: none"> <li>• Training is a contract award criteria</li> <li>• A test site for new models</li> <li>• Strong local agency champion</li> </ul>
		\$207K (1996)	
		\$700K (1997)	
Southern Willamette (OR)	Southern Willamette Private Industry Council; Lane Community College; Pierce, Inc.; BLM-Eugene; Oregon State University Extension Service	\$200K (1997)	<ul style="list-style-type: none"> <li>• New site with veteran partners</li> </ul>
Rogue Valley (OR)	Southern Oregon's Women's Access to Credit; Rogue Institute for Ecology and Economy; Rogue Community College; USFS; Rogue and Siskiyou National Forests (Illinois Valley and Applegate); BLM—Medford; Oregon Economic Development Department; The Job Council; Southern Oregon Regional Economic Development, Inc.; Convenio	\$365K (1995)	<ul style="list-style-type: none"> <li>• Based in an established community-based organization</li> <li>• Tapped into other local stewardship efforts</li> <li>• Location near state border helped to link with California projects</li> </ul>
		\$325K (1996)	
		\$456K (1997)	
Hayfork (CA)	USFS: Shasta-Trinity and Six Rivers; BLM-Redding; TOT (JTPA); Shasta Community College; Watershed Resource Training Center	\$465K (1996)	<ul style="list-style-type: none"> <li>• Uses an activist approach, initiated from the grassroots community</li> </ul>
Aberdeen (WA)	Lewis and Gray's Harbor County Public Work; Weyerhaeuser; Rayoneer Timberlands; John Hancock Life Ins.; Simpson Timber; Gray's Harbor; Thurston, and Mason Soil and Water Conservation Districts; USFS; USF&W; Chehalis Indian Tribe; Quinalt Indian Nation; Grays Harbor College; WADF&W; WA Dept. of Natural Resources; Natural Resources Conservation Service; IAM Woodworkers W2	\$2.4M (1996)	<ul style="list-style-type: none"> <li>• State-mandated</li> <li>• Private lands</li> <li>• Unionized</li> <li>• Retains trainees as employees</li> </ul>

While the projects selected are considered successful, they differ in several regards. Because there is no single model of the high-skill approach, each project was designed and implemented under the direction of its own steering committee and project managers. The projects share many similarities, such as operating on a “set aside”, a noncompetitive basis, or under a Memorandum of Understanding or Participating Agreement. No training project competes with private contractors for federal land management agency contracts, and all of the Oregon projects are involved in an effort by the Labor Education and Research Center to develop common approaches to educational curriculum and training, worker certification, and innovative contracting and procurement practices. But there are also some noteworthy differences:

- The Rogue Valley and Aberdeen projects retain some or most of their workers after they complete the training project, while other projects recruit an entirely new group of trainees each year. Graduates of most projects seek work as contractor employees or as independent contractors.
- The Sweet Home project no longer directly hires workers or provides training but is exploring the use of new contracting and procurement mechanisms. Private contractors, some employing project graduates, compete for contracts which are awarded on a “best value” rather than “lowest bid” set of requirements.
- Rogue Valley, Hayfork, and Aberdeen are actively working to develop a certification program for ecosystem workers. All of the Oregon projects participate in the development of a state-recognized Ecosystem Management Worker Apprenticeship program.
- Aberdeen receives the bulk of its funds from state agencies and these funds can be used on private lands. All other projects are heavily dependent upon funding from federal land management agencies. Only the workers in Aberdeen are unionized.

#### 4. Caveats

Our research both benefits and suffers from being the first of its kind to study these projects. As we tread this new ground, we acknowledge the limitations of our study: no overall evaluation plan or data gathering system that permits an evaluation of the demonstration nature of the projects, and no common set of objectives to measure a primary purpose of the projects: employing and training displaced forest workers.

In addition, there are no control groups against which to compare project results. Since alternative workforces, alternative design and procurement methods, and alternative marketplace models remain unevaluated, we cannot draw conclusions about comparable impacts. Much of the spirited discussion about these projects really revolves around the merits of alternative methods or approaches, and we do not speak to these.

This study is limited by the scarcity of data. Accordingly, it focuses on the opinions arising from multiple perspectives; it identifies areas where there is a consensus about the costs, savings, and benefits of this approach, and it identifies areas where substantial differences of opinion exist.

Where actual costs were obtained from some projects, they are assumed to be at least broadly representative of the costs found in other projects. The relative uniqueness of each project does increase the chances of discovering best practices or important lessons.

#### 5. Summary of Approach

Our central question of interest in this study is not whether jobs are good and whether stable workforces help their communities. It is not whether ecosystem management is beneficial to the environment. The questions are: What are the significant impacts of a high-skill approach to ecosystem management? What is necessary to produce these impacts? If there are incremental benefits, what can be done to sustain or increase them?

This study draws lessons from selected projects which trained and employed primarily dislocated timber workers. Where the projects could provide quantitative data, costs and benefits are estimated. The lack of hard data led to greater dependence on anecdotal evidence and qualitative data, the basis for most of our findings. The result is a somewhat lop-sided analysis and findings—there is more quantification on costs than benefits, particularly long-term benefits.

This study is not an attempt to evaluate the JITW projects, but to highlight the high-skill approach to ecosystem management as it is currently applied and to discern its most potent lessons. While the results are preliminary, they provide relevant information for land management agency practice as well as for policy analysis and discussion.

## Findings on Project Work and Workers

The following sections discuss the findings of this study in terms of each component of the model. The major findings are:

- Project leaders and land management agency staff had to use a variety of innovative design and procurement alternatives in order to get projects started and workers employed.
  - Project workers demonstrate specific attributes, attitudes, and values that positively influence their relationships with land management agency supervisors and lead to cost savings through changed work practices.
  - The ecosystem management skills taught through the EWP curriculum are consistently used in on-the-ground work, applied in both restoration and treatment work and survey, analysis, and monitoring work.
  - The cost of producing skilled workers includes training and recruitment, curriculum development, higher wage costs, and opportunity and other costs to workers. Some of these costs could be reduced if the high-skill approach to ecosystem management work were more prevalent, leading to more jobs for program graduates.
  - Using high-skill workers to perform ecosystem management work leads to cost reductions and savings for land management agencies in project planning, implementation, monitoring, and evaluation.
- There is some evidence that high-skill workers produce incrementally positive impacts on the watershed through restoration work of greater quality and durability, through flexible means of meeting watershed outcomes, and by producing accurate survey and analysis information.
  - The potential social impacts of a high-skill workforce can be inferred, but not verified, from the limited scope of this research project.

The economic benefits of a high-skill workforce should justify higher wages and a focus on quality jobs, which in turn should lead to economic and social benefits to the community.



# V

## Policy

*... quality jobs is part of the agency responsibility. It's a call to increase agency flexibility and look beyond the impact of downsizing; a call to increase our efficiency and effectiveness.*

BLM MANAGER

## 1. Policy and Management Objectives

Most of the forests in Oregon and Northern California are managed by the U.S. Forest Service (USFS) and the Bureau of Land Management (BLM); therefore, these agencies play a key role in determining the nature of projects and the skills required. Historically, the mission of these agencies has been natural resource management, but in recent years they have turned to an ecosystem management approach that includes the additional objectives of achieving social and economic impacts.

These management objectives determine, in large part, how forestry and ecosystem work is designed and implemented. In the past, federal regulations governing procurement processes tended to focus on keeping costs low and preventing fraudulent contracting practices. The result was an emphasis on low bids for discrete projects—often of short duration with detailed specifications.

The projects examined here were developed within the context of traditional procurement options, yet they attempted to meet economic and social objectives as well. The result is the demonstrated use of a wide array of innovative and experimental administrative tools such as participating agreements, interagency agreements, and innovative contracts. The process was inherently collaborative and included partnerships between land management agencies, state agencies, educators, and representatives from the community and the workforce.



Project Design and Procurement

## 2. Project Design and Procurement

Project design and procurement practices reflect land management agency policy and determine how work is organized, what skills are required to do the work, and the wage levels of the workers. While the stated policy of land management agencies is ecosystem management, standard design and procurement procedures do not yet easily accommodate the multiple and interdependent objectives of ecosystem management. This shift in management practice is underway, but there is still no consensus within the agencies on the best approach.

The selected JITW projects did not specifically develop and test alternative approaches to project design and procurement. Instead, they worked within the administrative framework of the USFS and BLM, utilizing new work design models and adapting standard procurement processes. Our study identified four models that are used by federal land management agencies in designing and contracting ecosystem management work.

*Standard Design And Procurement Model* was developed primarily for timber-related projects where a quantifiable amount of product is measured, such as board feet of timber or stems planted. The emphasis is upon securing the lowest possible cost to the federal government. With this approach, the assessment, prescription, and treatment design requirements are often established by different professional staff, even for the same watershed.

In projects such as pre-commercial thinning, contracts feature detailed specifications about how the work is to be done and what the final results shall be. Federal contracting officials refer to the practice of writing “ghost requirements”, meaning that no assumptions can be made about the skills of the workers who will eventually do the work, and thus the instructions must be highly specific, both to give direction to the workers and to assess the degree of project completion. This Standard Model has become the “least cost” model and cannot easily accommodate broader objectives.

*Best Value Contracting* attempts to incorporate agency mission and objectives into the decision criteria for awarding contracts. These criteria are developed by a review committee, and proposals are evaluated against the criteria to determine which proposal represents the best overall value. This model emphasizes overall project objectives and on-site communication between agency staff and workers rather than a detailed specification of the work to be done.

*Service Agreement or Retainer Contracting* is structured as a broad statement of objectives for ecosystem management projects for a particular watershed or land area, typically for more than one year. Instead of the contracting agency specifying in detail the project work to be done, bidders submit a statement of their qualifications or a listing of their skills, training and education, and relevant experience, as well as identified workers to be assigned to the projects and an hourly wage rate. The Service Agreement is awarded to the best qualified bidder with consideration given to the wage rate. After finalizing the agreement, the agency issues typically brief (often one page) task orders for specific projects. The contractor responds with a proposal of how to fulfill the task order, including an estimate of costs based on the approved billing rate. If the response is acceptable, a task order is initiated. This process can be repeated several times during the Service Agreement.

*Stewardship Contracting* features a multi-year arrangement covering a large area or watershed. Like the Service Agreement, it also features a broad statement of objectives, and the contract is awarded on a “best qualified” basis. The services requested and the skills required of the contractor may be more extensive than in the models described above. For example, the contractor may be required to perform many sequential tasks, such as conducting an assessment of the ecological health of the area, developing a recommendation for restoring and maintaining the health of the area, implementing the prescription, and monitoring results. The contracting agency reviews and approves each step of the process, and subcontracting is allowed if additional expertise is needed to complete a task.

*Workers get the ‘big picture’ and can work toward goals and objectives and the outcomes that are expected. They can place work within the ecosystem perspective.*

BLM OFFICIAL



*Some thinning is multi-grid, multi-species, riparian work with multi-diameter trees. This can not be done by traditional workers.*

PROJECT SUPERVISOR

Work  
Practices, Skills,  
and Attributes

In the projects we studied, project leaders and federal land management agency staff used a variety of design and procurement arrangements, such as memoranda of understanding, participating agreements, and task orders in order to get the projects started and displaced workers employed. The Standard Model approach was not always used, in part because ecosystem management work is more complex than harvest-related work (especially when it includes social and community objectives) and because, as “set aside” projects, most were not competitively bid. As a result, land managers used the existing procurement models but needed to be more flexible and creative in designing the work and procuring a workforce.

### 3. Project Work Practices and Worker Skills and Attributes

#### PROJECT WORK

It became clear from interviews, contracting documents, and project descriptions that there are two broad categories of work involved in ecosystem management: survey and analysis work and



restoration and treatment work. While both types of work fall within the scope of ecosystem management, there are significant differences between them and each requires a somewhat different mix of worker skills. This is detailed in Table 3.

Both types of work require worker judgment and thinking, and in the high-skill approach, more of the technical skills shift from the “ologists” and technicians to the ecosystem worker:

- In ecosystem survey and analysis, methods must remain constant, but workers may need to make judgments to interpret the site and determine what data sources should be included. For example, in a stream survey, workers must distinguish a pool from a riffle when identifying fish habitat.
- In restoration and treatment, workers vary the work processes to reach overall outcomes; often a recalibration of prescription or “on-the-spot” adjustments to original specifications is necessary. For example, the actual characteristics of a landscape area may require planting different types and amounts of vegetation than was originally prescribed.

	ECOSYSTEM SURVEY AND ANALYSIS	ECOSYSTEM RESTORATION AND TREATMENT
Definition	Work in which the primary objective is data collection, evaluation, and monitoring of environmental conditions. Examples include: wildlife monitoring, aerial photo interpretation, and stream surveys.	Projects designed to produce on-the-ground improvements and sometimes combine restorative and more traditional work. Examples include: bank stabilization, tree planting, and noxious weed removal.
Key Skills	Process-based focus which emphasizes consistency of method, repeatability, objectivity. Some innovation is required in applying new methodology and some judgment in applying definitions.	Outcome-based focus; flexibility is needed in choosing and applying micro-prescriptions that achieve overall objectives.
Training	Curriculum-based plus short, specialized courses often delivered just-in-time.	Curriculum-based but combining classroom and field training
Duration	Less seasonal; some monitoring must be done in winter, data gathering can be done in spring and summer, analysis in winter.	Seasonal (spring through fall)
Costs	Unit costs may be unknown when new technology is used.	Unit costs typically known
Consequences of Errors	Inaccurate information is used in subsequent planning and treatment.	Rework
Alternative Workforces	Agency professional or technical staff, temporary firms, college students.	Low skill/low bid Narrow skill/low bid Volunteers

**Table 3: Two Types of Ecosystem Project Work**

Alternative workforces can be identified for each type of work:

- For survey and analysis, the alternative workforce has historically been land management agency staff. The recent trend of agency downsizing has eliminated or greatly reduced this option, and temporary workers have been used instead. Both of these alternative workforces are higher paid than the workers in our study, and, in the case of temporary help, considered to be less skilled. College students are sometimes employed as surveyors, paid low wages, and may also receive class credit. But land management agency staff characterize student workers as less skilled and less committed (e.g., “*They don’t like working when it rains*”). High turnover among temporary and student workforces produces higher training costs and calls into question the issue of the reliability of information collected by different surveyors at different points in time.
- For restoration and treatment, alternative workforces include lower-skilled and lower-paid workers, and workforces that blend lower-skilled with higher but more narrowly-skilled workers, such as thinning specialists. These alternative workforces are considered low cost compared to high-skilled ecosystem workers.

The five projects we studied included both types of ecosystem work described above. The proportion of restoration and treatment work to survey and analysis work in 1997 for three of them is as follows:

<i>Project Type</i>	<i>Number of Projects</i>	<i>Percent of Work Completed</i>	<i>Percent of Total Project Dollars</i>
<b>Rogue Valley</b>			
Survey and Analysis	7	23%	31%
Restoration and Treatment	23	77%	69%
<b>Hayfork</b>			
Survey and Analysis	7	29%	38%
Restoration and Treatment	17	71%	62%
<b>Southern Willamette</b>			
Survey and Analysis	5	36%	51%
Restoration and Treatment	9	64%	49%

At each site, actual work projects combined both analysis and treatment types of ecosystem management work. As will be discussed later, crew leaders match workers’ skills and preferences to tasks within a project, and this specialization allows a single crew to perform both restoration and survey work. (It appears that assigning different tasks to different crew members is more likely than having all crew members be sufficiently skilled to perform both restoration and analysis work.)

**WORKER SKILLS AND ATTRIBUTES**

The key issue here is whether the high-skill approach in fact involves particular worker skills and attributes, and if the work differs from standard practice. There was a clear consensus from the interviews that skills alone do not make a high-skill worker. There are key attributes, attitudes, and values that successful ecosystem workers possess. These include:

- a love of working outdoors, being “woods wise” (i.e., a seemingly natural orientation to the land, vegetation, climate, etc.), and a commitment to doing what is best for the land.
- an ability to understand and focus on critical outcomes and thinking beyond the incremental steps of the process, which results in a flexibility for moving between projects or changing the treatment to accommodate unanticipated situations.
- independence and a feeling of ownership of the methods used to achieve results.

These attributes support some of the benefits and savings to be discussed later in this report. For example, they lead to savings in the amount of time crew leaders and agency representatives spend overseeing the projects.

We also found that land management agencies value these workers’ skills, attributes, and abilities, which establishes trust and communication and, in turn, affects how the work is carried out. The

land managers we interviewed significantly altered their supervision of the work based on the degree of trust they had in the ecosystem crew leaders and workers. A high level of trust was reported to result from:

- a demonstrated, consistent, repeated high quality of work;
- constancy of workers and crew leader;
- worker flexibility in adjusting work to meet unexpected scheduling changes; and
- workers’ ability to use the terminology and definitions of the field.

This “high degree of trust”, in turn, led federal land management supervisors to:

- reduce the frequency and amount of on-site supervision;
- reduce or eliminate job specification details—broader statements of objectives or outcomes (sometimes coupled with an initial site visit) were sufficient;
- permit workers greater flexibility in methods to reach objectives (e.g., negotiating in-course modifications of original work requirements that proved unworkable on site); and to
- assess final work quality and completeness through sampling rather than complete inspection (in some cases).

*We are able to operate somewhat freely in relation to outcomes. We can adjust thinning to accommodate ‘appearance,’ leaving some clusters, some wider spaces, while still reaching overall average density.*

CREW LEADER

*This project is committed to keeping forest workers at work in their own ecosystems, and has developed a system to train them so that they have the skills to succeed.*

COMMUNITY  
COLLEGE TRAINER

#### SKILLS REQUIRED FOR ECOSYSTEM MANAGEMENT

All projects developed a training curriculum to gain the concrete skills needed for ecosystem management.

The Oregon projects used the curriculum developed by the Ecosystem Workforce Project (EWP). The EWP formed a partnership in Oregon among educators from universities, community colleges, state and local agencies, and private ecology organizations to develop a practice-based curriculum for training in ecosystem management. This EWP curriculum covers a range of skills and knowledge, from analysis and treatment of the watershed to the business and interpersonal skills needed for securing work in the ecosystem management industry. (Appendix 4)

The EWP curriculum is divided into three main sections:

- Science for Ecosystem Restoration and Enhancement**
- Technical and Safety Knowledge for Ecosystem Restoration and Enhancement**
- Business Development and Management for Ecosystem Restoration and Enhancement**

The curriculum, with competency measures, content text, and references, is available through the OSU Extension Office in both English and Spanish.

The courses are designed as sequential modules to be delivered by academic, scientific, or business instructors. The project sites in Oregon used this curricu-

lum as the basis for training, and some projects supplemented the curriculum with technical math, English, or heavy equipment operation. (The curriculum was revised in 1997 after evaluation by learners and trainers.) The California and Washington projects developed similar curricula in partnership with local community colleges.

To test the validity of the curriculum and training, we developed a Checklist of Skills from the curriculum materials. (Appendix 5) The checklist contained approximately seventy items in these general areas: data collection and analysis, surveying and mapping, taking inventory of resources, silviculture techniques, and fisheries field work. At three of the five project sites (including the California site where workers were trained with a different curriculum), staff were asked to check skills typically used in ecosystem work: supervisors identified skills typically used by workers and workers identified skills they typically use.

Most of the identified skills are used on the job, although not all workers use all skills. Ratings were compared among supervisors, among workers, and between supervisors and workers. There was general agreement about the skills that were used: at one site, supervisors showed between 82 and 92 percent agreement on the skills used by the crew members.

While there was strong agreement about the skills typically used, there were differences among workers reporting the skills they used. Comparisons between workers ranged from 60 percent to 87 percent agreement; comparisons between supervisors and workers from 62 percent to 86 percent.

The survey results indicate that workers typically use a broad range of ecosystem skills in this high-skill approach. Further, there is consensus among project participants on what those skills should be, even where projects used different training curricula. Supervisors agree on what skills are typically used, although some reported that, in order to respond to the survey question, they considered the total skills present in the crew. Workers' responses sometimes varied when naming the skills they use, which may imply different skill levels, including some likely specialization of skills.

These results validate the EWP curriculum; it appears to reflect an accurate assessment of the ecosystem worker skills that are required. It should be noted that while these findings confirm that a broad range of skills are used by workers, we did not measure the degree of proficiency or mastery of these skills. In fact, respondents report that project workers often have a range of skills that are broad but not deep. Not surprisingly, workers who received two years of training are identified as more proficient than those who received only one year. The EWP Curriculum has since become the basic training guide for the newly established Ecosystem Management Worker apprenticeship program.

#### TRENDS INFLUENCING WORKFORCE SKILL REQUIREMENTS

Land management agency and project staff identified several trends that are likely to influence future workforce requirements and are therefore important to consider in future policy discussions:

- The focus of agency objectives is broadening from managing specific resources (i.e., discreet timber acreage) to the health of an entire watershed. Projects will cover a larger area and place more emphasis on overall outcomes than on detailed specifications. Workers will need to adapt methods to varying landscapes within the project, and the larger work site will make direct supervision impractical.
- Federal land management agencies will contract out a higher percentage of work (though not necessarily a greater dollar volume) and perform less of it "in house" as budgets are reduced and operations downsized. Savings in time devoted to preparing contracts, monitoring performance on site, adjusting contracts, and evaluating results will become increasingly important.
- New information technology will be used more and more. Workers who are skilled in Geographical Information Systems (GIS), Global Positioning Systems (GPS), and other new technology will be in demand.
- Agency staff believe a greater proportion of ecosystem management work will be in the area of environmental monitoring and information analysis, especially as watershed councils and other community groups become involved in ecosystem planning.

*As workers learn new skills their efficiency increases. They apply these new skills very quickly.*

BLM OFFICIAL

In sum, there is consensus among supervisors, workers, and crew leaders that workers in these projects indeed use a fairly consistent set of skills in data collection, surveying and mapping, inventory, silviculture techniques, and fisheries fieldwork. These skills are utilized in both ecosystem restoration and treatment work and survey and analysis work. Further, there is some evidence that these work crews compare favorably in terms of cost and quality to the alternative workforce options. The ecosystem workers we surveyed also exhibit key attributes and values that, over time, create a high level of trust with federal land management supervisors. This in turn leads to savings from reduced supervision.

Thus the skills identified and trained in these projects do appear to be important. Further, it is likely that skills will become even more important in the future due to a larger scope of work, the need for administrative savings, and the use of new information technology.



Training  
and  
Experience

#### **4. Training and Experience: Resources Required for the High-Skill Approach**

This section presents findings on costs of the training provided to ecosystem workers to produce high skills. Our objective is to identify at least the categories of costs involved as part of a framework for policy discussion. Where data are available we estimate the actual costs.

##### **RECRUITMENT COSTS**

Initially, much of the recruitment of dislocated timber workers was done in partnership with Job Training Partnership Act (JTPA) agencies. Since workers had to be certified as displaced in order to qualify for the program and there was considerable screening involved, recruitment costs were probably higher than the likely costs of future recruiting. Some projects found this approach restrictive and now recruit from other populations as well.

Recruitment costs in the projects tended to run only slightly lower than training costs, and in some projects exceeded training costs. (Note: In this analysis we include data from two additional EWP Oregon sites, not just the selected sites, in order to better estimate some costs.) For all five Oregon projects in 1996 where data are available, recruitment costs were \$137,107, compared with \$157,886 for training. Recruitment cost per trainee was \$2405.

It is not clear that the start-up costs of recruiting and selecting a high-skill workforce in the future would be any higher than the costs of recruiting and selecting any other workforce. If future applicants can be recruited from a pool of certified ecosystem workers, recruitment and selection costs could be reduced.

#### TRAINING COSTS

Training costs were funded differently at each site we studied. There are several types of training costs, both direct and indirect:

*Costs of attending training:* Trainees typically spend five to eight hours per week in class or on-the-job training. Some workers are not paid for attending classes, but are paid for on-the-job training; some are paid for both. For example, one project paid workers for five hours of classroom training each week. At \$10.29 per hour, this amounted to \$1337 per worker for 26 weeks of training.

*Curriculum development:* The curriculum may be modified each year and will be used for annual classes. Its cost should be amortized over several years and only a portion of the cost allocated to each annual class of trainees.

*Instructional costs:* Classroom instruction (e.g., an OSU Extension Service instructor) costs are \$200 per class day. Rogue Valley workers are paid for attendance at Friday classes at Rogue Community College as part of their JITW project funding.

*Structured field training:* On-the-ground structured training usually amounts to one day per week, or 20 percent of wage costs. Projects can last an average of 16-26 weeks, and on occasion, more than a year. Eight hours of training at \$10 per hour equals \$80/day per trainee plus benefits, if any. At some sites, a portion of transportation time to and/or from field work is paid. The Southern Willamette project estimates that 11 percent of the costs of each task order goes to training for that task.

*Specialized training beyond the established curriculum:* Training in new technology may occur in a class or on-the-job. As an example, specialized training for stream surveys may require two days of a ten-day project with six crew members and one BLM supervisor. However, to the extent that trainees retain the skills and the same crew is used again, the training represents a one-time cost and a future cost savings over recruiting and training new workers. Specialized training costs are similar to structured field training without instructional costs when the land management agency provides the instructor.





*The USFS wants quality work and the work done quickly . . . the learning curve slows us up initially, then we can accelerate to a quicker finish. Having multiple tasks bundled together does lead to initial planning that slows things down at first.*

PROJECT SUPERVISOR

*Initial on-the-ground training oversight:* Federal land management agency staff at times may be on site during early on-the-job training to provide input on skill and work requirements.

*Learning curve and lost productivity:* Most projects report an on-the-job learning curve which results in initial low productivity while trainees are acquiring and applying new skills. While the high-skill approach also has a multi-skill dimension—training covers many topics and skills—individual workers also bring differing backgrounds, experiences, aptitudes, and preferences for types of work. Thus, each worker learns at a different pace in the early stages of training.

Crew leaders and trainers adjust the work to fit each worker's learning curve and this also leads to a short-term loss of productivity. Once workers have completed or are well advanced in training, they have individual strengths, weaknesses, and preferences: some prefer data gathering, others like to use computers, and so forth. While the work crew in total has broad and multiple skills, each worker may choose some specialization. The extra planning time that crew leaders take to analyze the work requirements of the project and match workers to particular aspects of the project represents a cost that presumably would not occur with either lower-skilled workers or with higher but narrowly-skilled workers.

*Anticipated future costs* There appear to be several areas where additional training will be needed if all project trainees

are to be good candidates for ecosystem employment. These include:

- English language skills, essential to support increased direct communication between land managers and crew members;
- reading and writing skills, important especially in survey and analysis work;
- heavy equipment operation, required in some restoration and treatment work but not in the EWP curriculum.

The following cost estimates look at the cost of training per trainee, again using data from only the EWP. They do not include all categories of costs identified above (such as curriculum development, lost productivity, and initial training oversight) but do include the direct expenditures from each project's budget for training.

*Cost per trainee:* Total training costs divided by the number of trainees. For the Rogue Valley project in 1996, 14 workers were trained for approximately 12 months, and training cost per trainee was \$4500.

In the 1995 Sweet Home project, the cost per trainee was \$3,791. For all five Oregon projects (including projects not selected for this research study), the average cost per trainee was \$2,769.

*Cost per completion:* Total training costs divided by the number of trainees who successfully complete "the project year", including classroom and structured field training. All fourteen Rogue Valley

trainees completed the program, so cost per completion is the same as cost per trainee: \$4500. For all five 1996 Oregon projects, 46 of 57 trainees completed the project year, yielding a cost per completion of \$3432. Eleven trainees completed the 1995 Sweet Home project year, resulting in a cost per completion of \$4136. For the 1995-96 Hayfork project, 18 of 24 trainees graduated (two of the non-graduates may later complete the training), but training costs were not reported.

*Cost per success:* training costs divided by the number of trainees who reach a *defined* level of post-training employment. The parameters of "successful employment" are not universally established. In the first years of the projects, training was often JTPA-funded, which recognized "success" when a trainee, 13 weeks after graduation, is employed full-time at a wage equal to or greater than 80 percent of wages at his or her previous employment.

Generally, EWP projects considered the JTPA definition of success to be too restrictive. Some projects acknowledged success if a graduate had secured any kind of ecosystem work, of any duration; for example, work in a non-ecosystem job which uses some of the skills learned in training.

The EWP project identified various definitions of employment success from stakeholders, including aspects of a "family wage" job with sustained employment. (See Appendix 3.)

Regardless of the definition, it appears that most EWP graduates in Oregon are not employed in ecosystem jobs. A follow-up study by EWP located 123 out of 150 graduates of training projects. Of those 123 graduates:

- 50 were considered discouraged and had left the industry;
- 39 were working for registered apprenticeship program employers; 31 of these were continuing to work on current projects;
- 34 had worked in the industry in the past 12 months, but not for registered employers (i.e., ecosystem management worker apprenticeship training agents) and not necessarily doing primarily ecosystem management work.

Perhaps an extreme example, the Sweet Home EWP project graduated 30 of 31 trainees over a two-year time period, but only two of those graduates are believed to be working close to full time (seasonally) in ecosystem work. Some graduates of the Hayfork project are doing both traditional resource management work and ecosystem work for about \$9 per hour and perhaps less when paid on a piece-work basis.

In the past year the Oregon projects added a grant-funded Job Placement Specialist to assist EWP graduates in finding work. The Job Placement Specialist's salary, benefits, and other costs could be allocated to his caseload of graduates or could be divided by



placement success. Other projects address post-program placement less formally by attempting to match graduates with job opportunities.

#### WAGE AND RELATED ON-THE-JOB COSTS

The unique shared goal of the projects we studied (compared to other JITW projects) is ensuring that quality jobs are created. The EWP conducted preliminary research on wages paid for ecosystem rehabilitation work in Oregon and estimated that the average earnings of workers in reforestation and forest rehabilitation was approximately \$6,000 per year. Indeed, one argument for experimenting with the high-skill approach was to shift away from the low-skill, low-wage model characterized

by high turnover and short-duration projects. Therefore, it is presumed that these projects would have higher wages and benefit costs.

Testing this proposition is difficult. Wages in these projects average between \$10 and \$11 per hour, but we do not know enough about wages paid in other JITW projects and more traditional work to make definitive statements as to whether wages are actually higher in these projects than alternative ways of accomplishing the work. Some project workers and employed graduates have health insurance, typically for the employee only and sometimes with a high deductible. Only one contractor who hired project graduates provides retirement benefits and paid time off.

Total labor costs reported from these projects include the hourly wage, health benefits, workers compensation, payroll taxes, profit, and administrative expenses. The billable labor cost to the contracting agency is typically twice the hourly wage paid to the worker; in our study sample, \$20-\$26 per hour. By contrast, a contractor paying \$7 to \$8 per hour without benefits will have an hourly cost in the \$15 to \$17 per hour range.

While the wages paid in these special JITW projects may be higher than wages paid to other workers doing replanting or other treatment work, their wages may be lower than those paid to workers conducting analysis.

*Trained workers are well paid: good workers don't stay in bad jobs.*

ECOSYSTEM  
RESTORATION  
CONTRACTOR

### COSTS TO WORKERS

The risk of not being able to meet trainees' raised expectations is a severe and costly consequence of many new training programs, and JITW did not escape this. Many of the dislocated timber workers who entered these projects had suffered through mill closures, community upheaval, and the personal impacts of those changes. Many had high hopes for being trained and employed as ecosystem workers, continuing to work in the woods, remaining in their communities, and supporting their families. The unfortunate reality is that few project graduates found ecosystem industry jobs to employ them. In human terms, this is perhaps the greatest cost of these projects.

There is an opportunity cost associated with choosing to pursue ecosystem management training rather than other retraining offered to dislocated timber workers (e.g., truck driving, mill work, or high-tech production). This may be a high cost to project graduates who have not been able to find regular ecosystem work. For comparison, some displaced timber workers in Sweet Home who did not participate in the JITW projects, but sought work at a local factory, are now reported to be making up to \$40,000 per year with benefits.

In sum, it is costly to provide a high-skill, high-wage workforce. Training costs in these projects appear to average from \$3,700 to \$4,500 per worker per year, and costs per success are even higher as many trainees either need additional

training or leave the industry. Perhaps the highest cost is to the workers themselves: many expected to remain employed in a new ecosystem industry, yet jobs did not materialize.

While initial costs may be high, some of these costs would decrease if the high-skill approach were to become more prevalent. Recruitment, screening, and training costs all are likely to be reduced through economies of scale. There could also be a shift in who pays the cost of training and recruitment. If the high-skill approach was demanded by land management agencies and supplied by the marketplace rather than government-backed projects, then contractors would bear the cost of recruitment and training. More importantly, workers' opportunity costs would decrease if ecosystem management shifts to using a more highly-skilled workforce than required by current practices.



*We must not forget or undervalue the courage of these workers to commit to training for an industry that doesn't yet exist.*

COMMUNITY  
TRAINING DIRECTOR

# VI

## Findings on Economic and Other Impacts

The following sections present findings related to the impacts of a high-skill workforce. We begin with specific economic impacts—savings and benefits that accrue to the land management agency when flexible design, procurement, and oversight practices are combined with a high-skill workforce.

### Economic Impacts

#### 1. Administrative Costs and Savings

We found it impossible to quantify very precisely the costs to land management agencies of the high-skill approach. While we know that both the USFS and the BLM dedicated significant staff time to implementing the JITW projects, some of this time was required by the shift to ecosystem management that is the thrust of the Northwest Forest Plan and

therefore not attributable to the selected JITW projects. That is, the Forest Plan and ecosystem management in general are having profound effects on the culture and administrative traditions of land management agencies. We did not attempt to allocate some of these organizational costs to the five projects studied in this research; we did assess the incremental impact of savings or costs associated with a high-skill approach to ecosystem management.

On this more delineated issue we found remarkable agreement: there is a strong consensus that savings to land management agencies occur when:

*ecosystem work is designed with a high-skill workforce in mind*

*and*

*a high-skill workforce is engaged in ecosystem management work.*

The savings include administrative efficiencies, lower direct costs (in terms of total payroll), and savings relating to the quality of the work.



COST REDUCTIONS AND SAVINGS TO LAND MANAGEMENT AGENCIES

**Savings in Project Planning and Design**

- Reduced administrative time results from:
  - bundling multiple tasks into a single project to be done by one contractor rather than several;
  - developing broad objectives and outcomes rather than detailed work specifications (These savings may be low initially, until incorporating social and community objectives into the procurement process becomes more prevalent.);
  - designing work in “real time” during the implementation instead of having one agency group develop design specifications and another monitor implementation. This also leads to increased continuity of effort, which has associated economic benefits;
  - the ability to revise original job specifications based on actual experience, without modifying contract requirements. This occurs when high-skill crews have the requisite skill base to adjust methods.

**Savings in Project Implementation**

- There is a decreased need for supervision and guidance by contracting agency staff resulting from high-skill workers’ ability to:
  - work well independently, especially in survey work, where a small number of workers (usually in pairs) are distributed over a large area;

- make on-the-spot decisions without consultation or direction (e.g. knowing what plants belong in an area);
- adjust tasks and schedules to meet unexpected changes in requirements (Rogue Valley estimates that an average of two modifications per week were made during heavy work in the summer.);
- engage in direct interpersonal communication with agency professional/technical staff (the “ologists”) that leads to better-designed work at the start and thus less rework later;
- respond quickly to needed modifications;
- use technical terms properly. When staff and workers agree on definitions (e.g., “established trees”), workers can then apply those definitions independently.
- Wage savings may result when:
  - crews are less expensive—particularly in survey and analysis work—than alternative workforces, such as agency technical and professional staff or temporary agency workers whose skills often are not at the forest technician level and require more training;
  - the same workers perform multiple tasks that would otherwise be done by different workers at different pay rates.

*BLM can now provide less information about the work to be done . . . just boundaries and general scope of work.*

PROJECT SUPERVISOR

### Savings in Project Monitoring and Evaluation

- Time savings results when:
  - project completion and quality can be assessed through sampling or spot checks rather than inspection of all work;
  - work crews can conduct monitoring and reporting themselves. For example, Rogue Valley work crews take before, during, and after photographs of project sites, where formerly agency staff traveled to the site several times to take photographs. The crew also prepares a short analysis of problems encountered and how they dealt with them.

### Other Savings and Benefits

- Additional positive impacts include:
  - savings when trained crew members meet a similar task again and new training is not required. Efficiency also increases, especially in data gathering work where there is an advantage to having the same trained observers/data gatherers perform measurements at the same site over time;
  - savings from reduced conflict because interactions between agency personnel and crew leaders/workers is cooperative rather than adversarial, as is typical of (low-bid) contracting;
  - greater opportunity for mutual learning among agency staff and workers that results from working together toward shared objectives and empowering workers with flexibility and innovation in methods;

- savings from not having to supply detailed specifications, which “dumbs down” the process for both the inspector and the worker;
- potential substantial benefits to the agencies from the reinvestment of time and effort savings listed above. Agency staff report that the time saved from decreased on-site supervision, easier contract modifications, and savings in other areas can be re-deployed into important agency functions and processes.

### Economic Impacts

## 2. Other Economic Impacts

Our initial intent was to find and document other economic benefits that could result from the high-skill approach. For example, there should be a “multiplier effect” when newly-created ecosystem management jobs generate additional economic activity (such as equipment purchases) and additional new jobs (such as equipment sales).

Multiplier effects can be calculated for specific industries and types of jobs, as well as for wage differentials. For example, paying workers \$12.00 per hour as opposed to \$6.00 per hour will have an incremental benefit to the local economy, including an increase in the community’s tax base.

While these delayed economic impacts should logically occur, the small scale of these projects deterred us from attempting to measure them in the communities we studied.

### Watershed Impacts

## 3. Impacts on the Watershed

The research indicates some support for the notion that a high-skilled ecosystem workforce, operating under more flexible design, procurement, and oversight practices, will have incremental positive impacts on the watershed. While the data are weak, respondents generally agree that the work is of higher quality, which positively affects the sustainability and duration of the restoration.

### DESIGN OF RESTORATION AND TREATMENT WORK

As identified above, two major cost savings to land management agencies occur when work is designed and carried out by a high-skill crew: improved project design and planning “in real time,” and revising requirements when needed “on the fly.” In addition to reducing administrative and oversight costs, these practices were recognized as improving the quality of the restoration and treatment work in the watershed. When project design is separated from project implementation (“done by different people at different times”), what is designed may not always be what is required, and what is actually completed on the ground may deviate from what was once an appropriate design. A high-skill crew is reported to be efficient at integrating the design and implementation components of restoration work.

### DURABILITY OF WORK

Project staff, crew leaders, and crew members at every site reported finding examples of previous ecosystem work that had been done incorrectly and seemingly without an adequate knowl-

edge of the ecosystem, or done to meet specifications rather than outcomes. One example is trees or other vegetation planted at a site without considering other relevant factors that could reduce the durability of the restoration work, such as nearby vegetation or other conditions.

There are also several examples of the high-skill crew doing quality restoration and treatment work evaluated as capable of lasting beyond original expectations. One crew restored a major landslide which had interrupted a town’s water supply, and then stabilized the slopes to a level of security expected to surpass the outcome specified for the project.

### MEETING OUTCOMES

Agency staff and workers in all projects highlighted the ability of high-skill work crews to make on-the-ground decisions to meet overall objectives or outcomes, rather than simply meeting specifications. In one case, where the final appearance of the project was critical, the crew doing thinning not only met the specification for average overall density but also left individual clusters of trees and wider spaces that resulted in a more natural forest appearance.

### AVOIDING COSTS OF BAD INFORMATION

Perhaps one of the most valuable impacts for the watershed is the reliability of the information gathered by the high-skill worker. One BLM staff member notes that “information drives everything that is done”, emphasizing the hazard of acting on bad information.

*Schedules change during heavy work in the summer. There were an average of two changes per week due to agency modifications and vacations. USFS contracting officer representatives felt comfortable with us changing schedules to meet requirements.*

PROJECT SUPERVISOR



*We have to understand what was here 100 years ago and what should be here in the future . . . We must visualize the consequences of [different] possible actions.*

JITW WORKER

Monitoring watershed conditions and evaluating planned treatments require precise information, reliably collected over multiple points in time. Using different (and less-skilled) workers at different measurement times increases the potential for collecting inaccurate data. Changes in watershed conditions and the results of prior treatments might be obscured when inter-rater data are unreliable. That is, the changes may be due to measurement errors from using different raters at different points in time. Using unreliable data for subsequent planning and resource allocation then compounds any measurement errors.

In its review of USFS decision making, the United States General Accounting Office found that there were deficiencies within the agency's decision-making process which have "driven up costs and time", including:

not adequately monitoring the effects of past management decisions to more accurately estimate the effects of similar decisions and to modify decisions when new information is uncovered or when preexisting monitoring thresholds are crossed [and] not maintaining comparable environmental and socioeconomic data that are useful and easily accessible to forest managers. (US GAO Report, 1997)

Our findings indicate that such deficiencies might be partially remedied with a high-skill approach. At a minimum, it is clear that accurate survey and analysis work is critical to the agencies, and that this as an area that can benefit from further study.

## Social Impacts

### 4. Social Impacts

The NEAI was, in part, an attempt to address the adverse social and community impacts of the reduction of timber-related jobs in rural communities. One situation in a timber-dependent Washington community was described in this way:

It was chilling to witness the slaughter. The talk in cafes was of drunkenness, depression, divorce, abandoned homes, Grapes of Wrath-type desperate moves in search of work, illness, expired benefits, crippled schools, damaged tax base, repossessions, and, occasionally, successful transfer or clever adaptation. Now, the ex-loggers wait for the trees to grow and the jobs to come back, as their unemployment runs dry in the rain. (Pyle, 1986)

There is much research that supports the positive impacts of well-paying, year-round jobs on community stability. While the projects we studied have not had the time or reached the critical mass sufficient to produce these positive impacts, it seems clear that communities would benefit from well-paying, stable jobs—in terms of increased and more stable income, increased home ownership, higher tax revenues, reduced crime, stronger families, and healthier lifestyles. Economic benefits would also include welfare and unemployment insurance savings, and reduced costs of crime, such as jail costs. Again, we did not measure these presumed benefits due to the small scale of the projects we studied.

## Summary of Key Findings

Even though the scope and depth of our research is affected by the limited availability of hard data, we find the following issues to be significant:

- Ecosystem management work under this approach includes both the treatment and analysis of the ecosystem.
- The high-skill approach to ecosystem management does indeed require a specific set of skills.
- The costs associated with this approach are primarily in recruiting, selecting, and training workers, and the opportunity costs to the worker. All of these are significant in the projects studied, but they may be reduced if this approach were to become more prevalent.
- An economic case can be made for the high-skill approach to ecosystem management. High skills do have an economic value because:
  - There is evidence that the quality of the ecosystem restoration work is higher in this approach due to workers' ability to make judgments and assessments to meet overall objectives;
  - There are significant savings and benefits to the agencies involved in ecosystem management, including administrative savings, reduced need for supervision, efficiencies from on-the-ground assessments and adjustments to work, enhanced quality, and wage savings from avoiding alternative workforces that may be more expensive in terms of wages and reliability;
  - Information and analysis is of higher quality with this approach compared

to alternative workforce options. Agencies thus appear to benefit from avoiding the costs of bad information;

- Agencies can reinvest time and energy saved by working with trained ecosystem workers, which may be a critical issue in this era of downsizing and the demands of new technology.

Economic benefits to the communities are presumed but not verified because of the small scale of the projects.

We cannot quantify in any precise way the incremental costs and benefits accruing to the high-skill approach to ecosystem management. However, we believe that over time the costs would decrease and significant benefits, particularly administrative efficiencies and higher-quality work, would accrue to agencies and the watershed itself were the high-skill approach to become the dominant practice.

# VII



# VIII

## Implications

In this section we discuss some of the implications arising from our findings. Specifically, our findings inform the ongoing debate on contracting and procurement. The implications are less clear for the workforce: a high-skilled workforce could be produced and employed in a number of ways, such as public training and employment programs, apprenticeship approaches, or an unregulated contracting system. Below is a preliminary discussion of the implications of the high-skill approach for procurement and the marketplace.

### 1. Project Design and Procurement Alternatives

Many of the documented administrative savings and quality improvements discussed above accrue once the on-the-ground work has begun. Land manage-

ment agency staff are able to reduce oversight and adjust projects in-course, thereby avoiding redesigning the contractual terms. Our findings also suggest a potential for further savings in processes that occur prior to the on-the-ground work. While there has been more bundling of tasks into projects and some flexibility in the use of alternative contractual arrangements, federal design and procurement procedures have yet to be reworked to reflect the shift to ecosystem management and to take advantage of the benefits of a highly-skilled and multiple-skilled workforce.

As we reported in previous sections, federal land management agencies create the largest demand for ecosystem work in this region. Their contracting policies and practices are, therefore, a great influence on and potentially affected by the high-skill approach to ecosystem management. Our findings suggest that, of the four contracting models for designing and contracting ecosystem management work (Standard, Best Value, Service Agreement and Stewardship Agreement), all but the Standard (low-cost) model have potential for both realizing the savings of the high-skill approach and truly incorporating economic, ecological, and social objectives into federal contracting.



In the Standard Design and Procurement Approach, assessment, prescription, and treatment design requirements are often established by different professional staff, even for a particular watershed. This can result in loss of productivity, costly rework, and discontinuities in caring for the land. Retaining a single crew which can perform all three functions should improve efficiency and consistency of ecosystem management. A contracted crew could serve as part of the “institutional memory” for the work and its rationale.

The Best Value model appears to reduce agency staff time spent in design and oversight of contracted work, although more time may be required from other individuals and agencies who participate in defining best value contract terms and reviewing proposals. Recent changes in federal procurement guidelines allow for greater utilization of the “best value” approach; it is being used successfully in 1998 for the third year in the Willamette National Forest Sweet Home Ranger District.

The Service Agreement and Stewardship Contract alternatives have been used infrequently but may have the most potential for savings to land management agencies when the work is designed for a high-skill workforce. These alternatives should reduce certain overhead costs to contractors which may in turn reduce costs to the agencies. Rather than develop detailed and time-consuming proposals, contractors submit statements of qualifications, experience, and hourly rates. Once a contractor has secured a service agreement or steward-

ship contract, he or she prepares only brief responses to work statements or task orders.

In the Standard Design and Procurement Model (especially when tasks are not bundled), the contractor prepares detailed and time-consuming proposals. While these costs are not directly reimbursable by the agency, they represent real overhead costs to the contractors that must be reflected in the proposed billing rate. Contractors who value long-term arrangements, such as service agreements or stewardship contracts, and who will benefit from reduced costs of preparing proposals, may pass the overhead savings on to the land management agencies through a lower hourly billing rate. This lower rate would also benefit the contractor in the competitive bidding process.

Thus, the savings identified by this research could be accrued with a shift to procurement and work design arrangements that feature longer-term contracts and a high-skill workforce.

*I would like to change to a stewardship contract—a 3 to 5 year arrangement—involving a block of land with contractors doing the assessment and prescription; work and tasks would be bundled with the training leading to a broad diversity of skills to meet requirements.*

## 2. Implications for the Marketplace

To date, there are few project graduates employed outside the selected projects. Other than historical practices, there are no predictors of how the marketplace might respond and organize itself to provide workforces to meet demand.

We found three workforce models for performing ecosystem management (primarily treatment) work:

- High-skill, high-wage, multi-task, high independence: This workforce option is the subject of this study and features a work crew with broad skills that permit the workers to be somewhat interchangeable across tasks. Worker skill differences and preferences are a limiting factor, where the crew leader matches work requirements with specific worker skills. The crew is highly flexible and is able to make on-the-ground adjustments to changing schedules and requirements.
- Low-skill, low-wage, skilled supervisor: In this model, crew members have little training and are paid low wages. Work specifications are highly detailed and require close monitoring. Supervisors must provide concrete directions to the crew to insure that work meets specifications.

- Low and high-skill workers deployed on narrowly-defined tasks, at a variable wage with a skilled supervisor. In this model, the crew is a composite of workers with different skill levels, although wages are relatively low. The crew does contain some high-skill levels but with a narrow focus. For example, workers who are highly proficient in thinning can work only on that task. They may work faster than low-skill workers or high-skill/multi-skilled workers and thereby reduce overall cost to the contractor.

There is considerable difference of opinion on the merits of these and other workforce delivery options. Some USFS staff believe that ecosystem management workforce needs are best served through a large, active, and viable contracting community. In some areas, such as Southern Oregon, some contractors are described as paying living wages, employing high-skilled workers who are long-term members of their community, seeking out training for workers in new technologies as needed, and performing ecosystem management work of high quality—in short, they meet the goals of the JITW projects. Allocating ecosystem management work through numerous small, short-term contracts is seen as a desirable and effective way to maintain the viability of that contracting community.

JITW project graduates generally have found limited employment opportunities; most who continue in ecosystem management usually work for contractors or establish their own contracting firms. The EWP curriculum includes bidding procedures and other topics relating to independent contracting. The EWP projects seem especially keen on producing potential independent contractors, and trainees who have the potential or interest to become contractors are identified early in the training. These efforts would seem to lead to an increase in the number of independent contractors in the local contracting community. Graduates, whether working for themselves or others, typically seek small, short duration contracts, designed according to the Standard Design and Procurement Model described above.

All of these JITW projects encourage the development of new procurement and contracting models which feature bundled tasks and longer-duration contracts. They advocate for service agreements or stewardship contracts lasting more than one year. A consequence—perhaps unintended—is that fewer, bigger, longer contracts offer work for fewer contractors. While such contracts provide more stable employment for workers, competition for these contracts would be greater.

Implementing any new contracting and procurement alternatives would have substantial impacts upon the contracting community. Unreconciled are the competing objectives of encouraging more independent contractors and at the same time advocating contracting alternatives that would reduce the number of independent contractors.



In any case, the force that drives the dynamic is the “demand” side of the labor market. The policies set by agency leaders and how agencies design and procure work to implement those policies determines what work is done and by whom. Shifting to a high-skilled approach for on-the-ground ecosystem management work would cause the “supply” side to adjust, both in the number of contractors and the skill of workers.

*Employers should be rewarded in the contracting arena for retaining trained and skilled local workers.*

ECOSYSTEM  
MANAGEMENT  
CONTRACTOR

# IX

## Conclusions

Our research objective was to identify the impacts of a high-skill approach to ecosystem management, and we found consensus around these issues:

- The EWP curriculum and others developed in California and Washington established a broad array of generally agreed upon skills that are applied in ecosystem project work.
- Worker skills, attributes, and values allow work to be performed in ways that have an incremental benefit to the watershed in terms of restoration, treatment, and collecting and analyzing ecological information. When these skills are combined with flexible alternative approaches to project design, procurement, and monitoring, considerable savings should accrue to the land management agencies.

- If ecosystem management work develops into a viable, stable industry that employs a high-skill workforce, other social and community benefits desired by workers, families, communities, and land management agencies would be realized.

From the viewpoint of federal land management agencies: you get what you pay for. Agency policy, as implemented through project design and contracting methods, drives the skill and wage levels of ecosystem workers. Designing and contracting ecosystem management projects for a stable, high-skill workforce, and managing those projects in ways that utilize those skills, should lead to savings to the agencies as well as better conditions for the community and its watershed.

Our findings and their impacts, while compelling, do not provide conclusive evidence that the high-skill approach to ecosystem management will continue beyond the project stage. To some observers, the value of a high-skill workforce is mitigated by the context in which it was developed: a government make-work effort to offset jobs lost to conservation policies. While workers developed new skills and the work met quality standards, critics question if those skills have a market value outside the projects and if the higher wages reflect government policy rather than market value.

Another potential barrier to increased use of the high-skill approach is that support for it is inconsistent within the land management agencies themselves.



The paradigm shift from resource management to ecosystem management has not been accepted at all levels in the agencies:

- Some staff accept the mission of ecosystem management but question the basic tenets of the high-skill approach: that high skills are necessary for ecosystem management.
- Some agency staff maintain that ecosystem work can be done under the standard design and procurement method featuring detailed specifications, as long as the crew leader is trustworthy and understands the job to be done.
- Others question the value of direct communication with workers and suggest that, if politics were removed from the process and these projects were open to competitive bidding, contractors with lower-skilled and lower-paid crews would perform work of equal or better quality in less time.
- Still others, while agreeing that high skills are needed for increasingly complex and technical ecosystem management work, question the need for special JITW projects to perform this work. They believe the most efficient and effective approach is open and competitive bidding, where the contracting community incurs the costs of recruitment and training.

Counter to some of these arguments is the view that the value of high skills was demonstrated even before these JITW projects. That is, prior to agency workforce downsizing, land management agencies maintained stable in-house workforces. These workers were provided considerable training, required

less supervision, had the authority to make program changes, and created trust and mutual respect. Our findings show that the benefits to land management agencies previously obtained with in-house skilled workforces can also be obtained with a contracted high-skill workforce.

Our findings about the savings and benefits that accrue to the high-skill approach, when combined with new project design and procurement methods, certainly require further study. However, our research leads us to believe that these impacts are consistent enough to be obtainable in contexts other than the project work we studied.

If there is a core conclusion to this study it is this: there is an economic case to be made for employing a high-skilled workforce—it leads to savings to the employing agency and increased benefits to the watershed from higher-quality work.

These skills may well have sufficient value to command a higher wage. Higher wages, combined with design and procurement options that lead to longer-duration employment (such as service agreement and stewardship contracting) should have significant beneficial economic and social impacts on the community. Thus the high-skill approach offers one viable method for producing the economic, social, and watershed benefits that define ecosystem management.

*These workers excel on quality, work ethic, workmanship, and pride in their work.*

USFS OFFICIAL



## Recommendations from the Steering Committee

We are an interdisciplinary committee of academics and practitioners in community development and natural resource management. We have been active participants in guiding the research described in this report, and we assisted with a symposium at the University of Oregon that focused on the findings and implications of the research.

We are well aware of the limitations of this study. It is a qualitative study, and some of the findings are anecdotal. Hard data were difficult to gather, and this narrowed the focus. We have clearer findings about the impact of the high-skill approach on agencies and less about the impact on communities and workers themselves. The scope of the research is also limited by the very nature of the projects—they are small-scale, experimental projects in three separate states. A thorough test of the high-skill model will not be possible until more trained workers are doing a much higher volume of work, driven by a clear, consistent ecosystem management paradigm which is adequately funded. Thus the true results will be known only in the longer term.

Despite these limitations, we believe that this research supports what many have said about the high-skill approach: it works. It also confirms our own experience or conclusions, moving our philosophy about the value of community involvement, collaboration, and training to the level of knowledge, validating our attempts to initiate new training programs and curriculum, and helping to establish the evolving practice of ecosystem management.

Specifically, we believe the research validates the efforts of land management

agencies and community organizations to work collaboratively, jointly defining the economic, social, and ecological outcomes sought in ecosystem management. The focus on high skills and quality jobs is sound—it produces the desired benefits.

The research demonstrates that the high-skill approach can work. There are clear benefits for agencies and landowners, and we believe there are positive community impacts as well, not the least of which is the greater capacity of community-based organizations to participate in the economic future of the community. The education and training component is sound, although clearly it will need continuous improvement.

The greatest challenge is to sustain and enhance these efforts so that this type of approach to ecosystem management

# X



receives wider operational application. The clear danger is that the gains of these projects will be lost if the shift to ecosystem management does not take place quickly. Trained workers will drift away, contractors will be forced to compete on costs, and the education infrastructure will crumble.

We are convinced that there is a plethora of restoration and ecosystem work which needs to be accomplished, but the traditional practices of design and procurement remain dominant. The result, as one of us remarked, is “there is plenty of work, but no jobs!”

Put another way, there is an unfortunate gap between the supply and demand sides of the labor market. The JITW projects have created a supply of trained workers and an infrastructure (education, training, apprenticeship, etc.) to continue to build on the supply side. What is missing is the demand side—ecosystem work should be designed, procured, and completed in ways that encourage the quality jobs, high-skill approach.

Thus, the key recommendations stemming from this research have to do with policies and practices that will boost the high-skill, quality jobs approach. The key factor is how ecosystem work is designed and procured, both on public and private lands. In Oregon, these decisions will increasingly be made by watershed councils, and federal land management agencies also have a central role.

Specifically, we recommend the following policies and actions, many of which were derived from the symposium we held to discuss the research.

## Recommendations

### FOR LAND MANAGERS AND OWNERS

- Watershed councils and federal agencies should consider and advocate for appropriate implementation of the collaborative, high-skill, quality jobs approach. This will require extensive education and advocacy. The tools for such an approach already exist; they just need to be put to use.
- Ecosystem work and contracts should be designed and awarded on a basis that rewards contractors for retaining a high-skill, high-wage workforce. The stewardship and best value contracting models should be tested in more watersheds. These models should emphasize longer duration, multi-disciplinary work, and support development of local business and workforce capacity. Federal and state contracting mechanisms should support the new models.
- Federal land management agencies should strive for better alignment, from top to bottom, on design and procurement issues. Local efforts should be supported and new initiatives encouraged.
- There must be continuing investment in this approach—the collaborative approach takes time and effort, and the education infrastructure requires maintenance. We should capitalize on the final years of the Jobs-in-the-Woods program as well as efforts to avoid listings of endangered species. Any restoration work should include a quality jobs, community-based component.

*Market forces don't work in a vacuum—we should use policies to line up supply and demand.*

GOVERNOR'S  
WATERSHED POLICY  
OFFICIAL

#### FOR COMMUNITY ORGANIZATIONS AND WATERSHED COUNCILS

- Watershed councils need the tools of the high-skill approach. First, watershed councils need education and facilitation to develop workforce goals as part of the economic and social objectives of ecosystem management. Education and technical assistance about this research project would be a good start.
- Community-based organizations can be the vehicle to define community economic and social goals. They can be the brokers for projects and the liaison between different classes of landowners. Education, technical assistance, and networking are needed to expand the number of solid community-based organizations capable of participating in similar efforts.
- Watershed councils and others need a list of trained local contractors and workers who follow the high-skill approach. (See recommendation below on the industry and apprenticeship infrastructure.)

#### FOR EDUCATION, TRAINING, AND CERTIFICATION

- To avoid losing the valuable education infrastructure that has been built, JTPA and other funding for JITW and similar restoration efforts should be directed to training workers in communities in ecosystem management.

- The apprenticeship model is a useful approach, and ecosystem management contracts should encourage apprentice-linked contractors as supporting economic and social objectives.
- These efforts require more consistent prevailing wage information and integrated use of this information in contracting and procurement.

### Conclusion

In summary, the high-skill approach is one way we can promote the simultaneous economic, social, and ecological goals of ecosystem management. The experiments of the Pacific Northwest that were part of the Northwest Forest Plan show promise to landowners, communities, and workers. But they are fragile and could easily disappear, taking with them the infrastructure of collaboration and education so painstakingly developed.

Our recommendations include broad and specific actions by a variety of partners. We ourselves are among those affected by these lessons, and we will continue to advocate for more community involvement, education, and collaboration in the forests and communities of the Pacific Northwest.

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THE HIGH-SKILL  
APPROACH  
TO ECOSYSTEM  
MANAGEMENT:  
Combining Economic,  
Ecological, and  
Social Objectives

Appendix 1  
References: Literature and  
Interviewees

Appendix 2  
Interview Protocol and  
Questions

Appendix 3  
Goals of the Ecosystem  
Workforce Project

Appendix 4  
Curriculum Summary of the  
Ecosystem Workforce Project

Appendix 5  
Ecosystem Skills Checklist



THE HIGH-SKILL  
APPROACH  
TO ECOSYSTEM  
MANAGEMENT:  
Combining Economic,  
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## Appendix 1

# References: Literature and Interviewees

## Interviewees

The following people were interviewed during the research portion of this study.

Tom Anheluk E&S Environmental Restoration, Inc.; Sweet Home EWP graduate; 1995	Maggy Julian US Forest Service, Rogue River National Forest
Dean Bohn Crew Leader (1997); Crew Member (1996); Rogue Valley EWP	Lynn Jungwirth (and staff) Director, Watershed Resource Training Center, Hayfork, CA
Lynn Bornholdt Rogue Institute for Ecology and Economy	Marc LaPine Project Coordinator, Southern Willamette EWP
Glenn Brady Rogue Institute for Ecology and Economy	Brad Leavitt US Forest Service, Sweet Home Ranger District
Mike Cloughsey Oregon State University Extension Service	Don Maynard E&S Environmental Restoration, Inc.; Sweet Home EWP graduate; 1995
Jake Crabtree Ecosystem Workforce Job Placement Specialist, Rogue Institute for Ecology and Economy	Eileen Northrup US Forest Service, Rogue River National Forest
Jack Desmond Skookum Reforestation, Inc.	Steve Pace E&S Environmental Restoration, Inc.; Sweet Home EWP graduate; 1995
Tom Dew US Forest Service, Rogue River National Forest	George Parker BLM Salem
Brian Erickson Crew Leader, Aberdeen Project	Jack Ratledge US Forest Service, Shasta-Trinity National Forest, CA
Bjorn Everson Project Coordinator; Rogue Valley EWP	Tom Ross Crew Leader, Aberdeen, WA
Jim Gladen Supervisor, Rogue River National Forest, Medford, OR	Dave Rux IAM/Woodworkers Local Lodge W2, Aberdeen, WA
Tim Gonzales US Forest Service, Rogue River National Forest	Dan Sitton US Forest Service, Rogue River National Forest
Pat Hawe BLM Salem	David Sours Director, Rogue Institute for Ecology and Economy
Gary Hoppe BLM Eugene	Tim Sullivan E&S Environmental Restoration, Inc.
	Jim Walls Columbia Pacific RC&D, Aberdeen, WA

## Interview Questions

## Appendix 2

### INTERVIEW QUESTIONS FOR LANDOWNERS, LAND MANAGERS, AND EMPLOYERS (agency management, contracting officers, project supervisors)

## Interview Protocol and Questions

- A. *Obtain any project documentation available: project descriptions, contracts, task orders, post-contract reviews, etc.*
- B. *General questions (follow up all questions and seek quantification or estimates where possible)*
  1. How do these JITW projects differ from traditional forest work?
  2. What benefits, if any, do you see from these projects?
  3. Are there any factors that make these projects more difficult, time consuming, or costly to design and implement?
  4. Are there any things about these projects that make them easier, quicker, or less costly to design and implement?
  5. What trends do you see in the next several years that will affect the work of your company/agency? Have these projects demonstrated any approaches or methods that will be useful as your company/agency is affected by these trends?
- C. *Questions about work practices and attributes and their economic impacts*
  1. If you were observing a worker doing ecosystem management work (stream repair, etc.) what, if anything, would tell you this worker is a trained ecosystem worker—a JITW worker or project graduate? (Follow up with impacts of these characteristics)
  2. Does (would) having an available supply of trained, skilled workers influence how you would design and carry out ecosystem work? If yes, how? (For example, for land managers: if your agency is being down-sized [RIF], are there functions that could be performed by these workers?)
  3. If trained, skilled workers are being paid a higher wage (benefits, etc.), does this result in a higher project cost? Please elaborate.
  4. Are there any efficiencies that have been demonstrated from the JITW project? If so, do the efficiencies result in any cost savings or reductions?
  5. Are there differences (in the following areas) in the JITW projects compared to the way work has been done traditionally?
    - i. task specifications
    - ii. task complexity
    - iii. duration of work
    - iv. supervision requirements of workers
    - v. skill level of workers
    - vi. adaptability of the workers
    - vii. quality of the work that is done
    - viii. other
  6. Are there any areas where the skills of the trained workers are deficient or inadequate to meet current or future work requirements?
- D. *Questions about watershed impacts*
  1. What do you see as the major benefits to the watershed from the JITW projects?
  2. Could these same benefits have occurred (or occurred to the same extent) if high-skill workers had not been used?



3. Do you see ecosystem management work (and other forest work) moving to a broader scale, such as the watershed level? (may have been identified as a trend in question B5)
  - i. if so, will this provide greater watershed benefits?
  - ii. are there particular skills of these workers (or particular benefits of having a supply of available trained workers) that will be valuable in working at this broader scale?

*E. Questions about social impacts*

1. Does (would) having an available supply of trained, high-skill ecosystem management workers (doing steady, long duration work) change the nature of your (agency's) relationship with those workers? If yes, how?
2. Does (would) it change your relationship with the nearby community?

INTERVIEW QUESTIONS FOR WORKERS

*A. General questions*

1. What is your overall opinion about the JITW projects and their value?
2. What benefits have you gotten out of your work in the JITW project?
3. What has been the cost to you (the sacrifice you had to make) to participate in the project? Did you pass up other job or career opportunities to participate in this project?
4. What do you think you would be doing now if you had not been involved in this project?
5. How do you see forest/ecosystem work changing in the next several years?
6. Do you think the JITW project has helped make you better prepared for this future work? If yes, how?

*B. Questions about work practices and attributes*

1. If I was observing you doing ecosystem management work (stream repair, etc.) what, if anything, would tell me that you are a trained ecosystem worker—a JITW worker or project graduate? (Follow up with impacts of these characteristics)
2. How is this work different than the work you used to do?
  - i. What do you do when the job specifications (e.g., from the engineer) would not work and some modifications need to be made? Is this different than your previous job?
  - ii. How often is the crew leader on the site to supervise your work?
  - iii. Are there some on the spot decisions you can make without supervisor approval?
  - iv. Do you do a broader range of tasks than you used to on your previous job?
  - v. Are there sometimes other contractors working on the same project with you? If so, how does their work differ from yours?
  - vi. If you work with any technical specialists, is your work or relationship with them different than in your previous job?
3. What new skills have you learned? Are they used in your current work?
  - i. Here is a list of tasks that a trained worker might perform.
    - a. which tasks do you typically do on a contract?
    - b. which tasks required training? (which ones could you already perform?)
    - c. are there any of these tasks that require extensive training—a high skill level?
4. Have you learned new skills that would be useful in other work?

*C. Questions about economic and social impacts*

1. Are you:

- i. better paid than you were previously
  - ii. getting health and other fringe benefits
  - iii. employed longer (more months total, longer duration work)
  - iv. more satisfied with what you are doing and accomplishing? Do you feel differently about the value of your work (and the land) than you used to?
2. Do you still live in the same community you did prior to this project? If not, why did you move?
  3. (Has there been enough work at good wages to help you meet your financial obligations, family, mortgage, etc.) May be difficult to ask this question.
  4. What has been the impact upon your family of your participation in this project (and continuing to work in ecosystem management)?
  5. Do you see a real future for this field (ecosystem management work)? What do you see yourself doing 5 years from now?
  6. Do you anticipate any further training or education that you will need in your career as an ecosystem management worker?
  7. Do you anticipate some other costs required for you to keep working in this field, equipment, etc.
  8. How would you compare your situation now with other workers you know who have not sought retraining or have gone on to work in other fields?

#### *D. Questions about watershed impacts*

1. What do you think of the actual on-the-ground work that has been done by the JITW projects?
2. Has there been any real benefit to the watershed?
3. If so, what difference does it make having ecosystem work done by skilled, trained workers?

### INTERVIEW QUESTIONS FOR CREW LEADERS/WORK SUPERVISORS

#### *A. General questions*

1. How do these JITW projects differ from traditional forest work?
2. What benefits, if any, do you see from these projects?
3. Are there any factors that make these projects more difficult, time consuming, or costly to design, supervise, and implement?
4. Are there any things about these projects that make them easier, quicker or less costly to design, supervise, and implement?
5. What trends do you see in the next several years that will affect the work of your company/agency? Have these projects demonstrated any approaches or methods that will be useful as your company/agency is affected by these trends?

#### *B. Questions about work practices and attributes and their economic impacts*

1. If you were observing a worker doing ecosystem management work (stream repair, etc.), what, if anything, would tell you this worker is a trained ecosystem worker—a JITW worker or project graduate? (Follow up with impacts of these characteristics)
2. Does (would) having an available supply of trained, skilled workers influence how you would design, supervise, and carry out ecosystem work?
3. If trained, skilled workers are being paid a higher wage (benefits, etc.), does this result in a higher project cost? Please elaborate.
4. Are there any efficiencies that have been demonstrated from the JITW project? If so, do

the efficiencies result in any cost savings or reductions?

5. Are there differences (in the following areas) in the JITW projects compared to the way work has been done traditionally?
  - i. task specifications
  - ii. task complexity
  - iii. duration of work
  - iv. supervision requirements of workers
  - v. skill level of workers
  - vi. adaptability of the workers
  - vii. quality of the work that is done
  - viii. other
6. Are there any areas where the skills of the trained workers are deficient or inadequate to meet current or future work requirements?

*C. Questions about watershed impacts*

1. What do you see as the major benefits to the watershed from the JITW projects?
2. Could these same benefits have occurred (or occurred to the same extent) if high-skill workers had not been used?
3. Do you see ecosystem management work (and other forest work) moving to a broader scale, such as the watershed level?
  - i. if so, will this provide greater watershed benefits?
  - ii. are there particular skills of these workers (or particular benefits of having a supply of available trained workers) that will be valuable in working at this broader scale?

## Definitions and Checklists

## Appendix 3

# Goals of the Ecosystem Workforce Project

### I. Goals statement (1996):

The US Forest Service and Bureau of Land Management, in order to accomplish quality land management, forest stewardship, and watershed restoration objectives, assume direct responsibility for the quality of jobs and positive socio-economic impacts of the contracting process on resource-dependent communities, and will take appropriate action.

Our operational definition of “quality jobs” (1997) includes:

1. *Family Wages and Benefits*
2. *Skill Standards*
3. *Health and Safety*
4. *Job Stability*

### 1. Family Wages and Benefits

Some definitions from various stakeholders:

- \$32,000/yr. + benefits (OR AFL-CIO)
- County Average: \$18,000 to \$25,000 (OEDD)
- Covers the cost of food, shelter, clothing, health care, education, and transportation
- \$14 to \$16 per hour plus benefits (Washington State Labor Council)

### 2. Skill Standards

- High-Skilled
- Multi-skilled
- Certification
- Multi-task work design
- Entry-level training and skill upgrade

### 3. Health and Safety

- Worker-based workplace safety
- Safety and health skill standards & training
- Integration of safety and quality strategies

### 4. Job Stability

- Long-term contracts
- Long-term business planning
- Industry performance standards
- Efficient labor market
- Employment / Employability security

Our operational definition of “positive socio-economic impacts of the contracting process on resource dependent communities”:

- a) watershed-based planning linked to labor market strategies;
- b) community involvement in resource management and socio-economic impact planning.

## **II. Checklist for demonstration projects (collaborative, direct-hire, with participating agreement for federal agency work), to help us decide where to focus our efforts:**

- 1) Sustained employment (minimum 5 months)
- 2) Wages \$10.50 to \$14/hr with benefits
- 3) Diverse work experience across relevant ecosystem management categories
- 4) Structured training following the curriculum plan of the Curriculum Development Team, at least in its essential components
- 5) Participation in Ecosystem Management Apprenticeship program
- 6) Participation of federal land management agencies with potential for work on private land
- 7) Employs dislocated workers or at-risk forest workers who are residents of work area
- 8) If contracted demonstration project, contractor cooperates with local steering committee
- 9) Coordination with local JTPA for recruitment, training support, job placement, and needs-related support as eligibility allows

## **III. Checklist for the first Sweet Home contracted demonstration projects in 1996:**

- 1) Length of employment approximates 1995 demonstration projects (avg. 26 weeks)
- 2) Wages average \$10.50 to \$12.00; benefits average .90 to 2.00 / hr.
- 3) Contract provides diverse work experience appropriate for multi-skill training objectives.
- 4) Contractor crew enrolled in Ecosystem Management Specialist Apprenticeship Program or equivalent; contractor has demonstrated commitment to maintaining a high-skilled crew.
- 5) Contractor has equipment, supervisory personnel and business capacity to successfully complete project work.
- 6) Contractor cooperates with training coordinator to link employees to structured training. (JTPA will cover training costs for dislocated workers, other employees will require some in-kind or other investment from contractor, so JTPA doesn't cover their training costs. Wages for training days to be covered by contract revenues.)
- 7) Contractor employs 1995 project graduates and dislocated workers to fill any crew openings.
- 8) Contractor employs workers residing in the area of the project work (E. Linn, E. Lane, and S. Marion Counties).
- 9) Contractor works in partnership with local steering committee, comes to regular committee meetings to jointly assess progress, refine objectives, and develop action plans.
- 10) Contractor crew completes work at or better than quality and cost expectations of agency managers.

## EWP Curriculum Summary

In 1995, the Ecosystem Workforce Project formed a partnership in Oregon among educators from universities, community colleges, state and local agencies, and private ecology organizations to develop a practice-based curriculum on ecosystem management. The Curriculum Development Committee included representatives from these organizations:

- Bureau of Labor and Industries
- Clatsop Community College
- Government Contracting Assistance Program
- Lane Community College
- Oregon Department of Fish and Wildlife
- Oregon Department of Forestry
- Oregon State University
- Pacific Rivers Council
- Rogue Community College
- Rogue Institute for Ecology and Economy
- State and Local Job Training Partnership Act (JTPA) agencies
- University of Oregon

The curriculum covers a range of skills and knowledge, from analysis and treatment of the watershed to business and interpersonal skills. The curriculum is divided into three sections and sub-topic areas as follows:

- Watershed Processes and Ecology
  - Forest Ecology
  - Forest Management
  - Wildlife Habitat Management
  - Watershed Management, Restoration, and Enhancement
- Safety and Technical Knowledge
  - Basic Fire Suppression and Safety
  - Land Measurement and Survey
  - Stream Measurement and Survey
  - Worker Health, Equipment Operation and Safety
  - Forest Resource Protection and Regulation
- Business Development and Management
  - Interpersonal skills
  - Contracting Skills
  - Technical Business Skills

The curriculum was revised and translated into Spanish in 1997.

## Appendix 4

# Curriculum Summary of the Ecosystem Workforce Project

# Appendix 5

## Ecosystem Skills Checklist

*Please check those skills that workers typically use on the job:*

### Data Collection and Analysis

- Write good field notes
- Prepare for data collection
- Collect accurate/legible data
- Enter data into computer accurately
- Create a backup file
- Check for errors
- Correct errors
- Observe/safeguard confidentiality and proprietary information
- Integrate principles of timber, fish, and water management

### Surveying and Mapping

- Be aware of land measurement systems
- Operate equipment, use and care of the tools of the trade, such as data recorder, pocket compass, staff compass, transit, theodite, clinometer, cloth tape, steel tape, electronic distance measuring device
- Read topographic maps
- Be competent in computer skills
- Comply with safe practices
- Comply with regulations

### Taking Inventory of Resources

- Recognize plant communities
- Be aware of ecosystem structure and function
- Be aware of principles of ecology
- Recognize soil/physical qualities of landscape
- Collect data for watershed analysis
- Be aware of basic scientific principles
  - biology
  - hydrology
  - environmental science
  - soils
  - geology
- Comply with regulations

### Silviculture

- Manage the landscape
- Be aware of silviculture systems
- Be able to develop goals
- Analyze data related to goals
- Take inventory (stand exam)
- Take precise measurement of the stand plot
- Be aware of the techniques of silviculture
  - tree planting
  - site preparation
  - mechanics
  - chemistry
  - safety
  - slash burning
  - awareness of Forest Practices Act
  - thinning
  - spacing
  - animal control
  - state and federal regulations
  - wildlife considerations
  - woody debris
  - stream needs
  - plant methods
- Study silvics (growth, yield, seed source, genetics, biology of species)
- Be aware of nursery options
- Perform tree planting
- Be aware of young stand manipulations

### Basic Fire Fighting Skills

- Be competent in ICS