KLAMATH/LAKE FOREST HEALTH MANAGEMENT GUIDE

Author: Thomas A. Burns, Ph.D.
Illustrator: Edward Livingston
February, 1999

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For: Klamath/Lake Forest Health Partnership &
Klamath Ecosystem Education Partnership (KEEP),
South-Central Oregon

ACKNOWLEDGMENTS

Many individuals and organizations from the Upper Klamath Basin area contributed to the Guide through the two broad based partnerships that came together in a joint effort to produce the Guide: The Klamath/Lake Forest Health Partnership and the Klamath Ecosystem Education Partnership [KEEP]. Members of these organizations reviewed several drafts of the Guide and provided suggestions which greatly improved the product. Specialists from partnership organizations assisted with identifying the key references for the Resource section of the Guide.

The Guide developer, Tom Burns, and the two partnerships are grateful for a continuing grant from the Weyerhaeuser Family Foundation over a two year period to partially support development of the Guide. Maia Enzer of American Forests and Peter Titcomb of the Foundation were encouraging throughout. The partnerships also wish to recognize the Klamath/Lake District of the Oregon Department of Forestry, and especially Roy Woo and Anne Maloney, for their support of the Guide project in the form of meeting space, copying, and communications. The Winema National Forest of the U. S. Forest Service was kind enough to make possible the printing and binding of the first limited edition of the Guide.

Special thanks go to the three Klamath/Lake Forest Health Partnership members who have allowed their woodland management stories to be told in the Guide and who have supplied photos for their own stories and for the Guide in general: Ned Livingston, Bob Mezger, and Ed Kupillas. Ned Livingston is also responsible for the excellent illustrations in the Guide, including the cover illustration. Thanks are due to those others who have contributed photos to the Guide, mostly taken from materials in the public realm. Kathy Helm of the Lakeview District of the Bureau of Land Management assisted with editing the final text of the Guide. Finally, Leslie Sekavec of the Winema National Forest of the Forest Service contributed her energy and expertise to the project throughout and is largely responsible for formatting the Guide and seeing it reach its first printing.

AVAILABILITY OF THE GUIDE

Private woodland owners of the Klamath/Lake area can obtain copies of the Outline and Full Text Versions of the first edition of the Guide free of charge by visiting the following area offices [no moneys are available to cover the cost of shipping and handling]:

Klamath/Lake District Office, Oregon Department of Forestry
Klamath County Extension Service, Oregon State University

In the near future the Guide will be available on-line through links provided at the Web Sites of the following area agencies:

Winema National Forest, U.S Forest Service
Klamath/Lake District, Oregon Department of Forestry
Klamath County Extension Service, Oregon State University

PREFACE

This Forest Health Management Guide has been prepared to encourage woodland owners to think in terms of forest health and watershed improvement as they manage their woodlands. Its specific focus is private woodland owners of south-central Oregon, including Klamath and Lake counties, and the Upper Klamath Basin, and especially those landowners whose property is adjacent to or near public lands where there is potential opportunity for cooperative projects. The Guide should also be useful to most woodland owners in the high, semiarid plateau east of the Cascade Mountains, with the only change being references in the resources lists.

Guide users wanting a quick overview of the forest health management process can look at the Guide's Table of Contents, as well as the Outline Version of the Guide.

In summary, the Guide explains how woodland owners can develop, implement and evaluate forest management projects on their land while considering the full range of resources and effects over the larger watershed. Of course, unlike particular forest conditions that scientists can measure objectively, forest health is a concept applicable to an overall condition and so contains a degree of subjectivity. Consequently, because individual values affect a person's vision of the forest and individuals have different values, owners frequently do not have the same visions of what a healthy forest should look like. As discussed in this Guide, these differences can be accommodated, as long as the different visions respect the ecological limits of the project site and the surrounding watershed.

The Guide is a joint effort of two nonprofit partnerships in south-central Oregon: The Klamath/Lake Forest Health Partnership and The Klamath Ecosystem Education Partnership [KEEP]. Both organizations seek participation of all interested parties of the area to achieve constructive solutions to issues involving the use, management, and conservation of natural resources

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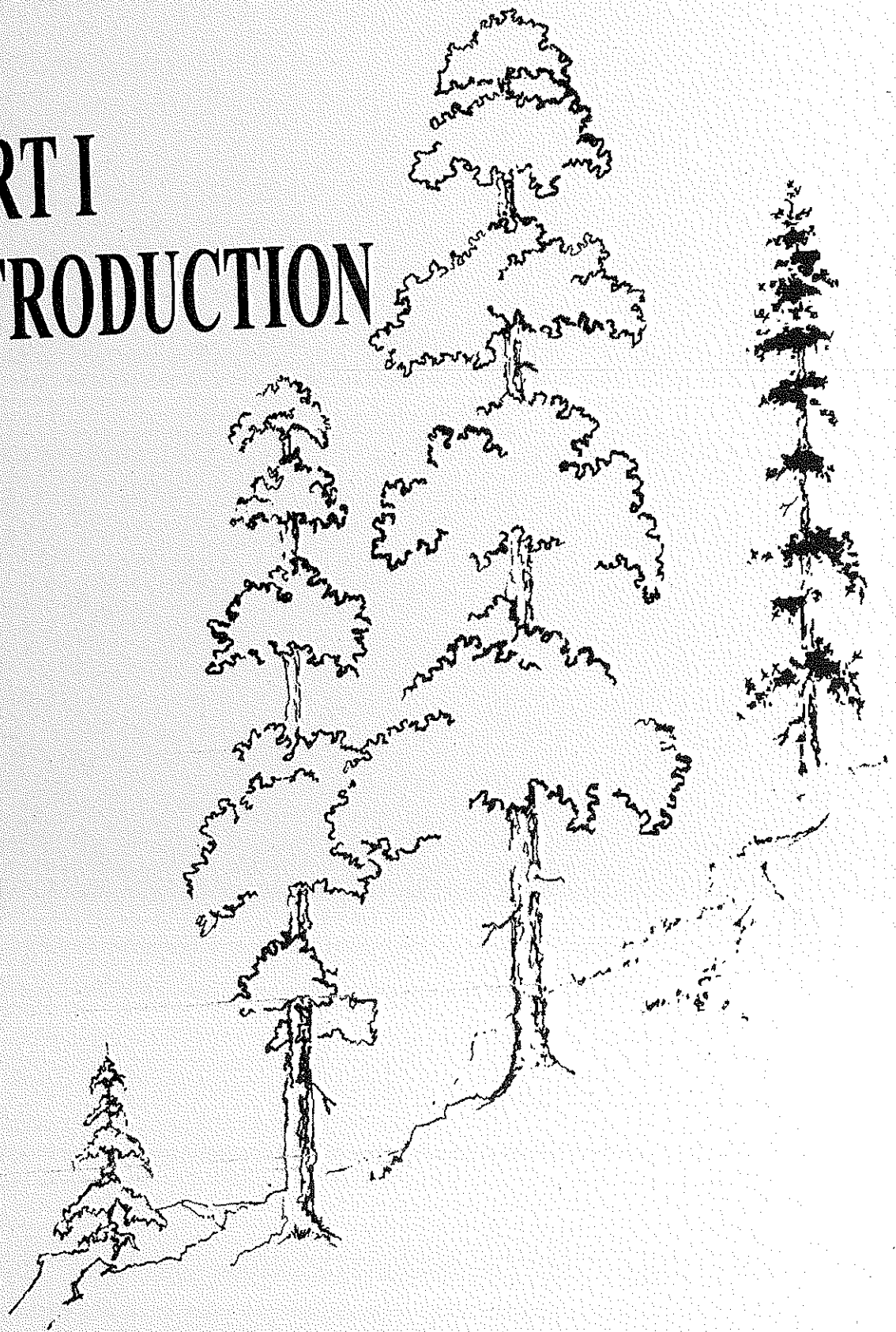
INTRODUCTION



Forest Health Management - The Challenge

Recent Assessments of Forest Health Conditions

Results of several large-scale, scientific assessments indicate a need for improvement in forest health and ecosystem conditions for south-central Oregon on most public and private lands east of the Cascades in the Pacific Northwest. Major factors contributing to this need are: area-wide fire suppression over the past 80 to 100 years, the design, location and density of roads, and some past timber, mining and grazing management practices. Inadvertently, many of these factors and practices have left much of the area's forest lands and grasslands at risk for catastrophic fire, pest and disease infestation, water quality and flow problems, and soil erosion. In some cases, poor forest health poses a threat to the continued survival of certain plant and animal species.

As a woodland owner, you undoubtedly recognize the need to address these forest health concerns, particularly as they relate to the long-term productivity of your land and the watershed upon which you and your neighbors depend.

Improvement Plans on Public Lands

In response to the scientific assessments mentioned above, state and federal land management agencies are developing overall watershed improvement plans on public lands of south-central Oregon.

How can you participate? You have the option of considering management of your own woodland in terms of this larger watershed improvement goal. You may even be able to take advantage of substantial assistance in managing your own land if you explore coordinating improvement plans for your land with those for surrounding public lands.

Area Watershed Councils

Presently, watershed councils and work groups are being formed in south-central Oregon. A primary intent of these councils and work groups is to generate consensus-based watershed improvement plans at the local level to address statewide watershed issues on private lands. Diminished water quality and quantity are the major statewide issues driving plans for change.

You can be a part of this improvement effort by participating in your watershed council and/or work group. Through those groups, you can help design a management plan to address these critical issues and improve overall watershed health. A major benefit of cooperating with local groups is that you have an opportunity to develop your own solutions before outside regulatory agencies mandate changes in their terms.

Other good news is that many changes you can make to significantly improve watershed conditions can often be achieved without great effort or expense. Other solutions are more challenging, but cooperative means are evolving, as are the channels for funding the projects to address them.

About the Guide

What Is In the Guide and When To Use It

The Guide describes for you the sequential steps to follow to achieve management goals on your property and, if you choose, the larger watershed. The process is presented with many options and many resources are identified to assist you.

Although you can use the Guide as your sole resource, you will probably be more effective if you also attend meetings of watershed working groups in your area and workshops sponsored by local agencies and organizations. These meetings and workshops are designed to explore improvement options on lands in the Upper Klamath Basin and will serve to augment the Guide. Using the Guide, in conjunction with attending these meetings and workshops, will make you a better informed, more involved landholder who can make a difference. Forest health improvement on a larger watershed or sub watershed scale depends on landholders like you voluntarily engaging in improvement efforts on your own land, while exploring cooperative opportunities for improvement with private and public neighbors.

How the Guide is Organized

There are four parts to the Guide. Part one introduces you to the basic ideas that underlie forest health improvement projects. Part two presents you with a description of the steps in the assessment, planning, implementation, and evaluation of improvement projects. Part three offers you three instructive and inspirational stories of the lives of area woodland managers. Part four identifies the array of resources that are available in the area to assist you with your own improvement projects.

How to Use the Guide

It is recommended that you use the Guide as a reference tool to consult and refer to as needed, rather than as a book to be read from front to back. The Guide presents the forest health management process in a perspective intended to be understandable regardless of your interests, objectives, experience, or knowledge.

The Guide is organized to accommodate users with different needs and levels of knowledge. In particular, the improvement process in Part two of the Guide is available in two formats: a short Outline Version and a detailed Full Text Version. Some users may want to start with the personal stories of forest land holders and managers in Part three to discover how others have engaged the improvement process before they embark on their own projects. This approach may be good for people new to woodland management who want to become acquainted with the subject by "reliving" the experience and thoughts of others who "have been there." Other users may want to see "just the no nonsense essentials." For these individuals, a detailed overview of the steps in the improvement process is available in the separate Outline Version of the Guide. This Outline Version parallels the Table of Contents of the Full Text Version of the Guide and provides brief statements describing activities in each step of designing and implementing improvement projects. Because of their shared organization, it is easy to move between the Outline and Full Text Versions of the Guide using the Table of Contents.

Even if you want the process in detail, it is still probably best to first get an overview by looking at the Outline Version of the Guide before going to the full text. If you follow this approach, you will get a sense of the whole before you become immersed in the details. If you are like many users, you will first examine the Outline Version and move to the Full Text Version as you consult with resource experts and agency personnel and feel the need for more background information. By familiarizing yourself with the details, you will be a more active and aware participant in the process. Whatever your approach may be to the Guide, it is important that you use it as you need it, and remember the Guide is there to assist you as you proceed.

In many forest health projects, you may rely on experts and specialists for technical knowledge, observations, and recommendations. Considering this, for each step of the process, the Guide identifies in parentheses after the main headings whether responsibility typically belongs to the landowner (owner), the experts (experts), or both (owner/experts). At the end of Part II of the Guide, you will find copies of work sheets developed to assist you with the more complex steps in project development and implementation.

Approach of the Guide

Definition of a Forest Health Management Project

Essentially, any project whose design considers all resources on the site and the condition of the larger watershed qualifies as a forest health improvement project.

The primary goal of improvement projects may be forest health, cultural resources, the economic returns, recreational amenities, or aesthetics. A forest health project could involve a wide range of activities - from improving a stand of trees or enhancing a view, to installing a trail for cross-country skiing or creating habitat for elk or mountain mahogany. The key is that the project design considers the full range of forest resources in the area. Focused projects that do not consider the larger perspective run the risk of inadvertently damaging long-term site and watershed health and productivity. One goal of this Guide is to suggest that most projects can be undertaken with overall forest health in mind.

Collaboration Supports the Technical Process

In the forest health improvement process, most woodland owners will work collaboratively with experts and specialists to design and implement their projects. You and those working with you will follow sequential project steps from assessment through planning and implementation, to evaluation and monitoring. In this collaboration with others, you will likely rely on:

- Observations and recommendations of experts,
- Cooperation of surrounding owners, where needed,
- Assistance of professional contractors and specialists, as needed.

Ideally, in pursuing this path, you will engage experts and specialists who have the knowledge to evaluate your project site for its full range of resources, and ideally these experts and specialists will fully utilize this knowledge in offering their observations and recommendations for your project. In reality, however, neither you nor those you collectively seek as experts will "do it all," completely. Still, by considering all variables, your project plans are more likely to include the important aspects and guide you to a successful project.

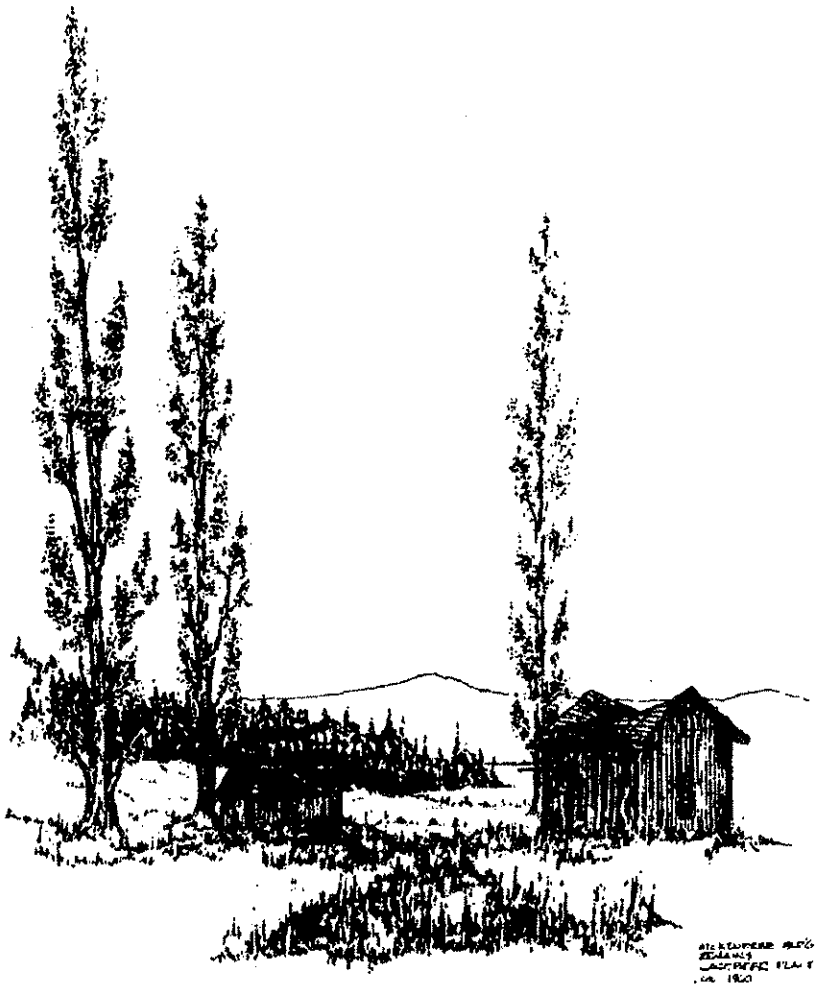
Using a collaborative approach will greatly facilitate the process; but keep in mind that when you depend significantly on the advice of others, the choice of the experts you engage is critical. The better the quality and range of advice you receive, the more probable it is that you will create a first rate improvement plan which will lead to a satisfying result for your project. Usually, there are expenses in hiring experts and contracting for assistance, but generally speaking, if experts, consultants, and

specialists are carefully selected and used efficiently, the benefits far outweigh the costs.

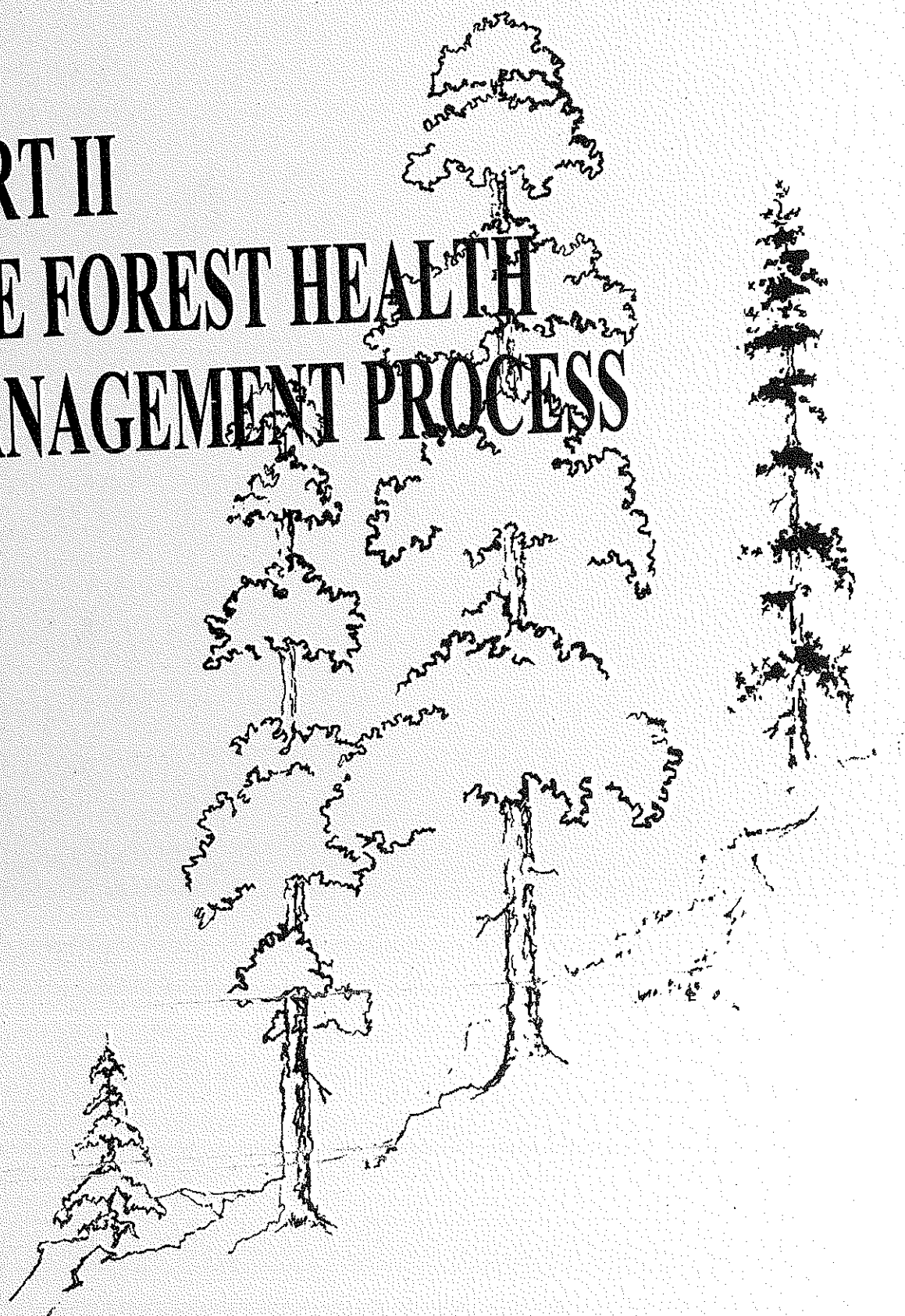
Above all, try not to be overwhelmed. Remember that the process is not as complicated nor difficult as it seems at first, and also keep in mind there is plenty of expertise out there to assist you.

Guide Evaluation

When you finish using the Guide, please fill out the Guide Evaluation Form at the very end of the Guide and send it to the address indicated. Your response will help us to improve the Guide in future editions.



PART II
THE FOREST HEALTH MANAGEMENT PROCESS



Most owners will coordinate project assessment, planning and implementation activities while relying on specialists to provide the technical information and recommendations. Different landowners will assume different degrees of responsibility, and some projects will require a minimum of input from experts, leaving most of the tasks to the ownership group.

You are reminded that the parenthesis after the title for each step indicates whether the primary responsibility for that phase or step typically belongs to you as the owner (owner), or to collaborating experts, consultants, or contractors (experts), or to both (owner/experts).

As the landowner, in the preliminary phase of the process you will probably perform most activities. Your first actions in considering a forest health project are to:

- Recognize the general concepts which apply throughout the process (Chapter 1),
- Consider the relationship between goals, objectives, and techniques (Chapter 2),
- Prepare the platform for starting a successful forest health project or program (Chapter 3).

Your work during this phase will identify your destination and set the general course for your project. The framework you create will allow experts to make their contributions most efficiently.

CHAPTER 1

GENERAL CONCEPTS OF FOREST HEALTH MANAGEMENT

There are eight general concepts identified and described in this chapter. The concepts are suggestions for you to consider as you begin to think about your improvement plan. The numbering of concepts is for reference purposes only and does not imply any such ordering or prioritizing on your part in addressing them. You will note that all concepts in Chapter 1 are primarily the responsibility of the landowner.

8 Concepts of Forest Health Management

#1 Anticipate and Plan - Recall and Evaluate - Adjust,
#2 Think at Different Scales,
#3 Consider Cooperative / Collective Efforts,
#4 Utilize Available Information and Expertise,
#5 Include Economics in the Picture,
#6 Assess Risk,
#7 Consider the Potential Impacts of Activities,
#8 Be Aware of Changing Resource Values

Concept #1: Anticipate and Plan - Recall and Evaluate - Adjust (*owner*)

Plan conscientiously and well, but remain flexible and creative so you will be able to adjust and adapt as opportunities and challenges emerge.

Although the Guide describes the improvement process as a sequence of consecutive steps, the actual process is more like a spiral than a line. You anticipate upcoming steps while you make adjustments after evaluating the consequences of steps you have completed. Improvement projects are more likely to be successful if they are well conceived from the start and if those guiding them remain flexible and creative, adjusting and adapting as options and opportunities are presented or are no longer available. If your initial plans are too sketchy, you may not achieve your project goals and your end product could differ greatly from what you initially envisioned. On the other hand, if you adhere too rigidly to a plan - even a well constructed one - you may end up "missing the forest (the objective) for the trees" (the plan).

Plan conscientiously and well, but remain flexible and creative so you will be able to adjust and adapt as opportunities and challenges emerge.

Concept #2: Think at Different Scales (*owner*)

Consider the effects to all resources, at all levels, and from all perspectives.

Undoubtedly, you have thought of actions that you considered to be great solutions to a problem only to discover that, when considering a broader perspective, your solution had numerous undesirable or unwanted consequences. Take this lesson with you as you plan your improvement project. For example, as you consider what you want to

accomplish for one resource, step back and assess the consequences to other resources in the forest system. Ask yourself:

- Does the effect of the improvement idea remain positive at a smaller or larger scale consideration of the same resource?
- Does a positive result for one resource remain positive for other forest resources in the project area?
- If the improvement idea has a positive effect for the resource system of the project area, does the improvement sustain when you consider the effect to the neighboring properties and surrounding watershed?

Generally speaking, the best improvement ideas benefit the overall resource system and are sensible in terms of limitations and needs of the larger watershed. Test your improvement ideas at different resource and area scales.

Concept #3: Consider Cooperative/ Collective Efforts (*owner*)

In searching for the best approach, always consider the option of cooperating with neighboring landowners in a collective effort. Among the many advantages of collective efforts are their ability to address improvement needs over larger areas with less risk, greater efficiency, and less cost. In considering a cooperative project, you may have to make adjustments in your own pursuits, but cooperation should not require you to sacrifice your own legitimate interests.

Concept #4: Utilize Available Information and Expertise (*owner*)

Make the effort to become generally well informed; then seek and utilize the best advice from the broadest range of qualified experts. There is no need for you to "reinvent the wheel" or try to do everything single handedly. Fortunately, many resources are available to assist you in all phases and steps of the process. One purpose of this Guide is to identify the resources that can assist you as you plan and implement forest health improvement projects. These resources consist primarily of area resource experts (such as private consultants and agency specialists), seminars and workshops, and written and media-based materials.

Concept #5: Include Economics in the Picture (*owner*)

For many projects on smaller acreages, you can accomplish important improvements at minimal cost by spending a weekend or two judiciously thinning with pruning shears and a small chain saw. For larger acreages and projects with multiple objectives, you will probably have to be concerned with designing improvement projects that, if not profitable, at least pay for themselves. Often times, if you can make a small economic investment up front and early in the health and productivity of your woodland, the returns can be considerably increased a few years down the road. Another benefit is that a property whose overall resources are healthy and in good condition is worth more in the marketplace and will be attractive to a larger buying audience and more lenders. Many projects in the area can be designed with a commercial component at the same time forest health is improved. In some cases, you may have to postpone economically marginal parts of comprehensive projects, while in the meantime getting your plans ready so you can take advantage of the market windows of opportunity when they arise.

Concept #6: Assess Risk (*owner*)

Risk is associated with resource conditions, as well as with the activities involved in managing these resources. Unhealthy forests are like unsafe buildings; their condition puts them at significant risk for changes that can result in great loss. Healthy forests are more productive and more resilient, and their resources are at substantially reduced risk from natural influences (such as fire, disease, flood, and drought).

Active management of natural resources is intentional, and its risks involve liability beyond that associated with natural causes. Improvement projects can involve substantial risk, and you are well advised to be knowledgeable and realistic about these risks. Of all improvement techniques, the utilization of fire is probably the most risky in terms of both risk to your woodland resources and your potential liability for damage to surrounding properties. Generally speaking, when it comes to risk, your best strategy is to recognize the risks involved in the treatment options you consider and to plan so as to minimize these risks in all reasonable ways.

Concept #7: Consider the Potential Impacts of Activities (*owner*)

Forests are very complex systems, and our knowledge of them is limited, though growing. Your challenge in managing your woodland is to accept the fact that even under ideal conditions and with the aid of all the best experts, you and your experts will really understand only a fraction of the forest system. The best improvement projects carefully evaluate the options to achieve objectives, respect the extent of our ignorance, and recognize the need to be cautious.

> Because values and perspectives change over time, your most secure management strategy may be to promote the health and vitality of the overall forest resource system.

Concept #8: Be Aware of Changing Resource Values (*owner*)

If you promote the health of the overall forest resource system, the land will be valuable regardless of which resources are highly valued at any one time.

From the natural system perspective, all aspects of the forest system are equally valuable and important. The microbes you cannot see in the soil are just as important for the functioning of the forest system as the tall pines and elk you can easily observe and value. When human needs and desires are superimposed on the natural forest system, different values are assigned to different forest components. For example, from the current economic perspective, large green trees are assigned great monetary value; these same trees as dead snags or rotting logs hold no short-term economic value, but rather are often regarded as an economic waste or loss. From

> Test your improvement ideas at different resource and area scales.

the biological perspective, however, these dead trees and rotting logs assume prime importance as homes for valuable fungi, insects, and wildlife. Aesthetically as well, a snag has a magnificence as great for some people as a live tree. And recreationally, a downed log can constitute a bridge across a stream, a seat for a picnic, or a stage where children can play. These different uses show that value is a matter of perspective, and perspectives are many. As you decide what is

of value to you in your woodland, you will probably want to consider all perspectives.

You also need to be aware that values change over time, both within and among perspectives. A mature pine today is economically valuable primarily for its lumber and secondarily for its chip and fiber potential. In the 90 years it takes to replace that tree, alternative and less expensive sources may be found to supply these materials. In that same time period, forest fungi such as mushrooms or certain minerals may become economically more important than trees. In that same 90 years, the biological or recreational perspective may supersede the economic perspective in relative importance in valuing forests.

Because values and perspectives change over time, your most secure management strategy may be to promote the health and vitality of the overall forest resource system. If you use this approach, you will benefit for as long as any forest and woodland resources have value from any perspective.

CHAPTER 2

CONNECTING GOALS WITH OBJECTIVES AND TECHNIQUES

Distinguishing among goals, objectives and techniques and recognizing how they interconnect is important for effective project planning.

One assumption in the Guide is that humans participate in and are part of the forest ecosystem. As part of the forest system, the health of humans and that of the forest are inseparable, and therefore goals and objectives for both are inherently part of any consideration of forest health objectives.

Humans, like all forest components, place demands on the system. The difference is that humans are in the unique position where their decisions are of a magnitude to influence the overall system. The forest ecosystem can be sustainable, as long as humans - as participants and managers, realistically balance their short- and long-term demands against the needs of the other parts of the system.

Experts and specialists will help you to refine your goals and objectives, and they will suggest techniques, but as the landholder, you will ultimately decide what you want to achieve and how you want to go about it.

Defining Goals, Objectives and Techniques (*owner*)

Generally speaking, goals are desired system conditions; objectives are desired specific conditions; and techniques are specific activities selected to achieve objectives.

Goals: Goals are the most general conditions that you as the landholder are striving towards. An example of a general goal you might adopt is: to improve forest health on your property while contributing to the improved health of your sub-watershed or watershed.

Objectives: Objectives are more specific targets for change. When objectives are taken together and met, you should expect your goals to be met. An objective within the above general forest health goal might be: to improve water quality and flows on the property.

Techniques: Techniques are specific kinds of activities you select, expecting that they will enable you to achieve your objectives. Listed below are three techniques you might select singly, or in combination, to help meet your objective of improving water quality and flows on your property:

- Replace a single, large, central road culvert with several smaller dispersed culverts,
- Plant willows along stream banks,
- Fence to create a riparian pasture, thereby controlling stream banks and beds.

Most forest health improvement plans will have multiple objectives that require using a combination of techniques over time to be fully met.

What You Should Know About Goals (*owner*)

Goals are general intentions, so you will usually have only a few of them. You could have a single all encompassing goal or possibly a few goals that you regard as separate. As your plan proceeds, you may discover incompatibility between some of your goals, in which case you will have to make some compromises or decide which goals to keep and which to discard. Where forest health improvement is of general concern, many objectives fit together under one umbrella goal. If you subscribe to the goal of achieving improvement of the conditions on your community watershed, you will most likely want to think in terms of this more general goal as you develop projects on your own woodlands.

If forest health is not a goal for you, the Guide encourages you to include it as a strong consideration as you pursue more specific goals.

What You Should Know About Objectives (*owner*)

Your objectives can be more general or more specific. The more specific your objectives are, the more individual objectives you are likely to have for your project. Because humans are part of the forest system and also manage it, you will want to include human objectives as part of your forest health objectives. In the box on this page you will find eleven general natural system and human system forest health objectives. You will find that most more specific objectives will fit in these general objective categories.

Objectives can be more specific within the identified categories. For example, your focus within a concern for improving the condition of the plant communities [Objective #3] might be to improve the quality of the ponderosa pine trees in a stand of trees; or your objective might be to maximize mule deer habitat [Objective #6] so that you can have the best deer hunting possible on your property [Objective #9]. When you think carefully about the full array of resources that are

List of Objectives

Improvement projects may address a landowner's desired changes by selecting some or all of the following general objectives:

#1 Reduce the Risk of Damage from Fire
#2 Reduce the Risk of Insect and Pest Damage
#3 Improve the Condition of the Plant Communities — **Natural System**
#4 Improve Water Quality and Flows
#5 Improve Soil Conditions
#6 Improve Habitat for Fish and Wildlife

#7 Generate Economic Returns
#8 Improve Habitat for Domestic Animals/Livestock
#9 Improve Recreation Opportunities — **Human System**
#10 Protect Historical and Cultural Resources
#11 Improve and Protect Spiritual and Aesthetic Opportunities

valuable to you on your property, you will probably discover that a project which begins with you identifying a single objective turns out to actually have several objectives, all of which are significant to you, though to different degrees.

Although most objectives listed above are self-explanatory, three objectives (#3, 7, and 9) require some additional comment. "Plant Communities" in objective #3 may not be a familiar phrase to some people. This term refers to the fact that plants usually occur in groupings or associations related to soil type, moisture conditions, elevation, exposure, and climate. For the south-central Oregon area, over 60 forest and forest-associated plant communities have been identified according to the dominant tree, shrub, and grass/herbaceous perennial plants in the community. An example community is: Ponderosa/Bitterbrush/Manzanita/Sedge.

Objective #7 (Generate Economic Returns) recognizes that humans are part of the forest ecosystem. Economic return refers to direct return in the form of income and to capital appreciation resulting from an increase in property value. Generally, when you improve the health of the overall forest system, you benefit in both ways since a healthier system is capable of producing more income in the long term and is worth more both for its increased capacity for production and because it appeals to a broader group of potential purchasers. If you have economic returns as a major objective in your forest management, you will probably want to keep both income and capital appreciation in mind as you design your projects.

Objective #9 (Improve Recreation Opportunities) includes hunting, gathering and fishing, as well as hiking, biking, climbing, skiing, swimming, boating, horseback riding, etc. When any of these activities reach subsistence or commercial significance, they may overlap with or shift to the economic objective (#7).

What You Should Know About Techniques (*owner/expert*)

Techniques are the specific activities you select to achieve your objectives. There are a great many techniques, but most fit into the following eight general categories identified in the following chart:

Techniques List

#1 Thinning and Culling
#2 Building, Rebuilding, Relocating or Obliterating Roads and Trails
#3 Treating Fuel Loads (Biomass Removal, Crushing and Mulching, Piling or Lop and Scatter, Burning/Underburning)
#4 Altering Human and Animal Access and Use
#5 Introducing Plant and Animal Species
#6 Manipulating Water Systems
#7 Treating Soils
#8 Marking and Flagging

Examples of more specific techniques within the general technique category of Thinning and Culling include: Pre-commercial Tree Thinning - Mechanical - Chain Saw; or Live Trapping and Relocating - Beaver.

What follows is a description of each technique category, including reference to the objectives generally associated with them. The objectives referenced are from the list of 11 objectives identified on the previous page. An asterisk (*) indicates the technique is a major one associated with that objective.

Technique #1 Thinning and Culling

In thinning and culling, you selectively remove some of the population of a plant or animal species from a particular area. Total removal amounts to eradication. You may want to selectively cull animals where their numbers are too great for the area to properly support, where their numbers hinder efforts to return an area to a healthier condition, or where they compete for limited resources with other animals that are more highly valued. Culling may involve hunting, poisoning, or trapping (live trapping and relocating where possible). *If you develop a plan that includes culling of wild animals, however, you should have your plan reviewed and approved by the Oregon Department of Fish and Wildlife before implementation because wildlife is the property of the state.* In most instances, you will find that using techniques that alter wildlife habitat are effective in controlling animal populations. In some cases (such as with beaver, muskrats, ground squirrels, and gophers), culling may be needed. In a few cases (such as with beaver), you may need to develop an ongoing program of culling to achieve the desired balance.

It is not recommended that your plan involve eradicating an entire plant or animal species from an area where it naturally occurs. Experience has shown repeatedly that a naturally occurring species that may seem to be "worthless" or even a nuisance turns out to perform an important function in the overall balance of the resource system. On the other hand, species eradication may be appropriate in your plan when the plant or animal species is an introduced exotic and competes to the detriment of native species (such as cheat grass/blue bunch grass; brook trout/bull trout). Exotic plant (weed) control and eradication efforts are more common to grasslands than to woodlands, but may occur as a prescription in the moist and dry meadows associated with the forests of south-central Oregon.

Thinning of a plant species is a technique utilized where excessive plant numbers result in an unhealthy condition (stress with a high likelihood of pest or disease infestation). For example, in the last 50-80 years of systematic suppression of wildfire in the overall area, the region's forests and grasslands have generally become much more densely populated (overstocked) with trees and shrubs. This fire suppression policy on woodlands has generally resulted in certain plant species (such as juniper and white fir) encroaching on ecological locations where, with fire, they would have been excluded. Thinning is one of the major techniques available to address this situation. Most plans that require thinning utilize mechanical thinning techniques (chain saw and loppers). *Because of the risk to surrounding species and water systems, thinning or eradication plans that use chemical techniques (pesticides) should be reviewed and approved by the Animal and Plant Health Inspection Service (APHIS) and Oregon Department of Forestry (ODF) before being implemented.*

Thinning can address several objectives. Asterisk(*) indicates a primary objective.

- *Reduce risk of damage from fire, (Objective #1)
- *Reduce risk of insect and pest damage, (Objective #2)
- *Improve condition of the plant communities, (Objective # 3)
- Improve water quality and flows, (Objective # 4)
- Improve habitat for fish and wildlife, (Objective #6)
- Generate economic returns, (Objective #7)
- Improve habitat for domestic animals/livestock. (Objective #8)

Prescribed Fire as Thinning Technique

Controlled (prescribed) fire is another thinning technique. Using fire to thin forest stands is much faster than other techniques, but it is risky to control and minimally selective. In circumstances where broad areas need to be thinned without the need for selectivity and where the control risk can be minimized, fire may be an appropriate thinning prescription. Although fire is a natural part of the environment, because of the risks involved with its intentional use, *any improvement plan that includes fire as a technique should be reviewed by ODF and implemented with great caution and all the expert assistance and cooperation you can get.*

Pre-commercial / Commercial Thinning

Thinning is generally separated into Pre-commercial Thinning and Commercial Thinning, depending on whether the resulting product has a market and will attract bids on a sale. You can combine the two by writing a commercial thinning prescription to include the felling and treatment of noncommercial materials. In the tradeoff, you can accomplish the overall thinning results you want, but you must be willing to accept a reduction in income to cover the additional thinning cost. Many improvement projects are designed using this approach. The primary benefit of thinning is the reduction of stress from excessive competition. Less stress generally translates into a lower risk of damage from disease and pests and a faster growth rate for the remaining vegetation.

Successful Thinning

The key to successful thinning of any type is to select the right trees to leave and to remove. Careful marking is essential. Where long-term forest health is the goal, you will want to mark to leave the best plants with the proper spacing. If you take an active interest in the marking or learn to do it yourself, you have the best chance that the thinning activity will produce the results you want for yourself and your woodlands.

Technique #2 Building, Rebuilding, Relocating or Obliterating Roads and Trails

The obliteration, improvement, or relocation of roads may be an important part of your improvement plan. Your objective should be to design a road and trail system for your property that meets your movement needs while impacting the natural ecology as little as possible. Important considerations in designing road and trail systems include knowledge of the following factors:

- Soils of the project area, including their condition (especially extent of erosion and compaction) and their anticipated response to the pressure exerted by vehicles,
- Movement and flow pattern of water on the project site (area hydrology),
- Gradient/slope of the land,
- Exposure and climate of the project area.

To support vehicle loads and to help water drain off, most roads are built up by intentionally hardening the road bed and successive surfaces. As a result, most roads act as dams that halt the natural downhill flow of water at the soil's surface and in its top layers. Roads that spiral around slopes and run along or across riparian zones tend to impede the gradual seeping and percolation of water and to channel water flows. The result is that water is concentrated and encouraged to move more rapidly through the watershed and with increased force. The effects can be to reduce the overall water-holding capacity of the area, to increase the likelihood of soil erosion, and to release the water earlier and more quickly than would occur naturally.

In a semiarid area where water is a precious commodity, it is desirable to minimize the negative effects of roads as much as possible. This is the reason most watershed improvement plans consider eliminating all skid trails and roads that are not really needed and redesigning and relocating roads that interfere significantly with natural hydrologic function. But roads are expensive to build and more expensive to build to accommodate the natural hydrology.

Road design and road building are specialized skills; so, if you are considering building roads or altering the road or trail system on your property as part of your improvement project, your plans will mostly likely benefit from the advice of a professional hydrologist and a forest road builder. Designing and building roads to accommodate the natural hydrology of an area is relatively new, so you may need to review the experience of several road builders to locate someone able to build roads with this perspective in mind.

Technique #3 Treating Fuel Loads

Due to long-term wildfire suppression, "down and woody" fuel loads have accumulated to excessive degrees on the forest floor over most of the woodlands of south-central Oregon. Prior to this suppression regime, frequent fires were a natural component of the forest ecology of the high plateau east of the Cascades. These fires usually moved quickly across the forest floor, consuming a small fuel load of grass, duff, brush and saplings. The fire rarely burned long or hot enough to do significant damage to either the organics of the soil or the roots or living layer of larger trees. And these fires rarely reached the overstory canopy of the forest to result in stand replacement events. Ironically, our best intentions to suppress all wildfire over the last 80 years have significantly increased the risk that the fires that now occur will be hot, stand-replacement fires of potentially catastrophic proportions.

With the excessive fuel problem being as widespread as it is in the region, treating fuel loads is likely to be a part of your forest health improvement plans. Unfortunately, dense stands of small trees which have arisen with logging and fire suppression often accompany and complicate the excess fuels problem. Mechanical thinning can address the density and fuel ladder problems, but the material felled in thinning adds to the ground fuel buildup. To address both the density and ground fuel load challenges, you will generally have to combine thinning with the selection of one or more of the following techniques:

Biomass Removal

In biomass removal, the forest floor is stripped of its excess layer of leaves, needles, twigs, and branches. This excess material is ground up and hauled away for a variety of uses. Advantages to this approach are:

- Excess biomass is eliminated while being fully utilized,
- No significant air pollution,
- Low risk of potential damage to surrounding properties.

Disadvantages of biomass removal are:

- Comprehensive disturbance to forest floor,
- Potential for widespread compaction of the soil,
- Potential loss of nutrients,
- Current lack of a commercial market for the product on a scale sufficient to address the scope of the problem.

Currently, biomass removal may work in a plan where you have a use for the product on your own land (such as when chipped and mulched as a soil additive for fields and

pastures). For most owners, this technique is worth keeping in mind as a possible future option.

Crushing and Mulching

Another possible approach to reducing fuel loads and the likelihood of catastrophic fire is crushing and mulching, which involves compressing the biomass on the forest floor into smaller pieces to encourage more rapid decay.

Advantages of crushing and mulching are:

- Potential to improve forest soils by retaining the forest's own biomass and nutrients,
- No expensive hauling away of the biomass,
- Minimal air pollution,
- Little risk to surrounding properties.

Disadvantages of crushing and mulching include:

- Comprehensive disturbance of forest floor and soils,
- Potential compaction of soils,
- Potential for hot fire at ground level damaging tree roots and soil's organic layer,
- Cost of treatment not offset by sale of a forest product.

Piling of Fuels or Lop and Scatter

The technique of piling to reduce fire severity has been used for many years. This activity is the opposite of the Lop and Scatter approach to dealing with the residue of logging activity. The advantages of the one activity are the disadvantages of the other. Typically, neither technique addresses cumulative buildup of fuels, only those of the current activity. Lop and Scatter distributes the material over the forest floor and is intended to distribute nutrients and woody material evenly, but in so doing it adds to the continuous fuel load and does not reduce the material to small pieces as in crushing and mulching.

Piling gathers the material into piles, breaking up the continuous fuel situation. This technique does not produce the same benefit to the soil and plants because there is an uneven distribution of nutrients and organic material. Piles are sometimes left to benefit some wildlife and sometimes burned, combining piling with spot burning. Pile burning unfortunately can result in localized hot fires that damage soils and tree roots in the pile areas. Piling can be done by hand or using mechanical equipment. Hand piling is more labor-intensive, but much less disturbing to the soil than mechanical piling.

Treatment of fuels can directly affect the accomplishment of several goals. The primary objectives have an asterisk (*) in front of them.

- *Reduce Risk of Damage from Fire (Objective #1)
- Reduce Risk of Insect and Pest Damage (Objective #2)
- Improve Condition of the Plant Communities (Objective #3)
- Improve Water Quality and Flows (Objective #4)
- Improve Habitat for Fish and Wildlife (Objective #6)
- Improve Habitat for Domestic Animals (Objective #8)

Burning/Underburning

Use of burning and underburning has increased in recent years. Burning (the practice of gathering and burning slash piles) to reduce fuels has been common for a long time. With the increased awareness in recent years of the buildup of forest floor fuels and the increasing risk of catastrophic fire, underburning, in all but young, forest regeneration situations, has emerged as one of the most common treatments to address moderate-to-heavy fuel loads over large areas.

Thinning of small trees and saplings is often done prior to underburning to eliminate fuel ladders, which otherwise could allow fire to ascend into the canopy of the forest overstory. When conducted by specialists with the proper timing and sufficient backup equipment and personnel, underburning can be very efficient and effective.

For heavy fuel loads, you will probably discover that you need two or three burns separated by three to five years to bring the conditions into desired ranges. Thereafter, you may only need to underburn about every 15 years to keep fuels within proper limits.

When done properly, the advantages of underburning include:

- Rapid treatment of relatively large areas,
- Even distribution of the nutrient residue,
- Use of a natural disturbance with minimal additional disturbance to resources,
- Cost-effectiveness among the currently available fuel reduction options.

Disadvantages of underburning are:

- A significant amount of air pollution at a time when air quality is of increasing concern,
- High risk to both the resource system and surrounding properties if the fire gets out of control,
- High risk to young trees that timber-oriented enterprises depend on for replacement stock.

The success and safety of underburning in your plan depends on:

- Expertise of the personnel planning and conducting the underburning,
- Site preparation,
- Timing of the burning,
- Sufficient backup support.

Expert assistance at all points in the underburning process, from planning through implementation, is essential. Attempting an underburn without proper site preparation and trained backup personnel is an invitation to disaster.

Consider Time of Year When Burning

Since most natural wildfires east of the Cascades occur in the Summer and early Fall due to lightning strikes, the times prior to and following these times (Spring and mid to later Fall) are the windows of opportunity for controlled underburns. During thc Spring and latter part of Fall, the higher moisture content of the fuels and lower surrounding temperatures make for conditions where the fire is more controllable. Spring underburning is generally less risky, because fuel moisture conditions and temperatures are more predictable and accommodating. If you do Spring burning, however, be aware that Spring is not the natural time for fires to occur, so during this time many forest floor plants are just emerging from dormancy and are most sensitive to fire. In the Fall, many of these same plants have already moved into dormancy due to the dry summer conditions.

Consider Weather and Timing When Burning
Other conditions to consider in your underburning plans are time of day and weather conditions, particularly wind strength and direction. Be aware that in the high mountain plateau area, winds generally escalate during the day, becoming strongest in late afternoon. Backburning (burning in the direction opposite of the wind) is the general approach in underburning. Because shifts in the wind are a great concern, it is important to watch weather forecasts closely for periods of low to moderate winds and higher predictability for wind direction.

The slope of the land and the direction it faces (aspect) are also important considerations in planning an underburn. In addition, sufficient basic support and backup support in equipment and personnel are part of any good burn plan.

Clearly, if you are thinking about using underburning as part of your improvement project, you will want to consult with burn specialists. You will also want to talk with other woodland owners to explore the potential for cooperative arrangements to reduce the costs and risks. And, too, *you will need to submit your underburning plan to ODF for their review and approval prior to implementing the treatment.*

Technique #4 Altering Access and Use by Humans and Animals

Controlling Human Access
Unlike public lands, private property is protected by trespass laws that discourage unwanted intrusion by other people. Consequently, permitting and regulation generally are not used on private lands, although they can be. One example would be requiring outsiders to obtain permits from the owner for hunting or fishing. In most cases where human use is negatively impacting the resources, owners can eliminate the problem by posting signs in appropriate locations, installing fencing and gates with locks, and erecting barriers to vehicles. Where use by outsiders is traditional and recognized in the surrounding community, the best approach may be to contact the primary users, indicate what you see as the problems, and ask for their suggestions and cooperation in addressing the problems before you start putting up signs and building closures. Appealing to law enforcement to solve the problem may be necessary, but this move is probably best employed as a last resort. Cooperation is what you are looking for, and making people angry can produce a result just the opposite of what you want.

Discouraging Access by Wild Animals
Occasionally, wild animals can disrupt an area's ecology. If you think you need to alter wild animal or fish access and use on your property to address a forest health issue, you will need to contact ODF&W to get an evaluation and recommendation. Wild animals and fish are the property of the state since they typically travel across private ownership boundaries; therefore, *plans to alter their access or use on private lands (especially for game animals and fish) must be approved by the state regulatory agency, in this case ODF&W.*

Controlling Access of Domestic Animals

Recently, there has been increased understanding about the ability of domestic animals, especially livestock, to disrupt the ecology of range and forest lands, especially in riparian areas. If livestock are managed so that they do not have unrestricted access to and use of riparian areas and stream banks and beds, the health of the forests and grasslands of the area - as well as the quality and flow of water - are expected to improve.

Two approaches are being taken to address control of domestic animals. One approach focuses on creating physical barriers to keep livestock away from water courses, while supplying alternative water sources in locations away from streams and riparian zones. Alternative water sources encourage livestock to disperse rather than concentrate in riparian areas, especially later in the grazing season. Most riparian barriers take the form of fences, and there is currently a substantial program to assist ranchers with fencing efforts. This program may increase in future years with the statewide effort to improve water quality in streams and to improve the habitat for fish, especially salmon and trout.

The second approach to managing livestock emphasizes movement and timing strategies. You can greatly reduce the negative impact of animals on vegetation and stream banks and beds if you keep the animals moving, not allowing them to concentrate for long periods of time in stream and riparian zones. Other ways you can significantly improve riparian areas are to put livestock in riparian pastures for shorter, more intense periods, or for different periods in different years, or at times when forage plants and soils are not especially sensitive. Also, if you remove livestock from riparian pastures in time for forage plants to recover at the end of the grazing season, the plants can remain vigorous while providing the protection to withstand the erosive effects of flood events which generally occur in the late winter and spring. Healthy grasses and shrubs (especially in riparian areas) resist erosion, restrain sedimentation, contribute to the water table remaining high, and provide shade and cover for fish and wildlife. A higher water table usually results in cooler water temperatures, greater amounts of water being stored in the ground to sustain longer flows, and in a widened riparian zone capable of sustaining a lot more forage for a longer period of time. Healthy riparian zones can simultaneously benefit ranchers, water conditions, and fish and wildlife.

The general recognition about the recovery value of fallow periods for agricultural lands is being extended to pasture lands, especially grazing areas on public lands. These lands have had heavy, long-term use and have lost vegetation important to restraining erosion and sustaining water tables and flows. The preferred management approach now being pursued on these lands is a program combining a period of rest with revegetation. After conditions improve, livestock can be reintroduced, usually following adjusted management strategies, as discussed above.

Some experts think that implementing effective movement and timing practices in livestock management can limit the need for fencing to select locations. Because of the

ongoing costs of maintaining riparian fencing systems over the extensive areas involved, fencing alone is probably not a realistic solution. In addition, comprehensive fencing of riparian areas often negatively impacts aesthetic and recreational resources and uses. If the area of your project includes wet meadows or perennial or intermittent streams, and your plan includes grazing livestock in this area, you may want to consider fencing, alternative water sources, and/or alternative management strategies in your improvement plan.

Altering access and use patterns of livestock may contribute to achieving the following objectives. Major objectives are preceded by an asterisk (*).

- *Improve Condition of the Plant Communities (Objective #3)
- *Improve Water Quality and Flows (Objective #4)
- *Improve Soil Conditions (Objective #5)
- *Improve Habitat for Fish and Wildlife (Objective #6)
- *Improve Habitat for Domestic Animals (Objective #8)
- Improve Recreation Opportunities (Objective #9)
- Improve and Protect Spiritual and Aesthetic Opportunities (Objective #11)

Technique #5 Reintroducing Plant and Animal Species

Native plants and animals can be reintroduced when conditions will support them.

Native Versus Nonnative Species

Plants and animals that are native to an area, but which have been either eliminated or severely reduced in numbers, generally can be reintroduced or encouraged so as to benefit the system. Of course, if reintroductions are to be successful, you must address the conditions that contributed to their loss to begin with. *Plans to introduce nonnative species or species not associated with the ecology of the location should be approved by ODF and/or Oregon Department of Fish and Wildlife (ODF&W).* Introduction of exotics is generally discouraged, because these species most often will not do well. Occasionally, however, exotic species may be so successful that they take over and out-compete the natives that belong in the system, upsetting the overall ecological balance. Examples are gypsy moths, black birds, water hyacinths, and bull thistles in America and rabbits in Australia.

Plant and Animal Reintroductions

Willows, which at one time were the object of comprehensive eradication programs, are now highly recommended for reintroduction in most riparian and riverine settings. Willows are noted for their ability to stabilize stream banks, reduce erosion and sedimentation, and provide shade for better fish habitat. Willows and aspens are common to the upland meadows and river systems of the high plateau and are staples in the diet of the beaver, once prevalent throughout the watersheds of the entire area.

The beaver, like the willow, has been the subject of systematic trapping and eradication programs. While being viewed as problematic to farmers and ranchers who depend on irrigation systems, beaver are nevertheless recognized as the native architects of the upland and riparian water system. If the beaver fits into your plans, you will find reintroduction programs, including some that successfully manage beaver in conjunction with livestock grazing and irrigation systems. Wildlife biologists and botanists of the area can offer you advice on the wisdom of plant

and animal introductions and the habitats necessary to support them.

Reintroduction of native plant and animal species can have a positive effect upon the following objectives.

- *Improve Condition of the Plant Communities (Objective #3)
- *Improve Water Quality and Flows (Objective #4)
- *Improve Habitat for Fish and Wildlife (Objective #6)
- Generate Economic Returns (Objective #7)
- Improve Habitat for Domestic Animals (Objective #8)
- Improve Recreation Opportunities (Objective #9)
- Improve and Protect Spiritual and Aesthetic Opportunities (Objective #11)

Technique #6 Manipulating Water Systems

From a management standpoint, hydrologic systems include ground water and surface water, both standing and flowing. These systems can be naturally occurring, human altered (such as dams), or human made (such as wells and irrigation systems). Because water is generally recognized as the limiting ecological factor for most semi-arid eastside ecosystems, the state of the hydrologic system and how water is manipulated and affected in any improvement plan is one of the things you will want to consider carefully. Wells, dams, and water impoundments may be involved in projects where providing dispersed water sources is important for livestock or wildlife. Irrigation systems may be part of your larger property system, but irrigation alone is rarely involved in forest health projects.

Common Water System Manipulations

The most common water system manipulations in forest health improvement projects involve adjustments to roads and stream banks, beds and channels. The relation between roads and trails, and hydrology is discussed in the earlier technique section on "Building, Rebuilding, Relocating or Obliterating Roads and Trails."

A frequently used technique you might consider to improve stream conditions in wooded riparian zones is the addition of large woody material - generally downed trees, into water courses. Placing woody material into water courses can slow water flows, increase pooling for fish habitat, and increase stream meandering.

Some improvement projects may include altering streams by mechanically restructuring stream channels, beds and banks. *Stream restructuring activities are usually best undertaken with the advice of a professional hydrologist and also may require local, state, and federal plan review and approval.* Generally speaking, most planners try to keep such alterations to a minimum, relying instead on improvements to stream conditions that can

often be achieved with revegetation and alternative approaches to livestock management.

Using Beaver in Water Management

In natural water systems in the semi-arid west, the beaver was historically the natural architect, manager and maintainer of large portions of these systems. Eradication of the beaver across vast areas of this animal's former range is primarily due to conflict between the beaver, farmers, ranchers, and their irrigation systems. In recent years, however, many experts have realized that if properly managed, the beaver can benefit water management to the point of outweighing the problems the animal poses. If your vegetation conditions allow and you are willing to commit to managing the beaver population, you may want to consider beaver reintroduction to improve water conditions on your woodlands.

Water Regulations and Rights

If water management is part of your improvement project, keep in mind that water is a state-owned commodity subject to federal regulations wherever water is navigable or wetlands are present. With the exception of residential or domestic use of water, private landowners must possess or obtain a state water right for the use of water on their land. Such water rights are granted as the right to use a specified amount of water from a particular source for a specified purpose at a particular location. A common mistake landowners make is to assume that their water right allows them to use the water for whatever purpose they decide and wherever they elect. In fact, a change in any of the landholder's water right specifications (such as amount, source, use, location, and sometimes timing) must be registered and approved by the Oregon Water Resources Department. Failure to do so can result in the owner losing the water right. Contact the Oregon Water Resources Department for the free pamphlet, "Water Rights in Oregon," October, 1997.

Need For Review and Approval of Projects

The matter of water rights and federal regulation of water is a complicated one. *If your improvement project plans involve altering or manipulating the existing water system, your plan must be approved by the local watermaster and county planning department and then submitted to the Oregon Division of State Lands, which will coordinate review by the necessary state and federal agencies before authorizing the project.* Landowners should be aware that this plan review process can easily take from six months to a year for what may seem like a rather simple and straight forward project. Attempts to avoid this process can have very serious consequences.

Work undertaken to improve the natural flow of water systems will generally also positively affect the following objectives:

- Improve Condition of the Plant Communities (Objective #3)
- *Improve Water Quality and Flows (Objective #4)
- Improve Soil Conditions (Objective #5)
- *Improve Habitat for Fish and Wildlife (Objective #6)
- Generate Economic Returns (Objective #7)
- *Improve Habitat for Domestic Animals (Objective #8)
- *Improve Recreation Opportunities (Objective #9)
- Improve and Protect Spiritual and Aesthetic Opportunities (Objective #11)

Technique #7 Treating Soils

Understanding soil types and soil horizons can help you maintain soil health, avoid excessive disturbance, and remedy existing problems.

Soils in the area range from the very coarse gravels through the sands to the silts and clays, and from mineral subsoils to organic topsoils. Recently, there has been increasing appreciation of the complex interactions in the organic layer of natural soils and the importance of sustaining this activity as a whole, particularly in forest soils. Soils in a semi-arid climate like that of south-central Oregon have a relatively low tolerance for disturbance. In some situations, a single pass by a churning dirt bike can set up conditions for wind and water erosion to begin.

Get to Know Your Soil

Knowing the soil types in the area of your project, their locations, and their potential reactions and sensitivities will be very valuable in your planning. Comprehensive soil surveys, including soil mapping for your property, are generally available from either the County Agricultural Extension Service or the Natural Resource Conservation Service (the former Soil and Water Conservation Service) in your area. These county-based soil surveys contain a great deal of information on potential uses and special qualities of the different soil types.

Current Focus of Soil Management

By contrast to farming areas, woodlands have relatively few treatments offering improvement. Intensive forestry management still includes the option for artificial fertilization. However, this technique is limited to very select situations due to its expense for a long-term crop and due to increased awareness that some fertilizers disrupt the soil system. The current management focus for soils is on activities that maintain and promote naturally healthy soils, including:

- Keeping human-generated soil disturbances to a minimum.
- Recognizing the role that litter and downed woody material play together with fire and moisture in building soil organics.
- Retaining and dispersing the nutrient-rich, fast-growing portions of plants when timber harvesting occurs.

Healthy forest soils can contribute to reaching the following goals:

*Reduce risk of insect and pest damage, (Objective #2)
*Improve condition of the plant communities, (Objective #3)
*Improve water quality and flows, (Objective #4)
*Improve soil conditions, (Objective #5)
Improve habitat for fish and wildlife, (Objective #6)
Generate economic returns. (Objective #7)

Greatest Soil Concerns

The two forms of soil disturbance generally of greatest concern for forest soils in south-central Oregon are the mixing of layers and compaction. The soil horizon consists of fairly distinct layers, each having different composition and separate functions, but all of which work together closely. When these layers are mixed, the horizon and functions are disrupted.

When machinery is used that produces a churning effect in the soil, layer mixing is likely to occur. As timber harvesting has become increasingly automated, the comprehensive use of machinery across the forest floor has become more common, escalating concern about the extent of soil mixing.

The same concern applies to compaction resulting when soil is subjected to the load pressure of equipment tires and tracks or animal hooves. Compaction hardens the soil by forcing the soil grains closer together, reduces moisture and root penetration, limits organic activity, and can severely retard plant growth. Certain soils types and soil moisture conditions are associated with compaction readily occurring. It is important to know which soils are in this category, where these sensitive soils are located, and when they are most vulnerable. In areas having compaction prone soils and sensitive conditions, 80 percent of the compaction can occur with the first pass of heavy tired machinery. Where compaction is severe enough, ripping the area may be the only option. Care must be taken to avoid damage to plant roots and excessive soil mixing during the ripping.

Consulting a Specialist

If your project area has possible problems with soil conditions, you may want to consult a soil specialist. If you need advice regarding soils, remember that a forest hydrologist can assess water as well since hydrologists are necessarily trained in soil science. The Agricultural Extension Service and the Natural Resource Conservation Service are excellent sources of information and advice on soils and hydrology.

Technique #8 Marking and Flagging

Although marking and flagging are most often associated with other techniques, each can stand alone. For example, project boundaries, resource areas, or vehicle pathways may be flagged so they can be readily observed and respected. In thinning or other harvesting activities, trees may be marked to be retained, as well as to be taken. Marking and flagging are important techniques for controlling movement and protecting resources quite apart from their identification role in the service of other techniques. The most common marking techniques involve using plastic tape, small flags, or special paints that do not harm vegetation. Different colored paints, tapes, and flags can be used to distinguish between different meanings and make these designations immediately recognizable.

Technique #9 Documenting and Monitoring

Documenting and monitoring are designed to provide information about initial project site conditions and about the process and effects of implementing standard techniques. When used, these techniques generally are employed before, during, and after implementation of standard techniques such as the eight listed in the preceding section.

The information you derive and compile through documenting and monitoring forms the basis for you to objectively evaluate any changes resulting from your projects. If monitoring indicates that the changes are what you desire, your project is successful; if the changes are not producing your desired results, your project may be partially successful or a total failure. If you do not use the techniques of documenting and monitoring, you have only subjective impressions to rely on for determining the results of your project. Good future management plans generally depend on knowing the results of current management decisions. In this context, impressions are often not sufficient. This is the reason documenting and monitoring are considered an integral part of most good improvement projects. Because of their significance, you will find additional discussions about documenting and monitoring included in other sections in the Guide, including the entire Chapter 7 on Monitoring and Adaptive Management.

CHAPTER 3

SETTING THE PROJECT STAGE

Beginning your project involves three tasks:

- Developing Initial Objectives
- Organizing Information and Mapping
- Setting Up for Documentation

Each task is described in detail below. Like the concepts in Chapter 1, the primary responsibility for these three tasks generally belongs to the landowner.

Task #1 Develop Initial Objectives (*owner*)

To design a desired future, it is important to know the land and its history and to achieve ownership consensus for the general improvement direction. Forest health management projects are conceived when you identify desired changes to the conditions on your property.

New Landowners

If you are new to your land, there are probably reasons you were attracted to it. Unless you are experienced in understanding lands of the area, as a newcomer you will want to fill in your general impression with a more detailed understanding and feel for your property before you try to define an improvement path. Most importantly, you should become familiar with your land by spending time observing what is there and what is happening, through the seasons. As the relationship with your land grows, others will share their impressions with you. You can also solicit observations of neighbors and experts.

Long-Time Residents

In contrast to the newcomer, you may be a longtime resident of the area with your family having owned the property for generations. As an "old-timer," you may be personally aware of how conditions have changed on your property over time, and you probably have a good sense of what conditions on your property you like and do not like. It is also possible that you are so familiar with the property from a workaday perspective that you overlook what may be some important and valuable aspects of the land. Even as a longtime resident, you can probably benefit from a fresh overall look at your property.

Compiling a History of Your Land

Knowing the history of your land is important whether you are a newcomer or a longtime resident. To know where you want to go with your land, you want to consider where it has been - the history of its management and use. You can get a sense of the property over time by reviewing family records, journals, diaries and albums, title records, old aerial photos, and gleaning information from local history associations and collections. Neighbors, previous owners, and longtime residents of the area are additional sources of information. Outlining the management history of your property and its conditions through time will give you a better sense of how your land reached its current state and also how your own ideas for improvement fit into this progression. As an example, knowing that what is now a wet meadow with a seasonal

stream on your property once supported a perennial stream with abundant willows and aspen, beaver ponds, and trout may influence your thinking about what you would like to accomplish in your improvement project. Experts are not likely to provide you with much historical perspective, so if you want the benefit of this point of view, you will have to do some digging as part of your preliminary project preparations.

Forming Initial Goals and Objectives

When you have a reasonably good sense of your property, your approach to thinking about improvement goals and objectives will depend on the type of person you are. You can approach thinking about goals and objectives in terms of correcting the problems you perceive, or in terms of realizing the potential you envision, or both. With your experience of your land as a backdrop, you probably have identified some objectives described in the previous chapter as relevant to either the problems or potential of your property. If this is the case, or if you had fairly clear objectives in mind before you picked up the Guide, you have already started the process of forming initial goals and objectives.

If others besides you participate in your land ownership, or have a recognized stake in your property, it is important to involve these people in the process of identifying and prioritizing goals and objectives. Typically, different individuals perceive the land differently and assign importance to various resources in different ways and to different degrees. Among the various stakeholders, objectives may be assigned different priorities, and where multiple improvement sites are involved, site priorities may differ. If you encourage each stakeholder to identify his or her goals and objectives and to prioritize objectives, you can discuss the differences and check whether you can accommodate each other. Remember, there is no need at the outset for you to achieve a final resolution of differences. All views should be understood to be preliminary and subject to substantial change as you accumulate detailed observations and the recommendations of experts and specialists during the assessment phase of the process. Objectives and priorities should settle into place, with consensus being achieved among significant stakeholders, as the assessment phase proceeds (described in the next chapter).

Task #2 Organize Information and Utilize Maps (*Owner*)

Aerial photos and topographical maps of the project area make the most useful base maps for organizing and utilizing assessment and planning information. You will find that some form of mapping system will greatly facilitate your project and is well worth your effort to set up initially.

Using Aerial Photos

Before you begin the forest health improvement process, it is advisable to have an effective tool in place to assist you in organizing and locating information as it accumulates. There are many tools, but aerial photos are one of the most effective. Copies of aerial photos of your property are available because county and state agencies contract

periodically for comprehensive photo assessments. In most cases, you can obtain copies of these photos through the contractor.

For any improvement project other than the very smallest and simplest, it is highly recommended that you acquire and study aerial photos of your property prior to beginning the formal forest health improvement process. Because they reveal physical features on your property that you can recognize readily, aerial photos provide an excellent base map for displaying assessment data. Most such aerial photos are aligned along a north-south axis, so you can easily indicate geographical orientation.

Climate Information

You can obtain basic climate information (such as temperature ranges, precipitation amounts, and prevailing wind directions through the months and seasons) for the site from the US Weather Service. You will probably want to include some of this information (such as prevailing wind directions) on the base map or as a separate climate overlay.

Topographic Maps

You will find that acquiring the 7.5 minute US Geological Service topographical map for your project site is also very useful. You can reduce or enlarge this map to fit the scale of the base photo map. If you reproduce this topographic map as an overlay to the base map, you can initiate the overlay mapping process.

If you request that the experts you hire in the assessment phase provide you with their observations and recommendations in the form of overlays to the base maps, the input of these experts will not only be immediately understandable to you but also be cumulative and comparable as you proceed. In addition, your maps will greatly assist the experts, making their work more efficient and less expensive.

Task #3 Set Up for Documentation (*owner*)

When to Document

You stand to benefit most if you elect to document the project as it unfolds. Documenting the conditions on the project site at the beginning provides you with baseline information that you can later use to evaluate the success of your efforts. Documenting the process itself records exactly what happened as the techniques you selected were implemented. Monitoring the project site after the project is completed is part of the continuing documentary record that will assist you in assessing what worked and what did not and in making future management plans.

Recommended Documenting Equipment

Preparing for project documentation is relatively simple. Since you are dealing with a physical site and the changes you will make to the site will result in physical alterations, a visual record will capture much of the information you need for documentation. A reliable still camera can do the job. If you own or have access to a video camera, this tool has the advantage of providing you with moving pictures and sound. With a video camera, you can record the comments of those assisting you throughout the process, as well as your own observations of the conditions and events as you capture them visually. The two types of cameras also serve to back up one another.

CHAPTER 4

PROJECT ASSESSMENT

Assessment involves evaluating current resource conditions; assisting and coordinating the input of experts, and then assigning their recommendations for changes to planning. To engage in the full assessment process, you will take 14 actions as listed directly below and described individually in this chapter.

14 Assessment Actions

#1 Document with an Eye to Monitoring,
#2 Define Project Boundaries Along Watershed Lines,
#3 Establish Potential Plant and Wildlife Communities,
#4 Establish Soil Types and Conditions,
#5 Assess the Water System (hydrology),
#6 Assess Plant and Animal Communities and Habitats,
#7 Assess the System's Economic Use,
#8 Determine Cultural Resource Use and Significance,
#9 Assess Aesthetic (visual character) and Spiritual Use,
#10 Determine Recreational Use,
#11 Make the Watershed Connection,
#12 Establish Options for Cooperation,
#13 Determine How the Owners Value the Different Resources,
#14 Prepare an Overall Assessment Report.

Here, as in previous sections, each action title is followed by parenthesis identifying the party most likely to be responsible for implementing the action (owner, experts, or both).

The systematic assessment of current conditions on the project site is the first step in project development. The scope and detail of assessment depends on several factors, including your property's size, ecological diversity, and various other conditions. In general, larger properties require more comprehensive assessment because their greater diversity and variation are usually associated with a greater number of different objectives of the ownership. Even if your project is more focused and on a small acreage, you may want to consider its effect on the overall resource system of your property, as well as the immediately surrounding area.

As lead collaborator in the process, you do not need to master the technical details of assessment. Instead, you can use the Guide to help you clarify your goals and objectives and to become generally aware of the range of factors involved in natural resource assessment. Specialized level assessment can come from the specialists and experts who assist you. Using the Guide in this manner will help you to:

- Suggest the project's general direction,
- Assemble appropriate experts needed to evaluate different resources of concern to you,
- Coordinate and assist activities of these experts and specialists.

Your advisors should present you with their observations so that you clearly understand what they mean. Since experts may provide recommendations for project planning while

offering their assessments, you may want to assemble these recommendations in terms of the steps identified in the next chapter on project planning.

Action #1 Document with an Eye to Monitoring (*owner and experts*)

Experts can map their observations if you ask them to do so, and they can indicate the most productive locations for documenting and monitoring the various resources. If you elect to document the conditions at these locations prior to beginning the work and through the progress of your project, you can start to integrate project documentation while establishing the baseline conditions important for the monitoring process.

If you ask your resource experts to base their assessments on measurements of the key resource indicators, their assessment results will provide a resource baseline you can use for monitoring. By noting the expert's site selection, along with the tools and processes of measurement, you can be introduced to the basics of monitoring each resource. If you work with each resource expert in this manner, you can determine the baseline for the resources of your forest system and also learn how to monitor each resource. Most experts are willing to help you learn about formal assessment and monitoring tools and procedures.

Action #2 Define Project Boundaries Along Watershed Lines (*experts and owner*)

You can divide larger, more complex areas into manageable assessment units using watershed drainage divisions and subdivisions and then upland, riparian and wetland/aquatic areas. The topographical map of the project site is very useful for defining watershed division boundaries. These boundaries, together with more specific project boundaries and upland, riparian and wetland areas, can be produced as an overlay to the photo base map. You will probably want to document the general character of the resources within these boundaries and divisions.

Action #3 Establish Potential Plant and Wildlife Communities (*experts*)

Potential plant and animal communities are those that the project site would naturally tend to evolve toward if the site were left to naturally occurring disturbance patterns under current climatic conditions. Potential communities exclude the effects of intensive human management, eg. agriculture.

Potential plant communities have been mapped for public lands of the area, as well as many private lands in the vicinity. Descriptions of the approximately 60 different potential plant communities/associations in south-central Oregon are available from federal land management agencies (Forest Service and BLM) in that area. Similar type descriptions of wildlife communities associated with these plant communities in their various structural conditions are being developed. These descriptions may be available from the Forest Service, BLM, and/or ODFW by the time you or your consulting experts are ready to begin your assessments.

Knowing the potential communities will help you establish an ecological baseline for evaluating both current conditions and the appropriateness of other objectives you have tentatively identified for your project. Generally speaking, there is enough flexibility to accommodate most owners' objectives while respecting the potential communities appropriate to the site. Management that sustains potential communities or moves the

site toward conditions that support these communities is likely to be most successful.

The maps of potential communities can be very useful, but it is important to "ground truth" these maps and make any necessary adjustments before incorporating them into your assessment and mapping system.

Map potential plant and animal communities as overlays to the base map, and document.

Action #4 Establish Soil Types and Conditions (*experts*)

Determining the project area's soil types and assessing their condition is fundamental to understanding the state of the resource system.

Comprehensive county soil surveys for nearly all private property of the area are valuable resources for soil information. Copies of these surveys are available from the County Agricultural Extension Service or the Natural Resources Conservation Service (NRCS), previously called the Soil and Water Conservation Service, USDA. The detailed maps in these surveys are especially useful.

If you obtain the soil maps relevant to your property, you can:

- Determine the nature and potential of the soils on the project site,
- Evaluate with experts the condition of these soils considering their structure and organic composition, as well as the extent of their compaction and erosion,
- Determine whether these soils will support the objectives of your improvement project,
- Produce a soil overlay for your mapping system.

Document the results of your soils findings.

See pages 34 and 35 for example topographic and soil survey maps for a representative subwatershed in the area.

Action #5 Assess the Water System (Hydrology) (*experts*)

Map the current surface and ground water system in terms of movement, flow, and timing, then evaluate conditions relative to site history and project objectives.

County watermasters, watershed councils, and the Natural Resource Conservation Service (NRCS) can be important sources for hydrologic information relevant to your site. They can also refer you to water resource experts, if need be. For properties in the immediate vicinity of public lands, hydrology information may be available from local divisions of public land management agencies as a result of their comprehensive and ongoing watershed analyses. To discover what may be relevant and available, contact the hydrologist in the agency/division whose lands are near the project site.

Since most forest health improvement projects will occur on upland areas or areas immediately associated with uplands, understanding the surface hydrology on the site and up-slope of the site will probably be sufficient. However, for projects in areas where heavy groundwater pumping occurs, it may be necessary to include known information about the groundwater hydrology in your site evaluation. (Note: The groundwater system of south-central Oregon is currently under study as part of the water rights adjudication process. As a result of these studies, better information on ground water should be available in the near future.) Evaluate the condition of the site's hydrologic system, relating what is happening on the site to conditions and plans up-slope of the site and

on the larger subwatershed or watershed. Determine whether the site's hydrology and the surrounding watershed will support your project's objectives.

Remember that if new water uses or changes in water use are contemplated as part of your project, water rights must be in place to support them. *Any proposed changes in water use or location must be registered with and approved by the Oregon Water Resources Department. Any plan calling for significant alteration of the existing water system (including creation or elimination of ponds or wetlands) must be approved by the area watermaster, county planning department, and the Oregon Division of State Lands.*

Map the hydrology information for the site as an overlay to the base map.

Document.

Action #6 Assess Plant and Animal Communities and Habitats (*experts and owners*)

Using the information you gathered on potential plant and animal communities for the site from Action #3 above, determine what parts of these plant and animal communities are present or absent and their condition. Make use of key indicator species to simplify the task. Consider changes through the seasons and any use by migratory species.

As you evaluate conditions, consider the following questions:

- Of the plant and animal species present, which are not associated with the potential communities (in other words, which are nonnative or exotic)?
- How do your findings compare with the historical records for the site?
- Of the native plants or animals present, which species were not historically supported in the locations where you currently find them?
- Do your findings support your project objectives?

ODF and ODFW may be able to assist you in your assessment. In addition, these agencies can suggest specialists in the area for you to consult about botanical, fish, and wildlife resources.

Map the inventory results for key plant and animal species.

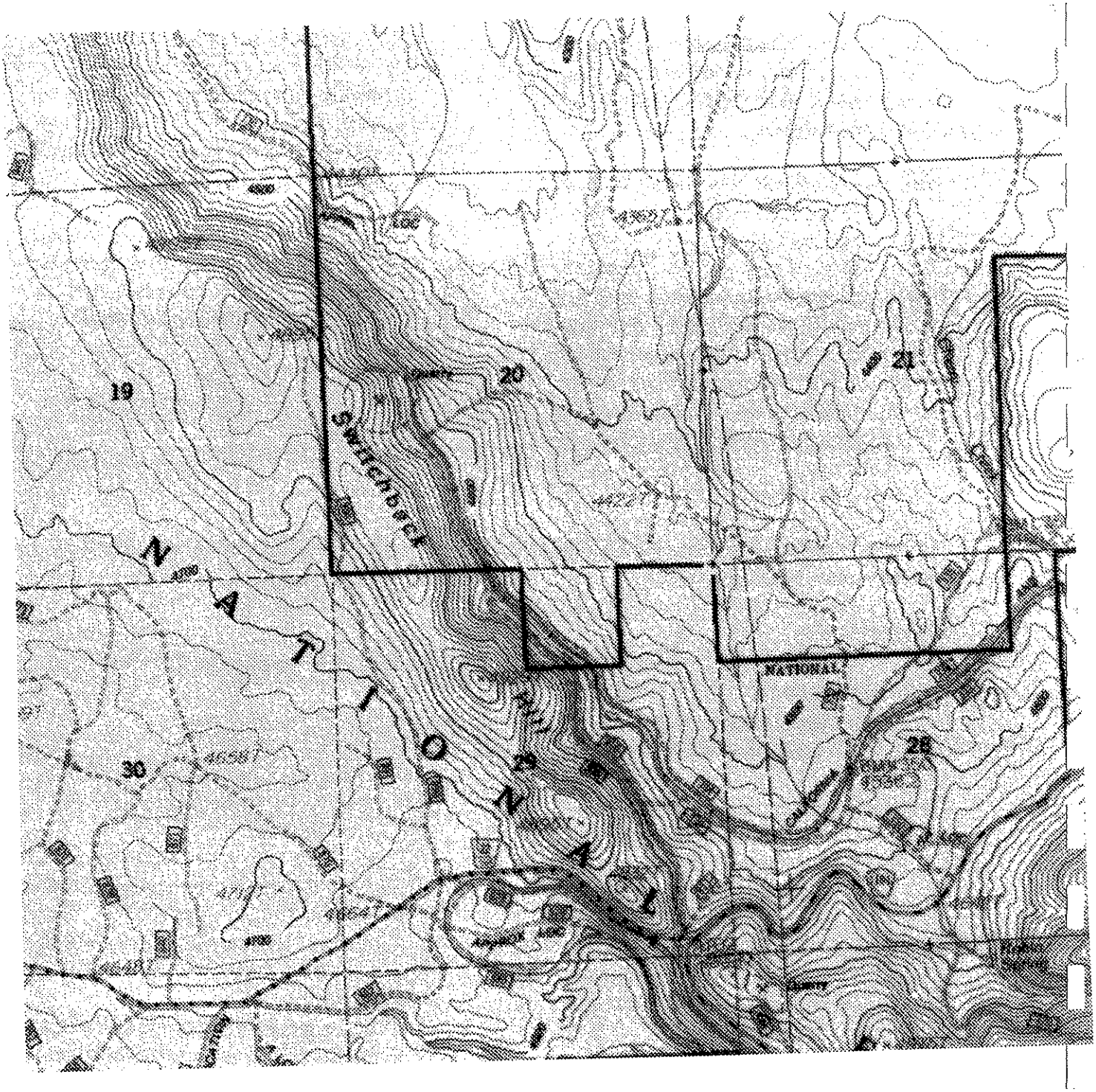
Document.

Action #7 Assess the System of Economic Use (*owners*)

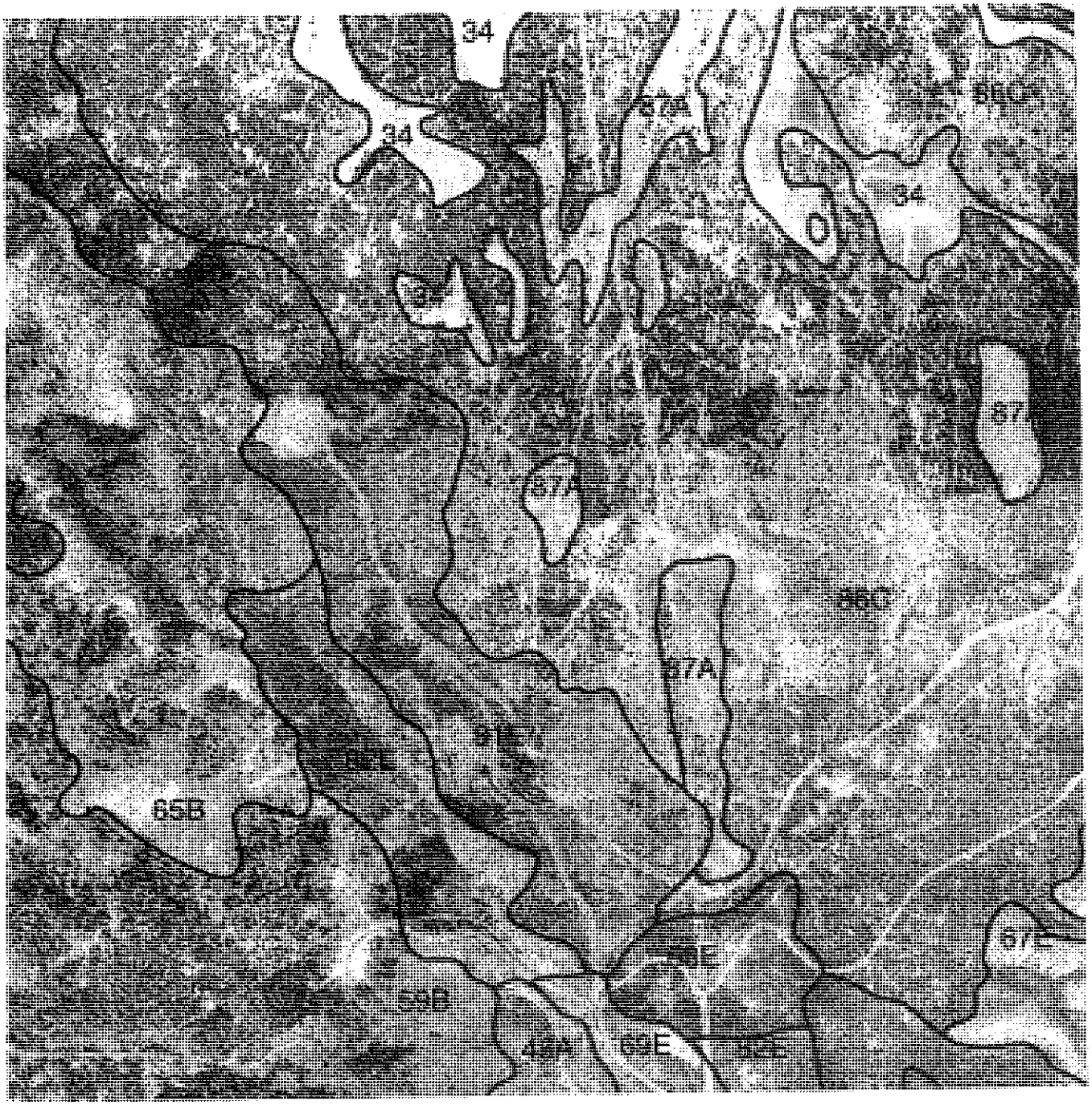
Indicate the site's economic use, historically and by the current ownership.

Consider the following questions:

- In what ways are you (the current landowner) using the project site for economic purposes?
- Are there structures, roads, trails, water systems, field systems, etc. associated with these uses?
- How does the economic use system affect the natural systems you have just evaluated?
- Does the property's historical (background) information of economic use indicate any trends that suggest directions for improvement?
- Is the existing use system compatible with your improvement project objectives? If not, what changes in use would accommodate your objectives, and are you willing to make these changes?



USGS Primary Base Series Quadrangle Map
Example of Topo map with 20 foot contour intervals
within the Sprague River Watershed



Example of soils map corresponding to topo map. Each different soil type is indicated by a number/letter combination within the delineated boundary. Each soil type is described in detail in the Klamath County Soil Survey.

Construct an overlay to the base map which indicates the physical structures and specific use areas that are part of your economic use of the site.

Document.

Action #8 Determine Cultural Resource Use and Significance (*owners*)

Are there any cultural or historical resources or continuing uses of these types associated with the project site or immediately surrounding area?

Considering what you discover, do your project objectives accommodate the cultural and historical resources on the project site?

You will want to be aware of laws and regulations about known cultural and historical sites and the discovery of such sites. Also be aware that requirements may change depending on whether public agencies are participants or public moneys are involved in your project. Clearly, projects involving significant displacement of soil or extensive flooding of land are more likely to encounter problems in disturbing cultural resources than are projects that treat the land's surface and are less disruptive.

Depending on the nature of your project, you may need to seek project review and approval from the Oregon Historic Preservation Office before you proceed.

Map cultural resources as an overlay to the project base map.

Document.

Helpful sources of information about cultural resources are:

- Oregon Historic Preservation Office in Salem, Oregon (which is the statewide clearing house for cultural resource information),
- Local historical museums and associations,
- Local tribal cultural specialists,
- Archeology specialists working for relevant public land management agencies.

Action #9 Assess Aesthetic (Visual) Characteristics and Spiritual Use (*owners*)

Are there aesthetic or spiritual aspects of the project site or surrounding area that are significant to you or others among the ownership group, to neighbors, or to others in the community? Has the land traditionally been used for such things as retreats or pow wows? Is the site valued for the view it affords neighbors or the touring public?

Overlooking these kinds of issues can result in ill-feelings that are not easily reconciled.

Based on your findings, are your project objectives compatible with such uses?

Map any special aesthetic and spiritual resource areas as an overlay to your base map.

Document.

Action #10 Determine Recreational Use (*owners and experts*)

Map any recreational use of the project site (including hunting, gathering and fishing) by owners and others through the seasons.

Consider the following questions:

- What is the site's recreational use under its current ownership?
- Considering the seasonal cycle, are there traditional recreational uses by others on the project site?
- Is the area of the project traditionally used by others for hunting, gathering or fishing purposes?
- Are the trails used by others for hiking, horseback riding, snowmobiling, cross country skiing, etc.?
- How are any traditional uses affected by the proposed improvement project?

If the site adjoins or is near public land, you may want to contact the recreation specialist of the appropriate agency to obtain information on existing recreation facilities and any relevant recreation development plans. As the importance of recreation use increases on public land, there is a greater need to relate improvement plans to this use.

Map your information about the site's recreational use areas on an overlay to the base map, making note as well of any recreation use in the immediate surrounding area.

Document.

Action #11 Make the Watershed Connection (*experts and owners)*

If your project is to make sense in the larger improvement picture, you will want to establish the general management direction for the properties surrounding the project site and the more general subwatershed and/or watershed. Knowledge of conditions and plans for property on the watershed "above" the project site is especially critical since the site is directly affected and limited by these circumstances. Also, because much of the uplands of south-central Oregon is managed by public agencies, it may well be worthwhile to consult their relevant watershed analyses in evaluating the watershed context for your improvement site.

Do the objectives of your project make sense in terms of the larger picture you discover? The connections made while discovering the surrounding watershed situation relate directly to action #12 on cooperation.

Summarize the results of exploring the watershed picture surrounding the project site.

Document generally.

Action #12 Establish Options for Cooperation (*owners and experts*)

You are encouraged in the preliminary phase to contact surrounding owners to get at least an impression of the management direction for their properties and to share your initial ideas for improvement projects on your own property. These explorations and those associated with discovering the situation on the surrounding watershed (in action # 11 above) should give you a sense of the possibilities for cooperation.

It is desirable to seriously explore cooperative endeavors as soon in the assessment phase as your project objectives seem to solidify and there is reason to believe some of your objectives are shared across ownerships. A decision to cooperate in the assessment phase involves recognizing that the parties share goals and at least some key objectives, and further that these goals and objectives can possibly be met with greater efficiency, less risk, and at lower cost if a joint project is planned. In the event a cooperative project does emerge from your contacts, the assessment will expand in scope, have multiple participating ownerships, and needs to be structured as a joint effort.

It is advisable to structure formal partnership agreements among the parties as soon as is practicable, especially if assessment costs are to be shared. It is best to clearly state 1) the commitment of the parties to participate and communicate and 2) the roles, responsibilities, and obligations among the parties. Casual, informal arrangements are not recommended since they are based on individual perceptions, impressions, and memories that vary greatly from person to person even in the best of circumstances.

Summarize the results of exploring possible cooperative options.

Action #13 Determine How the Owners Value the Different Resources (*owners*)

To evaluate the resource values of the ownership, consider the following questions:

- What resources do your regard as most important? Next most important? Etc.?
- Within resource areas, what are your priorities (for example, is hunting more important than snowmobiling among recreational uses?)?

- As you evaluate resource conditions on your property, what do you see as the most important improvements to make and in what order?
- Do others among the ownership agree with you, or are there significant differences of opinion about importance and priority?
- Is there at least a core of consensus on priorities within your ownership?
- Are the consensus values and priorities accommodated in the proposed project?
- Is the consensus on resources and priorities consistent with forest and watershed health?

Summarize the results of your findings.

Action #14 Prepare Overall Assessment Report (*owners*)

For your report the base map and overlays you developed during the assessment process will display most relevant information in a manner that is comparable, cumulative, and easily understood. Essential information to complete the report will include the summaries you put together in completing sections on the larger watershed picture, opportunities for cooperation, and the ownership's core resource values and priorities. If you document during the assessment process, you will have a visual record of the conditions referenced on the maps and in the summaries.

As you prepare your report, consider the following questions:

- Did the various forms of information you collected help you define and refine the improvement project or program?
- What changes, if any, did you make in your goals or objectives as a result of assessment?

Because assessment and planning run together in a collaborative approach, you may decide to prepare one document that combines the assessment report and the improvement plan (discussed in Chapter 5).

Notes

CHAPTER 5

PROJECT PLANNING

The outline for your project plan has probably been emerging as the recommendations of specialists have accumulated and the opportunities for cooperative ventures have emerged. It is during the planning stage that you will create the overall structure for implementing the various expert recommendations you decide to adopt. Unless you have given this task to an outside expert plan coordinator or general contractor, most of the planning responsibility will be yours as the landowner. If you have a small project that does not involve cooperation across properties and you do not expect to use higher risk techniques, your improvement plan may be rather simple and easily determined.

However, if your woodland is larger and more diverse, if your objectives shift considerably across the units of the property, if cooperative efforts are involved, or if your plan calls for higher risk treatments, your overall plan may be rather complex and require a long-term sequencing schedule. Do not let the idea of preparing a more complex plan overwhelm you. Think of a more complex plans as just a combination of more specific plans. It all breaks down into a sequence of smaller achievable steps. Above all, keep in mind that planning is greatly facilitated by assessment and a good plan is the basis for smooth implementation and a successful result.

Project planning involves 12 activities which are listed in the following chart and described individually in this chapter. About half of these activities are the responsibility of the owner, and the other half are usually shared by owners and experts.

12 Project Planning Actions

#1 Identify and Protect Resource Assets,
#2 Assign and Prioritize Objectives,
#3 Check Your Budget,
#4 Identify and Evaluate Techniques and Technique Options,
#5 Make Technique Selections,
#6 Sequence the Plan,
#7 Integrate the Plan,
#8 Time the Plan,
#9 Include Monitoring as Part of the Plan,
#10 Assemble the Plan,
#11 Have Experts Review the Plan,
#12 Notify Authorities and Obtain Necessary Permits.

Action #1 Identify and Protect Resource Assets (*owners and experts*)

Identify those assets of the existing resource system that you want to protect during implementation of the project. Ask the question: *What is currently on the project site that contributes to the site being healthy and desirable for you?* Part of planning improvement is to protect what is already there. You may want to produce an overlay for your base map to identify the location of the resources to protect.

Action #2 Assign and Prioritize Objectives (*owners*)

Drawing on the conclusion of the assessment report at the end of Chapter 4, list the project objectives in terms of the ownership's collective, agreed upon priorities. If yours is an improvement program with multiple sites, list the objectives and priorities for each specific project. Since priorities reflect a person's values, one person's values can conflict with those of another. Check over your list of objectives to ensure their compatibility within and across units, and as part of the overall plan for watershed improvement in your area.

Improvements made at one level should not be at the expense of the resource system at another level. In the best case scenario, improvements will have increasingly positive effects at broader scales or perspectives. If you discover objectives that have conflicting effects, look for a way to resolve the conflict.

Action #3 Check Your Budget (*owners*)

Before planning too far ahead, you will want to look at your list of goals and objectives by project to determine whether you can afford to make all the improvements you have identified. Although you do not have detailed financial information to develop a project budget at this point, you should have an idea from talking with experts about the general costs of improvements and the potential for income related to achieving various objectives of your project. Be realistic about what you can afford and plan within these limits. You may need to plan your improvements in stages which, taken together over a period of time, make sense and enable you to achieve your objectives.

Action #4 Identify and Evaluate Techniques and Technique Options (*owners and experts*)

Consider the technique recommendations of experts and/or use the Technique Evaluation Worksheet as you move through the evaluation process. The experts assisting you during assessment have probably recommended particular techniques to help you reach your objectives. Where the opinion of experts is unanimous, you may want to simply follow their advice in selecting techniques.

However, experts with different points of view or resource focuses often disagree on what the best techniques are. In this situation you need some way to evaluate technique options to make your best choices. To compare techniques prior to selection, evaluate each technique in terms of its positive and negative impacts on the components of the Natural and Human Resource Systems. To assist you in this process, you may want to duplicate and use the Technique Evaluation Worksheet provided on the next page and in the Worksheet section of the Guide.

Technique Evaluation Worksheet

Review the Technique Evaluation Worksheet to get a sense of what it entails and then keep it available as you read through the following explanatory remarks. You can use this worksheet to evaluate a particular technique for its potential positive and negative effects on the resources of the project site. The evaluation results will help you 1) to determine which techniques best meet your expectations, 2) to compare effects of using different techniques, and 3) to guide you in making technique choices that best suit you and your project.

TECHNIQUE EVALUATION WORKSHEET

Project Name: **Technique:** **Associated Objectives**	**Date:** **Project Site:**

Impact of Technique	Effect - Area Extent	Effect - Intensity	Effect - Duration	Sub -Total	Natural & Human Totals

NATURAL SYSTEM

Native Plants (benefits/diminishes condition of plants, plant communities, and plant habitats)

Positive 0 to +5				=
Negative 0 to -5				=

Native Animals (benefits/diminishes fish and wildlife, animal communities, animal habitats

Positive 0 to +5				=
Negative 0 to -5				=

Soils (benefits/diminishes condition of the organic and inorganic soil complex)

Positive 0 to +5				=
Negative 0 to -5				=

Hydrology (benefits/diminishes the condition of the water system - quantity, quality, timing)

Positive 0 to +5				=
Negative 0 to -5				=

Natural Systems Total ..... _____

x 2.5 = Weighted Natural System Total _____

HUMAN SYSTEM

Cultivated Plants (benefits/diminishes condition of agricultural crops)

Positive 0 to +5				=
Negative 0 to -5				=

Domestic Animals (benefits/diminishes condition of livestock)

Positive 0 to +5				=
Negative 0 to -5				=

Human Structures (benefits/diminishes condition of buildings, roads, irrigation, fencing, etc.)

Positive 0 to +5				=
Negative 0 to -5				=

Cultural/Historical Resources (benefits/diminishes condition of or access to resources)

Positive 0 to +5				=
Negative 0 to -5				=

Physical Health (benefits/diminishes health of owners, neighbors, watershed community)

Positive 0 to +5				=
Negative 0 to -5				=

Recreation Resources (benefits/diminishes hunting, fishing, hiking boating, skiing, etc.)

Positive 0 to +5				=
Negative 0 to -5				=

Aesthetic/Spiritual Resources (benefits/diminishes view, sound, retreat, ritual opportunities)

Positive 0 to +5				=
Negative 0 to -5				=

Economic Return (benefits - income, capital gain/diminishes - expenses, capital loss)

Positive 0 to +5	(single value)	x3 =
Negative 0 to -5	(single value)	x3 =

Economic Risk (benefits - risk protection, insurance/diminishes - risk exposure, liability)

Positive 0 to +5	(single value)	x3 =
Negative 0 to -5	(single value)	x3 =

Cooperation (collaboration within ownership, with experts, among ownerships benefits/detracts)

Positive 0 to +5	(single value)	x3 =
Negative 0 to -5	(single value)	x3 =

Human System Total..... _____

TOTAL TECHNIQUE SCORE .....

Worksheet Rating Scale

The Technique Evaluation Worksheet is designed to be mostly self-explanatory. It uses two simple numbering schemes, one from zero to positive five [0 to +5], and another from zero to negative five [0 to -5]. A zero rating indicates a neutral effect. A positive rating [1 - slightly; 2 - somewhat; 3 - moderately; 4 - considerably; and 5 - greatly] indicates a positive assessment of the use of a technique on that variable. A negative rating [-1 - slightly; -2 - somewhat; -3 - moderately; -4 - considerably; and -5 - greatly] indicates a negative effect of the use of the technique on that variable.

Considering Positive and Negative Effects

Because almost all techniques have both positive and negative effects across different aspects of the resource system and even on the same aspect of the system, you will find spaces on the Evaluation Worksheet to assess these positive and negative effects for each natural and human resource variable.

For example, mechanical thinning can benefit a resource variable like the forest soil to the degree the machinery crushes and promotes the breakdown of woody debris and contributes to building the soil organics. However, mechanical thinning can also diminish the soil by compacting it or disturbing the soil horizon (mixing layers) if machinery operators are not careful or the thinning is done when there is too much moisture in the soil. A good evaluation of mechanical thinning as a technique will consider both the potential positive and negative effects of employing the technique on each variable, as well as the collective effect over different variables. Additionally, the evaluation will highlight the need to mitigate for the negative effects if the technique is selected.

The Technique Evaluation Worksheet allows you to think of positive and negative impacts of using a technique on each aspect of the resource system by considering the extent of the area affected, as well as the intensity and duration of the effect. Clearly, effects that cover a broad area, are of high intensity, and are long term or permanent in duration are ones you either highly desire (when they are positive) or very much want to avoid (when they are negative).

Matching Techniques to Objectives

In preparing to complete the Technique Evaluation Worksheet, first list different techniques you can use to reach each improvement objective in your project. Information from Chapter 2 describing various forest health improvement techniques and associated objectives can help you match techniques with objectives.

A single technique may serve more than one objective. For example, eliminating a road can contribute to Improving Water Quality and Flows, Improving Recreation Opportunities, and Improving the Habitat for Domestic Animals.

From the list of objectives and associated techniques, identify each technique you are considering using and the project objective or objectives it can help to achieve.

How to Complete the Evaluation Worksheet

To fill out a Technique Evaluation Worksheet, you begin by indicating the project's name, site and date, and the technique to be evaluated with its associated objectives in the top section. Then assess the positive and negative impact to each variable or aspect of the natural and human resource systems.

In each case, consider:

- Extent of area impacted or affected, from a small part of the site itself [1] to an area much larger than the site, which may include the entire watershed [5],
- Intensity of impact or effect, from very slight [1] to very great [5],
- Duration or length of time of effect, from very brief [1] to very long term or permanent [5].

After entering positive and negative values for area, intensity, and duration effects for a resource variable, calculate the positive and negative totals across the three rows, and enter the two totals in the subtotal column. After you finish assessing positive and negative effects to the four variables under the Natural System, add the subtotal column and enter the total for the Natural System in the subtotal column. Because the impact to the overall natural system is at least as important as the impact to the human system, and because the human system has 2.5 times more categories for assessment, you multiply the natural system total by 2.5 to bring the relative scores of the two systems into equality. Put the result in the total column.

Proceed through the first seven aspects of the Human Resource System in the same manner as for the Natural System variables, entering total values for positive and negative effects in the subtotal column. The last three variables on economy and cooperation are assessed with a single positive and negative effect value, not in terms of the extent, intensity, and duration categories previously used. To have economic and cooperation variables match the total value for resource categories having three assigned values, you multiply the single value by three and enter the resulting positive and negative values in the subtotal column. Add the numbers in the Human System subtotal column and enter the result as the Human System Total in the subtotal column.

The Natural System subtotal added to the Human System subtotal produces an Overall Technique Score. Generally, where evaluating more than one technique to reach an objective, the best choice is the technique with the higher overall positive score. In addition, the greater the difference in overall scores among different technique options, the stronger the recommendation for the higher rated technique. Scores that are a combination of a very high natural system total and a very low human system total, or the reverse, indicate a technique that should be adopted only after very careful consideration.

Variability of Ratings

The Technique Evaluation Worksheet is not a precise tool. Since the criteria for assigning 0 through +5 or -5 ratings on each variable are loosely defined, the Evaluation Worksheet is most useful as a comparative tool when the same person is filling out the evaluation for all techniques. As long as this person is consistent, the resulting comparison should be reasonably valid. The validity of worksheet comparisons across assessments of different persons is likely to be very weak.

Addressing Economic Variables

Perhaps least understood from the worksheets are the economic and cooperation variables within the human system.

To help clarify the economic variables, the central issue is whether the ownership can afford the cost of using the technique - its affordability. To get a realistic answer, consider the following specific questions:

- Are you and the other owners able to participate in implementing the technique?

- What amount of time and type of labor can you and the other owners afford to devote to preparing for or implementing the technique?
- Can use of certain techniques result in your making money, and if so, how much? If not, can you break even?
- What are the impacts to the overall resource system of engaging in a commercial technique to achieve the improvement objective?
- Is the commercial return worth the impacts to the overall resource system?
- Is there an alternative commercial technique to achieve the desired change that may not be so monetarily rewarding, but which is less impacting to the rest of the system?
- Will implementing the technique cost you money, and if so, how much?
- Does use of the technique qualify you for outside assistance in the form of labor or material?
- Can your costs be reduced by deducting some or all costs from income or property taxes?
- How would any market demand changes for the product associated with implementing the technique affect its affordability?
- Should you take advantage of a demand market or wait for a market change?

Besides considering the economy of using each technique separately, you will probably also want to consider the economic results of combining techniques and sequencing improvements across sites.

- Will using moneymaking techniques support the expenses of implementing other techniques?
- Can costs and labor be reduced by entering into a cooperative effort with surrounding owners who have similar or related objectives?

Notes

Because economics is a critical variable in most forest health improvement projects, it is highly recommended that you seek expert economic advice as you answer questions such as those above. Service and consulting foresters who are independent of logging contractors can provide you with estimates of the market value of your forest products resources.

Locating and Selecting Experts and Contractors

As you seek additional advice on costs, you are likely to meet and evaluate possible contractors. Experts and specialists who have participated in your project and are independent of any economic relationship with contractors are likely to be a good source for identifying potential contractors. Also, ODF and the County Agricultural Extension office can supply contractor lists, although without evaluation.

Document the advice of those providing you economic input, especially if your consultations include cost estimates that can lead to contracts. At this point, discussions with contractors can easily overlap with issues covered in Chapter 6 under the sections "Locate and Evaluate Contractors" and "Develop and Review Contracts with Contractors." It would be good to review these two sections prior to contacting potential contractors.

Computing Economic Return

As you review the Economic Return category on the Technique Evaluation Worksheet, consider the consequences of implementing a particular technique to the subsequent value of your property - capital appreciation or depreciation. Added or lost value is at least as important as considering the balance between income and expenses. It is not uncommon for a large immediate return (income) to be offset by a significant loss in property value (capital depreciation). The best scenario is one where implementing a technique results in enough income to significantly exceed the costs, while at the same time the overall value of the property is increased. (Some forms of commercial thinning can have this effect, especially if longer term consequences are considered).

To determine the positive value for the Economic Return variable, consider the combined result of income and capital gains associated with using the technique. To determine the negative value, consider the combined effect of expenses and capital losses. For both categories, remember to include any income or expenses associated with funding assistance from outside sources.

Computing Economic Risk

The economic consequences of using a technique hinge on the level of economic risk, as well as balancing income/expenses and capital gains/losses. The use of any technique carries some potential economic liability, but there is a great deal of difference between the level of risk in "hand planting willows" and "underburning in the suburban interface." Generally, risk increases the more valuable and closer the surrounding properties are that are in the immediate vicinity of the project site. Since the risk level can be offset by owners carrying appropriate liability insurance, the level of insurance against liability claims must be considered together with the level of risk. Fill in the positive value for the Economic Risk category considering the level of protection the ownership has against the potential level of risk. For the negative value, consider the potential level of risk to property or persons associated with using the technique as planned. There is likely to be less risk where there is greater expertise and cooperation involved.

Addressing the Cooperation Variable
Cooperation in implementing techniques among owners, with experts, and among private and public neighbors has both advantages and disadvantages. Generally speaking, the broader the base of cooperation, the less risk, greater efficiency, and less cost. On the other hand, cooperation can also entail spending more time in planning and may sometimes involve requirements that can be restrictive. The Cooperation category is the place where you consider first the positive consequences of the extent of cooperation, from a single owner [0] to owners with experts and all relevant public and private neighbors [5], and then the negative aspects associated with cooperation, from none [0] to extensive time commitments and restrictive demands [-5].

Value of Worksheets
Completing several Technique Evaluation Worksheets may at first seem cumbersome and time-consuming, but it will be much less challenging after you complete one or two. Looking at the broad consequences of using a technique will help you to clearly see what the comparative consequences are of choosing different techniques. As a result, you will likely be better informed in making your technique selections, increasing the likelihood that your project will achieve the results you want and avoid unwanted side effects.

A completed Example Worksheet is included on the next page for an improvement project addressing precommercial thinning - mechanical. In this example, the use of chain saws and tract and wheel harvesters for small diameter logs is the technique evaluated for its contribution to achieving three project objectives: Improve the Quality of the Plant Communities; Improve Water Quality and Flows; and Improve Recreation Opportunities.

Notes

TECHNIQUE EVALUATION WORKSHEET

Project Name: Milly's Meadow Improvements
Technique: Commercial Thinning-Mechanical-Chainsaw, and Small Log Harvester-Tractor and Wheel Machines
Associated Objectives: Improve Plant Communities #3, Water Quality and Flows #4, Recreation Opportunities #9

Date: 7/98
Project Site: Milly's Meadow - Bordering 64 Acre Ponderosa Stand

Impact of Technique	Effect - Area Extent	Effect - Intensity	Effect - Duration	Sub -Total	Natural & Human Totals

NATURAL SYSTEM

Native Plants (benefits/diminishes condition of plants, plant communities, and plant habitats)

Positive 0 to +5	4	4	4	=	12
Negative 0 to -5	-2	-3	-1	=	-6

Native Animals (benefits/diminishes fish and wildlife, animal communities, animal habitats

Positive 0 to +5	2	2	2	=	6
Negative 0 to -5	-1	-2	-1	=	-4

Soils (benefits/diminishes condition of the organic and inorganic soil complex)

Positive 0 to +5	2	1	2	=	5
Negative 0 to -5	-4	-3	-1	=	-8

Hydrology (benefits/diminishes the condition of the water system - quantity, quality, timing)

Positive 0 to +5	2	2	3	=	7
Negative 0 to -5	-4	-3	-1	=	-4

Natural Systems Total ..... +8

x 2.5 = Weighted Natural System Total +20

HUMAN SYSTEM

Cultivated Plants (benefits/diminishes condition of agricultural crops)

Positive 0 to +5	1	1	1	=	3
Negative 0 to -5	0	-1	0	=	-1

Domestic Animals (benefits/diminishes condition of livestock)

Positive 0 to +5	3	3	2	=	7
Negative 0 to -5	-1	-1	-1	=	-3

Human Structures (benefits/diminishes condition of buildings, roads, irrigation, fencing, etc.)

Positive 0 to +5	1	1	2	=	4
Negative 0 to -5	0	-1	0	=	-1

Cultural/Historical Resources (benefits/diminishes condition of or access to resources)

Positive 0 to +5	0	0	0	=	0
Negative 0 to -5	0	0	0	=	0

Physical Health (benefits/diminishes health of owners, neighbors, watershed community)

Positive 0 to +5	1	1	3	=	5
Negative 0 to -5	-1	-1	-1	=	-3

Recreation Resources (benefits/diminishes hunting, fishing, hiking boating, skiing, etc.)

Positive 0 to +5	2	3	3	=	8
Negative 0 to -5	-1	-1	-1	=	-3

Aesthetic/Spiritual Resources (benefits/diminishes view, sound, retreat, ritual opportunities)

Positive 0 to +5	3	3	4	=	10
Negative 0 to -5	-1	-3	-1	=	-5

Economic Return (benefits - income, capital gain/diminishes - expenses, capital loss)

Positive 0 to +5	+ 3 (single value)	x3 =	9
Negative 0 to -5	- 2 (single value)	x3 =	-6

Economic Risk (benefits - risk protection, insurance/diminishes - risk exposure, liability)

Positive 0 to +5	+ 1 (single value)	x3 =	3
Negative 0 to -5	- 2 (single value)	x3 =	-6

Cooperation (collaboration within ownership, with experts, among ownerships benefits/detracts)

Positive 0 to +5	+ 2 (single value)	x3 =	6
Negative 0 to -5	- 0 (single value)	x3 =	0

Human System Total..... +27 +27

TOTAL TECHNIQUE SCORE ..... +47

Action #5 Make Technique Selections (*owners and experts*)

Where cooperation is involved, select techniques to match joint objectives in discussions among the multiple parties. For project objectives where cooperation is not part of the picture, it is time for you to select techniques to achieve these objectives. Remember to consider the technique recommendations you have received from experts involved in your assessment. Also consider information from the Technique Evaluation Worksheets where you have evaluated risks, costs, level of collaboration/cooperation, and impacts to the natural and human resource systems of using different techniques.

Action #6 Sequence the Plan (*owners and experts*)

To sequence your project plan, begin by listing and numbering project objectives. Then, list all techniques you have chosen. Next to each technique indicate the associated objective numbers. If you completed the Technique Evaluation Worksheets, you have already matched objectives to techniques, so you need only number the objectives. Generally, in most projects, there is a logical order to implement techniques (including documenting and monitoring). In describing plan development, this order is referred to as the Logical Technique Sequence, which is identified in the box on this page.

The following example should help clarify use of the Logical Technique Sequence. Suppose you are the owner in a project where the objectives (numbered and including more specific objectives) are:

- Reduce Risk of Damage from Fire [#1]: Reduce stand density and fuel loads,
- Improve Habitat for Fish and Wildlife [#6]: Protect existing wildlife nesting trees and snags,
- Improve Quality of Plant Communities [#3]: Improve a stand of ponderosa pine trees,
- Improve Water Quality and Flows [#4]: Extend the water flows in an intermittent stream,
- Improve Soil Conditions [#5]: Reduce soil erosion,
- Improve Recreation Opportunities [#9]: Develop mountain biking opportunities,
- Protect Historical and Cultural Resources [#10]: Preserve a native American sweat lodge site.

Logical Technique Sequence

- Documenting
- Flagging/Marking
- Thinning - Precommercial
- Fuels Treatment
- Road/Trail Repair or Obliteration
- Altering Human and/or Animal Access of Use - Fencing
- Introducing Plant Species
- Initiating Monitoring
- Introducing Animal Species
- Continued Monitoring

Now, suppose the list of techniques you, as the owner, have selected to achieve these objectives includes:

- Introducing Plant Species: Plant willows,
- Altering Human and/or Animal Access and Use: Fence livestock out of the stream area,
- Marking/Flagging: Flag a cultural resource site, and mark trees,
- Treating Fuel Loads: Underburn,

- Thinning - Precommercial: Use mechanical methods - the chain saw,
- Thinning - Commercial: Use mechanical methods - tractor, skid trails and landings,
- Road/Trail Building: Build a mountain bike trail,
- Introducing Animal Species: Beaver.

As the owner for this example project, you also plan to document throughout the project and to monitor after project completion. When these techniques are added to the techniques list, and the full list (with the numbers for their associated objectives) is shown using the logical technique sequence, the order described in the Example Project chart on this page emerges for implementing the techniques for your project.

At this point, this sequence is not absolute. You can adjust it somewhat to meet particular circumstances. For example, where precommercial and commercial thinning occur in the same project, you may decide to schedule precommercial thinning after commercial thinning, based on a need to select saplings for removal that are damaged during commercial thinning, and also to avoid injury from the sharp spikes of precommercially thinned saplings during commercial thinning. Another example of adjustment might be your decision to move trail building to a later position in the sequence since trail building is more flexible in location than road building.

Finally, you can arrange your list of techniques (with associated objective numbers that provide reasons for each) in the logical technique sequence. The resulting list should come close to identifying the proper order for implementing your project techniques. The list of techniques in the chart on this page has been organized in this manner.

Action #7 Integrate the Plan
(*owners and experts*)

If your improvement project is part of a larger improvement program where work on different sites is designed to take place in a coordinated plan, you will want to identify a logical technique sequence for each project site. Integrating the plan involves relating the technique sequence on an individual site to those on other sites in a larger, single ownership improvement program, and/or to demands of cooperative arrangements across ownerships.

Example Project
Order of Techniques Implementation
With Associated Objectives

- **Documenting:** Ongoing [all objectives],
- **Marking/Flagging:** [objectives #2,3,4,5, and 7],
- **Thinning - Precommercial:** Mechanical, chain saw [objectives #3,4, and 6],
- **Road/Trail Building:** Build a mountain bike trail [objective #5],
- **Thinning - Commercial:** Mechanical - tractor, skid trails and landings [objectives #3, 4, and 6],
- **Treating Fuel Loads:** Underburning [objectives #2,3, and 4],
- **Altering Human and Animal Access and Use:** Fencing riparian pasture to control livestock in stream area [objectives #1, 2, and 6],
- **Introducing Plant Species:** Planting willows [objectives #1, 2, and 6],
- **Monitoring:** At project conclusion [all objectives],
- **Introducing Animal Species:** Beaver [objectives #1, 2, and 6].

To illustrate the first of these situations calling for integration, consider the following: If your project is part of a multi-site improvement program on your property, and commercial thinning is one technique you plan to use on many sites, it would make sense for you to coordinate when this activity occurs across the various sites to make the work most efficient and economically rewarding. To illustrate the need for integration in the second circumstance, consider the example project from the previous section. Assume that this project is yours and that underburning as a fuels treatment technique is part of a larger cooperative effort among you and your neighbors. In this case, you would be aware from developing the sequencing plan for your own project that you need to complete numerous tasks before you are ready for joint underburning to occur on your project site.

One advantage of using the Logical Techniques Sequence for organizing a project plan is that the resulting plan often begins with techniques that are less demanding (marking and precommercial thinning), which you can elect to implement on your own. In addition, since most projects require at least the marking or flagging of existing special resources for protection during the project, it is possible for you and other owners to participate from the outset and to contribute by using less specialized skills to achieve the objectives of the project. Your involvement and achievement of early success in meeting some objectives are important factors in motivating continued effort and in determining overall success for your forest health projects. For the same reasons, where you are committing to an improvement program, you may want to start with a less complicated, individual improvement project on a site where objectives can be achieved relatively rapidly.

For the sake of being able to follow the example project from the previous two sections through the next few steps, assume that this project is yours. Imagine that this project is limited to a single site covering about 100 acres and that implementation of one activity in the project (underburning) is a cooperative effort across ownerships. In this situation, you recognize the need to integrate your project plan with the underburn activity of the multiple ownership. Assume that you have agreed with other landowners to a mid-Fall time for cooperative underburning. In this scenario, your decision on timing for joint underburning is the anchor commitment; you will assign timing for other activities in your individual project plan around this commitment.

Action #8 Time the Plan *(owner)*

Keeping in mind any needs to integrate your project plan across sites or cooperatively across ownerships, set the sequence of activities for your project to a time frame. To do this, first recognize that different techniques have different seasonal windows of opportunity for application, and that some plans may require multiple applications of some techniques over a period of time.

The Project Timing Chart for Common General Techniques on the following page summarizes the recommendations for technique application as well as the key factors that limit application for the semiarid area east of the Cascades.

Project Timing Chart for Common General Techniques for Semiarid Area East of the Cascades

Technique	Recommended Timing	Limiting Factors
Documenting	Unrestricted	Accessibility.
Flagging/Marking	Unrestricted	Accessibility and depth of frost and snow cover.
Thinning - Precommercial	Spring - Mid Summer, Fall - Winter	Accessibility, depth of snow cover. Avoid very dry conditions when chain saws are involved. Obey fire restrictions.
Road/Trail Building and Repair	Early Summer and Fall	Avoid high soil moisture content and very dry periods.
Thinning - Commercial	Late Spring - Mid-Summer, Late Fall and Winter	Avoid high soil moisture content periods unless ground is solidly frozen or sufficiently snow covered, where mechanical equipment is involved. Use care in late Summer and early Fall when conditions are very dry and fire hazard is high; observe state fire restrictions.
Treating Fuel Loads - Mulching	Late Spring-Fall	Avoid high soil moisture content periods.
Treating Fuel Loads - Underburning	Spring and Fall	Avoid wet and dry-hot periods; observe state fire restrictions, and avoid no wind or variable wind or high wind periods and times of day.
Road/Trail Obliteration	Summer - Fall	Avoid high soil moisture content and high water flow periods
Altering Human and/or Animal Access or Use - Fencing	Unrestricted	Accessibility, frost depth and snow cover.
Introducing Plant Species	Spring or Fall	Avoid very wet or dry periods.
Introducing Animal Species	Spring to Mid-Summer	Accessibility and habitat sufficient for species.

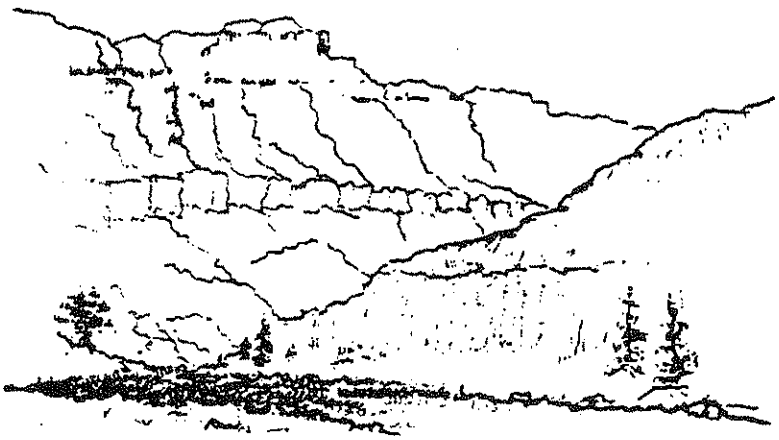
The Project Timing Chart for Planning which appears on the next page shows in graph form the recommended seasonal timing for techniques and allows you to time your own plan while keeping these recommended times in mind. An additional copy of this chart is in the Worksheet section of the Guide. You will probably want to make several copies of this chart to test two or three different timing arrangements before selecting the most efficient and appropriate for your needs. Also, if you keep the original chart as a form, you can use it for additional projects.

Completing the Project Timing Chart for Planning

The chart lists techniques down the left margin using the Logical Techniques Sequence identified in Planning Activity #6. For each technique, the line extending to the right across the annual seasons consists of an asterisk part, a question mark portion, and an unmarked portion. The "x" section [xxxx] indicates the generally recommended time period associated with implementing the technique, while the question mark [???] covers times the application may be possible, depending on the circumstances such as weather or soil conditions. *Underneath the standard or recommended seasonal timing line for each technique is a Project Timing line that you can fill in for your particular project if the technique is part of your project.*

Only the most common techniques are listed on the timing chart. If you plan to use a technique not represented on the chart, you will have to add it to the list (including what you discover to be its proper location in the technique sequence and its recommended standard seasonal timing). Techniques such as "Altering Human and/or Animal Access - Use-Permits," or "Altering Human and/or Animal Access or Use -Timing or Movement Strategies" do not have standard recognized technique implementation times and may shift over the years, but you can indicate the recommended initial time for implementation on the Project Time Line.

To describe projects extending over more than one annual round, simply add sheets in sequence and indicate the year on each sheet. If the use of only one or two techniques extend beyond the annual round provided on your first Timing Sheet and if you want to display all of the timing information on one sheet, you can mark the location for these techniques on the current year project line, indicating the following year date beneath your entered line.



PROJECT TIMING CHART

SEASONAL TIMING OF TECHNIQUES

TECHNIQUES	Spring			Summer			Fall			Winter		
	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Documenting	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	??	??
Project timing												
Flagging/Marking	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	??	??
Project timing												
Thinning - Precommercial	xx	xx	xx	xx	??	??	??	xx	xx	xx	??	??
Project timing												
Road/Trail Building/Repair		??	xx	xx	??		??	xx	xx	??		
Project timing												
Thinning - Commercial	??	??	xx	xx	xx	??		??	xx	xx	??	??
Project timing												
Treating Fuels - Mulching	??	??	xx	xx	??			??	xx	xx		
Project timing												
Treating Fuels - Burning		??	xx	xx	xx			??	xx	xx	??	
Project timing												
Trail/Road Obliteration					xx	xx	xx	xx	??			
Project timing												
Altering Human and/or Animal Access or Use - Fencing	??	xx	xx	xx	xx	xx	xx	xx	xx	xx	??	??
Project timing												
Introducing Plant Species	??	xx	xx	??				??	xx			
Project timing												
Introducing Animal Species	??	xx	xx	xx	xx				??			
Project timing												

To use the Project Timing Chart for Planning, first locate the timing of those cooperative techniques to which you are committed. Since multiple parties depend on their timing for implementation, this timing is the least flexible and your own project timing must accommodate them. Next, observing the recommended seasonal timing for techniques identified on the Project Timing Chart, notice that some techniques (such as Road Building, Fuels Treatment, and Animal Introductions) are more limited or restricted than others. If your project involves these more restricted techniques, you want to locate them next on the chart while respecting the Logical Techniques Sequence.

Next, identify where less restrictive techniques of the project can be located on the chart, again not violating the techniques sequence. Ideally, you want to schedule technique implementation on the chart from the upper left to the lower right. If all activities can be fitted to a single annual cycle, then you could complete the project in a single year.

Improvement projects that may require timing over a multiple-year period are those that:

- Involve a program across several sites,
- Require multiple applications of a technique over time,
- Are restrained in pace by economic factors.

If you have projects to implement over multiple years, your Project Timing Chart for Planning will consist of a timing sheet for each year in the multi-year project.

Example Project Timing Chart

Look at the Example Project Timing Chart for Planning that is provided on the following page. The example is based on the example project you were asked to suppose as your own in previous planning sections. You will recall that fuel treatment (in this case underburning) is a cooperative activity within the example project, and that as part of the cooperating group you have assigned it to mid-Fall. So, the first entry on the Example Timing Chart is this mid-Fall underburn which is indicated in the Example Timing Chart by a dotted line with wedged ends [<...>] in the month of October. To be ready for this burn, you should have implemented any techniques that are part of the project and that precede Treating Fuel Loads - Underburning in the Logical Techniques Sequence. Of the project techniques that qualify, two (trail building and commercial thinning) are more restrictive techniques, so you want to locate them first, if possible. If you assign commercial thinning to early Summer, you can place trail building (which is more flexible than road building) in late Spring.

With these techniques in place, you can place the others rather easily. You can assign Marking/Flagging to early to mid-Spring. Pre-commercial thinning can be located in late Summer since this activity can follow commercial thinning where both activities occur in the same project. You can assign willow planting to mid-to-late Fall after the underburning. And since you have decided that livestock will not have access to the area planted with willows before the fencing is completed, you can locate the fencing activity after the willow planting in late Fall.

Suppose that you have decided that documenting is something you plan to do periodically throughout project implementation, and that you plan to begin formal monitoring after the willow planting Beaver introduction would be the only activity that you could not fit into a single annual cycle. However, since beaver cannot be introduced until willow vegetation reaches the point it can support beaver, you would assign

PROJECT TIMING CHART - EXAMPLE

SEASONAL TIMING OF TECHNIQUES

TECHNIQUES	Spring			Summer			Fall			Winter		
	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Documenting	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	??	??
Project Timing	<...	.....	.....	.....	.....	.....	.....	.....	.....	....>		
Flagging/Marking	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	??	??
Project Timing	<...	...>										
Thinning - Precommercial	xx	xx	xx	xx	??	??	??	xx	xx	xx	??	??
Project Timing						<...	...>					
Road/Trail Building/Repair		??	xx	xx	??		??	xx	xx	??		
Project Timing			<.>									
Thinning - Commercial	??	??	xx	xx	xx	??		??	xx	xx	??	??
Project Timing				<...	...>							
Treating Fuels - Mulching	??	??	xx	xx	??			??	xx	xx		
Project Timing												
Treating Fuels - Burning		??	xx	xx	xx			??	xx	xx	??	
Project Timing								<.>				
Trail/Road Obliteration					xx	xx	xx	xx	??			
Project Timing												
Altering Human and/or Animal Access or Use - Fencing	??	xx	xx	xx	xx	xx	xx	xx	xx	xx	??	??
Project Timing										<.>		
Introducing Plant Species	??	xx	xx	??				??	xx			
Project Timing									<.>			
Monitoring	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	??	??
Project Timing									<...	.....	.....	...>
Introducing Animal Species	??	xx	xx	xx	xx				??			
Project Timing			<.>									

beaver introduction to perhaps three or four (or possibly more) years in the future anyway (entered on the chart with 2001 or 2002 beneath the line). Since you can suppose that in this example project your economic evaluation indicates that the economic benefits of commercial thinning will more than cover your costs for implementing the other techniques, there are no economic restraints for implementing all activities assigned to the single Spring to Winter period. As a result, you would be able to accomplish nearly all of your project objectives in a nine month time frame.

At this point you should organize the techniques for your own improvement project using a copy of the Project Timing Chart for Planning.

Action #9 Include Monitoring as Part of the Plan (*owners and experts*)

Maintaining forest health, like sustaining personal health, is an ongoing process. It is not something achieved once and forgotten. When you have met the immediate goals of your improvement project, you will want to do for the forest what you do for yourself: conduct regular checkups and watch for initial signs of any problems.

When it comes to maintaining forest health, monitoring is the method of conducting ongoing observation and evaluation. To observe and evaluate efficiently, you first identify key indicators for the health of different components of the resource system and, second, utilize the tools and methods for observing and evaluating changes to these indicators. Experts who provide you informed observations and offer recommendations for the project can also identify the following for you:

- How to monitor the resources on the sites,
- The best locations on the site for monitoring these resources,
- How to evaluate monitoring results and use them in an ongoing forest health maintenance program.

At this point in the project, hopefully you have committed to monitoring as part of your improvement plan and are accumulating the monitoring recommendations of the experts as you proceed through assessment and planning. Chapter 7 (Monitoring and Adaptive Management) explores integrating and implementing these recommendations. If you decide to monitor during implementation, look at Chapter 7 before beginning your on-the-ground work and include monitoring in your work plan along with documentation. In the example project, you will recall that you committed to documenting and monitoring as part of the project and scheduled these periodic activities on the example Project Timing Chart for Planning.

Action #10 Assemble the Plan (*owners*)

You may think of producing a written planning document as your least favorite activity, but you will find the plan to be very valuable in having all assessment information and planning activities written out and handy as you proceed to the implementation phase.

Your Project Plan need not be elaborate or require a lot of time. You can produce it in the form of a detailed outline of a few pages, and if an ownership group is involved, you can share the task with others or locate someone to assist you.

If you have already assembled an assessment report at the end of the Chapter 4, this report is Part One of your Project Plan. If you have not put this assessment report together, you will probably want to complete it first. Part Two of

your Project Plan summarizes the results of your work described in this chapter on Project Planning in which you finalized objectives, selected techniques, and sequenced, integrated, and timed the plan.

The assessment report, along with the planning document for your project, gives you a completed draft of your forest health management plan.

Action #11 Have Experts Review the Plan (*experts*)

Before starting to implement your plan, you will probably want to have the experts working with you (and perhaps others independent of this group) review and critique the plan. Based on the collective response of these experts, you can adjust the plan to its final form.

Action #12 Notify Authorities and Obtain the Necessary Permits (*owners*)

In your discussions with experts, you have probably been in contact with various agencies that are responsible for reviewing forestry projects. Representatives of these agencies may already be participating in assessment and planning for your project. If this is the case, these people have undoubtedly informed you about any requirements for notifying local, state, and/or federal authorities about your project before beginning work.

In Oregon, the Oregon Department of Forestry (ODF) is the agency to notify for forestry projects. If you submit a project plan to this agency, they can tell you what other authorities you may need to notify or approach for permits. Notification is often all that is required. For projects that involve operation of machinery during the fire season, you may be required to submit a copy of your project plan for approval. If your project is large in scale or involves high risk techniques, you will be asked to submit a project plan and have it formally approved.

It may seem an inconvenience to seek necessary approvals for your project, but you will appreciate the safeguards if you consider what might happen to your property if those around you could engage in high risk forestry activities without any oversight. Keep in mind that notification and approval also orients the emergency backup crews in your direction, in the event that anything goes wrong during your project work. With these crews in the picture, your overall risk is reduced, which is a substantial benefit to you.

If you put together a plan that incorporates ideas suggested in this Guide, you should have no problem obtaining approvals and permits for your improvement project.

CHAPTER 6

THE IMPLEMENTATION PROCESS

This chapter describes the project implementation process in terms of 10 general steps, listed below and explained individually in this chapter.

In many of these steps, it is recommended that you get some help from experts.

10 General Steps in the Implementation Process

#1 Document the Implementation Process,
#2 Set Up Formal Cooperative and Partnership Agreements,
#3 Create a Work Plan
  1) Construct the Project Timeline,
  2) Make Arrangements for Materials, Equipment and Labor to Fit Project Timeline,
  3) Develop Project Budget,
  4) Finalize Arrangements for Materials, Equipment and Labor,
  5) Specify the Work Plan,
#4 Locate and Evaluate Contractors,
#5 Develop and Review Contracts with Contractors,
#6 Protect Existing Resources,
#7 Designate and Mark Resources for Retention/Removal,
#8 Communicate Policy for Discovery of Cultural Artifacts and Remains,
#9 Work with Contractors,
#10 Communicate Effectively.

Step #1 Document the Implementation Process (owners)

The initial condition of the various resources on the project site that you documented during the project development phase are the record part of your project plan. Documenting each step in implementation is a good way to record the changes you make, as well as the way that you and those assisting you made them. If you document who did what, when, and where, this information can be important not only for future monitoring, but also in resolving conflicts, if any, among project participants.

As with other documentation, you will probably want to include records from locations that experts have identified as key monitoring points. In this way you integrate the project's documentation with later monitoring efforts. Then, after development of your work plan, you can schedule periodic documentation from these points. If you expect to monitor as well as document during implementation, you will want to look at Chapter 7 on Monitoring before you begin on-the-ground work.

If you take an active role in the implementation work, you may want to assign the documentation task to others among the ownership.

Step #2 Set Up Formal Cooperative and Partnership Agreements (owners)

Cooperative arrangements may have developed during assessment and planning, or

may become an option later. If cooperation among ownerships is part of the plan and these agreements have not been formalized, you will want to take care of this before any on-the-ground work begins. Details in cooperative agreements usually take some time to work through, so you want to leave yourself sufficient time. As with any contractual arrangement, it is important that you clearly define the responsibilities, costs, and risks for each participant. If arrangements are complex or involve significant financial investment, you may want to seek legal advice and have a lawyer review or prepare the documents. If your project involves higher risk activities, you may also want to review your liability coverage options with your insurance agent.

Step #3 Create a Work Plan (owners and experts)

As the owner, you have probably been overseeing and coordinating general assessment and planning during the project development phase. Unless you hire a general contractor to oversee project implementation, the duties and responsibilities of the general contractor will be yours. You will also need to put together a Project Budget as described in this chapter. This budget can be relatively simple if you are acting as the general contractor and you are contracting with subcontractors at set figures to do the total job for the project's various activities. However, if you and your crew are doing the bulk of the work of implementing the project, then you will be the one doing the preparatory work of the various subcontractors for Implementation Steps #2-5. In this case your Project Budget will reflect the details of materials, equipment, and labor costs.

1) Construct the Project Timeline (owners)

As the general contractor, you will create the framework for project activities. When you created the timed project plan (by completing the Project Timing Chart for Planning in Chapter 5), you arranged the techniques you plan to use in terms of the seasons of the year. The contractor's Project Timeline is a more specific version of this seasonal chart. In the contractor's timeline, you assign implementation of each project technique to particular dates and time periods for the duration of the project, or at least the first annual round if yours is a multi-year project. To do this, estimate the time needed by you and your crew, or by the subcontractor, to complete each unit of work. You can use time estimates indicated in previous discussions with contractors, or discover this information as you explore contractor options (see Step #4).

In scheduling different work units of the project, allow sufficient time between units to accommodate delays and overruns, which are likely to occur - even in the best planned and managed projects. *Remember that the more your project plan depends on the schedules of outside suppliers and subcontractors, the more flexibility you should design into your Project Timeline.*

Project Timeline Form

As you schedule project activity times, you may find it convenient to use a single sheet (desktop-size) annual calendar. These types of calendars are available at most office supply stores, or you can design one by enlarging a version of the Project Timeline form which appears on the next page and in the Worksheet section of the Guide.

PROJECT TIMELINE FORM

														DAY																
MONTH	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**
March																															
April																															x
May																															
June																															x
July																															
August																															
September																															x
October																															
November																															x
December																															
January																															
February																														x	x

It may be helpful to devote a different color pencil to each technique or activity. By drawing a colored line through the days of the appropriate months that you plan to implement that technique, you can readily see the period assigned to accomplishing each task.

In an improvement program of multiple sites, give each site a number and indicate these numbers within start and stop marks on the appropriately colored lines for the appropriate calendar periods. For a program involving multiple sites, you will probably decide to apply techniques sequentially across the sites since it is unlikely that you will have the manpower to implement each technique on all sites simultaneously.

If you are not knowledgeable in either general contracting or the particular work involved, you will probably want to consult an experienced contractor to review and evaluate the Project Timeline you construct. Adjust the Timeline in terms of this review.

2) Explore Potential Arrangements for Materials, Equipment and Labor to Fit the Timeline (owners and experts)

If you are going to perform the duties of the subcontractor and do the work of technique implementation with a crew of your own, begin by estimating your needs and arranging for necessary materials, equipment, and labor. To do this, consult your planning documents for specifications and visit the sites to take the measurements needed for estimating materials for each activity of the project. Then, make a materials list for each activity and for the project overall. If this list is extensive or involves items you do not know are readily available, you will want to contact suppliers and solicit bids to determine costs and availability.

Next, assess the equipment you need and decide whether to purchase, lease, or rent. Also determine when and how long you need the equipment. Determine equipment costs and availability.

Finally, if you need labor assistance, determine what skills you need, the number of workers, and when and for what length of time you need them. Determine the cost and availability of this labor. If you are not able to make arrangements for all the required materials, equipment, and labor to fit your Project Timeline, you will probably need to adjust the Project Timeline itself, possibly even the Project Timing Chart for Planning. After you have made the necessary adjustments and established a reasonable fit for the Project Timeline, you can complete your Project Budget before making any formal material, equipment, or labor commitment.

3) Develop a Project Budget (owners)

For your Project Budget, first consider any projected income the project will produce. Indicate the various sources and timing of this income, the projected amount, and the total income figure. With the information you have acquired on expenses, next make out the expense portion of your Project Budget. For each technique or separate unit of activity in the project, either itemize the materials, equipment, and labor costs and any contractor surcharges, or indicate the contracted cost agreed upon for the job. Remember to include any insurance, accounting, or legal expenses.

Total the expenses for each activity and for the combination of activities, and add a 15 percent overrun/unknown factor. The final figure should approximate your project costs. The total projected income, less the total projected expenses, should give you a fairly good financial picture of your project. At this point,

make sure the financial picture is one to which you can submit. If not, you will need to establish which activities logically precede others and determine how many of these activities you can afford.

4) Finalize Arrangements for Materials, Equipment, and Labor (owners and experts)

After you have compared your Project Budget with your available resources, you can make the written, formal arrangements for materials, equipment, and labor and for their time of arrival on the job site. Obtain firm, written commitments from your sources. When these arrangements have been made, you can enter this timing information on an enlarged version of your Project Timeline form.

5) Specify the Work Plan (owners and experts)

The work plan can be specified to different degrees. The more complex the project is, the more detailed the work plan will probably be. The work plan assists you and those in your crew to track who needs to do what, where, and when so that you can remain on schedule and meet your commitments.

Generally it is not difficult to map out a project by identifying a series of weekly targets. If you have an experienced crew that already understands your concept of working conditions and relations, this weekly target schedule may provide enough specification for your work plan. For a less experienced crew or one whose membership varies, you may need to write out your expectations and assign tasks and responsibilities to different members on a daily basis, in addition to providing weekly targets. Because there are so many variables that can influence work progress from week to week, having daily work plans more than a week in advance may not be efficient. When project activity becomes very concentrated or high risk or where coordination among many individuals is critical, daily, or even hourly, work plans may be needed, even for an experienced crew. Cooperative underburning is an example of one such activity.

Your improvement project work plan is complete when you have created your Project Timeline and specified it in terms of:

- Material, equipment and labor needs,
- Weekly planning targets,
- Times involving cooperative arrangements with larger scale planning requirements,
- Activities and times when you anticipate that daily [or hourly] planning may be required.

The above can be specified on an enlarged form of the Project Timeline form.

Step #4 Locate and Evaluate Contractors (owners)

If you and your crew are not planning to do all of the project work, you will be selecting contractors. You may hire a general contractor to supervise all of the work and to hire any subcontractors needed, or you may serve as the general contractor and hire subcontractors to implement different project techniques. You may have already contacted potential contractors in your effort to evaluate the economic differences among the technique options for your project (as discussed in Chapter 5, Action #4). If you have not made these contacts, you may want to review that section now.

Apart from exploring contractors recommended by the experts who have assisted you, you may also want to talk to other local woodland owners to discover their experiences and hear their recommendations. Recommendations from informed and

experienced local people are your best source for making your initial selection of contractors to contact. The better and more discriminating your initial contractor list, the less time you will have to spend in the evaluation process.

Evaluating contractors is a multifaceted matter. Certainly you need to feel that the contractor is someone you can work with, someone who will listen carefully to your issues and concerns, and someone who will respect your inquiries and suggestions. Your contractor should also be someone who clearly understands your goals and sensitivities and who has worked for others having goals similar to yours.

If You Want to Be Part of the Crew

Smaller contractors with smaller crews are often willing to work out an arrangement on a materials plus labor basis, and some will work with you as part of the crew. If your project is one where a smaller crew will be sufficient, you would like to participate directly, and you have at least the minimum temperament and skills required, there are some advantages to your being part of the crew. These advantages include:

- Being in a position to exercise great control and influence on how the job is done,
- Being able to determine the pace and ultimately the cost of the job,
- Being in the best position to respond creatively to options that arise during the work,
- Reducing your direct costs, if you can afford the time,
- Having the satisfaction of doing the work and of taking more of the credit for the improvements made.

Questions That May Help You to Evaluate Contractors

- Is the contractor qualified?
- What is the contractor's training, continuing training, and current membership in professional organizations?
- Is the contractor local to the area and familiar with its special features?
- How long has the contractor been in business in the area doing the type of work you are looking to hire?
- Is the contractor licensed and bonded? (You will want to see the documents and make sure they are current before you proceed to contracts.)
- Are all the members of the contractor's crew covered for workman's compensation insurance? (See the proof before you proceed to contracts, or you could be liable for worker injury on the job.)
- What is the contractor's reputation for beginning and completing jobs in a timely manner?
- Is the contractor willing to identify previous and current clients for you to contact for references?
- Will the contractor only take the job if he and his crew do all of the work and supply all of the materials for a set price?
- Is the contractor willing to work in terms of a materials plus labor arrangement?
- Is the contractor willing to include you in the crew, if you are capable and interested?

Step #5 Develop and Review Contracts with Contractors (owners)

Everyone wants and expects their contracted job to proceed smoothly with good results. Most of the time this is the case. When the job goes well, no one cares or looks at a contract. When a job does not go well, written and signed contracts are all that you or the contractor have to rely on.

Rule One - Have a Written Contract (Put the Work in Writing with Dated Signatures of All Parties)

Without a written contract, you are floating in the breeze with memories and opinions going in every direction. In this context, think of written contracts as anchors. They exist to help all involved to be as definite as possible about what job outcomes are expected and how and when those outcomes are to be achieved. Written and signed contracts are also legal commitments by the involved parties to abide by the conditions identified in the contract, many of which specify a fee for service arrangement.

Rule Two: Put Sufficient Detail in the Contract.

Contracts can be as minimal as: "Install new culvert, $1,000" (followed by the contractor's signature) on a note pad piece of paper. Such a contract leaves all details unknown and is weak at best. You may have discussed the details, but there is nothing in writing. So, when you are amazed to get a bill from the contractor for an additional $753 for the culvert at the end of the job, you look at your contract and you discover that the written statement could easily be understood to refer to only the cost of the installation, not the cost of the culvert itself. A $1,000 job became a $1,753 job because the "contract" was far too vague and general.

To avoid such problems, it is recommended that you construct contracts which at a minimum include the following components of a basic contract:

Components of a Basic Contract

- Location of the Job
- Start and Completion Dates
- Work to be Performed
- Who Will Perform the Work for Whom
- Materials to be Used
- Total Costs - Materials and Labor

If the basic contract is for labor plus materials, then the labor cost in its different divisions should be specified and an estimate given for the cost of all labor and materials together with a method for recording all labor and of accounting for all material expenditures. If the agreement is for an overall price for the job, then the price should be given as a total for the job including all labor and materials. Dated signatures on copies for all parties completes this basic contract.

Few contracts are more specific than this basic contract, but you need to recognize that a great deal is unknown with such a document. For example:

- What condition is the site to be left in?
- What is to be done with extra materials that are left over?
- Is the contractor licensed and bonded to cover things like an accidental diesel spill in your stream or your barn being burned down?
- Are the contractor's workers covered by workmen's compensation so you are not liable for their injuries on the job?
- Do you have the right to stop work if you cannot resolve disputes with the contractor, etc.?

In formulating contracts, you must decide what level of detail you want in a contract that you are willing to sign.

> Generally speaking, the more complex the job, the more critical the job, the more risky the job, and the more expensive the job, the more you want to define the contract in detail.

Rule Three: Be a Full Participant in the Creation of the Contract, and Review the Contract Carefully

Contractors have standard forms, now often generated by computer programs, which they use to formulate contracts. These forms are usually produced from the contractor's perspective and favor his or her legal position, especially in the "fine print." When you reach agreement in principle with a contractor, you cannot assume that the contract document that he or she returns to you for your signature is complete or is formulated considering your best interests. Review the contract carefully, read the fine print, feel entirely comfortable about asking for additional inclusions or exclusions before you sign, and seek professional legal advice if you are at all uncertain or unclear about any of the contract provisions.

Entire books have been written about developing contracts, and one major area of the law deals with this matter. What is provided here is simply a snap shot of the issue designed to encourage you to think carefully about any agreements you enter into on behalf of your improvement project. You do not want to put yourself in a position where you are unnecessarily either frustrated or financially at risk while trying to benefit your woodland.

Step #6 Protect Existing Resources (owners)

Before project work actually begins, you will likely want to identify and protect any vulnerable resources. You can flag areas around these resources using tape colored to indicate that no entry or disturbance is allowed. To control the impact of vehicles associated with the improvement activities, you will want to identify and mark the areas and lanes and trails to be used during the work. Without such travel markings, you could have widespread and unnecessary disturbance to the project area, to the extent of possibly compromising your overall improvement goal. Make sure your crew members, and also any contractors and their workers, understand your markings and recognize the need to respect them.

Step #7 Designate/Mark Resources for Retention/Removal (owners and experts)

If your project involves commercial extraction of resources from the site, the careful marking of these resources is critical to the success of your project. Experts assisting you should indicate the criteria to use in marking resources to be removed, as well as those to be retained. If you do not do the marking yourself, it is best to have a knowledgeable and experienced person do the work. This person should clearly understand the marking criteria and be independent of the contractor doing the removal. Use a marking system that will show what has been removed after the fact, as well as that what you marked for leave was in fact left. For trees, it is common to color code markings using blue for removal and orange for leave. If you mark both categories of trees breast high and at the base, you can check the cut stumps to be sure that all display your blue base marking.

If you are familiar with the marking criteria, you can examine the marking carefully when it is concluded to see if it meets your expectations. Try to picture the area with the resources marked for removal gone. If you do not like what you envision, you need to make sure that needed adjustments are made. If the area is small enough, you may want to make a visual record of the marked resources prior to removal. If the area is large, you may want to make a 360 degree visual record from identified and relocatable sampling points. If these points tie into your later plans for monitoring locations, your marking record serves your monitoring goals at the same time.

Step #8 Communicate Your Policy for Discovery of Cultural Artifacts and Remains (owners)

During project assessment you reviewed the cultural resources issue and determined if it applied to your project in terms of known cultural or historical sites (Chapter 4). In the process of doing Step #6 in this chapter, presumably you flagged to protect any known cultural sites in the project vicinity. You also had an opportunity during assessment to formulate your own position on cultural resources and to consider how this policy might be affected in the event you were cooperating with other area landowners. Before work begins, you will want to clearly communicate your policy to your crew and any participating contractors. Make it particularly clear to all what you expect if new cultural resources are discovered during project implementation.

Step #9 Work with Contractors and Crews (owners)

Most information in this section is common to any situation involving owners, contractors, and crews. As the property owner, your most essential function is to share your project goals and objectives with all assisting you. Remember that there are many different ways for workers to perform the same activities. Sharing your goals and objectives will assist the participants to understand what they are to do, and also how they are to do it. Indicating your vision to a general contractor or subcontractor does not necessarily mean those down the line will be made similarly aware. Where possible, get to know the full crew and share your goals with them from the beginning.

Emphasize the Importance of Safety

It is important for you to stress the safety of all participants in everything they do. Make it clear to everyone that short cuts which risk worker safety or threaten resources are not acceptable. Doing the job right, doing it well, and doing it safely are more important than doing it fast. Everyone needs to recognize that it takes very little extra time to perform the job well and safely. Encourage your contractors and crews to use the right tool or equipment, the right way, with proper protection, and with the needed assistance. Safety is an attitude, and you want to confirm this attitude in those who participate with you in your project.

The Role of General Contractor

If you are the general contractor, your primary duties are to:

- Guide the project process,
- Communicate how the selected and organized techniques can lead to achieving the project goals,
- Create the project timeline,
- Evaluate the work in progress on a regular basis,
- Coordinate the activities of different participants,
- Assess how the work is progressing relative to the work plan framework,

- Adjust the project timeline and the commitments of the various material suppliers and participants as needed.

If subcontractors are involved, you will meet with them for regular review and evaluation sessions and communicate frequently with them to get progress reports so you can make timing adjustments. If you see problems, you will want to meet immediately with those responsible and seek solutions. If problems persist, you will want to halt the work until they are resolved. (Your right to stop work under certain conditions can be part of your contract.) And, of course, you will meet your obligation in a timely fashion to pay your crew and subcontractors for work completed (pay schedules are part of most good contracts).

Responsibilities of the Subcontractor

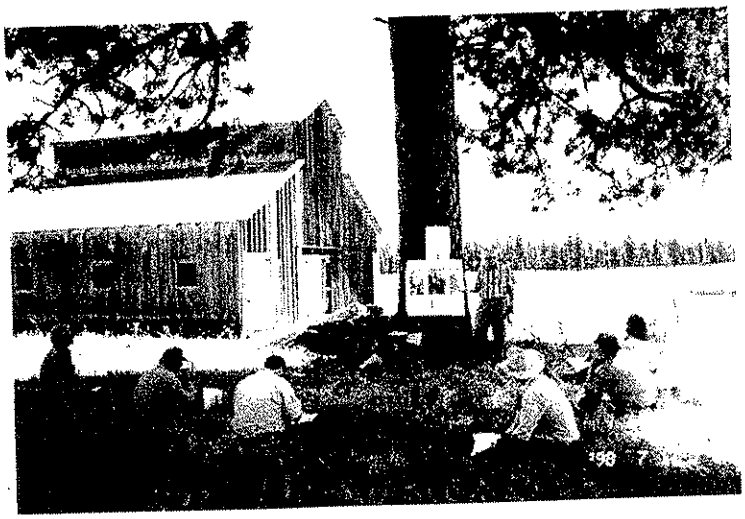
If you and your crew are doing the project work, you have the responsibilities of the subcontractor, as well as those of the general contractor. You are responsible for tracking the day-to-day supply of materials, equipment, and labor, as well as the daily assignment of tasks to make progress on the units of work you have identified in your developed work plan.

One of the keys to successfully executing the role of the subcontractor is to specify your weekly work plan for daily tasks and to remain ahead of the actual work with this plan. If you are a member of your own crew, you are in the best position to judge and evaluate the work progress and to adjust to any changing circumstances. If you are not working with your crew, you will need to be on the job site frequently, probably a minimum of morning and evening of each work day, to set up and assess the work.

Step #10 Communicate Effectively

If you have a good, detailed work plan with clear and detailed contracts, you need only communicate effectively to meet the requirements for successful management of contractors and crews. If you communicate the relevant parts of your work plan to the appropriate participants in a timely and diplomatic fashion, the implementation should go smoothly. Remember that a diplomatic approach to interacting with people is extremely important to a positive work situation, and that more and better work gets done in a positive work environment.

Good employers set high, but realistic expectations for everyone (including themselves), retain a sense of humor, and are able to laugh with their employees.



CHAPTER 7

MONITORING AND ADAPTIVE MANAGEMENT

If you have followed suggestions for documentation in the set up Chapter (Chapter 3, Task #3), the assessment chapter (Chapter 4, Action #1) and the planning chapter (Chapter 5, Action #9), you recognize the significance of monitoring as part of evaluating your project and determining your future management plans. You may want to review the three sections in those chapters before continuing with this chapter.

If you do not have the expertise in natural resources to set up a monitoring program, you can rely on the monitoring recommendations of specialists participating in your project. Your task is to implement - to the degree you consider useful - the monitoring procedures they identify for you.

Hopefully, in the documenting already completed for your project, you have recorded the initial resource conditions (assessment) and any changes you made to these resources through implementation. In doing this, you have accumulated the information needed to establish both a baseline for initial resource conditions and a record of how these conditions have changed through the implementation activities.

When to Start Resource Monitoring

You can shift from documenting to monitoring at any point in the process, but the most common timing is when you have completed your work with each resource. For projects designed to treat a resource over several years, you will most likely want to begin monitoring with completion of the first stage of work. At whatever point you make the decision to initiate monitoring, the twelve steps identified in the box below and described in more detail in the following sections indicate the process of setting up and utilizing the results of a monitoring program. When you complete the third step, you can begin putting together a monitoring chart that you can use to record your observations and measurements.

Twelve Monitoring Steps

#1 Select Resources to Monitor,
#2 Identify Resource Indicators to Observe and Measure,
#3 Select Sites for Observation and Measurement,
#4 Begin Constructing a Monitoring Chart,
#5 Identify, Locate, and Learn to Use Measuring Equipment,
#6 Establish Baseline for Indicators,
#7 Schedule Observations and Measurements,
#8 Collect and Record Data,
#9 Evaluate Data and Establish Data Trends,
#10 Evaluate Improvement Progress and Success / Failure,
#11 Identify Any Needed Management Adjustments,
#12 Share Your Data and Findings With Watershed Analysis and Policy Groups.

Step #1 Select Resources to Monitor (*Owners and Experts*)

To start designing a monitoring program, decide which resources you want to monitor and the level of detailed information you want to accumulate for each. The most obvious resources to select for monitoring are those you value most highly. Economically significant resources, such as the trees in a woodlot, often receive a lot of attention, including monitoring. However, being concerned with forest health, you are aware that the components of the natural resource system are interdependent, and that, at a minimum, you need to know the condition of components in the resource system upon which trees depend directly - such as soil and water. You also realize that if you do not pay attention to the amount of down and woody forest floor material and the density of the stand, your valuable trees may go up in smoke, or grow poorly.

Basic Monitoring Program

In areas east of the Cascades, a basic woodlot monitoring program includes ongoing assessments of the four components just mentioned: soil, water, down and woody debris, and composition and structure of the plant community.

Like most landowners, you probably also value other resources (such as fish and wildlife), so you will most likely want to monitor other components of the resource system, too. The more of the resource system you include, the more confident you can be about your management decisions.

Step #2 Identify Resource Indicators to Observe and Measure (*owners and experts*)

You cannot monitor all components of all resources, but you can periodically check on the condition of those parts that have the ability to indicate the state of the resource in general. Experts who worked with you during assessment should have identified key indicators for the different resources of significance to you on your site. If you have not identified these indicators, you will probably want to locate experts who can assist you as you start to set up your monitoring program. Your area Soil and Water Conservation District, Natural Resource Conservation Service, Oregon Department of Forestry, Oregon Department of Fish and Wildlife, and the County Agricultural Extension Service are good places to start in locating this assistance.

Step #3 Select Sites for Observation and Measurement (*owners and experts*)

In most cases, you will select representative sites to observe or measure each indicator. By observing the condition of the indicators at these strategic locations, you will be able to extrapolate the general condition for that resource indicator on the project site. Again, the experts who assisted you during assessment should have suggested appropriate indicator sites and perhaps even representative examples at these sites. If these sites have not been identified for all of the resources and indicators you want to monitor, you will want to get this information at this point.

How to Create A Monitoring Chart

- Down the left margin of a page, list the monitoring sites in an order that reflects how you would most effectively travel within the project area to visit these sites.
- Next, identify those indicators you plan to observe or measure at each site. You now have a combined listing - arrayed vertically down the left margin of the page - of your monitoring sites and indicators to be assessed at each site.
- Now, to the right of this site/indicator column, draw some horizontal lines and then vertical lines through them to create a box (matrix) for each indicator. In the first vertical column of boxes to the right of the site/indicator column, identify the resource associated with each indicator.
- In the additional columns and boxes to the right, you can include other relevant information and record your observations and measurements for each indicator over time.

Step #4 Begin Constructing a Monitoring Chart (*owners*)

You will probably find it useful to put together a monitoring chart to display your monitoring program and provide a place to record your current and ongoing observations and measurements for each indicator. As you read the following paragraph about how to construct a monitoring chart, you may want to look at the example chart following Monitoring Step #7 below.

When you have completed your chart, you have created a recording instrument for your monitoring program.

Step #5 Identify, Locate, and Learn to Use Measuring Equipment (*owners and experts*)

During the assessment period, hopefully you had an opportunity to watch your experts using any monitoring equipment that was necessary for them to observe or measure their resource indicators. If you arranged for them to show you how the equipment is used, you had an introduction to these tools and instruments at that time. If these same experts indicate how you can gain access to this equipment (borrow, rent, or purchase), you are acquainted with equipment sources. If you lack any of this information, you will need to contact the relevant resource specialists.

In most cases, the basic monitoring equipment which will serve you well is fairly simple, inexpensive, and readily available. By all means do not let obtaining and learning how to use this basic equipment stop you from engaging in monitoring. You can be confident that if a ninth grader can master these simple tools, you can, too! After you locate the required equipment, it is advisable to practice using it repeatedly until the process becomes

familiar; otherwise you may forget between monitoring events and become frustrated with having to constantly relearn the process. If you would like to indicate the tools and equipment associated with the observation or measurement of each indicator, you can dedicate the next vertical column to the right on your chart to this purpose. (See the example chart at the end of Monitoring Step #7 below.)

Step #6 Establish the Baseline for the Indicators (*owners and experts*)

Hopefully, when you arranged for experts to formally assess the different resources, you also asked them to provide you with baseline measurements for relevant indicators at your monitoring sites. If you did not arrange for them to supply this information, you will need to make your own initial observations and readings at the time you begin monitoring.

Look at your monitoring chart now and in the next column to the right, enter the baseline or initial observations and readings along with the date. Do this for each indicator on each site. (See the example chart at the end of Monitoring Step #7 below.)

Step #7 Schedule Observations and Measurements (*owners and experts*)

During assessment, your experts should have indicated how frequently you should make observations and measurements of each indicator, as well as the timing during the seasons when each of these monitoring activities should take place. If you did not get these recommendations, you will need to get them now.

Enter this scheduling information in the next column to the right on your chart. Do this for each indicator on each site. When you have finished doing this, you have completed constructing the chart for your monitoring program. See the Example Monitoring Chart on the next page.

Notes

EXAMPLE MONITORING CHART

Site/ Indicator	Resource	Equipment	Schedule	Baseline Record	Record / Observation And Date
Site #1					
[Indicator]					
[Indicator]					
Site #2					
[Indicator]					
Site #3					
[Indicator]					
[Indicator]					
[Indicator]					
[Indicator]					
Site #4					
[Indicator]					
[Indicator]					
Site #5					
[Indicator]					
Site #6					
[Indicator]					
[Indicator]					
[Indicator]					
Site #7					
[Indicator]					
Site #8					
[Indicator]					
[Indicator]					
[Indicator]					

Step #8 Collect and Record Data (*owners and experts*)

After your monitoring chart is ready, you can begin to collect and record your observations and measurements according to the schedule you have identified on your chart for each indicator on each site. With each observation or measurement note the date, time, and any special conditions that might influence the results (such as equipment uncertainties, unusual weather, or significant activities upstream or upslope).

Making these observations and measurements on a regular basis may appear like it will require a lot of your time. In fact, after you master the system, you will probably not spend more than an hour monitoring per month. You can often integrate monitoring with other activities, further reducing the time. Sharing the monitoring work with your children, other owners, or student groups can contribute to their knowledge about effective natural resource management.

Step #9 Evaluate Data and Establish Data Trends (*owners and experts)*

After entering a few observations and/or measurements for each indicator, you will be able to compare measurements and determine if any changes have occurred over time. For the first two or three readings, note any changes you see occurring. However, until you have enough entries over a long enough period of time (usually at least one full annual cycle), it is probably wise to refrain from drawing any firm conclusions, unless the changes are large and/or the implications are very troublesome. Remember that your project has probably resulted in some disturbance to the site, and it will take some time for the site to stabilize. It is also true that observations fluctuate naturally across the seasons for many indicators, especially in the semiarid country east of the Cascades.

Your resource experts should have given you an idea of what trends in observations and readings to expect for each indicator. As a result, for each reading or observation, you should be aware of what direction across the readings suggests improvement and what direction indicates a decline when compared to the baseline reading.

When you have enough readings for a particular indicator, examine the record for any clear trends. If observations for a single indicator suggest a trend, then check other indicators of the same type on the same or other monitoring sites. Is the trend in the one indicator confirmed, contradicted, or unclear in the others?

If indicators of the same kind on different sites show the same trend over a significant period of time, the trend may reveal a real change. To check further, examine any indicators of a different type that you may be tracking for the same resource. Do changes in these resource indicators reveal the same trend? When multiple single indicators and the group of indicators for a resource display trends that make sense together over a period of time, you can be fairly confident that the change and the direction of the change are reliable. You will have additional confirmation if the trends you observe overall for one resource make sense in terms of changes seen overall in other related resources in the system.

Step #10 Evaluate Improvement Progress and Success (*owners*)

As overall trends in your monitoring data emerge for each resource, you will be able to assess whether these trends are in line with the results you are seeking. Of course, some

effects take longer to show up than others, so you should judge monitoring results according to the pace of improvement expected for the particular resource. Your experts should indicate the rate of change you can anticipate as part of their monitoring recommendations.

Notes

How Indicators Show Progress Toward Goals

If indicator trends for a particular resource are consistent and in the desired direction, then the results of monitoring indicate you are making progress toward achieving your improvement objective for that resource. When this progress reaches your target condition, you have reached your objective for that resource. If indicator trends for all monitored resources are in the desired direction, you are making overall progress toward reaching your project goals for improved health of individual resources and the resource system on the project site.

What To Do When Indicators Show Lack Of Progress

If you discover a lack of progress in the monitored indicators or inconsistency across indicators for a resource, first verify the accuracy of your expected timing and pace for change. If there is inconsistency among indicators, check your monitoring technique to be sure you are performing the observations and measurements properly and consistently. If your expectations and techniques are correct, contact the relevant resource expert for an interpretation of your results. Keep in mind that indicators on one monitoring site may show improvement before others do.

Importance of Photos in Monitoring

In the course of your project, you may have developed a fairly good eye for what you are looking for in general forest health

improvement. As you assess the results of your project, remember to examine your monitoring photos from controlled photo points since these are especially revealing of the physical changes to the project area over time. You may be surprised at the extent of the improvement seen in the photos. When you are on the land daily, it is easy to miss gradual change, but such changes are collective and two to five years can make a big difference. "Before" and "After" photos can make this point dramatically.

Step #11 Identify Any Needed Management Adjustments (*owners*)

If your monitoring reveals a lack of improvement, or especially if it indicates a decline in the condition of a resource, check your results with the relevant expert. If this expert confirms your findings, you first want to discover whether something new and unexpected has entered the picture and is responsible for the lack of improvement. Did something that you and your experts did not anticipate occur to the site during the project work? Have weather conditions changed significantly (much drier or wetter)? Is something happening on the watershed upstream or upslope of the improvement site to retard improvement?

If you and your experts discover a new element, you will want your experts to recommend actions you can take to address the situation. If there is no new element affecting the site, you and the relevant experts will want to consider whether the associated project objective is truly appropriate for the site. If you determine it is, you will want to consider what alternative actions are available to promote the improvement you seek.

In evaluating your alternatives either to treat a new problem or to find a new solution to an old one, you will return to the planning phase. Your evaluation may convince you that the best approach is one of the following actions:

- Continue on the same course and give the site more time to mature,
- Apply a new management technique,
- Increase or reduce the application of a technique already in use.

Adaptive Management

Regardless of which of these three actions you take, when you make your decision you are using the results of systematic monitoring to adjust your management. Management decisions made consistently in this manner and on this basis are called "*adaptive management.*" Effective monitoring makes adaptive management possible. Using this approach, you can catch most problems as they emerge, so you have an opportunity to address them before they become major and expensive to remedy. You can also discover which techniques work best and have the least impact to other resources. As a result, you can apply these techniques with greater confidence on other sites or in later management rotations on the same site.

Addressing Recurrent Situations

Some woodlot management challenges can be predicted to reoccur. For example, if natural fire is not permitted to occur in your management scheme, then the need to address the buildup of fuels on the forest floor and the density of seedlings will occur periodically. If you monitor the down and woody debris and take tree density and growth measurements in your woodlands, you will learn when to deal with these conditions before they jeopardize the resource system or your financial investment. If you coordinate your woodland management with that of others on your watershed, hopefully you will discover a

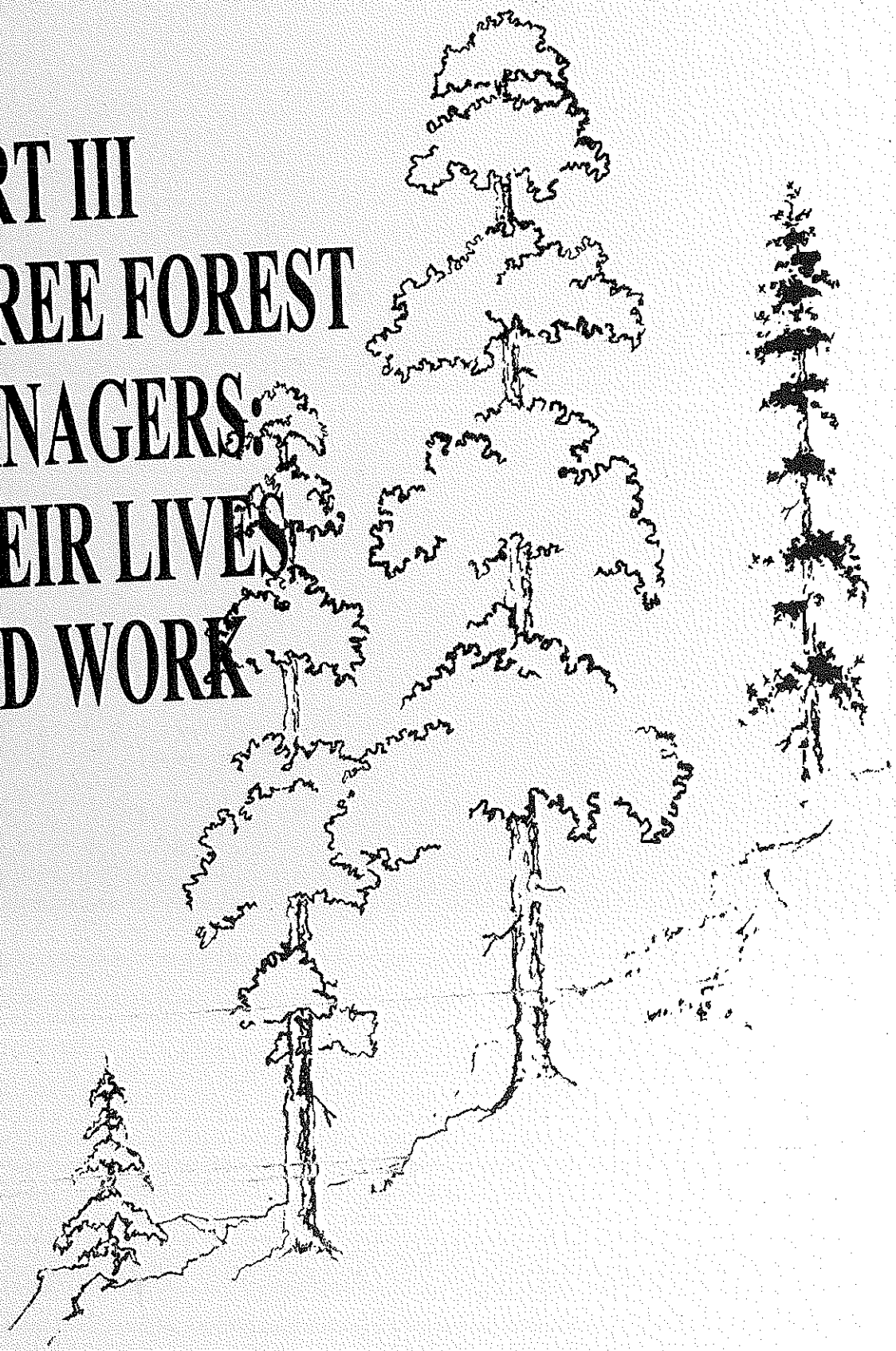
cooperative framework that allows you to address these kinds of common needs effectively and efficiently in your ongoing management.

Step #12 Share Your Data and Findings with Watershed Analysis and Policy Groups (*owners*)

You may have tapped into the knowledge and information of your watershed council as you developed your project. In turn, overall planning for your watershed can benefit from your experience. In addition, your monitoring data can be added to data available elsewhere for your watershed to provide a more complete picture of the condition of the resources.

Sharing experience and monitoring data among the watershed ownership community is the basis for achieving adaptive management overall on your watershed. You are probably interested in having a cooperative, adaptive, and locally controlled approach to watershed management, so where reasonable, it is in your interest to make this final connection from your own forest health improvement project back to your watershed community. Also, to the degree you are comfortable, you can benefit from participating in groups concerned with analysis and policy making for your watershed.

PART III
THREE FOREST MANAGERS: THEIR LIVES AND WORK



CHAPTER 8

A SENSE OF PLACE

Managing the Woodlands of Gerber Ranch

As told to Tom Burns by Ned Livingston

The Basics

My wife Marilyn is the Gerber Ranch connection; she is one of the three Gerber girls. I'm Marilyn's husband and the son-in-law to Marilyn's father, Henry Gerber and his wife, Mariam. Marilyn's grandfather and uncle were homestead patent recipients for the area in 1886 and settled in 1891. The way things turned out in our family, I am the one mostly responsible for managing the 2,400 acres of the ranch that eventually came to us. Our property is four parcels of the old ranch plus what we traded the Forest Service for as we sought to consolidate our holdings.

The land is on the western fringe of the Great Basin Steppe Province in Eastern Klamath County, South-Central Oregon. The base elevation is 5000 feet with average annual precipitation of eighteen inches. The vegetation pattern is sage and bunch grass on the rock flats; meadow grass, aspens and willows in the wet areas; juniper, plum, mountain mahogany, and bitter brush in the transition areas approaching the conifer stands; and finally ponderosa pine, incense cedar, and white fir stands growing on mountain slopes up to the 5400 foot elevation.

Ned and Marilyn Settle at the Gerber Ranch

The Gerber girls summered out on the ranch, but for the winter and the girls' schooling the family had a house in Klamath Falls because in winter the ranch roads were often impassable. I was raised in Klamath Falls, and Marilyn and I began romancing in 1949 when Marilyn was a freshman in high school. The very first time I ever came out to the ranch was with a friend, Lester. He and I decided one summer day after school was out to find the Gerber girls because we hadn't seen them in a couple of weeks. In the process of trying to find the house, we took a wrong fork in the road and we ended up at a logging site near by. That was the first logging operation I'd ever seen, and I recall my impression, "Hey, there are trees out here, and some really nice ones." But I was appalled with the mess, the trauma to the area that went on as a result of the operation, and the depth of the dust in the road. Les and I never found the girls, but we did finally get to the ranch house. They had just poured a fresh cement sidewalk

along the fence line to the new house, and Lester and I wrote our names in pebbles, "Les and Ned were here."

By the time Marilyn was going into her junior year in high school, the Korean War started, so I was "invited" into the service. When I got out, Marilyn and I got together and we headed for the University of Oregon. I was in the architecture school from '55 to '60, and Marilyn got her Masters in Anthropology in 1959. We were married in 1956 and from 1956 to 1960 we spent most of our vacations on the ranch, so it was during that time that I started to get to know the place. I was interested enough in it that when my advisors wouldn't let me do my final architecture project in furniture - which was my main interest, I ended up doing a comprehensive site and development plan for the Gerber Ranch. I didn't realize it at the time, but the way things turned out, I think the ranch had its hook in me from about that point.

A year or so after I graduated from architecture school, I started my own furniture business. During the four years Marilyn and I tried to make a go of it on our own, it wasn't easy making ends meet. We visited the ranch often and it seemed like as long as the ranch was there, in some ways there was no getting away from it. Finally, in 1966 Marilyn's father, Henry Gerber, suggested that we run the furniture business from the ranch, and he set us up on one of his hay farms near Bly. We lived in the ranch house, and Marilyn cooked for the crew in return for our room and board, and Henry gave me an outbuilding for my shop. I hired craftsmen to work with me and we built furniture that I designed right on the ranch and we shipped it to New York and all over the country. We even have one piece, a library ladder, that is in the Renwick Gallery in the Smithsonian Institution in Washington, D.C.

Even though Henry and I had very different ways of looking at things, we got along beautifully. From long before I met Marilyn, I had developed my way of dealing with my surroundings, and I tend to be especially sensitive to the breadth of things around me. As a rancher, Henry's attention was more channeled or focused on the specific things that concerned him. But Henry was capable of taking a peek on the other side where I was as a designer, and he was kind of intrigued with what I was doing. I think he could respect my work because we shared working with something you could see and grab hold of and use and because my furniture business didn't overlap with his ranching. If we had both been ranchers, I know we would have had a lot of conflicts.

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Henry Gerber's Woodland Management

Henry was around in the sixties when the BLM began thinning the timber on their property next to the ranch, but Henry was a rancher and he really never gave much thought to timber management. He would sometimes jokingly call the BLM a "Bunch of Lazy Men" and if he noticed the thinning activity he would say something like, "Well, the BLM has found something else to do." He would say it with a touch of humor, and he would say it to anybody. But his attitude about timber was typical of the ranchers of his era, "Well it's there, too bad there is so much of it; you would get more grass for more cattle if there was less of it." It was more a nuisance, at least the part of the timber that wasn't merchantable.

Henry was a real rancher and in my view ranchers tend to be very pragmatic. I think

people who work with the land confront so many variables in working around the problems of weather they learn to take a pragmatic view and limit their attention to the tasks at hand. A good example is the fact that Henry loved roads. If someone, especially the feds, came in and said they wanted an easement to improve a road on his property, he didn't hesitate, "Go ahead!" And the reason is that he grew up in the period of horses and wagons and then the Model T when dirt roads and paths were about all that was on the ranch and in the area. And trying to negotiate those paths to get from here to there, Henry and his crews spent a lot of hours jacking up rigs and pushing them through mud holes with little hope of making much progress. When you've spent some time in those mud holes, your view becomes pretty pragmatic and focused, and your concern is to look for anything that can help your ranching operation, and you don't spend a lot of attention on things that don't deal directly with the enterprise.

The 1,400 wooded acres of the ranch on Paddock Butte were used from the time of white settlement as a pasture for horses. There were upwards of seventy horses on the Gerber Ranch at that time, and horses were the only animals that could capture enough grass and go for a long enough period without water to make use of that acreage. So, that's how Henry Gerber utilized the mountain. It was thought of in ranching, not timber terms. Henry was not interested in managing timber, but he didn't hesitate to use the resource, as he did when he cut trees to finance the educations of his three daughters. His attitude was, if there are some trees out there and they would get the girls through college or allow him to take a trip to some outstanding hunting area, Henry would cut some trees.

Ned Becomes a Land Manager

In the late '60's I noticed the BLM and FS thinning activities on the surrounding properties and I understood the thinking behind it, but I didn't give it much attention because land management wasn't my domain. We drove by, and we watched and we critiqued it, and we thought they didn't chop down enough, and sure enough later they came in and chopped down some more. And that's one thing I've learned about thinning, you tend to be conservative. You think, "Man, I'm butchering this devil," and then you come back a year or two later and you realize you didn't take out enough.

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In 1974 Henry died very unexpectedly and at a relatively early age. As the family patriarch and the one definitely in the driver's seat, Henry gave the impression he was never going to die, so he hadn't really prepared for that possibility. To satisfy estate taxes and outstanding bank loans, parts of the ranch were sold including the Bly hay farm where we were making furniture. My mother-in-law, Mariam, didn't feel the same way as Henry did about supporting my furniture business, and so as the ranch passed to Mariam, Marilyn and I had to decide, "Are we going to bail out of here or are we going to tough it out?" At this point Marilyn was teaching at the public school in Bly and our two sons, Noel and Duncan, were in late elementary and junior

high school. Some ranch land had come to us at Henry's death, but there was no place to live or work. It was not an easy decision, but we decided to tough it out and start over and build our own infrastructure. It took us three years to design and build the house and shop on what we call "Frog Hill." And at the end of three years, my clients in the furniture business were tired, but still waiting for the promised products. But by that time I had lost the level of interest that I needed to continue with furniture making. Somehow, spending the time to sand one of those objects no longer really appealed to me.

At Henry's passing, the Frog Hill acres and 400 acres of irrigated agricultural land came to Marilyn. In addition, the family had reached an agreement and put it in writing on how the bulk of the ranch was to be divided when Mariam, Marilyn's mother, died. They wanted to not leave the estate problems Henry left, so, in that agreement, Marilyn and I knew we were to receive the 1,400 acres of timber lands on Paddock. We also knew all of the land, including the forested land on Paddock, needed attention. So, I took on a new career as a land manager.

Managing Paddock to the '95 Underburn

The management story of what had happened on Paddock Butte was really pretty typical for the area. The land had gone through timber harvests in the 1930's and early forties with two successive overstory removals, the last being a diameter cut removing everything over 16 inches. Anything under that diameter they called "bull pine" because it is a ponderosa pine that is black barked, young and still growing rapidly. But when you take out all those bigger trees, the rest of the trees are released and they say, "WOW, life is good," and they take off like gang busters. And being a bunch of adolescents, they grow fast and they pack together. But within five or ten years, they are competing heavily with one another, beating each other to death, stressing one another out.

When we showed up on the scene as managers about forty years later, I had the service forester, Bill Hunt, from the Oregon Department of Forestry come out and evaluate what we were looking at on Paddock, and he outlined a management plan in 1980. His report identified "few trees larger than 16 inches in diameter and very dense conditions - about 1000 trees per acre." What we had was a lot of stressed trees that were good candidates for insect and disease infestation, and an area at high risk that a wildfire could wipe it out. Substantial thinning was the recommendation.

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I didn't begin working right way on Paddock. Instead, in 1981 I began thinning on the Frog Hill property, part of which I realized was in the same shape as Paddock, and that put our home at risk for fire. It was just 13 acres that needed attention, but it took me until 1984 to thin it. The chain saw and I didn't exactly warm to one another at first and I also had a good deal of work to do on the 400 acres of agricultural land that came to us with Henry's death. In 1985, I began thinning on the Paddock lands. I was working in an area of dense thickets of small trees, and it was incredible. I felt like I was trying to empty the ocean with a spoon, but I kept at it. Then in 1987, my mother-in-law died and the Paddock lands came to us officially. At that point we

could begin to really implement the 1980 and 1982 ODF management plans and pursue some land trades with the Forest Service which had been there waiting for some years. We completed the trades in 1990 with the result that both parties could manage their lands more effectively.

From 1985 to 1992, I hand thinned 280 acres of the worst pine and fir thickets on Paddock. At the suggestion of ODF I marked the trees I wanted to leave and cut down the competition and laid it on the ground. There was so much downed material that there was no reasonable way to hand pile it for burning, so I crushed it with a D-6 CAT at Bill Hunt's suggestion. I was addressing the fuels problem by getting the material as close to the ground as possible. That way, if a fire did start, it was not going to get so hot because there was less oxygen under there to feed it, and with the stuff touching the soil there was more moisture in it so it would burn slower, and it had a chance to break down. I got a permit to do the work each year and at the end of the year ODF came out and determined whether old Livingston had left a hazard out there by virtue of my activities. Every year ODF was willing to write it off, and compared to what it was, it was a lot better, but in my own mind I knew I still had a significant fuels problem.

Fire - Part of the Management Experience

Over the years since I started managing our lands on the ranch, we have had a lot of opportunities to experience fire, both wildfire and underburns. For most people the minute somebody mentions fire, their hair stands on end, and fire can be a scary thing. But we have been around fire a number of times, so we have some familiarity with it. And because we have had the experience, we understand it at least generally. My fire experience began in 1955 when I got out of the Service. I was working for Weyerhaeuser in the box factory, and in September of that year we had a big thunder buster and there were fires everywhere. And all of a sudden they called us out of the box factory, gave us an old WW I helmet, put us on a Greyhound bus, and sent us out here to fight fires. We had never fought fires in our lives, any of us, but they put us on the front line. And fighting fire is one of the most exhausting experiences there is. During one break, I got tired, and I lay down near a big log that was still burning red with embers because the log was warm and it was cold out. But after a short time, I got up to take a leak or something, and when I went back that log had come loose and rolled down over where I had been lying. I was just lucky, but we were a bunch of know nothing fire fighters.

Most people have never had the experience of confronting a wildfire, but Marilyn and I have been there more than once, and both of our boys did all their college summer work

working for the FS and BLM on fire crews. And with Noel I have a son who has a forestry degree, works for the Forest Service and is a fire specialist. He has become a fire management officer and he is well thought of in the service, at least until last year when he lost 100,000 acres to three wildfires on his district. It was devastating for Noel, but fire can do that; it can humble you real fast. But with Noel, I know someone personally that I can rely on who has expertise to balance out who I would otherwise depend on. I can bounce questions off him and I do that.

Apart from wildfire, most people haven't had the opportunity to watch as fire specialists deliberately set fires and see how it's done and watch fire behavior. It's very interesting. With a lot of experience, you can predict generally what fire is going to do. Where you get in trouble is trying to predict specifics and trying to cope with the effects of changing conditions during a fire.

In 1980 we had a fire experience that involved the BLM. They had a plantation next to Paddock; they clear cut it in the late '70's, and they piled all the debris. In September of '80 they burned the piles, but they failed to inform us. This was in the time when I was just getting involved in setting out land management plans for the Paddock property. So, I saw a big plume of smoke and I thought, "God, that's us," and we took off for Paddock in the middle of the night. I was running through the woods toward the fire and I ran into a barbed wire fence and tore myself up. So when I got to the fire, I was in some condition, and what did I discover? It wasn't a wildfire; it was just the BLM burning piles. I was fit to be tied. And I think I lived up to their impression of me as "That wild man Livingston, look out for him." There was one fire engine and two people at the fire. So, I said, "What's going on, where is everybody?" They said, "We're right here." And they were expecting to leave the area in a short time. Well, I was pretty worked up, so, I raced down to the Gerber Guard Station, and I got the guy in charge, and I'm about foaming at the mouth. He's a nice guy, and he says, "Oh, damn, I think they forgot all about you." So, I said, "Those guys up there are getting ready to quit and pull off the fire." He said, "There'll be someone on the fire all night, Ned, don't worry; you can go home and go to bed." And sure enough he got a crew together and they sat out the fire all night, probably just slept all night, but they were there. I know now they were probably pretty safe in their activities, but they had put me through a scare and even a wounding, and when it comes to fire, you have to let those around you know what you are doing, because fire, especially at night, is a real nightmare, and people can get real excited if they think it's a wildfire on their property. And that's what I thought. Fortunately, most of my experiences since that time with the BLM have been a lot more favorable, I think for both parties.

1985 was the year of the Privy Springs fire. It was just before Noel left home for college, and Marilyn and I had just gone to bed; it was about 10:30-11:00. The phone rings, I answer the phone and it's the lookout down here at Bryant Mountain. He says, "You know you have a fire up there?" I said, "No, where?" He says, "Well it looks like it's west of your ranch." I said, "Hold on, I'll go look." So, I went out on the porch and looked, and sure enough there was a fire. So, I gave the lookout another azimuth and helped him pinpoint the fire, and I awakened Noel. He's the eldest son and supposedly he knows about fire, and we walked out here on the balcony, and we looked out there and he says, "Oh Dad, don't worry about it," half groggy, you know. So, he went back to bed. And I came down stairs and I

came out on the porch and I looked at that fire again and I see a big ball of fire go up, so I knew a tree had crowned out. So I ran back upstairs and I said, "Noel, go look," and he went out there and then he came alive.

That's a fire I can never forget. Our family were the first ones to get to the fire. And I thought about taking the CAT as we took off toward that fire, but I wasn't all that comfortable about it. I knew how to drive it, but it didn't have a canopy on it, which can be death if something falls on you in a fire. But I regret I didn't take the CAT over there because when we got there the fire was about five acres and it was in the tree tops, but I think I could have got a line around it. But by 10 o'clock the next morning after working all night, it jumped the line we all had been trying to establish and as we came home exhausted and we looked back, it looked like Hiroshima over there. The fire had exploded, and we knew we had lost it. 1,500 acres were burnt up, some belonged to Marilyn's sisters and the rest was federal, fortunate for us. But when it comes to fire, everyone is in it together, and it hurts to lose like that.

In 1985 the Forest Service did an underburn on neighboring acreage. That was the first time underburning came up to our borders, and it was very instructive. My son, Noel, was working for the Bly District of the Fremont N.F. and he was one of the participants, and his future wife was his boss. Of the Forest Service districts around, the Bly District was probably the one with the most underburning experience. But from my point of view they made some major mistakes up there on the mountain. We observed, first hand, and that's close when its right behind the house. Overall the burn showed the full range of effects. There was ample evidence up there where a good job was done, but there were a couple of places where they were pretty much out of control. The fire got hot and it wasted quite a few acres, and as it turned out some of those acres were on some of the land we ended up getting later in the trade. So, now when Noel and I go up there, I can say, "See son, you burned up your own cotton picking trees." And he just shakes his head, "Yeah Dad, those things happen." And it's true, in any fire there are going to be some negative results and some consequences you don't anticipate, and that's one of the lessons of that fire. But now I think they would not make the same mistakes.

Between wildfire and underburning, we have shared a number of other fire experiences with our neighbors over the last few years. In 1987 we cooperated with the Forest Service in a multi-party underburn that included 700 of our outlying acres, acres we later ended up trading to them. We really didn't do anything for that burn, just had the CAT in reserve if they needed it. That burn was overall a good one with good results, not much damage. Then we did an underburn with the BLM in '88 on a timbered portion of our 400 acre ag land parcel, and that was successful. In 1989, BLM did a prescribed burn on acres just south of us on Paddock. I was very nervous about that burn, and I told them to shut it down unless they got a CAT up there, and I was something of a horse's ass about it. They had done all this work, got it all set up, got everything ready, and I told the fire manager not to burn unless he had some equipment up there. So, they borrowed a CAT from ODF and brought it up there. One of the reasons I was so nervous was because my Mom was dying and I had to go to Eugene where she lived and they were getting ready to burn. I was kind of embarrassed, but they listened and they got the equipment in place and appeased my anxieties. When you've been around fire, you know there is always uncertainty surrounding it, and at that moment I couldn't tolerate the additional uncertainty that burn represented.

So, we've held hands with our BLM and Forest Service neighbors in good times and bad over the years, and we have built a certain amount of rapport with both agencies, and that's very important. Sometimes building a relationship is not easy to do because some of these agencies tend to have an exclusive view of things where you don't exist if you are not part of the organization. They also tend to think because they manage so much land that they know what they are doing and you don't. That can get pretty stiff sometimes, but I think the problem has gotten better in recent years. As it has turned out, by making an effort to get to know our agency neighbors, two of the rangers stationed at the Bly District of the Fremont N.F have become our personal friends. It really helps to know the people in the agencies in the area. You are much less likely to get overlooked and much more likely to be heard, and it helps us understand where they are coming from as well.

So now when Noel and I go up there, I can say, "See son, you burned up your own cotton picking trees." And he just shakes his head, "Yeah Dad, those things happen."

Prelude to the Underburn and the Burn Itself

We had a fire start on Paddock in 1994 just over a year before the underburn. There is nothing more frightening than seeing that plume of fire take off. Our younger son, Duncan, and I were here and we raced down there and I raced back and got the CAT because I didn't want to repeat the mistake of the Privy Springs Fire. It turned out the fire was not on our ground but a quarter of a mile away, and this time the way it went, they didn't really need me with the CAT. But that fire was interesting because they had underburned in the area three or four years earlier, and when the fire finally hit the underburned area, it dropped and cooled off and they got it under control. That was a lesson about the value of underburning right on our doorstep, and I took note.

So, in 1995 the BLM approached us about possibly doing a cooperative underburn, and I didn't go bonkers when they said, "fire." They wanted to work with us because our property sticks like a sore thumb into the surrounding federal agency land. They wanted to burn on their vast acreage, and it's easier if they burn right straight across. If they have to burn around us, it means a lot more time and care, and if they throw sparks on us and we burn, the liability can make it very expensive. Another reason they were so interested was because they knew I had recently thinned the acreage and crushed the residue, so the ground was ready. Also I had built a lot of fire trails with the CAT at Bill Hunt's suggestion while I was doing the crushing so any fire could be contained in a small area. They were tickled pink because the fire units were already laid out and we were relatively safe as such things go.

And I have to say I was basically ready. We had had experience with different fire types, I had just seen what the value of underburning was on Paddock, and I knew I had an excessive fuels problem from all the material I had laid down and crushed. I also knew the BLM had had a lot of experience with underburning, so I knew who I was dealing with, and they knew us. So, BLM came to me with the agreement all formulated and asked me to sign it, and I did. Those documents are spooky because you release them from any liability, so you need to know who you are dealing with. The way it finally worked, they did 80 acres of ours in '95 and the other 200 in '96. The BLM decided on

a spring rather than a fall time for the underburn because of the high fuel loads on the overall acreage. Spring burns are usually cooler, less damaging, and not so dangerous as their fall counterparts. Fall burns, however, tend to duplicate more natural burning conditions.

From the BLM's point of view they got a good deal because they could invest some time on our property and make their task on the larger overall burn acreage much more efficient and much less risky. From my point of view, I got a fantastic deal because they did ninety-five percent of the work. They put the fire plan together. They did all the hand lines. They came in and dug hand lines down some of the trails, and they did a lot of hand line work around wooden fences and snags. They invested a lot of time on our property before the burn itself. We provided some additional on site equipment and a couple of bodies for back up to their crews, but mostly I didn't have to do anything but breathe and sit there like a candied frog.

The BLM estimated the value of the burn on our property at $60 an acre, or $16,800 for our 280 acres. Maybe that works out as a value overall when they are burning the whole area, but if I had to do all the preparation and have all the people and equipment in here that they had and do it on my own, I know it would cost me a lot more than that. So that figure is way low, in my estimation.

The results of the fire were good. We put out test plots on the acreage, and when we worked up the results on those different plots and averaged in the effects to the woody material and the duff layer, the burn reduced the fuel load by almost exactly 50%. About 45 tons of fuel per acre remains. Since 10 tons per acre is the recommended ground fuel load for land in our area, we will need to treat the acreage one or two more times in the next five to ten years to reach our ultimate goal. But for a single underburn, a 50% reduction is a very acceptable figure, especially in light of the heavy fuel load we had. If we had tried to do more at one time, we would have probably done more damage, and if you get the fire too hot you can cook the soil and kill the tree roots. But as with almost any fire, there were a few spots that didn't burn well enough and some that got too hot and burned too much. Fortunately those were only a few acres out of the whole burn. The only other disappointment was that we lost quite a few snags that were supposedly protected and set aside for wildlife. As it turned out, the hand lines that they dug around the snags weren't wide enough and far enough away from the snags, and the radiant heat of the fire ignited the surface and some of the snags burned.

Fire is a rough tool, and I recommend to anyone who owns and manages forest land in the area, if they are thinking about using fire as a tool, they ought to go observe first hand an underburn in action to get a feel for fire behavior, because it's a revelation.

Fire is a rough tool, and I recommend to anyone who owns and manages forest land in the area, if they are thinking about using fire as a tool, they ought to go observe first hand an underburn in action to get a feel for fire behavior, because it's a revelation. A person has to understand the fundamentals of fire behavior and appreciate how quickly this behavior can change with a single alteration in the characteristics like wind or temperature or slope that define the situation. It's amazing what you can do, if you know what you're doing, but there are risks, and you can't expect to be able to sculpt the results in detail. There are a great many uncertainties with fire, so you

have to know what you are doing, be prepared to handle the worst case scenario, and be satisfied with the overall result and not expect the same result on every spot. There are also a lot of things you can do beforehand to foreclose on the worst risks.

Speaking of risk, the other thing we have done is to get insurance to cover our operation for liability because a forest landholder is liable for up to $300,000 if something goes askew and they trace the cause back to you. Fortunately, there is a major insurance company which offers policies to cover owners for that initial $300,000 of liability. Our premium is $400 or $500 a year which isn't cheap, but its more than worth it to us if something goes wrong. Given all the variables that are beyond your control, it is just too easy for something to go awry, even for the most conservative woodland manager.

We have put together a 16 page outline listing in some detail the positive and negative aspects of the underburn. We assessed the results on each variable with grades between 1 and 10, 10 being the high end. This outline is available on request. To date our underburn project with the BLM has been presented to the public via local and state media, plus a summary on the Internet. In addition, The Friends of the Winema sponsored a video in which this project is a significant part. In my view there are a great many forest health projects like ours that need to be put together and that we need to make known to the public in more comprehensive ways. Stories about these kinds of projects need to be in the headlines, not tucked away in the back pages of the newspaper.

The Underburn and the Partnership

Marilyn and I have been part of the Klamath/Lake Forest Health Partnership from the beginning. The Partnership got involved in the Paddock burn with the BLM because we kept encouraging the group to get beyond the talking stage and do something. Underburning was a big thing on the horizon for the agencies because of the effects of the drought and the increased build up of fuels over the many years of fire suppression, so the group thought it would be a good idea to have a chance to share and learn in the experience. Also, private landholders in the area needed to know more about fire as a tool if they were going to understand what was going on public lands and be willing to cooperate, if desired. Over the two year life span of the project, a wide variety of players participated, sharing their views, opinions, expertise, and information, and I think we all learned and benefited. Some of the local participants included consulting foresters, timber company managers, county commissioners, federal agency fire management officers, representatives of environmental groups, and state and federal agency supervisory personnel and engine crews. With all these different people participating, the project became a forum where the whole range of ideas and opinions could be expressed and kicked around and finally tested in sweat and smoke. The process was a valuable education for all concerned, and I think this was true regardless of individual attitudes concerning the use of fire as a tool.

As the lead organization, I thought the BLM did a great job. Their fire personnel were friendly, knowledgeable, and experienced; and they were very good teachers. There was a spirit of camaraderie among their crew that was infectious so they were fun to be around, and they were eager to communicate their role in and understanding of fire behavior to all involved. The working hours during the burn itself were quite long, with 12 to 14 hour shifts being common. In spite of the long hours and

working conditions that were grimy, hot, and smoky - to the point of gagging, the crews remained in good spirits and were back with each new day ready for another round of the same. To make sure everyone on the burn scene was properly informed, the BLM put together a detailed written fire plan. This plan was fine tuned in response to daily weather reports and hourly on-site weather updates. The different crews and the members within each crew were in constant radio communication so everyone knew what was happening and exactly how they were to contribute. To protect against the fire getting out of hand, three pumper engines were on site, and we provided three 600 gallon draft tanks in the event extra water was needed. As an added precaution, we provided a D-6 CAT on site.

Marilyn and I have been part of the Klamath/Lake Forest Health Partnership from the beginning.

One of the more outstanding consequences of the partnership underburn was that ODF got involved, and that was something new for them. Their focus is pretty exclusively on fighting wildfire, but they sent out at least one engine and two or three crew members the first year to participate in and learn about controlled fire. And the District Manager, Roy Woo, sent out a crew and more equipment the second year. It was a help to have them on board. They were amateurs in underburning - like a lot of us, and they had to have assistance all the way, but that was part of the advantage of it for Roy; he was able to participate and to provide some of his people a taste of the underburning process. And they could see it first hand with the BLM crew that has a lot of expertise and experience.

Quite apart from our underburn, the input of different agency and private Partnership members with their different points of view has been important for my land management. You can't help but garner nuggets of information you can use when you bring a group like that together with all the knowledge and expertise that is represented there. You can get an education, and as a manager it jogs you, gets you thinking in a direction you might not have considered otherwise. You also have access to all of those contacts when you need expertise or assistance. You have the personal contacts, and I have benefited from that.

What I have gotten out of the Partnership is only part of the picture. In the Partnership, all the key land management players in the area are together at the same table. And as a group we have taken a number of trips to different lands in the partnership, and the group has had a chance to see the range of problems and what the different members are doing to address them. On these trips the group always asks questions and inputs their ideas and they learn and they discover where they can connect on management issues and concerns. They also can see where they can cooperate across their management divisions, and that's important because the old management units were not designed in terms of the new landscape and watershed concepts. The different agencies need to cooperate in planning across the old boundaries, and private owners need to be involved and in a position to cooperate, like I was for the underburn with the BLM.

Underburn Alternative

Because I had thinned and laid all that material on the ground, I really didn't have an alternative to burning on the 280 acres we underburned on Paddock. If the BLM option had not come along, I think I would have just sat on it and taken the risk. But burning is one very effective tool to manage fuels, even though it has plenty of drawbacks.

On a much larger area of Paddock we used a different approach in 1992-93. I hired a local logger to salvage log the dead and dying fir on the 1,240 timber acres on Paddock that I hadn't already thinned. In that sale, the agreement was for the logger to take the desirable commercial fir that was stressed from the years of drought and remove and chip most of the small fir. The logging crew also thinned some of the small pine, but left the larger pines. They left all of the very small branches because that's where most of the nutrients are.

But if I had the job to do over again, I would have matters better defined in the contract, pay more attention to marking for thinning, know what to expect from the use of new types of equipment, design skid trails beforehand, and de-limb on site...

Overall, the removal of the fir was fairly successful. We were able to clean out the dead and dying trees, select for the appropriate ponderosa pine species, and leave a light to moderate fuel condition. But the project results were disappointing when it came to thinning the ponderosa pine. We made the mistake of not marking the trees to cut and left the choice of the cutting procedure to the logger's discretion. The logger elected to handle the small trees using a feller buncher rotary saw and then skidding the full length sawn trees with the tops and limbs to a landing to be later de-limbed and chipped. In the process of skidding the cut trees, a lot of damage was done to the remaining trees. Of course, no approach is perfect, and some damage is to be expected along with some soil disturbance whenever mechanized equipment is used. But if I had the job to do over again, I would have matters better defined in the contract, pay more attention to marking for thinning, know what to expect from the use of new types of equipment, design skid trails beforehand, and de-limb on site rather than skidding whole trees to avoid damage and leave the nutrients evenly distributed. I probably would also look more carefully at the previous work of the logger and be sure that the logging crew that the logger was going to use for the job were experienced and skilled.

In the same time frame as the fir thinning, Bob Mezger, a professional forester who also is a Partnership member, helped us set up cruise plots throughout the Paddock acreage to establish base line inventory and growth data. Then in 1995 I hired Bob as a consultant to put together a timber sale that involved a commercial thinning of the merchantable pine together with chipping of the tops on 340 acres of the Frog Hill parcel. The thin and chip approach is an excellent way to go, provided the return on chips will at least support the cost of the chipping activity. At that time, we had the advantage of a chip market that was up, and while the logger wasn't really interested in doing the chipping, when we pressed him, he would do it. As it turned out, there were even a few dollars to be made on the chips. Today, the chip market is down, and the nearest buyer is quite a haul away, so you would have to pay to have that chipping and removal done. One thing we really need in this area is to develop a local market for chips, especially as we look to the future. We need more buyers, processors, and probably fiber/chip manufacturers in the area.

For the pine thinning and chipping project, I wanted to avoid repeating the results of the '92-'93 fir project, so I looked to Bob for some professional help. Bob did the talking to the logger and the buyer and made up the logging and sale contracts for that sale. There ended up being some complications because I decided to sell some additional large timber from a small parcel at the same time as that

sale, and while it made sense to do the two jobs at the same time, pursuing two sale arrangements simultaneously made things a bit difficult for Bob. The main thing that upset me about the '92-'93 fir job was the extent of the unnecessary damage, and there was a lot less of that working through Bob.

Unfortunately there were other problems on that job. Some of the property was steep and rough and an entire area of felled trees was never skidded and decked, just left on the ground. That is not only a waste, it is money out of our pocket. I don't know what happened - if the skidders just forgot about them, or the weather prevented the logger from finishing the removal in that area, or if the logger just didn't feel there were enough loads to support the commitment of another day's labor and machinery. I do know Bob and I were never informed in any way, and I don't like that. Some of these big operators are under enormous pressure to do the job as quickly as possible and to maximize their loads every day. For future sales, I know that as the owner I have to stay on top of the job as it proceeds, and I am still searching for a more careful way to treat the land and operators with a good feel for the land. I'm still learning and seeking better solutions.

Management Goals and Records ("The Book")

In Marilyn's and my timber management, we are looking for an uneven age condition with all classes of trees. And we want those trees in the right numbers to promote health and growth, and we want to be sure the fuels are kept under control. I'd say Marilyn has a more pragmatic view of the timber resource than I do. She'd like to take a trip or two to Europe, and she could definitely let some of those big trees go to finance that. She has a tendency, like her father, to see those trees with "Greece" written on some of them. But I see them and say, "Maybe, Marilyn," because I hate to see them go.

In this age of computers and the automated man, I remain a "binder" man. When Henry died suddenly, he left total chaos because he was the only one who knew about the ranch and where all the parts and records were. Living through the difficulty that situation created for the family was what triggered the development of my binder system. I'm fairly well organized in getting information filed in separate binders where I have the information on things like personal taxes, investments, and art work, and I have a number of binders on management matters from water management to logging history, to timber inventory, to maps, to timber sales, to wildlife, etc. With the binders, the information is all there and organized in its categories, but I realized it wasn't easy to get to because there was no index and no summary. Presenting our land and management to the partnership served as part of the impetus to get the summary together. Also, I realized that if I departed, it would be difficult for the others to figure out what binder to go to for the desired information.

The Book is a quick reference, and it is very effective as a tool to introduce others to management of any aspect of the ranch. So, it assists me to be efficient with the experts we hire, and the results of their work goes into the Book...

In the summary, I've broken the management down into land, timber, water, plants and animals, taxes and regulatory issues, historical and cultural matters, and miscellaneous. Having the summary really helps, because in each case the summary gives the essential information for the category and then tells you where to go to find the detailed information in

the binders. So, that's how Ned's "Book" came into being and the shape it took.

The Book is a quick reference, and it is very effective as a tool to introduce others to management of any aspect of the ranch. So, it assists me to be efficient with the experts we hire, and the results of their work goes into the Book while the detail goes into the binders. There is also a lot of Livingston in "Ned's Book." I have included not just the facts, but also personal comments, because I don't think we should divorce the facts from the person; we get in trouble when we do. So, The Book contains lists of ranch employees and horses with comments because it is so easy to let these memories slide. For example, here is one fellow who worked at the ranch and I've written the comment, "loved catsup, rode and hayed at Bly, died in a traffic accident in 1980." He put catsup on just about everything, and Marilyn gave him a case of catsup as a wedding present.

The Book really contains all the moves I have made in the various areas of land management over the last twenty five years, and so in a sense it is my management autobiography. Marilyn is very much aware of The Book, and she is quite proud of what it represents, what it shows we did on her family ranch, her part of carrying on the homestead. So, The Book is both a management tool and a record of how we connected with the land.

Wildlife and Wild Plants in Management

If there is a hierarchy of importance to the different resources on the land, and I don't really think there should be or that it ought to be categorized in that way, I think the integrity of the land is more important to me than the economic factor. I can say that as long as there is bread on the table. But to me the quality of living here is VERY important, and what I can do to retain or assure that quality is at the top of the list.

So, if I know a critter or a special plant is out there, and there is something I can do to help them, like try to provide water, salt, cover, or preserve some habitat - like the mountain mahogany vegetation that's on the ridge top - I do that. I make it a habit to watch and see what the wildlife is doing, and how it is doing. For instance, I have it recorded in 1978 when the blue birds first nested in the Frog Hill house. We have put in ponds and stocked them with trout and turtles. We've helped ODF&W with their elk re-introduction efforts on Horsefly Mountain. We've put out dispersed water troughs for fighting fires and to help wildlife make it through the dry season. And I entered in The Book that it was in 1990 when the sage hens disappeared along with the last aspen groves due to too intense cattle use on some parts of the ranch. I designed a wildlife strip into my Paddock thinning to assist the mule deer with cover. Unfortunately I didn't make it wide enough, but I learned that I could get some help with my wildlife concerns from ODF&W or by talking to the wildlife biologists on the BLM and Forest Service staffs.

In The Book, I've listed all the trees that grow on our property, and it amazes me how few there are, only six, and one of them, the crab apple, is a domestic volunteer. I think the Magpies bring it in. I've listed all the shrubs, all the wildflowers - there are at least 150 different wildflowers that I've found on the property, all the rare, unusual or endangered plants like the catch-fly or pigmy monkey flower - it's on the endangered list, all the weeds are listed, all the birds - there are 75 different bird species here, and all the mammals. I've bothered to key out all these things, and if I run into something new, I

photograph it and figure out what it is, and to me that's exciting.

I know where all these wild animals and plants are, and the ones that need protection are identified on the maps in the Book, and they are there so I can remember to think about them. As a land manager, I want to know what's out there so I don't overlook something. And if I can do small things to help a critter out or protect a rare plant, then I do that because it's important to me.

Henry would not have done those things; he was a hunter and he loved to hunt deer on the property, but like most of the other ranchers of his generation, he just didn't think about doing anything to preserve wildlife. Wildlife was something he just took for granted.

Recreation and Spirit in Management

Recreation in the area of the ranch is pretty much a matter of big game hunting and the activities around Gerber Reservoir. The tradition in the area is that land is open to the public for recreational use. Because Henry loved to hunt and was sympathetic to the hunter ethic, he never posted the land. He used the ranch for deer hunting, and he did get an antelope on the property once. Henry finally posted the land near the house when some idiot shot his horse, Banjo, a great big white horse that Henry dearly loved. There was no excuse for it. But he never did post any of the outlying lands, including the land on Paddock Butte.

The outlying lands have always been open to the public, and they're open on our portion now too. But I have the whole area fenced and gated so people can't drive their vehicles anywhere they want to there anymore. If they are willing to walk, they can use the area, no problem. Just obey the basic ethic, know what you are doing, don't mess the place up, keep the gates closed, and it's available. I do have to play game warden out there sometimes, if people are hunting and the season isn't open, or if they aren't obeying the basic rules. I've chased bobcat hunters out recently and I had a confrontation with a cougar hunter that ended up with him being convicted in court. I don't like people trying to take unfair advantage of the resources.

In the sixties the deer population was up, and for the opening days of deer season, we would look across from the house over to Paddock and it looked like a little city, there would be so many hunter camp fires. The area was a favorite location for a lot of people. For camping the Casebeer place on our property is probably the nicest spot of any we have. There is a spring and aspen groves, just beautiful, and people can go in there; it's fine, just keep the gates closed. An antelope hunter went in there a few years ago. He had pitched his tent, and I came by and the gate was wide open. So, I went in to tell him he was more than welcome, but to keep the gate closed. He wasn't there, so I left a note, and it worked. I went by a little later and the gate was closed, and the note was gone.

If there is a hierarchy of importance to the different resources on the land, and I don't really think there should be or that it ought to be categorized in that way, I think the integrity of the land is more important to me than the economic factor.

When you get right down to it, Marilyn and I really don't do a lot of pure recreating. We have friends from town, and they'll say, "Ned, what are you doing this weekend? Don't you ever relax?" They are probably at the office

at 6:00 in the morning and it's probably intense stuff until about 6:00 at night - five days a week. So, for them, when the weekend comes, it's time to lay back and relax. But when they ask me that question, I think, "Well, why don't I do that?" And the reason is, I don't go to work that early and I don't work in a pressure cooker and I may not work that late. But I do it seven days a week.

So, in a strange kind of way, I'm recreating while I'm working every day. A good example is my listing all the wildflowers on the property. That didn't come from work, and it didn't come from going out there to just look for wildflowers

For me, the work out there is recreation. It is not like going to the office every day. The work is like, "Well, let's see, what am I going to do today," and sometime I don't even know, so, " OK, I'll figure out something." The work ethic is still there, and the work still gets done, but I don't approach it the great majority of the time with the pressure attitude of "I got to do this or that today." The work isn't a deadline kind of thing. I'm in love with the land, and it's fun to be out there as part of it. If I'm out marking trees for sale, I'm working, but I'm also having fun, because if I do it right, I'm going to see the forest in a healthier condition, relieved of some of the stress, able to grow, and I may make a dollar too.

So, in a strange kind of way, I'm recreating while I'm working every day. A good example is my listing all the wildflowers on the property. That didn't come from work, and it didn't come from going out there to just look for wildflowers. It came about by having on my irrigation boots and my shovel and moving water, but also having a camera over my shoulder. I'm always looking and feeling for what is around me when I'm out there. I'm not to the point of the native American ideal where you feel one or totally enveloped by the land, but there is a sense in which when I'm out there, I'm living the land and the land is living me. I definitely feel some of that.

When it comes to the spiritual, neither Marilyn nor I have thought that much about that. But what I can say is that I'm totally involved with that land. If I had to leave it, I'd be in dire straights. I've identified with it that much. And if I were totally in sync with the rhythm and pace of the land, that would be the ultimate. That would be about as close to nirvana as I think I could can get. I'm not there, but almost every day of my life I can sense the potential for that. When I go out there on the land to do whatever I'm doing, much of the time it feels a little bit like putting on a very nice down coat on a very cold day - very easy, enveloping and comfortable, and there is contentment in it.

When I go out there on the land to do whatever I'm doing, much of the time it feels a little bit like putting on a very nice down coat on a very cold day - very easy, enveloping and comfortable, and there is contentment in it.

CHAPTER 9

WHISKEY CREEK

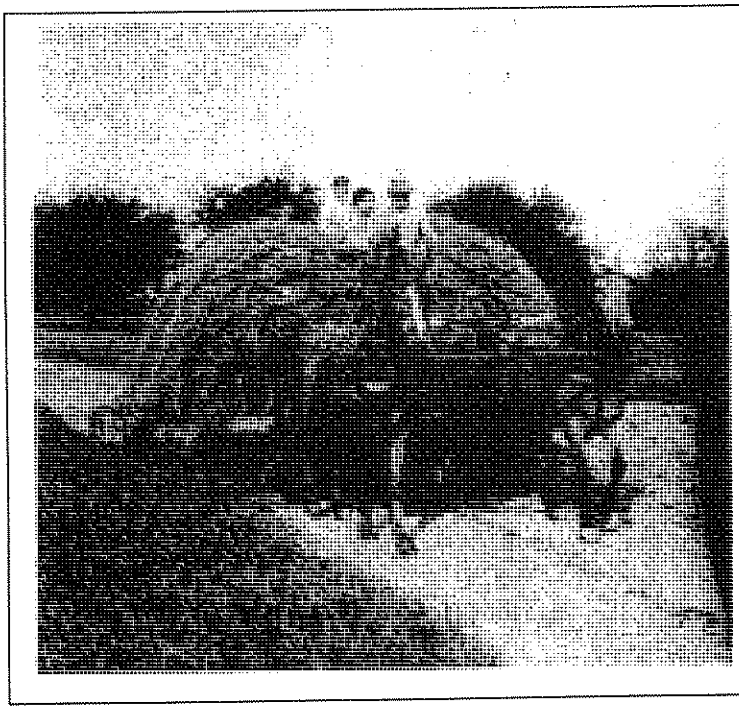
Satisfaction in the Pocono Mountains and the Ponderosa Pines

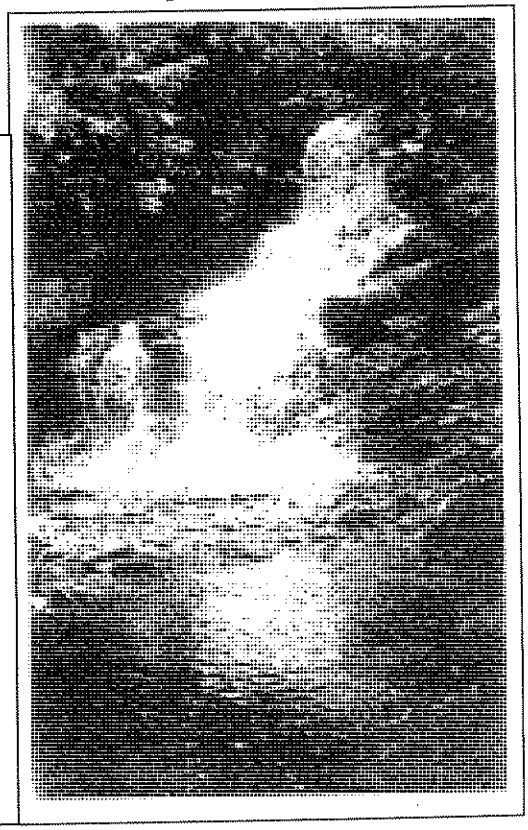
As told to Tom Burns by Robert Mezger

Background Life History

Bob grew up in Jersey City, New Jersey, the son of parents of German background who instilled in him their conservative and conservation oriented views of nature and life in general. At age 12, Bob contracted spinal meningitis from which he slowly recovered physically and mentally over the next few years. A very significant part of his recovery was his experience working during these years with an illiterate Pennsylvania mountain man, Louis Simons, in the Pocono Mountains in northeastern Pennsylvania. Bob's family first stayed at the Simons' farm as summer boarders at the time Bob was just beginning his recuperation. Seeing the positive consequences for Bob of his activity with Louis Simons, they decided to buy the small property next door so Bob would be able to continue to benefit from being close to Mr. Simons. During summers and for many weekends through junior high and high school, Bob traveled to the Poconos to first tag along with Mr. Simons and then learn and do many of the activities associated with running his small subsistence dairy farm. While Mr. Simons was patient with Bob's

Views from the Poconos where Bob recovered and discovered a love of nature.





limitations and mistakes, he constantly challenged him to do more and more.

In particular, Bob recalls two experiences on the Simons' farm. The first was learning to use a team of horses to go into the Simons' wood lot and cut and remove trees for use as fence posts or as wood to heat the Simons' home. The second was a special place on the Simon's farm that Bob often visited in the woods by a creek and a waterfall where he found he could relax, enjoy the beauty of the surroundings, and clear his head of whatever was a concern to him. It was from experiences like these early in life that Bob discovered his connection with the natural world and learned to appreciate nature for both its beauty and productivity. Bob says he still goes to the woods to ``hide" and find peace and comfort. Bob recreated himself through his experiences on the Simons' farm where the woods was very important to him, and these experiences formed the basis for his interest in pursuing a career in forestry following high school.

When Bob entered the forestry school at Pennsylvania State University in 1941, he found that with his experience in the mixed hardwood forests of the Poconos, he could relate his training to what he knew first hand in a way many other students couldn't. And for Bob, the uneven age management approach to forestry and the emphasis on long-term sustainability that were at the core of his schooling made sense in terms of the forests he had worked in and appreciated in the Poconos. Bob's education was interrupted at the end of his sophomore year by WW II and the draft which required his services. Bob elected the army infantry and then switched to the army air corps. When the time finally came for his squadron to be shipped out to the Pacific, Bob decided to marry, and while on his honeymoon with his bride, Pat, the war in the Pacific ended, the best wedding present he could imagine. Bob was eligible for immediate release, so he took the opportunity and returned to Penn State to finish his education.

Upon graduation, Bob and Pat left for the Denver area and a summer job with the Forest Service before he entered graduate school for a master's degree in forestry from the University of California at Berkeley. During the summer job, Pat became pregnant with their first child, and Bob got his introduction to the conifer forests of the West, mostly in the high elevation lodgepole pine of the Rocky Mountains. Once at Berkeley, Bob was not excited by West Coast city life, but during the summer of his first year of graduate work, he discovered the special qualities of the ponderosa pine species while working for the University in its ponderosa forests in the Sierra Mountains. As a result, Bob decided to do his thesis work on the growth characteristics of ponderosa pine.

At the end of his Berkeley experience, Bob found there were more job opportunities with the federal agencies than there were in the private sector, so he took a civil service test and was offered a job working for the Bureau of Indian Affairs in Gray's Harbor, Washington, on the Olympic Peninsula. Bob worked on the Quinault Indian Reservation on the peninsula for about a year and a half where he was introduced to forestry in the real world. He scaled logs and did some cruising and other measurement work, but he and Pat were not thrilled with life in an area that gets 140 inches of rain a year. When a position with the BIA opened at the Indian agency at Lapwai in northern Idaho, near Lewiston, Bob took it because it meant both drier country and a ponderosa pine forest. After about a year and a half working with his favorite conifer species, Bob visited a classmate from Penn State who was working for the BIA in the ponderosa forests on the Klamath Indian

Reservation in south-central Oregon. It was a spectacular forest and as a fly fisherman Bob did not miss the fact that the streams of the area supported some of the best trout fishing in the country. So, in 1952 when an opportunity arose to come to the Klamath Indian Reservation, Bob jumped at the chance. The job was on a large forest that was considered to be the premier timber reservation in the BIA system. The forest was predominantly ponderosa pine, the management approach was uneven age, and the position was one of substantial responsibility as assistant to the forest manager.

From 1952 to 1955 Bob lived with his family on the reservation at agency headquarters and worked on a major inventory and analysis of the entire 800,000 acre Klamath Reservation timberlands. The inventorying took Bob to all parts of the forest and the analysis involved him in some of the earliest attempts at computer modeling, correlating growth rates with weather cycles to determine a sustainable harvest level for the forest as a whole. The analysis told the BIA forestry staff that their decision to scale back harvest rates after the peak demand of the war years was correct, and that following an uneven age management approach, they could sustain harvests at that level indefinitely. Bob was where he wanted to be in both his work and his living situation. He lived in the ponderosa pines with several trout streams nearby, and he enjoyed the idea of managing a rich and beautiful forest in a way that was sustainable long term and that provided for the economic needs of the Klamath Tribes. For Bob, the forestry work he was doing was responsible both ecologically and socially, and he felt a personal sense of connection to the forest and the people.

Then in 1955 Congress passed the termination legislation that was to end the relationship of the federal government as an overseer for the Klamath Tribes and the Klamath Reservation. With termination on the horizon, Bob knew that if he was going to continue with the BIA he would have to leave the area, but he and his family wanted to remain. So, with another forester, Bob left the BIA and started a consulting forestry firm in Klamath Falls to provide, among other things, independent assessment services to determine the value of the large number of Indian allotments that were going on the market. But after a while, when the allotment sales dwindled in number, it became apparent to Bob that there was not enough work in the area for an independent forestry consulting firm.

Meanwhile, during the time Bob was in the consulting business, the process of termination of the federal government's responsibility for the Klamath Tribes proceeded with most of the tribal members electing to take their share of the value of the communal reservation lands as individuals. The bulk of the land ended up being sold to the federal government which added it to the National Forest system. But

about 22% of the tribal members, known as the "remaining members," elected to retain their land. By 1959 the process of termination had come to the point where a trustee was to be appointed to manage the lands of the remaining members. U.S. Bank was selected to be the trustee and it assumed responsibility for the resources, which consisted of 98% timber land. According to Bob, the land that was assigned to the remaining members was intentionally skewed toward more productive timber ground - the better part of the resource - because those making the decisions recognized that this land was better for long term management purposes. The bank decided that they would have an in-house forestry staff to manage the 135,000 acres that were involved, and Bob was hired as the head forester with the responsibility to start the forestry department within the trust department.

Some people would prefer to retire and go play golf. My feeling is that I can get more satisfaction out of managing the Whiskey Creek woodlands and of continuing to put into practice what I know and do what I enjoy.

So, Bob went to work for the bank in 1959. He hired two other foresters, and for 22 years they managed the remaining members' lands, which were known as the Klamath Indian Forest, until 1981. The trust instrument provided that every five years the remaining members could elect to continue or terminate the trust agreement. In the second election in 1969 they elected to terminate.

Personally, Bob thought the decision was a mistake, but it was their choice. So, the next step for Bob and the bank staff was to make sure the members got adequately compensated, and according to Bob they worked hard to see that that happened. The federal government ended up as the buyer, and the Klamath Indian Forest was added to the lands purchased in 1955, creating the present day Winema National Forest. Since the federal purchase of the Klamath Indian Forest involved a formal condemnation process, Bob and the bank were involved in appraisals and protecting the beneficiaries' interests during the condemnation action. The property was removed from the bank's management and given over to the Forest Service in 1974, but a period of twenty years was granted to complete the trust termination process, and by the time Bob and the bank went through all the court action that was part of that process, the money was finally available for distribution in 1981.

For Bob, his work on the Klamath Reservation and the Klamath Indian Forest was a major part of his professional career, and even if the results were not what he personally wanted to see, he views it as the best professional opportunity he could ask for. With the turn over of the Klamath Forest to the Forest Service in 1974, Bob worked with the bank to develop management relationships with other timber land owners in the area, and Bob continued with those management duties until he retired from the bank in 1986.

Bob's story in his own words focuses on the timber company he and another bank forester decided to start. Bob describes how over the past twenty years they have managed the original property they bought in 1978 to improve both the health of the woodland and the value of the timber on the property.

Whiskey Creek Timber Company

I had been thinking about acquiring timber property since 1955 when the termination of the Klamath Reservation came along. During that time, I was looking at property for other people and wishing I was in a position to take advantage of some of these really nice

properties that were on the market. So many times I would evaluate a property and end up saying later, ``Why didn't I buy that piece of property?" But with a young family, the financial resources just weren't there for a number of years. Still, I didn't want to come to the end of my road just saying, ``Why didn't I?" Some people would prefer to retire and go play golf. My feeling is that I can get more satisfaction out of managing the Whiskey Creek woodlands and of continuing to put into practice what I know and to do what I enjoy.

So from about 1974 on I was seriously looking to purchase the right kind of property that would allow me to practice what I preached. I had had conversations with other foresters about the subject, and Jim Dahm, who was also a member of the forestry staff at U. S. Bank, was one of them. We had been looking for property for quite a while, but most of what was available didn't have the characteristics that suited us. We were interested in land that was well stocked with trees and that had an element of merchantable wood on it, and good future potential. Finally in 1978 a 160 acre piece of property was advertised in the newspaper, and it had all the qualifications that filled the bill for us and it was a price we could consider. So, Jim and I formed a partnership, and purchased the property under a contract with the owner. Part of our agreement with the seller was the right to harvest some trees with our substantial down payment and that helped us get started. The company got its name from the Whiskey Creek watershed that that first piece of land is part of. We operated as a partnership until 1990 when we formed a corporation.

In the Whiskey Creek enterprise, Jim and I have much the same goals and objectives, but as in any multiple ownership there are some differences, and they have been there from the start. We are two different individuals with two different family circumstances, and different needs. But we approach management from the point of view that we are two professional foresters who have the vision that the ownership of timberland can provide satisfaction and income and security. All of those things are in both of our objectives.

Over the years we have added additional timber parcels, but it is our management on the Whiskey Creek parcel that we selected to share with the Forest Health Partnership, and the challenges of that parcel are very typical for a lot of forest land in the area.

...Jim and I have much the same goals and objectives, but as in any multiple ownership, there are some differences and they have been there from the start.

Management Strategy

For me, forestry can be rather loosely defined as a combination of activities. It is an art, it is a science, it is a business, and it is an engineering endeavor. The artistic side is the subjective aspect that has to do with feelings, emotions, and interpretations as well as the aesthetic consequences of management practices. The science of forestry is the technical aspect which describes how the various components of the system work. The business part of forestry is concerned with the economic results of harvesting forest products as well as the cost of management activities. And the engineering dimension of forestry has to do with technical measurement and such things as surveying and mapping. There are a great many things that go into my definition of forestry, some of which can be measured in terms of economic return, and some of which probably can't. But for me, the forestry I practice for myself can't be red ink, it can't be a loosing enterprise. It has to result in a positive

economic consequence. So, what I have to do is decide what kind of return am I satisfied with. Do I want a maximal return, do I want a reasonable return, can I tolerate a below average return? In the Whiskey Creek enterprise, I think we are looking for a reasonable return on our investment.

Uneven Age Management

My experience with the BIA managing ponderosa pine forests with an uneven age management approach convinced me that it was a viable and productive way to manage the forest. There are other approaches, and I can't say which is best, only that I think the one I have used works and that it has some advantages. It may have some disadvantages as well. Probably the single biggest advantage of an uneven age approach is visual, and relates to how people feel about the forest they see. Managing timber stands over time in a way that does not require massive changes to the way it looks or the way it feels when you are there is an advantage. You may not be able to measure that advantage in direct dollar terms, but it is worthy of consideration because people do have feelings and sensitivities. And generally speaking, I think the diverse structure of an uneven age forest is appealing to people's sensibilities.

I'm not a biologist, but I suspect an uneven age approach can serve a broader range of biological needs as compared to approaches like clear cutting where there are radical changes. The mono-cultural plantation systems may be technically correct systems but they require radical change rather than fostering continuity, and I suspect that their lack of structural diversity means they support a less diverse biological community. In areas of the south and in the Douglas fir region of the Northwest, plantation systems seem to work because of the requirements of the species, but in our semi-arid area with the species we have here, if you can do things in a gentler fashion with less obvious impact and still achieve good production results, I think it is important to consider the less radical approach.

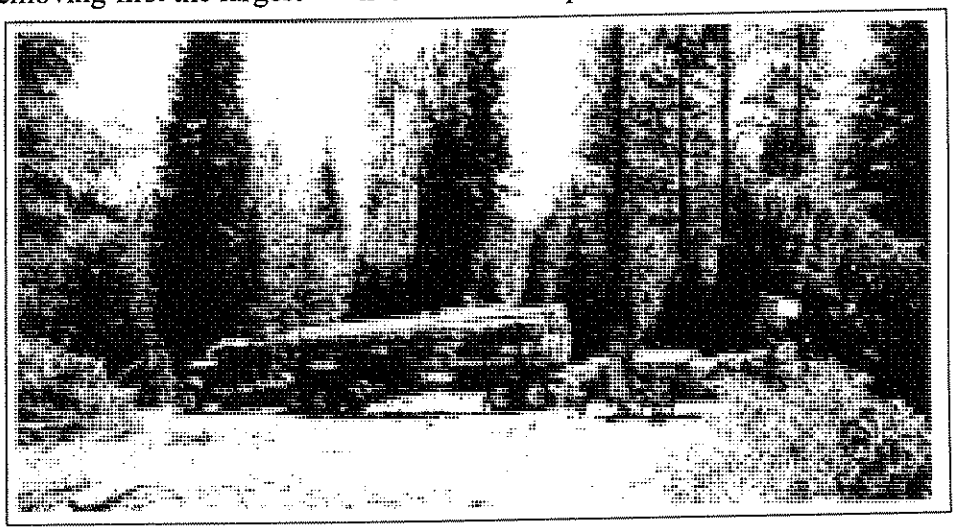
Uneven age management does have some potential disadvantages, one of the most important of which can be that the greater number of entries required may result in greater collective impact, especially to things like soils. We really don't know the answers to questions like these, but they are important considerations and we need to monitor these collective impacts carefully.

In any event, the strategy we have adopted for Whiskey Creek is to seek an uneven age stand that is well stocked, evenly distributed or balanced in size and age classes from seedlings to 28 inch diameter trees, and which will provide a continuous stream of income and which will appreciate in value long term. We anticipate that the general trend for the value of timber will be up, that is unit value, apart from growth. Appreciation in these wood

products has been the history of the timber marketplace over the last many years, allowing for the temporary ups and downs that are always occurring. So, we do not feel that we need to be in a hurry to capture immediate economic benefits.

When we started we faced a stand of trees which had gone through two successive overstory removals, removing first the largest trees in 1936 and then a general diameter limit cut of all trees down to 16 inches in the mid 1950's. The result of these treatments, together with fire suppression and no thinning, was a stand of relatively young trees in a very dense condition which were stressed and growing very slowly. There was, however, some merchantable timber, though in the smaller size classes. We spent six to eight years in pre-commercial thinning, dropping stems that were six inches or less, selecting especially those that were damaged or had relatively low potential for return. We thinned them, piled them and burned them over the years. We wanted to remove enough of those small stems that didn't have good growth capabilities so we could free up the next size class for a period of growth. We left a lot more trees in the six to ten inch category than we ultimately wanted because they had market potential. We waited for them to grow somewhat larger or until they became marketable and then we periodically harvested among those trees to generate income to live on and to maintain the forest property. As we selected for these commercial harvests, again we retained the best trees in the better locations and freed them for further growth. Working since 1978 we have not achieved the balanced uneven age forest we want, but we are much closer now than we were when we started.

In our approach to date, we have restricted fire to pile burning. My view is that if I have another way to achieve a result, I would prefer not to use a comprehensive, broadcast burn technique. Generalized burning tends to eliminate the seedlings and lower end of the size classes, and we want to retain appropriate numbers in all size classes so there is a continuous line of product to come off the forest. But as a result of the thinning we have done, we recognize that we have opened up the forest and allowed the brush to come in, and if we end up with too great a fire risk as this brush accumulates, we may have to do some light controlled burning. I'm not totally



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opposed to burning; I just have a more restricted concept of its use than some, and I don't want to jump on a bandwagon just because it's going by.

Economic Results

I have put together the chart on the following page to highlight the economic consequences of our uneven age management approach on the Whiskey Creek property over the past eighteen years. I have included in this chart a comparison between the uneven age approach we took and an alternative approach which would have maximized the economic return at the time of the purchase in 1978 by harvesting all the merchantable trees for saw logs down to 10 inches in diameter and leaving enough smaller trees to suffice for restocking. In the forestry profession this type of cut is known as a 10 inch diameter cut. In the uneven age approach which we selected, there have been five entries, each involving a selective cut designed to remove the excess trees in the smaller size classes and to retain most of the trees in the larger classes where there are too few trees. The overall economic goal of the uneven age management approach has been to increase the value of the remaining trees while producing a steady flow of income over the years from harvesting the excess trees in the smaller size classes as they began seriously competing with each other or grew to merchantable size. The approach taken in the 10-inch diameter cut liquidates the merchantable timber assets on the property and monetizes it, continuing the trend of the two previous overstory removals. What follows are the actual facts for the uneven age approach which we took and the most reasonable estimates and projections I could derive for a hypothetical 10-inch diameter cut approach.

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Economic Results and Comparison

Before discussing the chart, it is important to recognize two points. First, in the calculations for both approaches, revenues and expenses were discounted at a safe rate of 6 % to generate a Net Present Value that approximates the initial timber investment. These factors were then introduced into a standard formula to determine the Internal Rate of Return for each approach. Second, I have not considered the effects of reinvestment in either approach. As income is generated in either approach, there are choices as to how to use it: spend it to purchase goods or services, or invest it in stocks, bonds, mutual funds, CDs, real estate, etc. There are simply too many different scenarios for the use of the income and the economic results of this use over the years for me to try to characterize them. Clearly, the 10-inch diameter cut produces the largest, most immediate amount of money which is also available for the longest period, and if all of this money had been immediately invested and left to accumulate with dividends in the stock market, the return over the extraordinary years of growth in the market since 1978 would exceed by a considerable sum the growth in value plus income that resulted from the uneven age approach. This is true, though less impressively so, if in fairness we assumed that the income generated over time from sales in the uneven age approach had been likewise invested in the stock market. These have been extraordinary years for the stock market, something which could not be predicted in 1979 and which may well not apply to the next 18 years. There is no way to know in advance

Comparison of the Results of a Hypothetical 10" Diameter Cut and of the Actual Uneven Age Management Approach Used at Whiskey Creek

	Hypothetical 10" Diameter Cut	Actual Uneven Age Approach	Actual to Hypothetical Percentage Difference
Original Volume (MBF*)	568	568	0
18 Year Harvest (MBF*)	568	315 (546 including 950 tons of chips)	45 % less (4 % less)
*MBF - Thousand Board Feet			
Number of Entries & Cash Flows	1	5	400 % more
1996 Volume (MBF)	184	639	247 % more
Largest Tree (1996)	12.4"DBH	21.4"DBH	73 % more
Cash Flow	$56,800	$73,178	29 % more
Final Value	$18,400	$204,480	1,011 % more
Cash Flow and Final Value	$74,400	$277,658	273 % more
Total Operating Costs (including taxes, insurance, general management, and cost of sales)	$12,704	$22,257	75 % more
Internal Rate of Return	6.9 %	10.3 %	49 % more

what investment route will generate the best return, but it is worth noting that among all the choices available in 1979, investment in the stock market in the manner described above is one of the few standard investment choices where the growth in value has been phenomenal.

Several points emerge from an examination of the comparison in the Economic Results chart. First, the uneven age management approach produces a nearly comparable volume of product over the eighteen year period as the 10 inch diameter cut approach [only 4 % less when the 950 ton chip volume produced in the uneven age approach is included]. Yet the uneven age approach results in a current volume on the site 247 % greater than the diameter cut choice. Second, the uneven age approach produces a 29 % greater income result over the same eighteen years. Third, the value of the timber on the property after eighteen years is 1,011% greater following the uneven age approach. Fourth, the Internal Rate of Return for the uneven age approach is 49 % greater than the return for the diameter cut. Fifth, expenses for the uneven age approach are conservatively estimated at 75 % greater than the diameter cut, but with the numbers being relatively low, the uneven age costs are low compared to the large value increases these expenditures produce.

Overall, I think the chart reveals that given the time period involved and the assumptions used, the uneven age management approach has a distinct economic advantage over the 10 inch diameter cut. While I think for the most part the economic results alone support an uneven age management approach, if the landowner and the watershed community place significant value on even economic flows and community stability, on biological diversity, on ecological integrity, on forest health, and on forest aesthetics, then I think a much stronger

argument can be made for the greater benefits of the uneven age management approach.

Wildlife Management

In forest management, wildlife can be beneficial or it can be detrimental. And under the circumstances where wildlife is detrimental to achieving our goals in managing timber, we have to deal with that. In the beginning, you could go nearly any place on the Whiskey Creek property and see almost nothing but bright white spots in the tree tops; there was that much of a problem. We assumed it was porcupines, but we did notice a large number of gray squirrels and nests in the tops of the trees. So, we contacted the Oregon Department of Fish and Wildlife and had a wildlife representative come out and assess the situation, and he determined that the culprit was the squirrels that were working on the leading stems of trees to get at the nutritious cambium layer. He agreed that we had enough of a problem that we could be given a permit to do some hunting of the squirrels and reduce the population. Between hunting and thinning the stand the situation is greatly improved. There are still squirrels, but by separating the trees in thinning, the squirrels can't just move directly from tree top to tree top to feed like they could before. We have noticed very little damage in the stand since those first two years, and in the thinning process, we have removed almost all of the damaged trees.

Because the 160 acres was so dense with young trees when we first bought the property, there was all kinds of cover but no forage for big game, and we saw no signs of these animals. As a result of our thinning and opening up the stand, there is now an ample supply of forage in the bitterbrush and grasses that have come in, and with the forage the deer are there. That was one of the side benefits of our management. It is possible that in the future the deer could get out of control and start taking too many of our little trees, and then we would have to address that matter, but we haven't seen that happen yet.

Mistletoe Problems

We had a small knoll of two or three acres in the Whiskey Creek 160 that was heavily infested with mistletoe and a bunch of dwarf misshapen trees as a result. To get rid of the problem we essentially clear cut the area and chipped the wood that was removed. We created a small clearing and then replanted those acres with trees and used the mesh tubes to protect the little trees from deer damage until they could get going.

In forest management, wildlife can be beneficial or it can be detrimental. And under the circumstances where wildlife is detrimental to achieving our goals in managing timber, we have to deal with that

Working with Neighbors

The Whiskey Creek property is on the fringe of a rural-suburban interface. There were a number of smaller properties in the area with one home on our borders when we bought it. Others came along later. One of the problems we faced was that we didn't have legal access on the dirt road that led into our property and that had been used for years by the owners in the area. There was always a chance that someone might try to stop us from using the road by putting up a blockade. So we got together with a number of neighbors who were also frustrated by the lack of legal access and we utilized a section in the Oregon Statutes that provides relief for anyone whose property is landlocked. The neighbors who live there

were very cooperative; some of the non-resident neighbors were not as cooperative. Some people have the view that, "What's my land is my land and I'm not going to give up anything, if I don't want to." But the law protects you against uncooperative neighbors on the issue of access, and we worked it out. We made a determination of the value of the land for the road area, and compensated the owners for that amount to gain a legal easement for the road.

When we first bought the property, some of the neighbors had concerns about what we might do with our land as a timber company, and so we visited with them and talked and we explained what we were going to do and how we would do it, and gave them an opportunity to express their concerns. Once they understood that we weren't going to clear cut the area and that we intended to improve the quality of the woods, they had no further comments. Where we own property in other locations, we have taken concerned neighbors out and shown them what we were going to do, and asked them to tell us if they saw anything that was incompatible with their view. And if we can help, we will do it, if the issue is reasonable and doesn't deny us our right to manage the property for our goals. Our experience is that by communicating up front with our neighbors we have always been able to assure them that they don't have any reason to be concerned about our operation on our property.

We have gone to considerable lengths to be good neighbors. We have cooperated with the people who live on the road to get a gravel surface added that would hold up, so they could use the road on a daily basis. The surface wasn't important to us at all, but we participated in the expense as good neighbors. And we have made sure that when we have logging trucks going by on the road, the road is watered so we are not creating an undue amount of dust. We have also opened our property for use by the neighbors if they want any of the thinning material, especially for fire wood, and we haven't posted the property. So our land is open to them to use for any reasonable purpose.

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We also dealt with the neighbors' concern about fire, and that is a really critical issue in interface areas. We are as concerned about their use of fire as they are concerned about ours, and so we discussed what precautions both sides needed to be sure to take. On those occasions when we burn our thinning slash, we do it in late fall when any risk is low, and we notify them when we are going to burn so they aren't surprised and upset.

Besides private owners as neighbors, we also have state and federal agency owners on our Whiskey Creek borders. When we were negotiating the road easement, we negotiated with the state also, and we traded an easement through their property for an easement through our property which gives them access to a parcel that was otherwise hard for them to reach. Again, when ODF did some thinning on their adjoining eighty acres they left all the slash on the ground, and we were concerned about the fire risk. So we discussed it with them and they recognized the potential problem and they came out and crushed the material with a cat, compressing and breaking up the material and lowering the fire risk. By our doing that, we helped address a potential

risk not just to us but to all the neighbors. People need to realize that if they have good relations with their neighbors, and they communicate about their concerns, the problems can be solved and everyone can benefit.

In the Oregon Forest Industries Council there is what is called the ``Prudent Neighbor Policy" which recommends that if you are going to do something on your property which can impact your neighbor or give the impression of impact, you should talk with them before you do it, and we do that because we feel it is to our benefit to keep our neighbors informed as to what we are doing. The other advantage of communicating with our neighbors is that we have the opportunity to discover things that we might want to do together. For instance, if either the state or the federal agencies should want to do some controlled burning in the area of the Whiskey Creek property, then we would be open to looking at that as a joint possibility.

I see this Guide as an important communication tool to reach private woodland owners and help them to think broadly and wisely about the woodland management choices that are available to them.

Watershed Considerations

As of now, there is no watershed council in the Whiskey Creek area that I am aware of. There is a lot of potential in the current orientation to these councils and partnerships, and even though we have a very small ownership in the watershed, I think we could benefit and we would be more than willing to do what we can that is reasonable to assist others to improve overall conditions. But there is always the fear

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that the little guy is going to get stepped on in these groups, that your own interests will be substantially diminished, and so participation is a hard sell to the average woodland owner. To work, these groups have to be put together right, with respect for all views. As far as our operation is concerned, I don't think we would be asked to do anything differently, but by the same token if we are missing something that we really ought to be taking into consideration, and we can afford to, then we would want to do it. On the other hand if we are doing something that can benefit others as they look to manage their property, then we would want to share that with them so the entire area can benefit.

The Partnership and the Guide

I'm interested in the Klamath Lake Forest Health Partnership because I believe no man is an island, and I think we can all benefit by sharing information. I expect to learn some from others, and I expect to share some of my knowledge that I have accumulated over the years as a forester in the area. From a professional forestry standpoint, I think forestry has fallen out of grace in the public eye, and that concerns me. There is a need for foresters to communicate to the public who we really are and what we stand for. I want people to understand that forestry has always been concerned with all of the values of the forest, and that most foresters have strong feelings about and for the forests and that it is

not fair to think of this group as only concerned with timber production, though that is a significant part of it. From my experience in forestry, there has always been considerable internal questioning and scrutiny within the profession about the effects on all forest resources of the various management practices and policies. The expression of interest in forest resources by a much broader spectrum of people has certainly increased in recent years, but many of these people are not well informed about the complexities of natural resource management. A lot of people are more involved because of how they feel than because of what they know. The public needs to be aware that most of the questions raised by this broader public in recent years about non-timber resources have been aired and debated within forestry for a long time. I admit that I was naive, but I got involved in forestry so I could deal with trees, not people, but in recent years it has become clear that I have to deal with people, and that is one reason I am participating in the partnership.

Like other members of the public I have been concerned that some of the management activities on public and private timber lands could have at least short term detrimental impacts, if not long term impacts. Along with others, I have tried to have input into the process - especially the process of public agency decision making, and I have been frustrated with a situation that was not really open to input. But in recent years, the pendulum has swung the other way so that the opportunities for input and challenge are so great that nothing gets done. I agree that the process needed to be changed, but not with the result that everything just comes to a halt. It is my hope that the Partnership and partnerships and watershed councils can contribute to bringing us out of the current impasse and stagnation and back into a period of productive and responsible activity. As an eternal optimist, I see so much that can be done on both the public and private lands and I am an advocate for seeing the good things that forestry has to offer being put into practice.

I see this Guide as an important communication tool to reach private woodland owners and help them to think broadly and wisely about the woodland management choices that are available to them. My ultimate hope is that the partnership will be able to carry a similar message to those who manage all the forests in the area, and that the community will support active and diligent forestry on all the forested lands of the area.

Basic Advice to Woodland Owners

My view is that there are about as many motivations and objectives in managing woodlands as there are owners. Respecting this diversity, as a professional forester, I would say that woodland owners are in the best position to get the best job done on their woodlands if they will consider doing the following things: First, think carefully about what you really want, really look closely at your needs, objectives and expectations. Second, communicate those objectives and expectations clearly to all those you work with. Third, remain open minded to suggestions from others who may have more knowledge about the way forests work. Be willing to consider alternatives. Fourth, explore and locate the people and organizations that are available to you that can help you. Fifth, choose the best people you can find to work with, people who have a good reputation in the profession and in the community. Talk to others who have used the person's services. Check references. Look at the results of their work and see if it looks like what you expect. Sixth, don't hesitate to ask questions of all the people you are considering as prospective consultants or contractors and make sure you

understand the answers and that the answers are in line with your thinking and objectives. Seventh, be willing to pay people a reasonable fee for their services. Locating and investing in good advice is the best investment you can make. Eighth, give the people you select the freedom to do what you hire them to do in the best way they know how. Ninth, and in general, put your energy into planning. Take the time to set it up right. The best advice from an appropriate range of experts will help you create the best plan, and good advisors will direct you to the best contractors so you get the best job done. A few dollars invested in quality advice and planning can make all the difference in the world in the outcome and your level of satisfaction with the results.

Satisfaction in Forestry

There is a great deal of satisfaction in being involved in a productive enterprise like Whiskey Creek Timber Company, in applying the knowledge I have as a forester and seeing the conditions on the land move, respond to our efforts, and know that the forest we are headed toward is more valuable and one I will feel more comfortable in than the one I started with. Those changes represent the kind of stewardship I believe in. A prime piece of forest ground in mature condition is a wonderful thing, and the Klamath Indian Forest was that kind of property where the challenge was to maintain that condition. Nothing out there in nature is static and if you don't continue to be active what you have is not what you are going to get. But as wonderful as a piece of property in prime condition is, there is a lot of satisfaction that comes from taking a property in poor condition but that has good potential and seeing it move in a healthy, productive direction. That was our challenge at Whiskey Creek.

In my view, ownership involves stewardship which means that even though I have title to the property, my responsibility does not stop with considering only myself. My responsibility extends to my neighbors and to the broader community and society.

Satisfaction for me also has a social aspect, and I think that is one reason I found the BIA experience rewarding. In my view, ownership involves stewardship which means that even though I have title to the property, my responsibility does not stop with considering only myself. My responsibility extends to my neighbors and to the broader community and society. And the sustainability, continuity and viability of that land has to be factored into my use. I think it is important for us as members of a society that cherishes the freedoms that we have to recognize that there are responsibilities that go with them. You can talk about those things or you can demonstrate them, and I'd rather demonstrate than talk about them. With the Whiskey Creek enterprise, I have tried over the years to get my family involved because it is a goal of mine to see connection and continuity between that land and those who managed the land.

On the Whiskey Creek property, there are thousands of little stumps from the huge amount of thinning we had to do, and they are the result of a lot of hard work, cutting and then piling and burning. I've had some of my kids and grandkids and my in-laws out to share in that process of working together on the property. It's sometimes hard to convince a teenager that that work is significant, but I have wanted to be for my family what the farmer in the Poconos was for me, the one who helped me to discover myself, my capabilities and my connection with the land. I can only offer a demonstration of what I think is important in relating to the land. I can't know

if it is going to take, but I try to keep all the members of my family involved, and I have taken them all out to Whiskey Creek enough so that they know what I'm doing and why I'm doing it.

I've tried to keep my children aware of the business aspects of the management as they have grown up because part of my objective is to demonstrate to members of my family that a

piece of property, properly managed and productive, can have both short and long term benefits. At the same time I think my children are aware that for me stewardship is more than just a business, and they can see that in me. I think they understand and appreciate what makes me tick in that regard. I've gotten one of my daughters lost on a hunting expedition, and she knows my comfort level in the woods, even when I'm lost. And with my son, when the opportunity presents itself we hunt and fish together, and in those episodes we talk about things and we can see each other's responses to the surroundings.

Spirituality and Forestry

Spirituality has always been part of my make up. I can't say where it came from. It didn't originally come from formal religion because that was not something that was especially important in my growing up. I do know that I discovered the spiritual aspect of the natural world when I went to the Poconos at age twelve. Today, my spirituality and religious

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understanding influences everything I do, including my experience in the woods and my approach to forestry. Spirituality comes through in the feelings of belonging that I have in the woods and that's a long standing relationship I have with the natural setting which inspires me. Spirituality for me is also part of the realization that stewardship really means we have temporary custody of the land. When you feel like you belong in a place, you respect and care for it, and when you recognize that ownership is really just temporary custody, you know you have a responsibility beyond yourself. I would say a good steward of the land feels these feelings and recognizes

this responsibility while he seeks productive consequences. I think I try to do this.

I think this is the stewardship concept that is embodied in the code of ethics that the members of the Society of American Foresters subscribe to when it refers to maintaining the integrity of the land. I think I've been lucky because in most of my work, with the BIA and the bank, I experienced very little pressure to do anything that would have violated that code or the spiritual sense that underlies my concept of stewardship. As a professional forester, I feel I am very fortunate in that I've been able to work in the place where I have the greatest enjoyment, so the work rarely has the kind of tension and stress associated with it that is true for so many people. In fact, I've never thought of it as work. And I suppose it all goes back to that farmer, Mr. Simons, and recovering my life in the woods and on that farm and with that man in the Pocono Mountains of Pennsylvania.

And I suppose it all goes back to that farmer, Mr. Simons, and recovering my life in the woods and on that farm and with that man in the Pocono Mountains of Pennsylvania.

CHAPTER 10
A CAREER IN THE TIMBER INDUSTRY
Balancing Timber Production with Maintaining the Beauty of the Forest

As Told to Tom Burns by Ed Kupillas

Background Life History

Ed was born in 1931 to parents who emigrated from Germany after WW I to Brooklyn, New York. Ed's parents came from a tradition where nature was highly revered for both its beauty and productivity and they instilled these views in Ed from a very early time in his life. Though they lived first in Brooklyn and then in White Plains, New York, where Ed's father was a pastry chef and then the owner of a pastry shop, the family took frequent trips to the country for picnicking, hiking, canoeing, fishing, and mountain climbing throughout Ed's childhood and young adulthood. Early on, Ed's mother planted the idea in Ed's mind of pursuing a career in forestry as an admirable profession and although Ed considered many other possibilities, it was this idea that stuck with him and that was confirmed during a very positive family vacation to Kidney Pond Camp in the Maine woods when Ed was about sixteen years old. The summer after graduating from high school and making his decision to go to forestry school at Syracuse University, Ed went west to work initially for a rancher and then for the Forest Service in the area of St. Maries, Idaho. This was the beginning of Ed's commitment to the ranching lifestyle and a career working in the conifer forests and magnificent mountains of the West.

In 1949 Ed began his forestry schooling at Syracuse which he found to be challenging and productive. As an athlete, musician, and socially active person, Ed was somewhat discouraged by the narrow technical focus of many of his fellow forestry students, but he stuck with the program and elected courses in rangeland management, public policy, and wildlife biology to prepare himself for forestry in the West. Upon graduation in 1953, Ed wanted to marry his fiancee, Sally, and head West, but he faced the draft for the Korean War. He checked out his options and decided on the Marine Corps which provided an opportunity in an officer training program. The Korean War truce occurred in August, 1953 as Ed was finishing basic training with the result that Ed was relieved of active duty overseas, but he was obliged to finish officer's school and his two year commitment. Ed married Sally while he was in officer school, and ended up as a company commander in the Marine Corps engineers.

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In 1955 Ed completed his stint in the Marines, and because of a former Syracuse instructor's continuing interest in him, Ed had an opportunity to take a position with the BLM district in Medford, Oregon. So, Ed gave up his idea of entering smoke jumper school for the chance to begin his forestry career for real. With the BLM from 1956 through 1962, Ed used his aerial photogrametry training and was involved in comprehensive inventory work which introduced him to much of the Southwest Oregon area. Later in the job he got

a good deal of practical experience in contract administration, timber cruising, and timber sale lay out and appraisal. Through these six years Ed fell in love with the Rogue Valley and spent many weekends with his BLM colleagues climbing the area mountains. During this same period, he and Sally had three children and bought a cut over 40 acre parcel of land which the family began rehabilitating. But Ed found the bureaucratic restraints of working for the government not well suited to his nature, so he began to look for opportunities in the private sector.

In 1962 Ed accepted an offer to work for Elk Lumber Company in Medford which owned 80,000 forested acres in the area and was looking for someone with experience dealing with timber sales on federal land. Ed found the work with Elk and the perspective of the company perfectly suited to him. The owner/managers were experienced in timber production, respected the limits of sustainable harvests, were committed to the land and the community for the long term, and allowed him a lot of freedom to do his job. For three years with Elk, Ed had one of the most enjoyable work experiences of his career working with timber on Elk lands and buying and managing timber sales which Elk bought on public lands. Then, about a year after Boise Cascade Corporation bought out Elk, at age thirty-six Ed was offered a major promotion to become the timber manager for Boise's northwest Oregon division which included 190,000 acres of private, industrial forest land. The job meant moving out of the Rogue Valley area to Salem, Oregon but Ed and Sally felt the opportunity warranted the change, so Ed accepted and the family made the move north.

What seemed a dream job turned out to be very frustrating for Ed, mainly due to his boss who had no feel for the forest, was only concerned with the bottom line, and was "ethically challenged" in how he conducted Boise's business. Ed and his staff of thirteen foresters found themselves constantly pressured to exceed the limits of what they knew to be long term sustainability, especially with the old growth that was on company land. Ed sought support from the corporate level forestry staff but was told that the senior position of the manager meant there was nothing they could do. After four years of putting up with the situation and following an especially egregious episode of the manager's unethical behavior, Ed contacted the main office of Boise and indicated that he planned to quit if something wasn't done about this general manager. Lacking political power, Ed made his departure from Boise, but not before he delivered the goods on his boss to corporate managers in his exit interview. Within three years and after further investigations, Boise got rid of the general manager.

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After nearly ten years with Boise Cascade, in 1972 Ed left to go to work as the timber supply manager for Columbia Plywood out of Portland. By this time the environmental movement was under way and the timber industry and Ed were feeling the pressure, especially timber companies like Columbia that were mostly dependent upon sales of timber from public lands. Facing what seemed an unreasonable, emotional opponent whose arguments kept shifting and who rarely gave ground, Ed fought for continued production from public lands and logs for his mills. As the battles became more nasty in the early '70's, and the job more hectic, and the pressure

ever increasing to satisfy company needs as the manager in charge of raw log supplies, the effects of the job took their toll on Ed personally, and he and Sally divorced in 1974. By 1976, Columbia had been forced to liquidate so many of its mills due to lack of supply that Ed knew he needed to look elsewhere for employment.

Ed took on the role of an industry advocate, again struggling against the restrictive effects of environmentalists. His job took him primarily to the area of the Klamath Basin east of the Cascades and especially to the Winema National Forest. In spite of Ed's efforts, with the advent of the Northwest Forest Plan for the west side of the Cascades and the emergence of the Columbia Basin Ecosystem Management Project for the eastside, Ed and the timber industry have faced continued reductions in both the volume of timber output and the lands available for timber harvest.

In 1976 after marrying his second wife, Sue, Ed moved with Sue and her two children back to the Rogue valley, bought a small ranch, and took a job as timber manager with Southwest Forest Industries in Medford. Having returned to the area he favored, unfortunately Ed's job was headed down the same path as his job at Columbia. The recession of the late seventies and the continued cut back of harvesting on public lands through the eighties led to Southwest selling off mills and shrinking in size until it was bought out in 1988 by Stone Container Corporation. Ed continued to fight for keeping access to timber on public land for the needs of Stone Forest Industries and the timber industry of the area, but to no avail. As the losses of mills and staff stacked up, industry personnel tended to just hunker down and try to survive, and it became more and more difficult to motivate staff in what was a depressing situation. By 1991 and under management by Stone that did not understand or appreciate Ed's procedure in acquiring private timber, Ed was visited by a corporate vice president and received "the golden parachute." At the age of 61, Ed found himself secure, but "unemployed."

After a few months, Ed began his own one man forestry consulting business, working from his small cattle ranch near Medford. As someone who had worked as a supply manager in the timber industry for many years and fought for sustaining timber flows to industry from public lands, it was logical that one of the jobs Ed was offered and took was to represent what remained of the timber industry in the area in its supply relationship with federal land managers. Ed took on the role of an industry advocate, again struggling against the restrictive effects of environmentalists. His job took him primarily to the area of the Klamath Basin east of the Cascades and especially to the Winema National Forest. In spite of Ed's efforts, with the advent of the Northwest Forest Plan for the west side of the Cascades and the emergence of the Columbia Basin Ecosystem Management Project for the eastside, Ed and the timber industry have faced continued reductions in both the volume of timber output and the lands available for timber harvest. At the present time Ed indicates that less than 22% of the area of the national forests in the Northwest is open for timber harvest, and little is coming off that acreage. As an advocate attempting to counter the advocacy of environmental groups and the Indian tribes, Ed has been frustrated as a consultant just as he was for years as a timber supply manager.

It is the other parts of Ed's consulting business that have brought him greater satisfaction and that have pointed out a direction that he is

taking which he feels offers some hope for being able to resolve the current impasse between the timber industry and environmentalists. In the past four years Ed has become involved in four different community based partnerships, watershed councils, and advisory groups. At different scales and in somewhat different ways, each of these groups is making an effort to bring all of the parties concerned with natural resource management into constructive relationships and to discover and explore areas of agreement which will allow a fair and balanced management direction to emerge for public lands of the area. Ed is convinced that if local citizens participate in these community based efforts, the extremists who have controlled the debate until recently will be replaced by moderates who actually have a very large center ground that they share. Based on his experience over the last four years working in local community groups, Ed believes that from their common center ground, reasonable people can agree on management directions that will conserve the ecological integrity of the forests, address watershed improvement needs, and recognize that well maintained forests and range lands can also supply many products useful to humans and their communities.

With both of his wives, Ed chose to live and raise his families on rural properties with enough acreage to allow all the family members to engage in farming and/or ranching activities. All of Ed's children have been raised in this environment, growing up working close to nature on the ranch and making frequent excursions into the lakes, forests, and mountains of the surrounding areas. As his parents did for him, Ed has tried to foster in his children both a fundamental sense of being connected to the natural world and an appreciation of nature for its beauty and productivity. Some evidence of Ed's success can be seen in the fact that once grown, Ed's three sons all elected occupations [horticulture, geo-hydrology, and fisheries biology] closely tied to nature and natural resources.

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Ed's story in his own words begins with his description of his family's most recent natural resource adventure - the "K Ranch" at Flounce Rock Mountain. Then Ed describes in some detail his work as the lead consultant in the Moore Park revitalization project in Klamath Falls, Oregon, a project which focuses on community based solutions to forest health challenges in the urban - suburban interface.

The "K Ranch" at Flounce Rock Mountain

For the last few years since my mother died, my father has been living in the Medford area near us and he and my grandchildren spend a good deal of time with us on our 77 acre ranch a few miles from town. During this time the family has taken on a new land management project. In 1991, when I was still working for Southwest Forest Industries, a logger who was one of the ones locating private timber for us came to me because he needed a $25,000 loan. My father loaned him the money and this guy put up a 320 acre piece of ground he had logged as collateral. He was a good promoter

and he found a lot of property with good timber to log, but he was a poor logger, and a lousy businessman, and he ended up defaulting on the loan. He did a lot of damage to the property the way he logged it, but fortunately he left a good many six to ten inch trees and didn't clear cut it. We tried to sell it, but it came back to us again in another default. So, it began to look like we were supposed to keep this property.

The property sat for a time and then with Labor Day coming up in `93 or `94 Sue said, ``Let's go out to the ten acre lake on the 320 acre property for a Labor Day family camp out and picnic." So we did that and we all had a good time, and my father said, ``You know, maybe we shouldn't sell the place." We could see that if you cleaned up the slash piles and cared for the wounds to the land and did some replanting, the property had possibilities. So, I said, "OK, but if we don't sell, we will need to spend the time and money to fix it up because it shouldn't be left the way it is." And that's what we decided to do.

I bought a small crawler tractor and for the last four years we have been gathering slash and burning it, and slowly bringing the land around. My father was in his late eighties when we started and he has done a good share of the work, especially planting trees, and he has had a really good survival rate for his plantings. We have been planting the low slopes first with ponderosa pine and then where the fir naturally starts to mix in we are planting half pine and half fir. There is still a lot of work to do, but there is one ten acre pond and six or seven smaller ponds that can store water for livestock and provide habitat for fish and waterfowl. There are about 200 acres in medium size Douglas-fir and pine timberland which is coming back with natural reproduction and the replanting we have done. In addition, there are twenty acres of meadow and about eighty acres of oak savannah in the middle of deer and elk wintering range. I was up there last season just before elk season and counted an elk herd of twenty-two with a big branch bull in there and we saw the same herd in there this spring. With a lot of hard work, in another ten years that property will be beautiful and productive and valuable.

My father was in his late eighties when we started and he has done a good share of the work, especially planting trees, and he has had a really good survival rate for his plantings.

Working on that 320 acres has again been a family affair, and because my father is the owner, he really is the leader. With the outings and picnics, it is almost like our Westchester County, New York in the Rogue Valley, but this time we own land and the four generations of Kupillases are the ones not just enjoying it, but also working to bring it back to health and productivity. The property has the potential to satisfy the things that make a difference to me: to be productive for timber and cattle, to be in a healthy resource condition for all resources, and to be a beautiful place to be and to visit. In fact, our plans for the property span most of the things we think of when we talk about multiple use: raising trees, raising cattle, possibly raising fish, and enjoying it as a family for swimming and hiking and hunting and fishing. And we are doing this at the same time we are improving the health of the resource system, including the habitats for fish and wildlife. With the visits of my grandchildren and my father's great grandchildren, I anticipate the fourth generation in the family having the kind of experiences on the K Ranch as well as our home ranch and the public lands of the surrounding area that played such an important role in shaping my life. That's my hope.

Moore Park - Managing the Urban-Suburban Forest Interface

Of all the jobs I've taken in my consulting business, the job dealing with Moore Park in Klamath Falls, Oregon probably is the most outstanding in my mind. Moore Park is located on Upper Klamath Lake and is the major public park for the city of Klamath Falls. The park covers about 522 acres and extends from the shore of the lake through a developed lower section with large ponderosa pine trees to a steeper undeveloped and forested area. In 1993 the park was identified by the city as having a forest health problem. There were trees throughout the park that were dead and dying from disease and insects due to the stress of overcrowding and persistent drought. Being a park, the dead trees were an aesthetic problem for the park users while they were picnicking or playing tennis, or at the archery range, or riding their bikes around the roads and trails. And if these trees became rotten enough they were a possible safety problem if they fell on someone. The dead trees were also a potential fire hazard, especially on the steep slope of much of the park, and that was a problem both for users and for the residents of Lynnwood, an upper middle class subdivision that borders the park. The risk of fire was high because there was so much human use of the area. Overall this situation was of considerable concern to the city because if it didn't do something about the conditions and something unfortunate occurred, they could be held liable for damage to life and property.

In 1993 the city developed its first plan to address the problem. They were going to selectively log the area and remove the dead and dying trees. But that plan was rejected by ODF after review by ODF&W because the plan lacked any provision for the fact that there were eagles, an endangered species, nesting in the area proposed to be logged in the park. As a result of that rejection, the city lost its opportunity to do anything about the matter in 1993. The city proposed another plan in 1994, but that plan was rejected because the eagle protection part of the plan was judged to be inadequate by ODF&W. At that point the city managers were quite frustrated, so the city decided that it would sell the upper acreage of the park where most of the critical problem was.

The city proposed the sale to get out from under the problem, but the sale proved to be very unpopular with the residents of the area who wanted the park area to remain. Most of these people were from the Lynnwood subdivision on the park border and they formed an organization called Friends of Moore Park. They became very vocal in the community and were opposed to any sale. They were successful in bringing enough pressure to bear so that the city planning commission withdrew the sale in the Spring of 1995. But when the planning commission made that decision, it solicited a pledge from all of the parties involved to work together toward a solution to the problem.

There were trees throughout the park that were dead and dying from disease and insects due to the stress of overcrowding and persistent drought. Being a park, the dead trees were an aesthetic problem for the park users while they were picnicking or playing tennis, or at the archery range, or riding their bikes around the roads and trails.

Oregon Department of Forestry (ODF) held a meeting facilitated by Roy Woo, the ODF district head, to bring all of the parties together to explore a solution. That meeting solidified the commitment of all the players, and set the city on a course to locate an independent agent to put together a plan that would meet all of

the objectives. ODF gave the city a long list of foresters who might do the job. The city hired one person from this list for a short time, but for some reason that arrangement didn't work out. When he left, the city contacted me to see if I was interested. I said I was interested but that I would need some time to look into the project before I could commit. They agreed to that, and I began the discovery process which led to an actual contract to oversee putting the project together and seeing it through to a conclusion.

I had to file a plan with ODF and that plan had to abide by the requirements of ODF&W because there was a history of eagles both nesting and roosting in trees in the park. There were five nesting trees and two or three roost trees.

The first thing I had to do was identify the objectives and the players. I got what information I could informally on the situation from ODF and other sources so I could develop some ideas, and then there was a meeting at ODF between me and Mike Townsend from ODF and a representative from the city. The three of us discussed the project, who needed to be involved and who needed to be satisfied: the city's citizens who were the owners, the citizens in Lynnwood who were at risk and who had formed the Friends of Moore Park Association, the city administration which was the legally responsible party, ODF which had to be satisfied that we would comply with the Forest Practices Act and that we would do the job in a safe manner, the Klamath Tribes whose cultural sites had to be respected, and Oregon Department of Fish and Wildlife (ODF&W) which had to be satisfied that the eagle habitat issue would be addressed in an adequate manner. We discussed how that would all be done, and then we agreed that if we could reach an understanding, I would run the project. So when we finished I said I would write up a proposal covering what we had discussed.

The city looked at my proposal and approved it. Because there were many parties involved and because it was into June and the entire project had to be completed before the end of October to avoid the threat of weather, I had to move on several fronts at the same time. Mike Townsend at ODF knew all of the players and he put me in touch with the key contacts for each group. I worked with these people while I kept the city informed and while I looked for the additional contacts to do the on-the-ground work.

I had to file a plan with ODF and that plan had to abide by the requirements of ODF&W because there was a history of eagles both nesting and roosting in trees in the park. There were five nesting trees and two or three roost trees. I had put together plans involving wildlife sensitive areas before, so I had a little experience in that area, and for this project I worked with Mike Townsend and Beth Waterbury of ODF&W to develop a plan that would meet the wildlife needs for Moore Park. The preliminary work had been done to identify the locations of the eagle nesting trees and roost trees. We had to identify alternative trees that would be left to substitute for these trees and indicate what exactly we were going to do to minimally disturb the areas around these trees. We also had to show that the time of the work corresponded with the window of opportunity between September 1st and December 31st when the young eagles had fledged and were no longer in need of using the nests and roosts on a regular basis. I discussed the requirements with Mike and Beth and I put together a general proposal for

dealing with the eagle matter. Beth looked at it and modified it slightly.

At a later point I met with Beth and Mike and the logger and we visited each eagle site and discussed exactly what was to be done. I marked the trees to be left and the trees to be removed while we were all right there. We had to deal with conflicting needs. On the one hand we wanted to remove the dead and dying trees and thin the overcrowded stands, and on the other hand we wanted to minimize disturbance to the area, especially within 300 feet of these trees, to protect the eagles. Having everyone right there to make those decisions, including the person who was going to be responsible for the chain saws and guiding the CATs, was important so each person could see the problems and adjust to the real situation, not make it a theoretical armchair decision. It didn't make much sense to leave a nest tree surrounded by dead trees, where if the dead trees caught fire the nest tree would be destroyed. So, in those kinds of situations we reached reasonable compromises. We didn't limit disturbance to the ideal, but neither did we do as much thinning and removal around these trees as we might have if we were only concerned with the health of the trees and some safety matters. Approaching it that way we worked through the give and take until it was all settled. While the paperwork on the eagle proposal

was in process, I was exploring locating the logger to do the work. Given the park situation, I knew the logger had to be very skillful. He had to remove trees while avoiding park structures and not damaging the trees to be left. He also had to be very light on disturbing the ground and careful to leave as little debris as possible. There are a number of loggers around that have that kind of ability, but this was a job that required the logger to really enter into the spirit of the enterprise if it

was going to be truly successful. Those loggers are the exception. My challenge was not only to find such a logger but to do it on short notice. ODF supplied me with a list of 73 loggers to consider, an impossible task. But I got very lucky in this case. Before I started contacting the names on my list, I had a call from Randy Crutchfield. He said he had heard about the project and was interested in doing the work and certain that he could do what was needed. But I had never met or heard of him before. So we talked and he seemed like a knowledgeable person who could put the logging end of the project together, and he indicated that he had done other logging jobs requiring similar abilities and that he would be happy to show me his work. So, I went with him and we visited three different job sites of his, two of which were in park settings. The sites were clean, and in spite of a goodly number of trees being removed in some cases there was almost no sign of his having been there. It was obvious that he knew how to do fine work, so I was impressed. I didn't have to rely on what someone said; he showed me repeated instances of what he had done. And Randy seemed to be the kind of person who listened and communicated well and who knew others in the area who could be useful contacts for other aspects of the job. I also felt Randy was the kind of person I could work with. So, after I made an additional inquiry or two, I selected Randy to do the logging. I was really very fortunate, because the search for the right logger could have been very time consuming.

During July and August I put the project plan together. There had been some questioning as to whether there really was a disease problem in the park trees, so early on an ODF insect and disease specialist came down and rendered an opinion about the dead and dying trees. He confirmed that we did indeed have a problem that needed to be attended to. His view of what needed to be done matched entirely with my own.

Once I had determined that Randy was to be the logger, I had to work out with the city how Randy and I were going to be paid for our work. The arrangement we made was that Randy and I would do the job for the value of the material that would be harvested. This was not the best arrangement, but it was the one that the city opted for, mainly because of the very short time frame. The city's main priority was to get the area treated and the problem resolved as quickly as possible in the brief period that remained in 1995. As a municipal entity, they didn't feel they had the time to go through the process involved in assuming the role of the party selling the timber. The city also didn't want to take on the risks and potential liability that surrounded the project if they adopted the project as their own, and subcontracted the planning and logging work to myself and Randy. The route the city opted to go left Randy and me taking the risks, but also receiving the benefits. And it left me with the potential conflict between marking trees to be removed for health reasons versus reasons of value. I knew I could handle this conflict, but generally speaking I don't recommend this approach.

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Without a cruise and appraisal, Randy and I had only a rough notion that there would be sufficient volume to pay us adequately for our work, and we didn't know if the big volume of

smaller dead trees would be merchantable or not. There were a lot of unknowns for us and if anything went wrong - and there were plenty of opportunities for that to happen - we might have lost money on the project. But Randy and I decided the risks were worth taking, and we worked out what our individual percentages would be of the profits. I set it up so there would be a percentage hold back on Randy's and my payments until the job was finished and approved by the city. All of that was incorporated into the agreement I put together between ourselves and the city. This agreement was approved and signed by the city attorney and at this point we had agreement on a plan and a contract.

With the agreement with the city in place, I had to work with Randy to come up with an overall approach to the logging. A good portion of the area was not especially steep and the soil type was such that it accommodated ground based logging, to be done with a track machine or CAT, or rubber tire skidder. But the upper area, part of which was above the Lynnwood subdivision, was quite steep, and there had been some discussion about logging that area by helicopter to avoid ground disturbance. Another alternative was to cable log it. We could have brought in a small yarder and logged the hillside that way. But we didn't know how much of the dead material on the slope was merchantable and overall the volume was not enough to make the yarder operation economical. And yarders are somewhat scarce and take time to set up. We discussed helicopter logging, but again there was an economic factor and generally you have to schedule that type of logging pretty far in advance. The helicopter logging companies are also notorious for not meeting schedules. We had a very narrow window of opportunity for that season, the city was already three seasons behind on getting the job done, and to depend on a helicopter crew seemed risky. We debated that option for a while because we knew the approach would be gentler on the land, but every time you add in another operator the situation becomes more complicated and it is less likely that you are going to be able to keep to a tight schedule.

If there had been more time, I would have probably gone with the helicopter on the steep part, especially knowing now that there was sufficient volume there to justify it. But at the time, we looked at all the options and decided that the best trade off was to tractor and wheel skidder log the entire area. We would be as careful as possible, use the old skid trail system that was already there, and that way we could be reasonably sure that we could complete the job on schedule. We recognized that in making that choice we would accept some damage to the hillside, but we would do what we could to minimize damage and repair the effects of what damage occurred. Erosion was the main problem but there are things you can do to mitigate it with waterbars and seeding, and we planned for these activities.

Randy was also worried about the boulders that were scattered around on the steep hillside coming loose during the logging and crashing down into the homes in the Lynnwood subdivision. This was a potential problem whatever logging technique was used and the risk was only slightly greater using the tractor approach. We considered putting up a chain link fence, but Randy came up with the idea of first logging the lower area just above the subdivision where the slope was less steep and felling the trees and leaving them so that they created a dam to catch any boulders that might come loose and stop them. The tree dam was a better barrier and less expensive than the fence would have been, and so that was how Randy handled it. A few boulders did come loose during the logging and in fact Randy's

barrier caught them and there was no damage to property in Lynnwood from the project.

Once we knew what approach we were going to take to the logging operation, we had to find a destination for the products and put together those agreements. There were three products: the saw logs, the chips and the hog fuel - mostly bark from de-limbing that is used to fuel furnaces or co-generation plants. Randy took the lead on exploring who the buyers might be because he had better information on the local market and had developed the contacts. He came to me with the different proposals that the mills came up with and we selected what we thought was the best deal and I put the purchase orders together. Klamath Veneer bought the saw logs, the Weyerhaeuser plant bought the hog fuel and Roseburg Lumber purchased the chips. Randy was especially important in finding a buyer for the chips and in locating an operator who could do the chipping and chip hauling. As it turned out we were very fortunate with the chip business. Fortunately for us, the price on the chip market happened to be up as we were negotiating with the buyers. Very shortly after we signed the purchase order with Roseburg Lumber for chips the price took a dive. Being able to make a little money on the chips rather than losing money to get rid of them was one of the major reasons we ended up doing all right financially on the project.

As soon as we had an agreement with the city, I began marking trees and I was still marking when Randy began the logging in the second week of September. I would go out and mark trees when I wasn't involved in doing other things for the project, and I kept ahead of Randy's fallers. Being a park, the criteria for marking were different from most timber sales. I had marked the wildlife trees that were not to be cut, now I had to mark the trees that were to be removed. Basically I marked to leave the best trees, and I marked to leave all the larger trees that in my judgement were not going to die in the next three to five years. I looked at spacing and selected trees to remove to reduce stress and overcrowding of the smaller green trees, and I marked virtually all the smaller dead and sick trees for removal. Marking is as much an art as it is a science once you get past the numbers and volume figures. I had to envision what the area would look like when the trees I was marking were removed. I had to feel that the result would both produce the park like appearance that was desired and be a healthy situation for the area. I marked trees to cut to a smaller diameter than I might have done otherwise because we wanted to leave the place looking clean and open, free of debris for safety and fire purposes. The marking was mostly my business as the forester, but occasionally Randy would suggest an option that he saw. We would discuss his idea, and we were always able to come to an agreement about what to do that met both of our concerns.

I marked the trees to be left and the trees to be removed while we were all right there. We had to deal with conflicting needs. On the one hand we wanted to remove the dead and dying trees and thin the overcrowded stands, and on the other hand we wanted to minimize disturbance to the area, especially within 300 feet of these trees, to protect the eagles.

As I began going over the property, one of the things I had to do was establish the boundaries. The city was terrific in getting the city surveyor out there to provide us the boundary lines so we did not go onto adjoining property. But when we determined the park boundary up the slope of the hill, it became obvious that the same health problem applied to the private property up-slope from the park boundary to

the ridge top. It seemed unfortunate to treat the park and leave the adjoining property - which visually seemed part of the park - untreated and in a position to generate a fire that could damage the park. I mentioned this to Randy and he said he thought it was Alice Kilham who was managing that property and he would talk to her and see if she was interested in having that land treated while we were there. So, Randy took the lead and contacted Alice and we met with Alice out on the ground to discuss the situation. We hiked all over the hillside, and she agreed to our selectively removing trees from the area using the same forest health criteria as for the park and with the same arrangement for payment as with the city. To include treatment of that private property in the plan we had to arrange with the city to skid the logs down the hill to the landings on city property. Again, the city gave the permission readily because the park was benefiting from the treatment of the up-slope area. This was one more example of the kind of ease in achieving cooperation that was true for the entire project. If the adjacent landowner had not agreed to treat the land or the city had balked at using their landing, we would not have been able to get the full benefit for the park.

I worked with Randy to determine how he was going to do the harvesting as part of the plan. I put together a logging plan and we went through the design for where the skid trails and landings would be. We found an existing open area that was well placed for the major landing and we identified where old skid trails were and committed to using and staying on them to reduce disturbance. For the logging areas that were not accessible to the main landing, Randy came up with a system of wagons with bunks and wheeled skidders to transport the logs to the main landing using the park roads. That way he got the logs and the tops to the main landing area where the tops were put into the chipping pile and the logs were decked and readied for loading onto the standard log trucks, and he did that without creating any new trails or bringing the large log trucks into the main part of the park. So, Randy and I worked through the details of how we would get the job done, and Randy was the major player in that because he knew what he could do and what equipment he owned or had access to.

Marking is as much an art as it is a science once you get past the numbers and volume figures. I had to envision what the area would look like when the trees I was marking were removed.

Sue Machado was the dynamic leader of The Friends of Moore Park and we needed to keep this group informed about the plan. Just after Labor Day we got together and agreed on a time to bring all of the parties together for a review of the plan we had developed for the project. I said I would put together a display area where everyone could see copies of the various contracts, the agreement with the city, the eagle plan, and pictures of Randy's logging work together with pictures of the park the way it is now and the way it was proposed to be. And I indicated that I would go through the project and explain each step in the process as it was planned. At that point we had the approval for our eagle plan from ODF&W. So, on September 6th we had a meeting in the Park Pavilion with everyone there: the city representatives, ODF, ODF&W, the Parks manager, the Friends of Moore Park, the logger, and myself. We gathered all the people around, went through the project plan, and then fielded a few questions. Everyone was receptive and friendly and no one voiced any substantive objections, so with everyone on board we forged ahead with the project.

ODF had a copy of the entire plan, so they had been notified, and they had obtained the project release from ODF&W. For ODF we were required to abide by all of the Oregon forestry regulations and our plan indicated that we would do so. ODF had the responsibility to come to the scene periodically and make sure we were in compliance. They also do a final review and sign off on the project if you have operated within the regulations and have not left a potential hazard. If their reviews indicated that we were not operating within the forest practices rules, they could shut the operation down, and if we left a site in an improper condition they could force us to go back in and correct it. With our plan and reviews we had none of these problems. We were working closely with ODF and Mike Townsend throughout the project.

Because the park contains some cultural sites of importance to the Klamath Tribes and because we were going to be logging over most of the area, the city contacted the Tribes and put them in contact with me so we could get the tribal archeologist to come and mark off any areas that we needed to avoid during the logging. As I was marking trees in August, a tribal crew appeared on two or three occasions and they went over the area and they did mark one or two small areas which they considered as significant. It was easy for us to just leave those untouched, and we did.

Randy began the logging operation in the second week of September. In the most developed part of the park, he used the wagons to remove the trees. He felled the trees and cut them into sections but he left the branches on. Then he loaded the sections into the wagons and used the rubber tire skidder to pull the wagons to the main landing area. He did the de-limbing as the sections came off the wagons and the top section came as one piece and it went onto the stack of tops to be chipped later. Doing it that way he avoided creating a lot of the mess on the park site where the tree was felled. The park crew was right there to clean up the few remaining twigs and needles. So as Randy moved through even the manicured area of the park, there was almost no sign of his having been there within a few hours.

When the time came for Randy to log in the area where the picnic tables and concession and park buildings were, the park manager was very cooperative and helpful. He had the park crew there to assist and he worked with Randy to make arrangements for the power and phone companies to come in and take lines down when Randy needed that. And once those arrangements were made, the utility company crews were there and did their jobs in a timely fashion so there were almost no delays for

Randy. Randy was the guy on the ground and he knew his schedule and he made all the specific arrangements and told the people just what he planned to do and what he needed from them. He was very effective and efficient in that way.

The logging part of the project was completed on schedule by the end of October. Very shortly after that the chipping operation began. It took place in the area of the main landing where the tops and branches had been decked and lasted just a few days. While the chipping was going on Randy was doing his clean up and mitigation work on the skid trails. We ended up with some disturbance on a steep twenty acre area, mostly on the skid trails themselves, and Randy ripped, waterbarred and seeded those trails. The hog fuel operation was really part of the clean up with the material from the de-limbing and debarking being piled and loaded into trucks and hauled away to the Weyerhaeuser plant. That operation took only a day or two. Randy then started the landing site clean up.

In the eleventh hour we ran into our first potential glitch in the whole project. Things had gone so smoothly and everything had dropped into place in almost a miraculous way through the whole project; it was almost as if we were being reminded of how the real world works. It turned out that the city had just hired a new parks director. Randy had one last clean up task he wanted to do which was to remove three piles of small debris from the landing area that couldn't be chipped or ground up for hog fuel. It was a mixture of small rocks, twigs and needles, the very last bit of residue from the entire operation. We had processed over 350,000 board feet of timber from 170 acres, tops and all and it came down to these three piles. That is amazing in itself and most loggers would not have even begun to worry about those piles, they would have just spread the stuff out and left it and that would have been just fine. But Randy wanted to go the extra mile and get rid of that last bit, and there was a small land fill area inside the park where he wanted to take that material. Randy had talked with the park manager and it was fine with him. Randy was going to supply the dump truck and he wanted to use the park loader that was right there to load the trucks.

Because the park contains some cultural sites of importance to the Klamath Tribes and because we were going to be logging over most of the area, the city contacted the Tribes and put them in contact with me so we could get the tribal archeologist to come and mark off any areas that we needed to avoid during the logging.

Well, in came the new parks director and he didn't have any knowledge of all the ways everyone had been cooperating during this entire project, and he thought the park shouldn't be supplying the loader free of charge. This man had just recently been with the military and he got rather testy and we almost didn't reach an agreement. It was really silly when you consider the entire picture, and finally we had an hour long meeting and the guy came around and we overcame that hurdle and got the last bit cleaned up.

On November 13 I reviewed the entire site and everything was completed to my satisfaction. At that point I scheduled a final review by ODF for November 21. On November 16 the Friends of Moore Park put on a celebration dinner in a restaurant downtown, and people had an opportunity to applaud the individuals who had contributed to making the project a success and to talk about all the good things that had happened in the course of the project and as a result of the project. When it was my turn to speak, I stressed the extraordinary

degree of cooperation that had been extended by so many parties to make the project work. Sue Machado gave out Moore Park tee shirts, and kudos and pats on the back were extended and a good time was had by all. It was a good feeling to know that it wasn't just me who thought we had done a good job. The whole community of interested parties was pleased and felt strongly enough to put on the event and announce it publicly.

On November 21st ODF conducted the final inspection and they found no problems and signed off on the project. At that point Randy and I received the withheld portion of our payments and the project was over.

Looking at the treated park area now, two years later, I like what I see. There are almost no new dead trees, the eagles have been back for two years with successful broods, the wounds to the slopes are healing nicely in response to Randy's mitigation efforts, and unless you know the small things to look for you can't tell that a major logging operation took place recently in the area.

For me, the satisfaction in the project was three fold. We avoided the hazards and overcame the risks and we were able to make some money. That was nice, but I could have made the same money in a lot of other ways, so the financial gain was not my major source of satisfaction. The main source of personal gratification was the fact that we had improved the conditions on a very nice piece of property that was very important to a large number of people. Thousands of people use that park every year, and what we did in our project helped to assure that they will continue to

Photos of Moore Park, before (on left) and after (on right)

enjoy a high quality experience there. The area is again beautiful and safe and in a healthy condition, and we were able to return it to that condition almost without our work being noticeable.

The other major source of satisfaction was the extraordinary quality of the cooperation by all of the many interested parties, the ease with which the varied components of the project fell into place with good people taking full responsibility for their own actions and willingly and promptly stepping in to cooperate and assist others. It was almost magical, and it shows what people can do to address a complicated resource problem if they stop considering just the letter of the law and if they back off just protecting their own turf and commit to really working together to reach a common goal. The process had failed three times before our project came into being, and we had a very narrow window of opportunity if our effort was going to be successful. If there had been just one point where we were really stalled by an uncooperative party, we might have failed as well. But it seemed like by the time I came on the scene everyone involved had been through enough failures and everyone was ready to make the effort to really put it together. If we could only carry that lesson with us and not have to relearn it in every community project, we would be so much happier and accomplish so much more for the benefit of all and do it in so much less time.

From the beginning of the time when I was thinking about what I wanted to do with my life, back in the 1940's and out in the woods of Westchester County, New York, I wanted to find a career in the natural resource field where what I did would have a productive consequence and leave the resource in a beautiful, healthy condition. I have participated in a lot of forestry projects over the years that have satisfied that ideal in one aspect or another, but in the Moore Park project at the end of my full time career I think I actually realized that ideal as a whole. And because I managed the project from start to finish, I can feel that I had the major responsibility for the positive results for the park resources.

It also occurs to me that as I moved through my career, I became more and more involved with the challenges of managing people. The Moore Park project was a complex challenge in people management, and again the way it worked out, it came as close to achieving the people management ideal as I can imagine. So, as I really reflect on it, the Moore Park project brought the resource management and the people management ideals together for me in one project and for that reason it may be the pinnacle event of my career. I can only hope that some kid from the city has a chance to visit Moore Park with his parents and be as inspired by the beauty of that place as I was by visiting the woods of Westchester County with my parents. At the personal level, the Moore Park project brings it all full circle for me.

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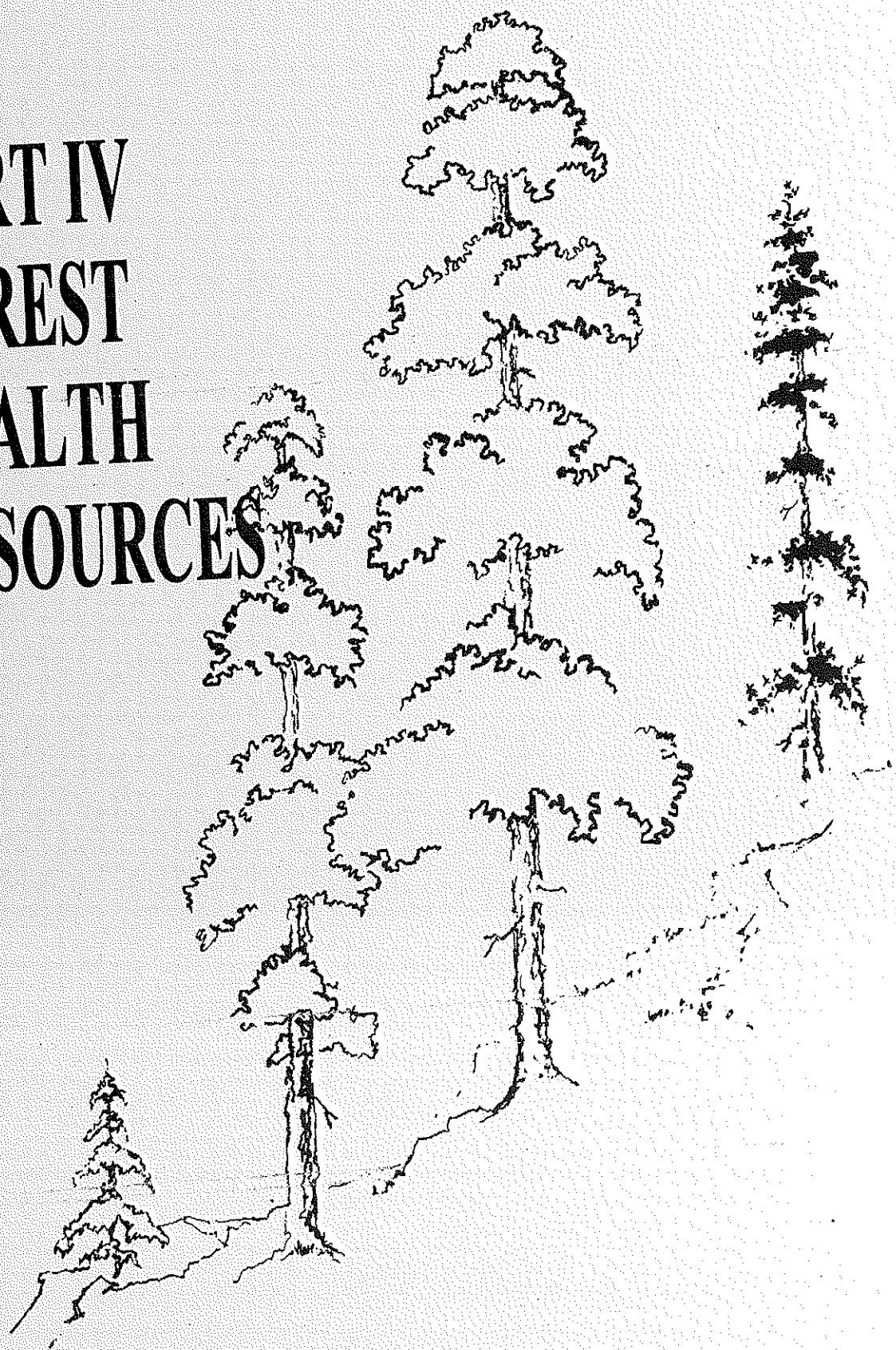
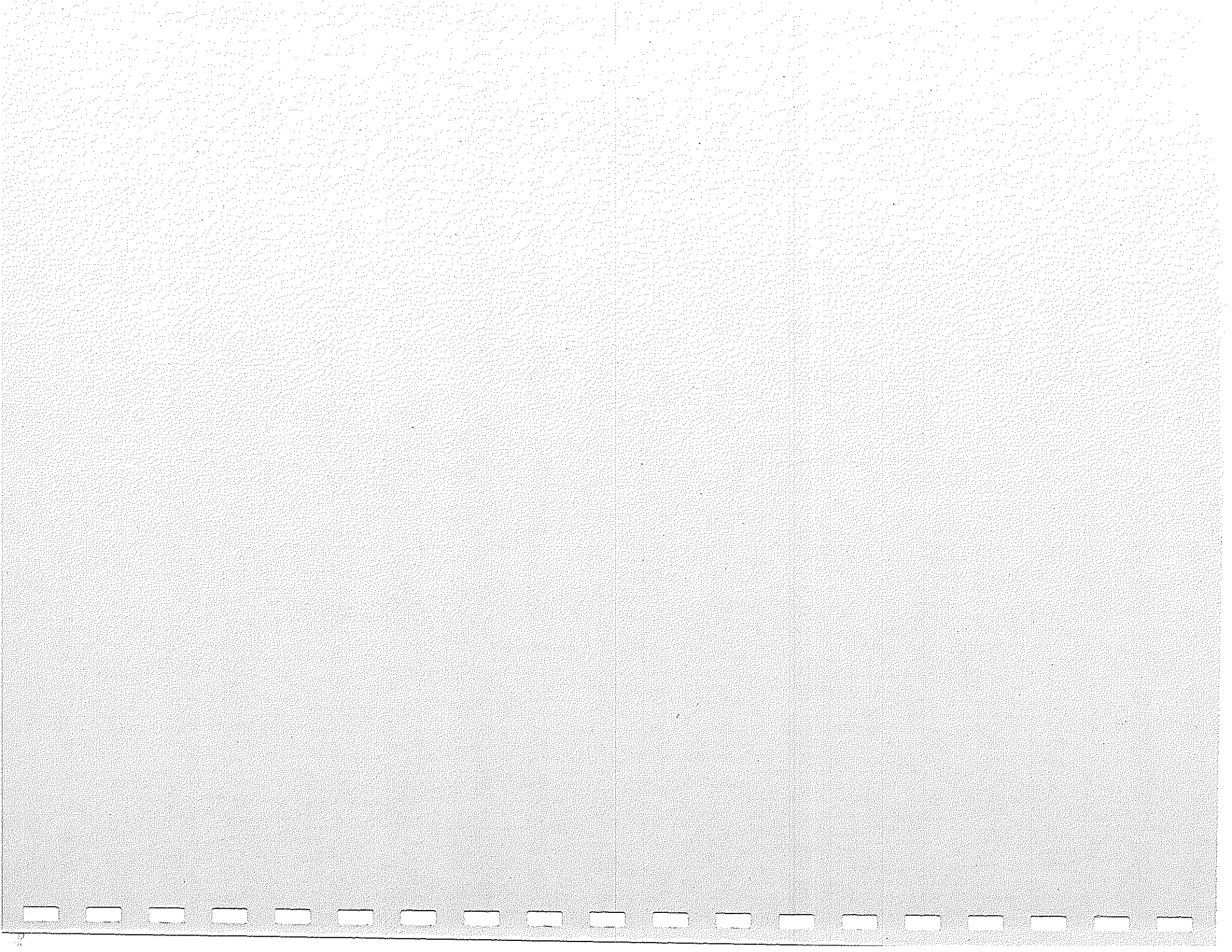
PART IV
FOREST HEALTH RESOURCES





CHAPTER 11

FOREST HEALTH RESOURCES

Introduction

The Resources section provides you with access to materials which can assist you in developing and executing your improvement project. The section is arranged in four parts: an Introduction, the Forest Health Resources Chart, an alphabetical List of Public/Private Organizations - List #1, and an alphabetical List of Key Print and Media References - List #2. The Forest Health Resources Chart is the central tool in the Resources section. For the area of the Upper Klamath Basin in south central Oregon and northwestern California, the Chart serves as an index to both the Public and Private Organizations that are available to assist you and the most highly recommended literature and media references for each of the major topics/variables of concern to you as you develop a forest health improvement project.

Forest Health Resources Chart

How to use the Resources Chart

You probably will want to look at the Chart on the following pages as you proceed through this description. Across the top of the Chart you find the Resource types listed: Index - Public/ Private Organizations - List # 1, and Index - References - List # 2. Down the left hand side of the Chart you find the different Topics involved in forest health assessment, planning, and monitoring, and in project implementation. The general topics are in bold print with the sub topics in plain type. Information in brackets [ ] further define a subtonic. In the Organization List column to the right of the topics column, you find for each topic and sub topic a listing of entries, each with a letter and a number, for example: A20, K30, P50, etc. Entries in bold face are primary organizational contacts [**K30**] for that topic. Each of these letter-number entries correspond to an entry in the List of Public/Private Organizations - List #1 which follows the Resources Chart. So, for instance, K50 corresponds to Klamath County Watermaster in List #1 where you find the relevant address[es] and phone number[s] for that organization. Where a single agency or organization has many divisions in the area, all divisions are listed, but only the main agency is referred to by number. Contact the main office or division most relevant for you. In the Index - References - List # 2 column on the right side of the Chart, you find letter-number entries for each topic similar to those for List # 1, for example: K20, S16, etc. These letter-numbers refer to List #2, the Key Print and Media References List which follows the Public/Private Organizations List. So, for instance K20 corresponds to a book by Donald Kent entitled *Applied Wetland Science and Technology* in List # 2 where you find the full citation for that reference. References in bold print are primary references among the key references.

Resource Topics	Forest Health Resources Chart Index Public/Private Organizations List #1	Index References List #2
Watershed	**B80E95,F60,K80,O68,U70,U80**,B85,C20,C60,K20,K85, L45,N40,O30,O35,O48,O60,O78,085,P10,R60,S40,U85, W5,W40,W45,W65	**B80a3,N12,O77,R25, M20**,F60b,h,G20, O75g,h,Q85
Analysis	**B80,F60,O78**,K85	**M60,R25**,F60h
Councils	**O68,S75**,K85,U80	O72
Ecosystem Management	**B80,C20,F60,K80,O68,U80**,C55,C70,E95,F40,K20,K60, N40,O48,O50,O60,O78,O85,P10,R60,S40,U70,U85,W5, W40,W45,W65	**A30,C50,F60b,c,U90a**, M60,N12,N18,N70 O65a,O77,Q85,S18
Upland	**B80,C20,F60,O68,O85,S70**,C70,E95,F40,K65,O48,O50, U70,U80,U85,W5,W40	**F60b,c,h**,A30,C50,N12, U90a
Riparian	**B80,F60,O68,O85,W65**,E95,F40,O37,O48,O50,U70,U80 U85,W5,W40	**B80a2,b,O77,F60c**,A30, C50,E90,K70,N12,O65b, R60,U90a,W60
Wetland	**F40,B80,O68,O85**,B85,C55,E95,F60,K80,O48,O65,U70, U80,W40,W45,W65	**E70a,K90,M10,M45, R63,T40,U90a,V40** B80b,K20,N10a,N12, O40,R10,S60,U90b
Aquatic	**F40,048,O68,O85**,A50,B80,B85,C60,E95,F60,K80,O30, T80,U70,U80,W40,W45	**S18,U90a**,B85d,M30, M65,N12,O65a,U90c
Climate	**N15**,E95	
Characteristics [Temp/Precip/Wind]	**N15**,E95	
Air	**O45**	
Quality	**E70,045**	
Water	**C30,K50,K73,N30,O45,O95,S75,U70**,K80,E95,O80,U80, W10,W40,W45,W65	**W20**,F60f,P30
Rights	**C30,K25,K50,095,W10**,K73,O37,W65	**O79b,c**
Hydrology	**B80,F60,B85,K50,N30,O68,S75,U80**,E95,F40,G20, K73,O55,O78,O80,O95,P10,U70,W5	**C40,F60f,G70,R60**,P30
Quality/TMDL	**C50,E70, F40,K80,N30,O45,O68,T60,U80**,A50,C30, C60,E95,K50,K70,O30,O37,O48,O78,O80,O85,095,S40, S75,T80,U70,U85,W5,W10,W40,W45,W65	**B80a1,G20,O40**,E70b, F60c,f,h,M30,O69,R40, U90c
Quantity/Supply	**B85,C30,K25,K50,K80,O68,S75,U80,W10**,K40,K70, K73,M50,O37,O78,O95,T90,U70,W65	**B85a,b,c**,H90,R40
Irrigation	**B85,C30,K25,K50,N30,O95,S75,U80,W10**,E95,K40, M50,O37S75,T90,U70,W65	
Soil	**E95,N30,S75,U80**,M50,O37,O55,O60,S70,U70,W5,W40, W65	**N10,b,c**,
Types/Condition	**E95,N30,S75**,B80,F60,M50,S70	**N10,b,c**,H70a,b,O77
Condition/Use	**E95,N30,S75**,B80,F60,K40,K36,M50,O37,O45,S70,W65	**N10,b,c**,E90,O77

Resource Topics	Forest Health Resources Chart Index Public/Private Organizations List #1	Index References List #2
Fire	**O50**	**A30,P90**,O68a,b,c,T20
Wildfire	**B80,C20,F60,O50,**P10,W5,W40	**P90**,F60c,O68a,b,c,T20
Prescribed Fire	**B80,F60**,C20,P10,W5,W40	T20
Animals - Wild	**C15,F40,**A60,K80,O48,O73,O85,O92,P10,W40	**F60k,N70,U90a,W60a,b** C85,O60a,b,R10,T40
Aquatic (fish)	**C15,F40,K70,K80,O48,O93,**A50,B80,C60,F60,O85,T80, W5,W40,W65	**B85d,M30,O65a,**M65, O69,P40,S18,U90c,V40
Terrestrial (wildlife)	**C15,F40,O48**,B80,D20,F60,K80,O73,O85,U65,W5,W45	**F60k**,R10,S60,T40,U90b
Threatened and Endangered	**C15,F40,O48,O93**,A90,C60,D20,K70,K80,N40,O85,T80, W40,W45	**O73**,B85d,F60k,N70, O60a,b,O65a,O68d,e U90b
Livestock	**E95,O37**,K36,K40,M50,N30,O40,W40	**B80b4**
Grazing	**B80,E95,O37,S75**,F60,K40,M50,O40,W5	M30,O60b,O79a,P40
Plants	**E95,N20**,A60,K36,K40,K53,M50,N30,O37,O40,O50,O85, S70,U70,U80,	**H70a,b**,B15,F80,K70, O77,V60,F60c
Communities	**B80,F60,O50,S70**,C20,N20,N30,N40,O37,O40,P10,S75, U85,W5,W40,W68	**B15,F80,H70a,b,K70, O77,V60**,F60c
T&E Species (rare plants)	**N20,B80,F60**,N30,N40,O85,P10,W40	**E10,H73,O73**,F80
Timber Management	**A70,C20,F60,E95,O50,S70**,B80,C70,E20,K65,N40,O88, S77,U70,U80,U85,W5,W40,W68	**F60c,h,O77,O68,O75, S70,U95b,W10,W12,** C65,M30,O60b,O70,O74 R20,S10
Reforestation/ Planting	**C20,F60,E95,O50,S70,**A70,B80,K65,W5,W68	**O75b,c,d,e,O77,S70** O68f,W12
Harvesting/ Logging	**C20,F60,E95,N65,O50,S70,** A70,B80,K65;O88,S77,W5,W68	**O75a,f,l,m,077,S70**,W12
Maintenance	**C20,F60,**A70,B80,E95,K65,W5,W68	**O77,S70**,W12
Thinning	**C20,F60,E95,O50,S70,**A70,B80,K65,088,W5,W68	**O77,S70,O75q,r,s**,W12
Fuels Treatment	**B80,C20,F60,S70,**K65,W5,W68	**O77,S70**,W12
Roads/Trails	**C20,O50**,S70,W40,W68	**F60c,h**,O68g,O75n,o,p
Logging	**C20,F60,O50**,A70,B80,E95,K65,S70,W5,W68	**O77**,F60c,h,O68g, O75i,k,n,o
Recreation	B80,F60,P10	**O77**
Fire	**B80,C20,F60,O50,**S70,W5,W68	O68g

Resource Topics	Forest Health Resources Chart Index Public/Private Organizations List #1	Index References List #2
Specific Health Issues	W40,W68	**F60a,e,g,077**
Weeds	**A60,B80,E95,K53,S75,**F60,M50,N30,O37,O40,O50,W5, W65,W68	**B80c,d,O77,U80,W40**
Insects	**A60,F60,O50,**A70,B80,C20,E95,S70,S75,W5,W68	**F60e,g,F90,O77**,K20, O75u
Diseases	**F60,O50**,A70,B80,C20,E95,F60,S70,S75,W5,W68	**O65,K80,O70,** B80,E20,F60,O55,O60, K30,P10,R60,S40
Social	**K28,K80,L20**	**R13,S85**,F60c,h
Culture/History	**O65,K80,O70,**B80,E20,F60,O55,O60,K30,P10,R60,S40	**O77,R13,S85**,F60c
Economics	**K30,R60**,E20,O55,O60,S77,T90	**O60b**,F60d,N18,O62, O65b,O70,R20,S10,S75
Funding	**O68,S75,U70,U80**,K30,K45,N30,N40	**O60b**,O65b,P10,R20, S10
Grant Writing	**S75,U80**,K30	
Funders	**F40,K20,O68,U70**,F10,J20,O35	**O62,P10**,R20,S10
Documentation /Monitoring	**O78**,A70,B80,C20,F60,N30,O50,S70,S75	**B80b1,2,5,O77** R25,R63
GIS (Geo. Info. Systems)	**O78**,B80,B85,F40,F60,P10,U70	
Maps	**G20,O50,O78**,B80,B85,C20,C30,E95,F60,K45,N15,N30, O68,O95,S75,U80	
Equipment	B80,F40,F60,O48,O50	
Suppliers		
Trap/Release Programs	**C15,F48**,B80,F40,F60	
Fish and Wildlife Sources	**C15,F48**,F40,F60	
Nurseries	**O32,O50,U85,C20,F40**,F60,N30,S75	**F60i**

List #1, Public/Private Organizations

A50 American Fisheries Society - Oregon Chapter
P.O. Box 722, Corvallis, OR 97339
[541] 753-0442

A55 American Forests
P.O. Box 2000, Washington, D.C. 20077-4244
[202] 955-4500

A60 Animal and Plant Health Inspection Service [APHIS], USDA
6135 N.E. 80th Ave., Suite A-5, Portland, OR 97218-4033
[503] 326-2814

A70 Association of Consulting Foresters of America
732 N. Washington St., Suite 4-A, Alexandria, VA 22314
[703] 548-0990

A90 Audubon Society - Klamath Basin Chapter
112 N. 5th St., Klamath Falls, OR 97601
[541] 883-2000

B80 Bureau of Land Management [BLM, USD Interior]
Lakeview District, Oregon
1000 S. 9th St., Lakeview, OR 97630
[541] 947-2177
Klamath Falls Resource Area
2795 Anderson Ave., Klamath Falls, OR 97603
[541] 883-6916
Lakeview Resource Area
[same as Lakeview District info]
Alturas Field Office, California
708 W. 12th Street, Alturas, CA 96101
[530] 233-4666

B85 Bureau of Reclamation [BOR, USD Interior]
Klamath Basin Area
6600 Washburn Way, Klamath Falls, OR 97603
[541] 883-6935

C15 California Department of Fish and Game
Butte Valley Wildlife Area
Meiss Lake Rd., Macdoel, CA 96058
[530] 398-4627
Dorris and Macdoel Area
Dorris, CA 96023
[530] 397-3474
Tulelake and Newell Area
Newell, CA 96134
[530] 664-5412

C20 California Department of Forestry
Chico Branch
Williamsburg Lane #A, Chico, CA 95926
[530] 895-4312

C30 California Department of Water Resources
Main Office
1020 Ninth Street, Third Floor, Sacramento, CA 95814
[916] 327-1646
Northern District Office
2440 Main St., Red Bluff, CA 96080
[530] 529-7342

C50 California Water Quality Control Board
Coast Region
1440 Guerneville Rd., Santa Rosa, CA
[707] 576-2220

C55 Carpenter Design
658 Front St., Klamath Falls, OR 97601
[541] 885-5450

C60 Center for Watershed and Community Health, Division of Pacific Rivers Council
P.O. Box 10798, Eugene, OR 97440
[541] 345-0119

C70 Concerned Friends of the Winema [CFOW]
P.O. Box 1348, Chiloquin, OR 97624
[541] 783-3120

D20 Defenders of Wildlife
West Coast Office
1637 Laurel St., Lake Oswego, OR 97034
[503] 697-3222
Oregon Biodiversity Project
[contact West Coast Office]

E20 ECONorthwest
99 W. 10th St., Suite 400, Eugene, OR 97401
[541] 687-0051

E70 Environmental Protection Agency [EPA]
Region 10 MD - 103
1200 Sixth Ave., Seattle, WA 98101
[206] 442-4280, [800] 424-4372

E90 Evergreen Foundation
5000 Cirrus Dr., Suite 201
Medford, OR 97504
[541] 773-2247

E95 Extension Service
Oregon State University - Extension Service
Klamath County [OSU]
3328 Vandenberg Rd., Klamath Falls, OR 97603
[541] 883-7131
Lake County Extension Service [OSU]
Courthouse, Lakeview, OR 97630
[541] 947-6054
Klamath/Lake County Master Woodland Managers Program [contact KC Extension]
Watershed Steward Education Program [contact KC Extension]
F10 Farm Service Agency - Consolidated Farm Service Agency [FSA, USD Agriculture]
Klamath County Office
2316 S. 6th St. Suite C, Klamath Falls, OR 97601
[541] 883-6924
Lakeview Office
100 N D St., Lakeview, OR 97630
[541] 947-2367
Modoc County Office
356 Main St., Tulelake, CA 96134
[530] 667-5396
F40 Fish and Wildlife Service [USFW, USD Interior]
Klamath Falls Area Office
6610 Washburn Way, Klamath Falls, OR 97603
[541] 885-8481
Division of Law Enforcement
317 S. 7th St. Room 301, Klamath Falls, OR 97601
[541] 883-6900
Ecosystem Restoration Office [ERO]
6610 Washburn Way, Klamath Falls, OR 97603
[541] 885-8481
Klamath Basin National Wildlife Refuges
Headquarters Office
4009 Hill Road, Tulelake, CA 96134
[530] 667-2231
Tulelake National Wildlife Refuge
Rt. 1 Box 74, Tulelake, CA 96134
[530] 667-2231
Klamath Marsh National Wildlife Refuge
HC 63 Box 303, Chiloquin, OR 97624
[541] 783-3380

F60 Forest Service [USFS, USD Agriculture]
Fremont National Forest
524 N. G St., Lakeview, OR 97630
[541] 947-2151
Bly Ranger District
Hwy. 140, Bly, OR 97622
[541] 353-2427
Lakeview Ranger District
Hwy. 395 N., Lakeview, OR 97630
[541] 947-3334
Paisley Ranger District
Paisley, OR 97636
[541] 943-3114
Silver Lake Ranger District
P.O. Box 129, Silver Lake, OR 97638
[541] 576-2107, 576-2169
Klamath National Forest
Goosenest Ranger District
37805 Hwy. 97, Macdoel, CA 96058
[530] 398-4391
Modoc National Forest
Doublehead Ranger District
Hwy. 139, Tulelake, CA 96134
[530] 667-2246
Winema National Forest
2819 Dahlia St., Klamath Falls, OR 97601
[541] 883-6714
Chemult Ranger District
Hwy. 97 , Chemult, OR 97731
[541] 365-7001
Chiloquin Ranger District
38500 Hwy. 97 N., Chiloquin, OR 97624
[541] 783-4001
Klamath Ranger District
1936 California Ave., Klamath Falls, OR 97601
[541] 885-3400
G20 Geological Survey [USGS, USD Commerce]
Western Region Office
345 Middlefield Rd., Menlo Park, CA 94025
[650] 853-8300
Oregon Representative
10615 S.E. Blossom Dr., Portland, OR 97216
[503] 251-3265

J20 Jeld-Wen Foundation
3250 Lakeport Blvd., Klamath Falls, OR 97601
[541] 882-3451

K20 Klamath Basin Ecosystem Foundation
P.O. Box 728, Klamath Falls, OR 97601
[541] 885-5450

K25 Klamath Basin Water User's Protective Association
2455 Patterson St., Klamath Falls, OR 97603
[541] 883-6100

K28 Klamath County Commissioners
305 Main St., Klamath Falls, OR 97601
[541] 883-5100

K30 Klamath County Economic Development Association [KCEDA]
125 S. 6th St., Klamath Falls, OR 97601
[541] 882-9600

K36 Klamath County Experiment Station
6941 Washburn Way, Klamath Falls, OR 97603
[541] 883-4590

K40 Klamath County Farm Bureau
4240 Hwy. 39, Klamath Falls, OR 97603
[541] 882-6766

K45 Klamath County Library
126 S. 3rd St., Klamath Falls, OR 97601
[541] 882-8894
Branch libraries in Bly, Bonanza, Chemult, Chiloquin, Gilcrest, Malin, Merrill, Sprague River

K50 Klamath County Watermaster
5170 Summers Lane, Klamath Falls, OR 97603
[541] 883-4182

K53 Klamath County Weed Control
305 Main St., Klamath Falls, OR 97601
[541] 883-4696

K60 Klamath Ecosystem Education Partnership [KEEP]
30242 Hwy. 97 N., Chiloquin, OR 97624
[541] 783-3462

K65 Klamath/Lake Forest Health Partnership
3200 Delap Rd., Klamath Falls, OR 97601
[541] 883-5681

K70 Klamath River Basin Fisheries Task Force
P.O. Box 1006, Yreka, CA 96097
[916] 842-5763

K73 Klamath River Compact Commission
6600 Washburn Way, Klamath Falls, OR 97603
[541] 883-6935

K80 Klamath Tribes
Administration, P.O. Box 436, Chiloquin, OR 97624
[541] 783-2219 or 1-800-524-9787
Fish and Wildlife Division
116 E. Chocktoot, Chiloquin, OR 97624
[541] 783-2095
Culture and Heritage Division
121 1st Ave., Chiloquin, OR 97624
[541] 783-2218

K85 Klamath Watershed Coordination Group
6600 Washburn Way, Klamath Falls, OR 97603
[541] 885-8481

L20 Lake County Commissioners
Courthouse, Lakeview, OR 97630
[541] 947-6004

L35 Lake County Watermaster
Courthouse, Lakeview, OR 97630
[541] 947-6038

L45 Legacy - The Landscape Connection
P.O. Box 59, Arcata CA 95518
[707] 826-9408

M50 Modoc County Agriculture Department
356 Main St., Tulelake, CA 96134
[530] 667-2713

N15 National Weather Service [NOAA, USD Commerce]
Medford Station
4003 Cirrus Dr., Medford, OR 97504-4187
[541] 773-1067

N18 National Woodland Owners Association
374 Maple Ave., Suite 210, Vienna, VA 22180
[703] 255-2700

N20 Native Plant Society of Oregon
P.O. Box 337, Klamath Falls, OR 97601
[541] 850-9770

N30 Natural Resources Conservation Service [NRCS, USD Agriculture]
Klamath Falls Office
2316 S. 6th Suite #3, Klamath Falls, OR 97601
[541] 883-6932
Lakeview Field Office
100 N. D St., Lakeview, OR 97630
[541] 947-2202
Environmental Quality Incentive Program [EQIP], USDA, NRCS
[contact local Natural Resources Conservation Service office]

N40 Nature Conservancy
Pacific Northwest Office
821 SE 14th St., Portland, OR 97214
[503] 230-1221
Center for Compatible Economic Development
7 East Market St., Suite 210, Leesburg, VA 20176
[703] 779-1728

N65 North American Horse and Mule Loggers Association
8307 Salmon River Highway, Otis, OR 97368
[503] 994-9765

O30 Oregon Adopt A River
P.O. Box 1235, Hilsboro, OR 97123
[541] 885-5450

O32 Oregon Association of Nurserymen
2780 SE Harrison Suite 102, Milwaukie, OR 97222
[503] 653-8733, 228-5456

O35 Oregon - California Resource Conservation and Development Area [ORE-CAL RC&D]
Dorris, CA 96023
[530] 397-2555

O37 Oregon Cattlemen's Association, Klamath County Chapter
9747 E. Langell Valley Rd., Bonanza, OR 97623
[541] 545-6370

O40 Oregon Department of Agriculture [ODA]
635 Capitol St. N.E., Salem, OR 97310-0110
[503] 378-3773
Regional Water Planner
20300 Empire Ave., Suite B-3, Bend, OR 97701
[541] 419-4945

O45 Oregon Department of Environmental Quality [DEQ]
Eastern Region
2146 N.E. 4th St., Suite 104, Bend, OR 97701
[541] 388-6146

O48 Oregon Department of Fish and Wildlife [ODFW]
Klamath District Office
1850 Miller Island Rd. W., Klamath Falls, OR 97603
[541] 883-5732
Klamath Trout Hatchery
Hwy. 62, Fort Klamath, OR 97626
[541] 381-2278
Lakeview District Office
Roberta Ave., Lakeview, OR 97630
[541] 947-2950
Summer Lake District Office
Summer Lake, OR 97640
[541] 943-3324

O50 Oregon Department of Forestry [ODF]
Klamath/Lake District
3200 Delap Rd., Klamath Falls, OR 97601
[541] 883-5681
Lakeview District
2290 N. 4th St., Lakeview, OR 97630
[541] 947-3311
D. L. Phipps Forest Nursery
2424 Wells Rd, Ekiton, OR 97436
[541] 584-2214
Stewardship Incentive Program [SIP]
[contact Klamath/Lake District office]

O55 Oregon Department of Geology and Mineral Industries
1831 1st St., Baker City, OR 97814
[541] 523-3133

O60 Oregon Department of Land Conservation and Development
1175 Court St. N.E., Salem, OR 97310
[503] 373-0064
Central Region Office
20300 Empire Ave. Suite B1, Bend, OR 97701
[541] 388-6424

O65 Oregon Division of State Lands
Main Office
775 Summer St. NE, Salem. OR 97310-1337
[503] 378-3805
Eastern Region
20300 Empire Ave. Suite B1, Bend, OR 97701
[541] 388-6112
Oregon Natural Heritage Program
[contact Main Office]

O67 Oregon Forest Resources Institute
808 SW 3rd St., Suite 480, Portland, OR 97204
[503] 229-6718

O68 Oregon Governor's Watershed Enhancement Board [GWEB]
Central Office
255 Capital St. NE, Salem, OR 97310-0203
[503] 378-3589
Grants Pass Field Office
101 NW "A" St., Grants Pass, OR 97526
[541] 474-5385

O70 Oregon Historic Preservation Office
525 Trade St. SE. #301, Salem, Oregon 97310
[503] 378-5023

O73 Oregon Hunters Association, Klamath Chapter
P.O. Box 8161, Klamath Falls, OR 97601
[541] 882-2016

O78 Oregon Institute of Technology [OIT]
Department of Applied Environmental Sciences
3201 Campus Drive, Klamath Falls, OR 97601-8801
[541] 885-1183 or 885-1495
Learning Resource Center [Library]
[541] 885-1772

O80 Oregon Lakes Association
P.O. Box 345, Portland, OR 97207-345
[541] 885-5450

O85 Oregon Natural Resources Council [ONRC]
Southern Field Office
943 Lakeshore Drive, Klamath Falls, OR 97601
[541] 885-4886

O88 Oregon Small Woodlands Association
P.O. Box 3079, Salem, OR 97302-3079
[503] 588-1813

O92 Oregon State Police, Fish and Wildlife Division
2525 Biehn St., Klamath Falls, OR 97601
[541] 883-5713

O93 Oregon Trout
Headquarters
117 SW Naito Parkway, Portland, OR 97204
[503] 222-9091
Klamath Trout Project
117 SW Front St., Portland, OR 97204
[503] 381-2322
Southwest Oregon Area Representative
33 N. Central Ave., Medford, OR 97501
[541] 772-7988

O95 Oregon Water Resources Department
3850 Portland Road NE, Salem, OR 97310
[503] 378-3739
South Central Region
1340 N.W. Wall St., Bend, OR 97701
[541] 388-6669

P10 Park Service [USD Interior]
Crater Lake National Park
Park Administration, Crater Lake, OR 97604
[541] 594-2211
Lava Beds National Monument
Lava Beds, Tulelake, CA 96134
[530] 667-2282

R60 Rogue Institute for Ecology and Economy
762 A St., Ashland, OR 97520
[541] 482-6031

S40 Sierra Club, Klamath Group
P.O. Box 1774, Klamath Falls, OR 97601
[541] 884-2421

S60 Small Log Utilization Group, Central Cascades Adaptive Management Area
Willamette National Forest
P.O. Box 10607, Eugene, OR 97440
[541] 425-6533

S70 Society of American Foresters
National Office
5400 Grosvenor Lane, Bethesda, MD 20814-219
[301] 897-8720
Oregon Office [with 14 local chapters]
4033 S. W. Canyon Rd., Portland, OR 97221
[503] 224-8046

S75 Soil and Water Conservation Districts
Fort Rock - Silver Lake SWCD
HC 64, box 18, Lakeview, OR 97630
[541] 947-5855
Klamath SWCD
2316 S. 6th St., Klamath Falls, OR 97601
[541] 882-6932
Lakeview SWCD
100 N D St., Lakeview, OR 97630
[541] 947-2202, 947-5116

S77 Southern Oregon Timber Industries Association
2680 N. Pacific Highway, Medford, OR 97501
[541] 773-5329

T60 TMDL [Total Maximum Daily Load] Advisory Committee
1936 California Ave., Klamath Falls, OR 97601
[541] 885-3406

T80 Trout Unlimited
5200 Huntington Ave. #300, Richmond, CA 94804
[510] 528-5390

T90 Tulelake Grower's Association
356 Main St., Tulelake, CA 96134
[530] 667-5214

U65 Unlimited Pheasants
P.O. Box 1343, Klamath Falls, OR 97601
[541] 882-2200

U70 Upper Klamath Basin Working Group [Hatfield Committee]
6610 Washburn Way, Klamath Falls, OR 97603
[541] 883-6935

U80 Upper Klamath Watershed Council [Klamath County Watershed Council]
2316 S. 6th St., Klamath Falls, OR 97601
[541] 882-6932
Watershed Council Working Groups [contact UKWC for information]
Lost River, Sprague River, Williamson River, West Klamath Lake, Klamath Project, Klamath River, Upper Deschutes River

U85 U.S. Timberlands - Klamath Forest Nursery
7680 Happy Hollow Lane, Bonanza, OR 97623
[541] 545-6432

W5 Washington Forest Protection Association
711 Capitol Way, Suite 608, Olympia, WA 98501
[206] 352-1500

W10 Water for Life Foundation
P.O. Box 12248, Salem, OR 97309-0248
[503] 375-6003

W40 Wilderness Society
1424 4th Ave., #816, Seattle, WA 98101
[206] 624-6430

W45 Wing Watchers
658 Front St., Klamath Falls, OR 97601
[885-5450]

W65 Wood River Riparian Management Program
P.O. Box 12248, Salem, OR 97309-0248
[503] 375-6003

W68 World Forestry Center
4033 SW Canyon Road, Portland, OR 97221
[503] 228-1367

List #2, Key Print and Media References

A30 Agee, James K., *The Fire Ecology of Pacific Northwest Forests,* Covelo, CA [Island Press] 1993, 493p.

B15 Baumgartner, D.M. and J.E. Lotan, *Ponderosa Pine: The Species and Its Management,* Pullman, WA [Washington State University] 1988, 281p.

B80 Bureau of Land Management, [BLM], [USDI],

a) Bail, Kristin, [local documents available at BLM, Klamath Resource Area office]
   1) "Introduction to the Clean Water Act," [303 stream listings, TMDLs, and relation to DEQ and Senate Bill 1010], 1998, 7 p.
   2) Riparian Areas," [local document introducing basic riparian area concepts and management options to address improvement], 1997, 5 p.
   3) "Watersheds," [local document introducing basic watershed concepts and management options for improvement], 1997, 3 p.
   4) "Water Quality," [basic water quality concepts and measurement procedures], 1997, 4p.

b) BLM -*TR 1737 Series of Technical References on Riparian Areas.* 1989 - 1994
   1) *Greenline Riparian-Wetland Monitoring,* 1993.
   2) *Inventory and Monitoring of Riparian Areas,* 1989.
   3) *Management Techniques in Riparian Areas,* 1992.
   4) *Managing Change: Livestock Grazing on Western Riparian Areas,* 1993.
   5) *Process for Assessing Proper Functioning Condition,* 1993.
   6) *Riparian Area Management,* 1992.
   7) *Riparian and Wetland Classification Review,* 1990.

c) *Noxious Weed Strategy for Oregon/Washington,* Oregon State Office, Portland, Oregon, [document #BLM/OR/WA/PT-94/36+4], 1994.

d) *Partners Against Weeds: Final Action Plan for the Bureau of Land Management,* [document #BLM/MT/ST-96/003+1020] 1996, 43p.

B85 Bureau of Reclamation, Klamath Basin Area Office, [BOR], [USDI],

a) *Klamath Basin Water Supply Initiative: Draft Options Report,* 1997.

b) CH2MHILL, Inc., for U.S. Bureau of Reclamation, Klamath Falls, Oregon, "Draft Technical Memorandum - Klamath Basin Runoff Forecasting," 9/15/95, 6 p.

c) CH2MHILL, Inc., for U.S. Bureau of Reclamation, Klamath Falls, Oregon, "Technical Memorandum on Agricultural and Refuge Water Use," 11/1/95, 23 p.

d) Logan, Dan and Doug Markle, "Literature Review of Fishes and Fisheries of Upper Klamath Lake, Oregon," Chapter 6 in *Environmental Research in the Klamath Basin, 1992 Annual Report,* U.S. Bureau of Reclamation, Sept., 1993, Denver, Colorado, pp. 223-242.

C40 Chow, Ven Te, ed., *Handbook of Applied Hydrology,* New York [McGraw-Hill] 1964.

C50 Clark, Lance R. and R. Neil Sampson, *Forest Ecosystem Health in the Inland West: A Science and Policy Reader,* Washington, D.C. [Forest Policy Center, American Forests] 1995, 37 p.

C65 Continuing Education Coordinating Committee for Forestry and Range, Oregon & Washington, *Regional Calendar of Forestry & Range Continuing Education Activities, Oregon & Washington,* College of Forestry, OSU.

C85 Csuti, Blair, *Atlas of Oregon Wildlife,* Corvallis, OR [OSU Press] 1997, 492 p.

E10 Eastman, Donald C., *Rare and Endangered Plants of Oregon,* Wilsonville, OR [Beautiful America Pub. Co.] 1990, 194p.

E70 Environmental Protection Agency [EPA],

a) *A Citizen's Guide to Wetland Restoration,* [EPA Document #910/R-94- 005], Region 10, Seattle, WA, 1994.

b) *Monitoring Guidelines to Evaluate Effects of Forestry Activities on Streams in the Pacific Northwest and Alaska*, EPA, Region 10, Publication #910/9-91-001, Seattle, WA, 1991.

F60 Forest Service, [USDA],

a) *Diseases of Pacific Coast Conifers*, Agriculture Handbook #521, June, 1993.

b) Diaz, N. and D. Apostol, *Forest Landscape Analysis and Design: A Process for Developing and Implementing Land Management Objectives for Landscape Patterns*, USDA, Forest Service, Pacific Northwest Region, [document #R6-ECOL-TP-043-92] Portland, OR, 1993.

c) Everett, Richard L., Paul Hessburg, Mark Jensen, and Bernard Bormann, eds., *Eastside Forest Ecosystem Health Assessment,* Vols. 1-5, USDA, Forest Service, Pacific Northwest Research Station, Portland, OR, 1994.

d) *Forest Owner's Guide to Federal Income Tax,* USDA Agriculture Handbook # 708, October, 1995.

e) *Insect & Diseases Web Site*, Online: http://www.fs.fed.us/r6/nr/fid/index.htm

f) McCammon, Bruce, John Rector and Karl Gebhardt, *A Framework for Analyzing the Hydrologic Condition of Watersheds,* USDA, Forest Service and USDI, BLM, BLM/RS/ST-98/004+7210, June, 1998, 38p.

g) *Western Forest Insects*, Misc. Publication No. 1339, Nov., 1977.

h) *Status of the Interior Columbia Basin: Summary of Scientific Findings,* Gen. Tech. Rep. PNW-GTR-385, Portland, Oregon, 1996, 144p.

i) State and Private Forestry, *Pacific Northwest Nursery Directory and Report*, document #R6-CP-TP-27-97, 60 p.

k) Thomas, Jack Ward, *Wildlife Habitats in Managed Forests*, USDA, Forest Service, Portland, Oregon, 1979, 512 p.

F80 Franklin, Jerry F. and C.T. Dyrness, *Natural Vegetation of Oregon and Washington*, Corvallis, OR [OSU Press] 1988, 452p.

F90 Furniss, R.L. and V.M. Carolin, *Western Forest Insects*, USDA, Forest Service Miscellaneous Publications, #1339, 1980, 654p.

G20 Gearheart, Robert, et. al., *Watershed Strategies for Improving Water Quality in Upper Klamath Lake, Oregon,* Arcada, CA, August, 1995.

Volume 1, [Overview of the Area], 39 p.

Volume 2, *Watershed Strategies for Improving Water Quality In Upper Klamath Lake, Oregon*, August, 1995, 300 p.

G70 Gordon, Nancy D. et. al., *Stream Hydrology: An Introduction for Ecologists*, New York [John Wiley and Sons] 1992, 526 p.

H70 Hopkins, William E.,
a) *Plant Associations of South Chiloquin and Klamath Ranger Districts - Winema National Forest*, USDA, Forest Service, [document #R6-ECOL-79-005], 1979, 96p.
b) *Plant Associations of the Fremont National Forest*, USDA, Forest Service, Pacific Northwest Region, [document #R6-ECOL-79-004], 1979, 106p.

H73 Hopkins, William E. and S. Garrett, *Sensitive Plant, Animal and Noxious Weeds Guide for the Deschutes, Fremont, Ochoco, and Winema National Forests* - Area IV, USDA, Forest Service, Pacific Northwest Region, [document #R6-DES-TP -017-90], 1990.

H90 Hubbard, L.L., "Water Budget for Upper Klamath Lake, Southwestern Oregon," *U.S. Geological Survey, Hydrologic Investigations Atlas,* HA-351, one sheet, 1:250,000 scale, 1970.

K20 Kent, Donald M., *Applied Wetland Science and Technology*, Boca Raton, Florida [Lewis Publishers], 1994, 436.

K70 Kovalchik, Bernard L., *Riparian Zone Associations - Deschutes, Ochoco, Fremont, and Winema National Forests,* USDA, Forest Service, Pacific Northwest Region, [document #R6-ECOL- TP-279-87], 1987, 171p.

K90 Kusler, Jon and Mary E. Kentula, *Wetland Creation and Restoration: The Status of the Science*, 2 vols., U.S. EPA, document #600/3-89/038a+b, 1989.

M10 Marble, Anne D., *A Guide to Wetland Functional Design*, Boca Raton, Florida [Lewis Publishers], 1992, 222p.

M30 Meehan, William R., *Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitat,* American Fisheries Society Special Publication #19, Bethesda, Maryland, 1991, 751 p.

M45 Mitsch, William J. and James G. Gosselink, *Wetlands*, New York [John Wiley and Sons], 1997, 539p.

M60 Montgomery, Gordon E. Grant, and Kathleen Sullivan, "Watershed Analysis as a Framework for Implementing Ecosystem Management," *Water Resources Bulletin*, vol. 31, no. 39, June, 1995] 369-386.

M65 Moyle, Peter B., "Klamath Basin Fisheries," in *Inland Fisheries of California*, Berkeley, CA [Univ. of CA Press] pp. 1-59.

N10 Natural Resources Conservation Service [NRCS], [USDA],
a) "Wetland Restoration, Enhancement, or Creation," Chapter 13 in *Engineering Field Handbook* [210-EFH,1/92] 1992.
b) *Soil Survey of Klamath County Oregon: Southern Part*, 1978, 269 p., 106 maps.
c) *Report on Water and Related Land Resources: Klamath Drainage Basin,* 1970, [northern Klamath County soils].

N12 Natural Resources Law Center, *The Watershed Source Book: Watershed-Based Solutions to Natural Resource Problems*, Boulder, CO.

N18 The Nature Conservancy, *A Citizen's Guide to Achieving a Healthy Community, Economy & Environment,* Leesburg, VA.

N70 Noss, Reed F. and Allen Y. Cooperrider, *Saving Nature's Legacy: Protecting and Restoring Biodiversity,* Washington, D.C. [Island Press] 1994, 416p.

O40 Olson, Richard K., *Created and Natural Wetlands for Controlling Non-Point Source Pollution,* U.S., EPA, Boca Raton [C.K. Smoley] 1993, 216p.

O60 Oregon Biodiversity Project,
a) *Oregon's Living Landscape: Strategies and Opportunities to Conserve Biodiversity*, Corvallis, OR [OSU Press] 1998, 232 p.
b) *Stewardship Incentives: Conservation Strategies for Oregon's Working Landscape,* published by Defenders of Wildlife, 138 p.

O62 Oregon Coordinated Resource Management Task Group, *Public Funding Sources for Landowner Assistance,* January, 1998, 19 p. [available from most natural resource agencies]

O65 Oregon Department of Fish and Wildlife, *[ODFW]*
a) *Klamath River Basin Fish Management Plan*, Nov., 1996, 158 p.
b) Habitat Conservation Division, *Riparian Tax Incentive Program,* [brochure describing the program available from ODFW district offices]
c) Wildlife Division, *Teaming with Wildlife*, [23 p. brochure describing the program and potential funding available at ODFW district offices].

O68 Oregon Department of Forestry, *[ODF]*
a) *Building a Fire Wise Home*, video.
b) *Disaster in the Making: The Awbrey Hall Fire*, video.
c) *Fire Free, 10 Steps for Wildfire Defense*, video.
d) Forest Practice Note No. 8 revised, *Spotted Owl*, Dec., 1994.
e) Forest Practice Note No. 10, *Osprey*, Sept., 1992.
f) Forest Practice Note No. 2 revised, *Reforestation*, Dec., 1994.
g) Forest Practices Note, *Road Maintenance*, 1981.
h) Forest Practices Note, *Summary of Oregon's Restoration Requirements.*
i) *Management Planning Information Sources - Klamath and Lake Counties*, Jan., 1996, 11 p.
k) *Forest Practices Program Web Page,* Online: http://www.odf.state.or.us

O69 Oregon Department of Forestry and Oregon Department of Fish and Wildlife, *A Guide to Placing Large Wood in Streams*, May, 1995.

O70 Oregon Department of Revenue, *What You Should Know About Harvesting Timber and Timber Taxes,* February, 1997, pamphlet.

O72 Oregon Governor's Watershed Enhancement Board, "A Quick Explanation of Oregon's Watershed Council Partnership Program," May, 1996, 13 p.

O73 Oregon Natural Heritage Program, *Rare, Threatened and Endangered Species of Oregon,* Portland, Oregon, 1998, 92p.

O74 Oregon Small Woodlands Association, *An Association of Small Woodland Owners Dedicated to the Protection, Management, Use and Enhancement of Oregon's Forest Resources*, Pamphlet available from Oregon Department of Forestry, Klamath Falls.

O75 Oregon State University, Extension Service Publications:
a) *Logging Woodland Properties,* EC 956, Jan., 1983.
b) *Reforestation Planning Guide: Helping Insure Reforestation Success for Woodland Owners,* EM 8241.
c) *Seedling Care and Handling*, EC 1095.
d) *Seeding to Control Erosion Along Forest Roads,* EC 885, March, 1978.
e) *Site Preparation*, EC 1188.
f) *Timber Harvesting Options*, EC 858.

g) *Watershed Management Guide for the Interior Northwest*, EM 8436, 1993.
h) *Watershed Stewardship/A Learning Guide,* EM 8714, July, 1998.
i) *Designated Skid Trails Minimize Compaction,* EC 1110, Feb., 1983.
k) *Designing Woodland Roads*, EC 1137, July, 1983.
l) *Felling & Bucking Techniques for Woodland Owners,* EC, 1124, July, 1983.
m) *Hauling Logs from Woodland Properties,* EC 1140, October, 1983.
n) *Maintaining Woodland Roads,* EC 1139, Sept., 1983.
o) *Planning Woodland Roads,* EC 1118, July, 1983.
p) *Road Construction on Woodland Properties*, EC 1135, August, 1983.
q) *Thinning: An Important Timber Management Tool*, PNW 184, Aug., 1983.
r) *Thinning to Prevent Mountain Pine Beetles in Lodgepole and Ponderosa Pine*, EC 1106, Sept., 1982.
s) *Using Precommercial Thinning to Enhance Woodland Productivity*, EC 1189, Jan., 1988.
t) *Woodland Handbook for the Pacific Northwest: A Guide for Pacific Northwest Woodland Managemen*t, 1971.
u) *Forest Insect Ecology & Management in Oregon,* Manual 10, November, 1988.

O77 Oregon State University, Forestry Media Center, College of Forestry, *Forestry Learning Materials: Videos, Multimedia, Slide-Tapes, Films,* Corvallis, OR, 1998, 45p.

O79 Oregon Water Resources Department,
a) *Grazing Livestock in Riparian Areas*, Agency Coordinated Reports, on line: http://wrd.state.or.us/publication/reports/reports.html
b) *An Online Introduction to Oregon's Water Law and Water Rights System*, on line: http://www.wrd.state.or.us/law/aquabook/index.html
c) *Water Rights in Oregon: An Introduction to Oregon's Water Law and Water Rights System*, October, 1997. [available from Oregon Water Resources Department, Water Rights Section]

P10 Pacific Northwest Grantmakers Forum, *Pacific Northwest Grantmakers Forum - Member Directory,* Seattle, WA, [published biannually since 1992].

P30 Philips, K.N. et. al., *Water for Oregon*, U.S. Geological Survey, Water Supply Paper #1649, 1965. 149 p.

P40 Platts, William S., *Managing Fisheries and Wildlife on Rangelands Grazed by Livestock,* published by Nevada Dept. of Wildlife, 1990, 615 p.

P90 Pyne, Stephen J., *Fire in America: A Cultural History of Wildland and Rural Fire,* Princeton, N.J. [Princeton Univ. Pr.] 1982, 654p.

Q85 Quigley, Thomas M. and S.J. Arbelbide, tech. eds., *An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath And Great Basins*, USDA, Forest Service, [Gen. Tech. Report PNW-GTR-405], 1998, 1,500 p.

R10 Ratti, John T., Lester D. Flake, and Alan Wentz, *Waterfowl Ecology and Management: Selected Readings,* Bethesda, Maryland [The Wildlife Society], 1982, 1328 p.

R13 Ray, Verne F., *Primitive Pragmatists: The Modoc Indians of Northern California*, Seattle [Univ. of Washington] 1963, 237.

R20 Redwood Community Action Agency - Natural Resources Services, *Financial Incentives for Stewardship of Non - Industrial Private Forest Land in Humboldt County*, Eureka, CA., October, 1998.

R25 Regional Ecosystem Office, *Ecosystem Analysis at the Watershed Scale: Federal Guide for Watershed Analysis, Section I - Process ,and Section II - Analysis Methods and Techniques*, version 2, 1995. [draft document]

R40 Risley, John, et. al., *Upper Klamath Lake Nutrient-Loading Study, Assessment of historic Flows in the Williamson and Sprague Rivers*, U.S. Geological Survey, Water Resources Investigations Report #98-4198, Portland, OR, 1998.

R60 Rosgen, Dave L., *Applied River Morphology*, Pagosa Springs, CO, [Wildland Hydrology] 1996.

R63 Roth, Emily, et. al., *Oregon Freshwater Wetland Assessment Methodology*, Oregon Division of State Lands, 1996, 184p.

S10 Sampson, R. Neil and Lester A. DeCoster, *Public Programs for Private Forestry*, Washington, D.C. [American Forests] 1997.

S16 Scharpf, Robert F., *Diseases of Pacific Coast Conifers*, USDA, Forest Service Agricultural Handbook #521, 1993, 199p.

S18 Science, Technology, and Public Policy Institute, National Research Council, *Restoration of Aquatic Ecosystems*, Washington, D.C. [National Academy Press], 1992, 552p.

S60 Smith, Loran M., Roger L. Pedersen, and Richard M. Kaminski, *Habitat Management for Migratory and Wintering Waterfowl in North America*, Lubbock, Texas [Texas Tech Press], 1989, 560p.

S70 Society of American Foresters, Oregon State Division, *Ask a Professional Forester*, on line: http//www.forestry.org

S75 Southern Forest Experiment Station, USDA, *Estate Planning for Forest Landholders - What Will Become of Your Timberland?*, General Technical Report SO-97.

S85 Stern, Theodore, *The Klamath Tribe: A People and Their Reservation*, Seattle [Univ. of Washington] 1966, 356p.

T20 Temperate Forest Foundation, *Two Sides of Fire*, video.

T40 Tiner, Ralph W., *In Search of Swampland: A Wetland Sourcebook and Field Guide*, New Brunswick, N.J. [Rutgers University Press], 1998, 264p.

U80 USDI and USDA, *Guidelines for Coordinated Management of Noxious Weeds in the Greater Yellowstone Area*, 1992, 127 p.

U90 U.S. Fish and Wildlife Service, USDI,

a) Cooperrider, Alan, and Ron Garrett, U.S. Fish and Wildlife, Klamath Falls Field Office, *Klamath Basin Ecosystem Restoration Strategy*, January, 1997.
Volume 1, *Description of the Ecoregion*, 122 p.
Volume 2, *Description of the Ecological Issues*, 110 p.
Volume 3, *A Holistic Strategy for Restoration of the Ecoregion*, 148 p.
Volume 4, *The U.S. Fish and Wildlife Service's Conceptual Fish and Wildlife Strategy*.

b) *Leaflet #13, Waterfowl Management Handbook*, Washington, D.C., 1988-present, 110 p.

c) *Recovery Plan for Lost River and Shortnose Sucker*, Portland, OR, April, 1993, 108 p.

V40 Vileisis, Ann, *Discovering the Unknown Landscape: A History of America's Wetlands*, Washington, D.C. [Island Press], 1997, 433p.

V60 Volland, Leonard A., *Plant Associations of the Central Oregon Pumice Zone*, Rev. Ed., U.S.D.A., Forest Service, Region 6, R6-ECOL-104-1985, Sept., 1988.

W10 Washington Forest Protection Association, "The Role of Private Landowners in Improving Forest Health," 1994, 16 p.

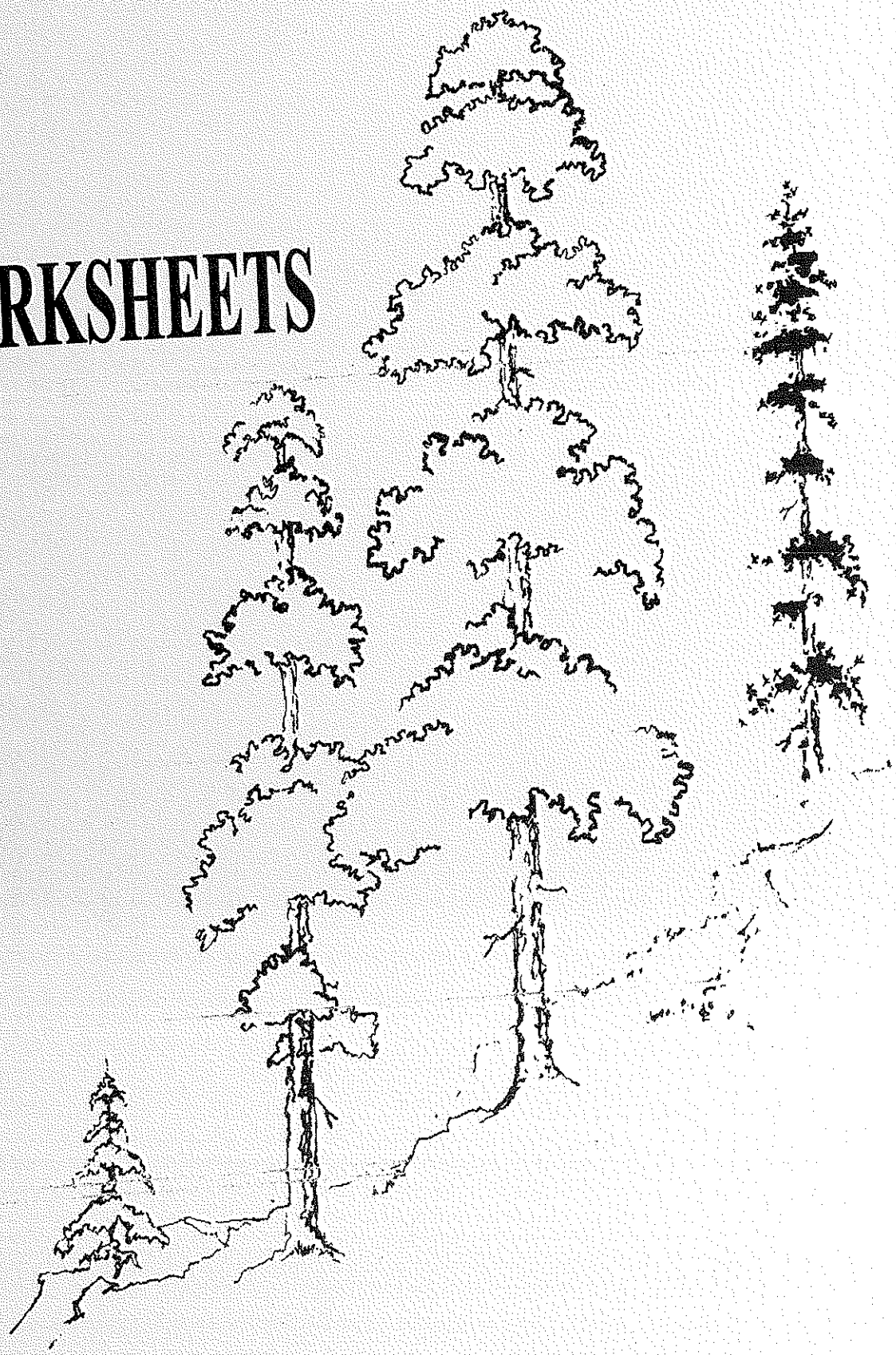
W12 Washington State Department of Natural Resources, *Forest Practices Illustrated*, 64 p.

W20 Western Water Policy Review Advisory Commission, Final Report: *Water in the West: The Challenge for the Next Century*, Denver, CO, 1998.
on line: http://www.den.doi.gov/wwprac/reports/final.htm

W40 Whitson, Tom D., ed., *Weeds of the West*, Jackson, WY [The Western Weed Science Society], 1991, 630 p.

W60 World Forestry Center, Woodland Fish and Wildlife Project Publications Series: [a large set of practical guides to assist private woodland owners to manage fish and wildlife effectively] Examples are:
a) *Managing Ponderosa Pine Woodlands for Fish and Wildlife*
b) *Riparian Areas: Fish and Wildlife Havens*

WORKSHEETS



TECHNIQUE EVALUATION WORKSHEET

Project Name: **Technique:** **Associated Objectives**	**Date:** **Project Site:**

Impact of Technique	Effect - Area Extent	Effect - Intensity	Effect - Duration	Sub -Total	Natural & Human Totals

NATURAL SYSTEM

Native Plants (benefits/diminishes condition of plants, plant communities, and plant habitats)

Positive 0 to +5				=
Negative 0 to -5				=

Native Animals (benefits/diminishes fish and wildlife, animal communities, animal habitats

Positive 0 to +5				=
Negative 0 to -5				=

Soils (benefits/diminishes condition of the organic and inorganic soil complex)

Positive 0 to +5				=
Negative 0 to -5				=

Hydrology (benefits/diminishes the condition of the water system - quantity, quality, timing)

Positive 0 to +5				=
Negative 0 to -5				=

Natural Systems Total ..... _____

x 2.5 = Weighted Natural System Total _____

HUMAN SYSTEM

Cultivated Plants (benefits/diminishes condition of agricultural crops)

Positive 0 to +5				=
Negative 0 to -5				=

Domestic Animals (benefits/diminishes condition of livestock)

Positive 0 to +5				=
Negative 0 to -5				=

Human Structures (benefits/diminishes condition of buildings, roads, irrigation, fencing, etc.)

Positive 0 to +5				=
Negative 0 to -5				=

Cultural/Historical Resources (benefits/diminishes condition of or access to resources)

Positive 0 to +5				=
Negative 0 to -5				=

Physical Health (benefits/diminishes health of owners, neighbors, watershed community)

Positive 0 to +5				=
Negative 0 to -5				=

Recreation Resources (benefits/diminishes hunting, fishing, hiking boating, skiing, etc.)

Positive 0 to +5				=
Negative 0 to -5				=

Aesthetic/Spiritual Resources (benefits/diminishes view, sound, retreat, ritual opportunities)

Positive 0 to +5				=
Negative 0 to -5				=

Economic Return (benefits - income, capital gain/diminishes - expenses, capital loss)

Positive 0 to +5	(single value)	x3 =
Negative 0 to -5	(single value)	x3 =

Economic Risk (benefits - risk protection, insurance/diminishes - risk exposure, liability)

Positive 0 to +5	(single value)	x3 =
Negative 0 to -5	(single value)	x3 =

Cooperation (collaboration within ownership, with experts, among ownerships benefits/detracts)

Positive 0 to +5	(single value)	x3 =
Negative 0 to -5	(single value)	x3 =

Human System Total..... _____

TOTAL TECHNIQUE SCORE .....

TECHNIQUE EVALUATION WORKSHEET

Project Name: Milly's Meadow Improvements **Technique:** Commercial Thinning-Mechanical-Chainsaw, and Small Log Harvester-Tractor and Wheel Machines **Associated Objectives:** Improve Plant Communities #3, Water Quality and Flows #4, Recreation Opportunities #9	**Date:** 7/98 **Project Site:** Milly's Meadow - Bordering 64 Acre Ponderosa Stand

Impact of Technique	Effect - Area Extent	Effect - Intensity	Effect - Duration	Sub -Total	Natural & Human Totals

NATURAL SYSTEM

Native Plants (benefits/diminishes condition of plants, plant communities, and plant habitats)

Positive 0 to +5	4	4	4	=	12
Negative 0 to -5	-2	-3	-1	=	-6

Native Animals (benefits/diminishes fish and wildlife, animal communities, animal habitats

Positive 0 to +5	2	2	2	=	6
Negative 0 to -5	-1	-2	-1	=	-4

Soils (benefits/diminishes condition of the organic and inorganic soil complex)

Positive 0 to +5	2	1	2	=	5
Negative 0 to -5	-4	-3	-1	=	-8

Hydrology (benefits/diminishes the condition of the water system - quantity, quality, timing)

Positive 0 to +5	2	2	3	=	7
Negative 0 to -5	-4	-3	-1	=	-4

Natural Systems Total ..... +8

x 2.5 = Weighted Natural System Total +20

HUMAN SYSTEM

Cultivated Plants (benefits/diminishes condition of agricultural crops)

Positive 0 to +5	1	1	1	=	3
Negative 0 to -5	0	-1	0	=	-1

Domestic Animals (benefits/diminishes condition of livestock)

Positive 0 to +5	3	3	2	=	7
Negative 0 to -5	-1	-1	-1	=	-3

Human Structures (benefits/diminishes condition of buildings, roads, irrigation, fencing, etc.)

Positive 0 to +5	1	1	2	=	4
Negative 0 to -5	0	-1	0	=	-1

Cultural/Historical Resources (benefits/diminishes condition of or access to resources)

Positive 0 to +5	0	0	0	=	0
Negative 0 to -5	0	0	0	=	0

Physical Health (benefits/diminishes health of owners, neighbors, watershed community)

Positive 0 to +5	1	1	3	=	5
Negative 0 to -5	-1	-1	-1	=	-3

Recreation Resources (benefits/diminishes hunting, fishing, hiking boating, skiing, etc.)

Positive 0 to +5	2	3	3	=	8
Negative 0 to -5	-1	-1	-1	=	-3

Aesthetic/Spiritual Resources (benefits/diminishes view, sound, retreat, ritual opportunities)

Positive 0 to +5	3	3	4	=	10
Negative 0 to -5	-1	-3	-1	=	-5

Economic Return (benefits - income, capital gain/diminishes - expenses, capital loss)

Positive 0 to +5	+ 3 (single value)	x3 =	9
Negative 0 to -5	- 2 (single value)	x3 =	-6

Economic Risk (benefits - risk protection, insurance/diminishes - risk exposure, liability)

Positive 0 to +5	+ 1 (single value)	x3 =	3
Negative 0 to -5	- 2 (single value)	x3 =	-6

Cooperation (collaboration within ownership, with experts, among ownerships benefits/detracts)

Positive 0 to +5	+ 2 (single value)	x3 =	6
Negative 0 to -5	- 0 (single value)	x3 =	0

Human System Total..... +27 +27

TOTAL TECHNIQUE SCORE ..... +47

PROJECT TIMING CHART

SEASONAL TIMING OF TECHNIQUES

TECHNIQUES	Spring			Summer			Fall			Winter		
	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Documenting	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	??	??
Project timing												
Flagging/Marking	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	??	??
Project timing												
Thinning - Precommercial	XX	XX	XX	XX	??	??	??	XX	XX	XX	??	??
Project timing												
Road/Trail Building/Repair		??	XX	XX	??		??	XX	XX	??		
Project timing												
Thinning - Commercial	??	??	XX	XX	XX	??		??	XX	XX	??	??
Project timing												
Treating Fuels - Mulching	??	??	XX	XX	??			??	XX	XX		
Project timing												
Treating Fuels - Burning		??	XX	XX	XX			??	XX	XX	??	
Project timing												
Trail/Road Obliteration					XX	XX	XX	XX	??			
Project timing												
Altering Human and/or Animal Access or Use - Fencing	??	XX	XX	XX	XX	XX	XX	XX	XX	XX	??	??
Project timing												
Introducing Plant Species	??	XX	XX	??				??	XX			
Project timing												
Introducing Animal Species	??	XX	XX	XX	XX				??			
Project timing												

PROJECT TIMING CHART - EXAMPLE

SEASONAL TIMING OF TECHNIQUES

TECHNIQUES	Spring			Summer			Fall			Winter		
	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Documenting	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	??	??
Project Timing	<...	.....	.....	.....	.....	.....	.....	.....	.....	....>		
Flagging/Marking	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	??	??
Project Timing	<...	...>										
Thinning - Precommercial	xx	xx	xx	xx	??	??	??	xx	xx	xx	??	??
Project Timing						<...	...>					
Road/Trail Building/Repair		??	xx	xx	??		??	xx	xx	??		
Project Timing			<.>									
Thinning - Commercial	??	??	xx	xx	xx	??		??	xx	xx	??	??
Project Timing				<...	...>							
Treating Fuels - Mulching	??	??	xx	xx	??			??	xx	xx		
Project Timing												
Treating Fuels - Burning		??	xx	xx	xx			??	xx	xx	??	
Project Timing								<.>				
Trail/Road Obliteration					xx	xx	xx	xx	??			
Project Timing												
Altering Human and/or Animal Access or Use - Fencing	??	xx	xx	xx	xx	xx	xx	xx	xx	xx	??	??
Project Timing										<.>		
Introducing Plant Species	??	xx	xx	??				??	xx			
Project Timing									<.>			
Monitoring	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	??	??
Project Timing									<...	.....	.....	...>
Introducing Animal Species	??	xx	xx	xx	xx				??			
Project Timing			<.>									

PROJECT TIMELINE FORM

														D	A	Y														
MONTH	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**
March																															
April																															x
May																															
June																															x
July																															
August																															
September																															x
October																															
November																															x
December																															
January																															
February																														x	x

EXAMPLE MONITORING CHART

Site/ Indicator	Resource	Equipment	Schedule	Baseline Record	Record / Observation And Date
Site #1					
[Indicator]					
[Indicator]					
Site #2					
[Indicator]					
Site #3					
[Indicator]					
[Indicator]					
[Indicator]					
[Indicator]					
Site #4					
[Indicator]					
[Indicator]					
Site #5					
[Indicator]					
Site #6					
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Site #7					
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Site #8					
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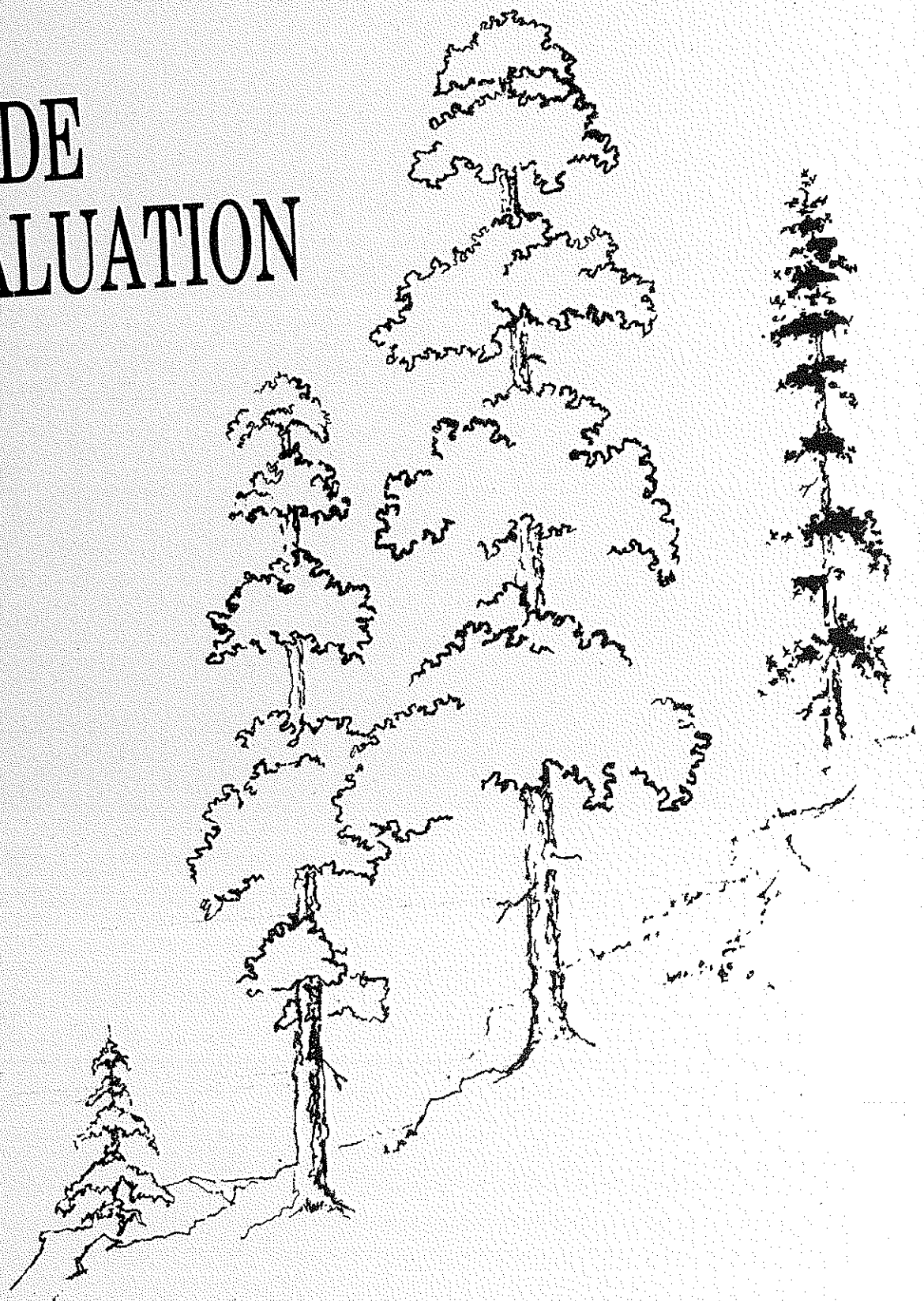
GUIDE EVALUATION



GUIDE EVALUATION FORM

Your response to using the Guide is important in assessing the Guide's value and in making adjustments so the Guide can be made more useful. Please fill out the following brief questionnaire by circling the appropriate response, detach the form from the Guide, and send it to the following address: Klamath/Lake Forest Health Partnership, c/o Oregon Department of Forestry - Klamath/Lake District, 3200 Delap Rd., Klamath Falls, OR 97601. Please use the back of the page for any additional comments you wish to make concerning the Guide.

1) What Version of the Guide did you Use? **Outline Version Only** **Full Text Version Only** **Both Versions**

On a scale from 1 to 5, please respond to questions #2 - 12 by circling the appropriate number:

	little	some	average	more	much
2) In Terms of how you Actually Manage your Own Woodlands, Indicate the Importance of the Following Forest Resources:					
Recreation, Including Hunting and Fishing	1	2	3	4	5
Timber Production	1	2	3	4	5
Views, Vistas and the Spiritual Connection	1	2	3	4	5
Grazing Productivity	1	2	3	4	5
Habitat for and Observation of Fish and Wildlife	1	2	3	4	5
Access - Roads and Trails	1	2	3	4	5
Water Quantity	1	2	3	4	5
Woodland as a Whole, Watershed Condition	1	2	3	4	5
Water Quality	1	2	3	4	5
3) How Much did you Use the Outline Version of the Guide?	1	2	3	4	5
4) How Much did you Use the Full Text Version of the Guide?	1	2	3	4	5
5) How Much did you Use the Resources Section of the Guide?	1	2	3	4	5
6) How Important were the Management Stories to you?	1	2	3	4	5
7) How Useful were the Worksheets to you?	1	2	3	4	5
8) How Important were the Illustrations and Photos to you?	1	2	3	4	5
9) How Clear did you Find the Statements in the Text?	1	2	3	4	5
10) How Adequately did the Guide Cover the Issues of Concern to you?	1	2	3	4	5
11) To what Degree did the Guide Influence the Way you Think about Managing your Woodlands?	1	2	3	4	5
12) To what Degree did the Guide Encourage you to Broaden the Range of your Management Concerns?	1	2	3	4	5

13) After Using the Guide, are you more or less Inclined to Engage in a Forest Health Improvement Project? **more** **same** **less**

14) After Using the Guide are you more or less Inclined to Cooperate with your Neighbors in Managing your Woodlands? **more** **same** **less**

15) Would you Recommended the Guide to Others to Use? **Yes** **Maybe** **No**