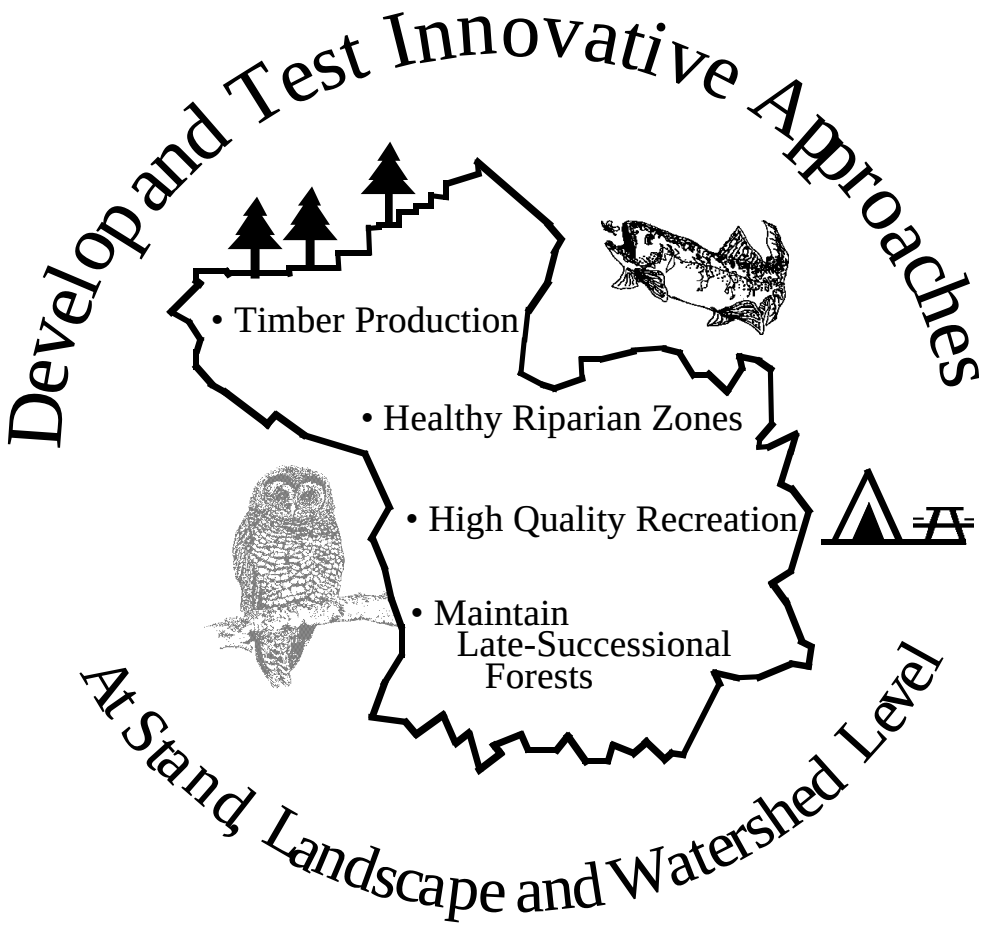
Guide to Adaptive Management on the Cispus AMA

March 1998



Southwest Washington Province
USDA Forest Service
Gifford Pinchot National Forest
Randle / Packwood Ranger Districts

Preface: A Road Map

The basic purpose of this ***Guide to Adaptive Management on the Cispus AMA*** (Adaptive Management Area) is a practical one: to document the integrated learning that has taken place thus far, from which a vision for future management of the Cispus AMA was developed. In order to meet the needs of a diverse readership, and in order to provide documentation for future learning, this Guide compiles lessons learned and information gathered from the Cispus AMA's major efforts to date.

Some readers may wish to direct more attention to certain sections of this document than others. This Preface offers a "road map" to the contents of this Guide.

Chapter One establishes a sense of place and purpose. Basic regulatory requirements are identified, and the process through which this Guide evolved is outlined.

Chapter Two provides a multi-faceted discussion of adaptive management, reviewing the scientific concept of adaptive management, the federal Adaptive Management Area policy, and the specific components of that policy which apply to the Cispus AMA. This chapter also provides background on management direction from the Gifford Pinchot Forest Plan.

Chapter Three documents the "processes of collaboration" that have taken place on the Cispus AMA. Four features of each process are discussed, including the purpose, steps taken during the process, the nature of learning, and the products which resulted.

Chapter Four is the "keystone" chapter, the vision for management that integrates the collaborative processes of the *Cispus Landscape Analysis and Design* (1997), *Cispus Research and Monitoring Plan* (1996), and *Cispus AMA Strategies* (1995).

Chapter Five describes selected projects and activities, both current and those which may occur in the AMA in the near future. It also identifies others who have been, or could be, involved with these projects.

Several ***Appendices*** provide additional reference material. ***Appendix A*** identifies the various documents which contribute to and provide background for this Guide. ***Appendix B*** highlights the technical and social objectives for AMAs established by the ROD. ***Appendix C*** lists the groups and organizations which have participated in AMA activities to date, and specialists who have contributed to this body of documentation. ***Appendix D*** is the summary of a 1996 community self-assessment survey. ***Appendix E*** is a more in-depth summary of the *Middle and Upper Cispus River Pilot Watershed Analysis*. ***Appendix F*** is the executive summary of the *Cispus AMA Strategies*. ***Appendix G*** is the summary of the *Cispus Landscape Analysis and Design*. ***Appendix H*** is the *Cispus AMA Research and Monitoring Plan*, including both topics for study and evaluation, and a variety of questions to guide monitoring work. Appendix H also

includes a database of current research and monitoring projects on the AMA. ***Appendix I*** lists objectives for the Cispus AMA developed by the AMA Steering Committee.

The Guide does not, in itself, propose any change to land allocations or to the applicable standards and guidelines for lands within the Cispus Adaptive Management Area. These allocations and standards and guidelines are described in the Gifford Pinchot Land and Resource Management Plan (Gifford Pinchot Forest Plan), as amended by the Record of Decision for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (1994). The products of the Cispus *Landscape Analysis and Design* process as well as site-specific proposals evolving from this document will be subject to all applicable procedures for conducting environmental analysis under the National Environmental Policy Act (NEPA) and its implementing regulations.

This Guide is intended to be a working document. It has been placed in a ring binder to accommodate changes and modifications that will result from the lessons we will learn along our journey in adaptive management. Please forward any comments, ideas and suggestions to AMA Coordinator Margaret McHugh, Cowlitz Valley Ranger District (formerly Randle RD), P.O. Box 670, Randle, WA 98377-9105; telephone (360) 497-1130. Thank you for taking the time to read the Guide!

Ted C. Stubblefield	Harry L. Cody	Randall D. Shepard
Forest Supervisor	District Ranger	District Ranger
May 1998	May 1998	May 1998

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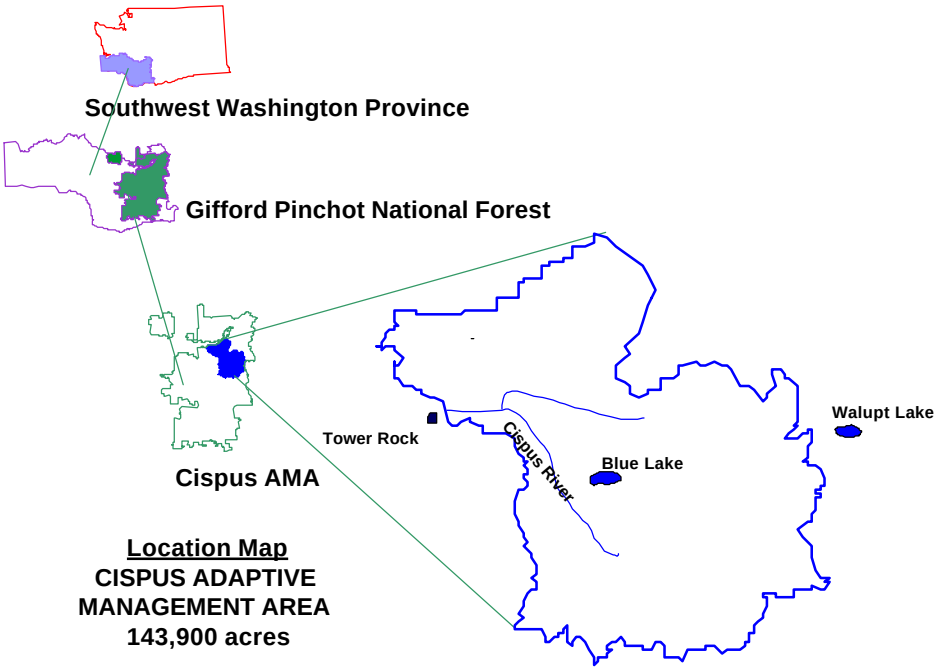


Figure 1-1. Vicinity Map.

A. What is the Cispus AMA?

The Cispus Adaptive Management Area (AMA) was designated through the Record of Decision for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (1994). The objectives for the Adaptive Management Areas were to encourage the development and testing of technical and social approaches to achieving desired ecological, economic, and social objectives (ROD, D-1). Specifically, for the Cispus AMA, the ROD emphasizes the development and testing of innovative approaches at stand, landscape, and watershed level to integration of timber production with maintenance of late-successional forests, healthy riparian zones, and high quality recreational values (ROD, D-13). The ROD amended the Gifford Pinchot Land and Resource Management Plan (Gifford Pinchot Forest Plan) to overlay the Cispus AMA and its standards and guidelines on top of the Gifford Pinchot Forest Plan's management area categories and associated standards and guidelines. This guide does not change the Forest Plan's management categories or associated standards and guidelines within the AMA, but rather provides a vision for achieving the goals stated above for the Cispus AMA.

B. Description of the Cispus AMA

Nestled among the volcanic peaks of southwest Washington's Cascade Range, the Cispus River Watershed encompasses an area of striking beauty, ecological variety, and human history. Winding through steep slopes blanketed by Douglas fir, western hemlock, and western red cedar, the Cispus River is just one of many waterways, both large and small, that flow through the region. In addition to the trees which dominate much of the landscape, the watershed is home to a diverse range of birds and mammals, including peregrine falcons, northern spotted owls, and mountain goats.

This region has been the site of human activity for thousands of years. Native Americans, including the Yakama, Cowlitz and Warm Springs Nations, continue centuries-old traditions with seasonal berry-picking, harvesting of cedar and beargrass, and hunting. Residents of the neighboring unincorporated communities of Randle, Packwood and Glenoma are connected to the watershed through recreation and harvest activities, as well as through the place the landscape holds in their daily lives. The Cispus also draws people from around western Washington who have developed strong ties to this piece of land by returning season after season to enjoy the area's beauty and recreational opportunities. Sometimes called a "microcosm" of the Gifford Pinchot National Forest for the wide range of geographical, ecological, commodity, scenic and recreational resources it holds, the Cispus River Watershed is treasured by all — citizens, organizations and policy-makers alike.

On this site, the USDA Forest Service (USFS) has embarked on an experiment using adaptive management principles in managing this portion of the Gifford Pinchot National Forest. The AMA lies within the jurisdiction of the USFS, straddling the Randle and Packwood Ranger Districts. These two Ranger Districts, in partnership, are responsible for the management of the Cispus AMA.

The task has been to look with fresh eyes at lands the Forest Service has managed for nearly one hundred years. The AMA, in accordance with direction from the Northwest Forest Plan of 1994, challenges USFS employees and partners to use innovative ideas and develop new processes for learning, monitoring, researching, and managing. These processes will explore how we can work better with citizens and organizations to manage the lands within the Cispus AMA. We will assess what we know about the biophysical conditions of and human concerns about this ecosystem, and identify what information is missing. We will merge our efforts to identify and develop techniques to better meet management goals which reflect both social and biophysical complexity. We will always be receptive to opportunities for learning.

Work on the Cispus AMA will be a journey in learning. This guide tells the story of our journey, and charts our course for the future.

C. What is the Purpose of this Guide?

1. Evolution of this Guide

The *Guide to Adaptive Management on the Cispus AMA* is intended to do two things: to provide a concise summary of information gathered and work conducted to date pertaining to the Cispus AMA; and to use that background to present an integrated vision for future land management. It is hoped that this document will be used by citizens, managers, and decision-makers as they work together and learn to manage adaptively.

This Guide is also intended to be an example of adaptive management in and of itself. It is a working document. As written, it reflects a current picture of understanding and the nature of key relationships. It is expected that this Guide will change, grow, and be modified and improved over time to fit the changes that occur as natural processes and management activities change the landscape, and as values and needs of people change. We will learn and evaluate and modify. This is adaptive management.

This Guide weaves together information and learning from numerous sources, but is primarily based on four separate documents prepared as a result of several significant collaborative processes on the Cispus AMA. The first and most comprehensive document is the *Middle and Upper Cispus River Pilot Watershed Analysis* (WA), published in June 1995. In doing the WA, Randle and Packwood Ranger District staff amassed volumes of social and (primarily) biophysical data on past and current conditions within the watershed which makes up approximately 80% of the AMA (see Appendix E). At the same time the WA was being completed, Randle and Packwood Ranger District staff also spearheaded an ambitious public participation effort, Collaborative Learning, designed to open dialog with the public about their concerns and interests regarding the watershed itself. The Collaborative Learning process resulted in the development of the second document, the *Cispus Strategies* (Appendix F). While Forest Service staff initially hoped that this process would itself result in a plan for the AMA which included the priorities of the public as well as the Forest Service, it eventually became clear that the Collaborative Learning and WA documents would need to be integrated before a comprehensive vision of the future could take shape.

Figure 1-2. Watershed Analysis Open House, March 1995. Photo courtesy of Al Horton.

To accomplish this integration, Cispus AMA managers embarked on a process of landscape analysis. The public and other natural resource agencies worked with the Forest Service to blend social objectives identified in the *Strategies* with the opportunities and limitations of the landscape described in the *Watershed Analysis*. The resulting Landscape Analysis and Design document (LAD, Appendix G) provides the vision for future management. The last major process was the development of a research and monitoring plan for the Cispus AMA; this document (Appendix H) forms a critical component of this Guide. All four documents and the processes which produced them are described in more detail in Chapter 4.

Over almost three years of intensive efforts in collaborative work and research, a vision for the Cispus AMA has been taking shape. Many individuals and organizations holding a common concern for the fate of these lands have worked together to develop it. It is a "vision" because these participants have identified objectives, goals, and values of central importance, which have been translated into ideas for how the landscape should look in the future and possible strategies for getting there.

2. Who Should Read this Guide?

Many people who live, play, work, harvest, and just spend time in the Cispus River watershed joined with us as we set forth to learn how to do adaptive management. Citizens from neighboring communities and from cities and towns across western Washington and Oregon have been steady partners from the beginning. We hope that these and all citizens who care about and are interested in what goes on within the borders of the Cispus AMA will read this Guide and use it to help them participate in the planning and implementation of activities and projects undertaken within the AMA.

The management of the Cispus AMA is carried out by many people within the USDA Forest Service. Forest Service employees at all levels will find in this Guide a reflection of the work and ideas they have contributed toward the integrated vision it lays out. More importantly, this Guide is also intended to serve as the primary source of guidance for land managers, planners and specialists as they design and implement projects and monitoring programs.

Through the Cispus AMA, the Forest Service has enhanced important relationships with several government agencies at both the federal and state levels, particularly the U.S. Fish and Wildlife Service (USFWS), the U.S. Environmental Protection Agency (EPA), and the Washington Departments of Fish and Wildlife (WDFW) and Natural Resources (DNR). We have also worked closely with regional universities including Washington State University, Oregon State University and the University of Washington, and the USFS Pacific Northwest Research Stations in Portland and Seattle. Their involvement has been and continues to be a crucial element in making adaptive management a reality on the ground. This Guide is intended to be just as useful to personnel within these agencies as it is within the Forest Service.

The National Forest and the AMA comprise a significant portion of the land base in East Lewis County and Skamania County, and the AMA shares a boundary with the Yakama Indian Nation.

The lands within the AMA, the plants, animals, trees, lakes and streams are integral parts of the identity of these communities. Developing relationships with county commissioners, tribes, local businesses, and citizen initiatives link the Forest Service with the concerns, skills and knowledge of the people who live closest to the AMA. This Guide is intended to be helpful to these groups as they seek to accomplish community goals. We hope this Guide fosters continued participation and dialog with local leaders and citizens.

Please share with us your comments, concerns and ideas regarding this Guide. It was developed with your help and will only fulfill its potential if it is responsive to the experiences and concerns of us all.

3. Addressing the Guidelines of the Record of Decision

The Record of Decision (1994) states that the plan developed for each AMA should include certain components. This Guide is intended to address those components for the Cispus AMA. To clarify where the suggested plan components are discussed in this Guide, Table 1-1 notes the location of discussions of these components both in this document and in the four parent documents, their appendices, and other resources available through the Cispus AMA.

C. Components of this Guide

This Guide is a compilation of highlights of other documents and the integration of this information and direction into a vision for the Cispus Adaptive Management Area. By necessity, much of the rich detail and specific examples have been left out in order to convey a "big picture" view. Throughout the Guide, references to parent documents, their appendices, and other sources are made for readers interested in more detailed information. These references are also listed in Appendix A.

Figure 1-3. Tower Rock and the Cispus River Valley. Photo by D. Lawrence.

Table 1-1. Record of Decision Guidelines for AMA Plans

Plan Guidelines	Location in this Guide	Reference for More Information
A shared vision of the AMA.	• **Chapters 4 and 5.**	• **Cispus AMA Strategies** • **Cispus LAD**
Learning that includes social, political and biophysical knowledge.	• **Chapter 3 (current knowledge).** • **Chapters 4 and 5 (future approach to learning and current research).**	• **White Pass Community Self-Assessment** • **Cispus AMA Research and Monitoring Plan** • **Pilot Watershed Analysis** • **White Pass School District Census Data Analysis**
A strategy to guide implementation, restoration, monitoring, and experimental activities.	• **Chapter 4.** • **Appendix F.**	• **Cispus LAD** • **Cispus AMA Research and Monitoring Plan**
A short-term (three to five year) timber sale program, and long-term yield projections.	• **Chapter 5.**	• **Randle and Packwood Ranger District Timber Out-Year Planning** • **Cispus LAD**
Education of participants.	• **Chapters 3 and 4.**	• **Cispus AMA Strategies** • **Cispus LAD** • **White Pass Community Self-Assessment** • **Cispus AMA Research and Monitoring Plan**
A list of communities influenced by the AMA projects and outputs.	• **Chapter 3.**	• **Cispus AMA Strategies (p. 48)** • **White Pass Community Self-Assessment**
An inventory of community strategies, and resources and partners being used.	• **Chapters 2, 3 and 4.** • **Appendix C.**	• **White Pass Action Plan** • **Cispus AMA Strategies** • **AMA Partner List (see Appendix C)**
Coordination with overall activities in the province.	• **Chapter 2.**	• **Cispus AMA Research and Monitoring Plan** • **AMA Steering Committee direction**
A funding strategy.	• **Chapter 5.**	• **Cispus AMA Strategies**
Integration of community strategies and technical objectives.	• **Chapters 3, 4 and 5.**	• **Cispus LAD** • **Cispus AMA Strategies** • **Cispus AMA Research and Monitoring Plan** • **White Pass Action Plan** • **White Pass Community Self-Assessment**

Chapter 2: A Model for Adaptive Management

What is "adaptive management," and what does it look like in practice — particularly on the Cispus AMA?

This chapter defines and discusses adaptive management as a scientific concept and as a policy for federal land and resource management. The Adaptive Management Area objectives articulated in the Northwest Forest Plan (NWFP) are outlined and briefly discussed. The particular emphasis of the Cispus AMA is highlighted. The chapter closes with a review of how planning and projects in the Cispus AMA are shaped by the Gifford Pinchot Forest Plan as it was amended by the NWFP.

A. What is Adaptive Management?

The basic rationale for adaptive management in the context of ecosystem management is that we don't know everything there is to know about how to manage natural resources. The complexity, changeability, and particularly the unpredictability of the world around us mean that there is always room to learn (Stankey & Shindler 1996). A fundamental principle of adaptive management is that to ***manage*** environmental resources and processes more effectively, we should take steps to ***adapt*** our management practices by incorporating new knowledge. Even more importantly, adaptive management suggests that we actively accelerate our learning by explicitly designing management activities as ***experiments*** (K. Lee 1994). From project design to implementation to evaluation to re-design, management activities in an adaptive management framework reflect an awareness of the major tenets of experimentation: rigor, baseline data, controls, clearly defined research questions, and close monitoring and documentation.

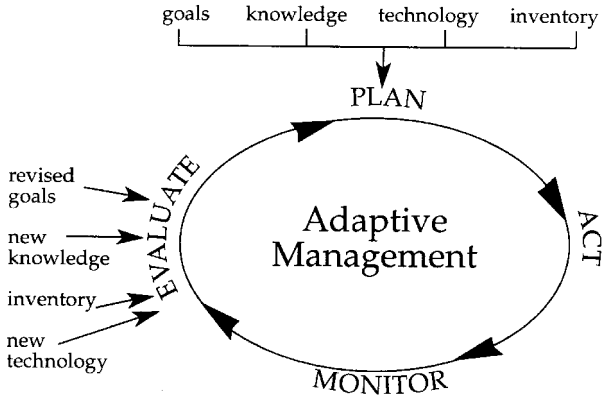


Figure 2-1. Model of Adaptive Management (ROD p. E-14).

The theory behind this is that when the basic elements of experimentation — for example, what is the central question we want to know more about? What are the baseline conditions? Can we include experimental controls? — influence management practices, learning will be more efficient and complete.

The crucial step in this approach to resource management is to ***adapt*** management practices for the future using the knowledge generated by previous and current activities (K. Lee 1994; McLain & Lee 1996).

Adaptive management is a dynamic process. As illustrated in Figure 2-1, the basic components of planning, acting, monitoring, evaluating, and adapting described above are related to each other through a continuous "loop," rather than as five individual steps to follow. This process never ends, as new knowledge is continually being produced and incorporated into management practices. ***Monitoring*** plays a critical function in adaptive management, forming a bridge between past and future activities. Thorough monitoring and documentation facilitate the availability of information which may be used to fine-tune decisions and actions taken at other points in the loop.

In summary, then, the essence of adaptive management is active learning. Adaptive management suggests that we design management activities and structure management organizations in ways that increase what we can learn about any and all aspects of the management situation. Adaptive management differs from traditional management and research by:

- explicitly recognizing ***uncertainty***
- designing management as an ***experiment***
- using information to ***improve*** management
- emphasizing ***learning*** at all stages of management.

B. The Adaptive Management Area Concept in the Northwest Forest Plan

In 1993 and 1994, the federal government, including President Clinton and numerous agencies (notably the USDA Forest Service and USDI Bureau of Land Management) engaged in a process of study and deliberation on the widely recognized gridlock over the management of forest ecosystems in the Pacific Northwest. A series of events kicked off by President Clinton's April 1993 Forest Summit culminated in the "Record of Decision and Standards and Guidelines" (ROD). Released in April 1994, the ROD amended all planning documents in the USFS and Bureau of Land Management within the range of the northern spotted owl. Several new land allocations were introduced in the ROD, including Late-Successional Reserves (LSRs), Riparian Reserves, and Adaptive Management Areas (AMAs). The regional ecosystem management approach laid out in the ROD is commonly known as the Northwest Forest Plan (NWFP).

The federal government adopted the concept of adaptive management in the NWFP. Landscape units designated to adopt the adaptive management approach would serve as "a geographic focus for innovation and experimentation" from which lessons useful for meeting objectives on all federal lands could be widely shared (ROD, p. D-3). Though they comprise less than one-sixteenth of the total FS/BLM lands within the range of the northern spotted owl, the AMAs

represent a unique and ambitious experiment "intended to contribute substantially to the achievement of objectives" for the NWFP as a whole (ROD, p. D-2).

Ten Adaptive Management Areas (AMAs) were designated by the ROD: four in Washington, four in Oregon, and two in northern California (see Appendix F for map showing locations of all ten AMAs). Ranging in size from 92,000 to nearly 500,000 acres, AMAs were "designed to develop and test new management approaches to integrate and achieve ecological, economic, and other social and community objectives" (1994, ROD, p. 6). In other words, Adaptive Management Areas are administratively designated regions on the landscape where local units of federal agencies were charged with revising their approach to management to reflect the principles of adaptive management.

A significant aspect of how the NWFP applied adaptive management is that both ecological and social systems and issues are viewed as arenas for learning how to improve management. The AMAs are intended to generate social learning — learning about the dynamics of human interaction and their implications — as well as technical and ecological knowledge. The AMAs were also seen as opportunities to encourage relationships between federal land management agencies and citizens and organizations (Stankey & Shindler 1996).

The NWFP states that "it is hoped that localized, idiosyncratic approaches that may achieve the conservation objectives of the President's Northwest Forest Plan can be pursued. These approaches rely on the experience and ingenuity of resource managers and communities rather than traditionally derived and tightly prescriptive approaches that are generally applied in management of forests" (ROD, p. D-1). Specifically, a key feature of Adaptive Management Areas was identified as "Innovation in community involvement . . . including approaches to implementation of initial management strategies and perhaps, over the longer term, development of new forest policies" (ROD, p. D-2).

This aspect of the AMA policy does not find its roots in the basic concept of adaptive management. Rather, it reflects an approach to adaptive management which Kai Lee calls "civic science." Civic science recognizes that management takes place within an intrinsically social, and thus political, environment. Lee suggests that to realize the potential of adaptive management, managers should enlist both citizens and scientists into the process of management design. Benefits of this approach include a new realm of knowledge and potential support for management activities of a far-reaching web of relationships.

The NWFP recognizes that the dynamic nature of adaptive management will rely upon flexibility within agencies strongly shaped by administrative rules and regulations in order for AMAs to fulfill their learning goals. The ROD specifically states that "the guiding principle is to allow freedom in forest management approaches to encourage innovation in achieving the goals" of adaptive management (ROD, p. D-3).

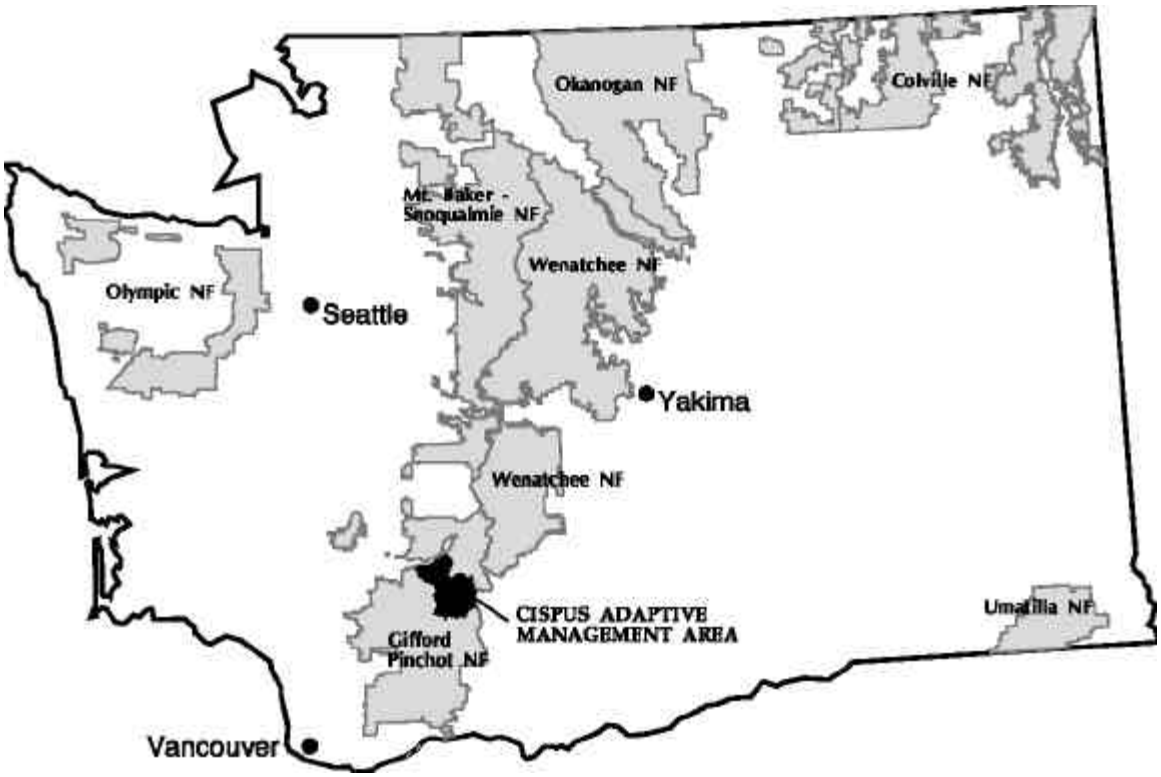


Figure 2-2. Location Map for Cispus AMA: Washington State

Adaptive Management Areas were established specifically to promote learning. In addition to size, each AMA represents a unique configuration of ownership patterns, ecological conditions, and local community infrastructure. The network of AMAs is collectively charged with addressing several technical and social learning objectives and, through appropriate planning, testing and evaluation, with testing and considering alternatives to existing standards and guidelines. In addition, each individual AMA has specific areas of emphasis upon which to focus, toward the ultimate goal of learning how forest communities and the environment might be sustained together. The special emphasis of the Cispus AMA is described in the next section.

It is important to note that because the AMAs are designed to be the testing grounds for new methods and ideas. The purpose of creating multiple AMAs in the region is to allow experimentation; what works in one area may not work for another. After the appropriate testing and evaluation, the lessons learned throughout the AMA network may be incorporated into forest planning revisions.

C. How Adaptive Management on the Cispus is Taking Shape

At just over 143,000 acres, the Cispus AMA is among the smallest of the ten Adaptive Management Areas. It is one of three AMAs which are located within the jurisdiction of one agency, the USFS. The Cispus AMA sits on a heavily forested, mountainous landscape where Douglas fir and associated species are the predominant vegetation. These characteristics are very different from AMAs in southern Oregon and northern California, where a drier climate contributes to a very different ecology. While all of the AMAs were located near communities significantly impacted by changes in forest product harvest, the dynamics of associated communities of place and interest are also unique to each AMA. In the case of the Cispus, recreational interests of people who live close by and those who live far away are both of critical importance in the management of AMA lands. The communities neighboring the AMA are close to their roots and identify closely with the landscape around them.

These and other social and biophysical features (described in more detail in Appendix E) give the Cispus AMA its unique environment and character. But what is special or unique about the way adaptive management has taken shape in this rich and varied context?

Figure 2-3. Collaborative Learning Field Trip, August 1995. Photo courtesy of Connie Warner.

The driving force that has emerged time and again in our collaborative work on the AMA is a love for the land shared by all participants. The people who care deeply about this land continue to participate in our projects and discussions in whatever way they can. As their love for the Cispus region has grown, so has their knowledge about it, and their interest in learning more.

All the participants in the AMA bring their knowledge, caring and commitment to this landscape to our work together. In so doing, the learning that takes place includes learning about each other as well as about the ecosystem which brought us together. This interaction and relationship building are the basis for the social learning encouraged by the NWFP.

1. Coordinating with Others

This work of developing relationships has assumed a role of primary importance on the Cispus, and has defined the Cispus AMA's strategies in working with communities of place and interest. The Cispus AMA provides a forum where those who care about this patch of land can learn more about it, and about each other. As we share together this process of learning, the ways in which the land is managed will change to reflect that learning. Several examples of how the Cispus AMA provides an opportunity to coordinate with citizens and other aspects of the adaptive management network are discussed below.

Community Strategy We have endeavored to foster these growing commitments of people to each other in the pursuit of knowledge on the AMA. The approach of working with different communities of organizations and citizens has shaped and been shaped by numerous collaborative projects and activities, including the White Pass Community Self-Assessment, the development of monitoring and community studies curricula with local schools, coordination with Lewis County Commissioners, and the recently formed local Public Development Authority. Quarterly newsletters, field trips, community and interagency forums for special forest products, and research and monitoring have also formed a major component of the Cispus AMA's strategy of collaborating with interested communities. A list of community participants and partners may be found in Appendix C.

Coordination with Southwest Washington Province The Southwest Washington Province, as delineated in the ROD, encompasses the entire southwestern region of the state, including the Gifford Pinchot National Forest and the Cispus AMA (see Location Map, Figure 2-2). Adaptive management on the Cispus is coordinated with Province-level activities through the Cispus AMA Steering Committee. The Steering Committee is composed of 10 members from the GPNF, Pacific Northwest Research Station (Portland, OR Station), the Forest Service Regional Office, and the Provincial Interagency Executive Committee (PIEC). The Steering Committee reviews all of the planning initiatives of the AMA, and in conjunction with the Technical Review Panel, reviews the AMAs research and monitoring plans. The Technical Review Panel is a voluntary panel of technical experts, recommended by the Steering Committee, that individually review all documents, monitoring and research projects and priorities submitted by the AMA. Their members reflect fields that are significant in the Cispus area:

Forest Fuels Management	Local citizen
Fisheries Biology	Washington DOE
Natural Resource Committee	Lewis County
Cultural Resources	Yakama Indian Nation
Sociology	Seattle PNW
Silviculture	University of Washington
Anthropology	Washington State University
Wildlife Biology	US Fish and Wildlife
Forest Ecology	Washington DNR

Their recommendations are referred back to the AMA scientist and coordinator through the Steering Committee.

The following are objectives articulated by the AMA Steering Committee for the Cispus AMA. The objectives are described in more detail in Appendix I.

Table 2-1. Cispus AMA Steering Committee Objectives

Social Assessment	Monitor changing needs, values and interests of the local community and other forest users, and identify formal and informal communication networks and leaders within the communities.
Relationships	Develop relationships with local, county, state and other federal agencies, local community members, interest groups and research communities to collaboratively develop and implement a management strategy based on biophysical and social assessments.
Landscape Design	Design, implement, and adapt as needed, a landscape design that depicts management direction and reflects a shared vision for the Cispus area.
Ecosystem Health	Maintain and/or restore ecosystem health including, but not limited to, fish and wildlife habitat needs, a mix of seral vegetative states based on long-term landscape objectives, and maintenance of water quality standards.
Project Implementation	Identify project level activities that implement the AMA strategy of developing innovative forestry management practices that integrate ecological and economic values in a sustainable manner.
Recreation	Ensure high quality recreational opportunities.
Education	Develop ongoing educational opportunities in ecosystem management for external and internal audiences.
Monitoring	Develop and implement research and monitoring programs for innovative projects and areas of ecological concern, including use of citizen monitoring.

Model Forest Network The Model Forest Network includes forests in Canada, Mexico, Russia, and the Cispus, Applegate, and Hayfork AMAs from the United States. The Network began in 1992, as an essential element of Canada's Partners in Sustainable Development of Forests program. The objectives of the Network are similar to those of the Adaptive Management Areas; sustainable development of forestry practices, development of new and innovative concepts in forest management, testing and demonstration of best sustainable forestry practices. The Model Forests also reflect a variety of cultural and ecological values. As a member of the Model Forest Network, the Cispus AMA is linked to innovative forest management initiatives at an international level. The Cispus AMA Coordinator attends regular Model Forest Network meetings, and shares written documents and correspondence with other Model Forests.

The Model Forest Network is linked to the research and management community through its home page on the World Wide Web (http://www.idrc.ca/imfn).

Interaction with AMA Network The Cispus AMA shares with and learns from other AMAs by exchanging quarterly reports and newsletters, and participating in periodic AMA coordinator meetings. An innovative proposal to tie the Cispus AMA's research and monitoring plans together in GIS is intended to be shared with the AMA network, as funding is implemented. The Cispus is also working to maintain current information on research studies on the Cispus AMA web page, to better coordinate with other AMAs and with the public in general (http://www.fs.fed.us/gpnf/ama).

By developing a standardized, user-friendly GIS format for exchanging data and ideas over the Internet, the Cispus AMA is building the capacity to connect with the local community, the Southwest Washington Province, the Pacific Northwest region, and the world. The links forged by the AMA will then enable citizens and organizations at several levels to learn more about each other, and create a new source of ideas and creativity at all these levels.

2. Designated Priorities for the Cispus AMA

Like the other nine AMAs, this Cispus AMA received a special management emphasis when it was originally designated:

> Development and testing of innovative approaches at stand, landscape, and watershed level to integration of timber production with maintenance of late-successional forests, healthy riparian zones, and high quality recreational values (ROD p. D-13).

The four basic areas highlighted here — timber production, mature forest ecosystems, aquatic and riparian functions, and high quality recreation — do not represent a major departure from previous management direction in the Gifford Pinchot National Forest. The discussion of the Gifford Pinchot Forest Plan (GPFP) below includes these components as important areas of concern to this National Forest. In addition, these four priorities have been echoed in the comments and contributions of non-Forest Service participants, including members of the public and government and non-government organizations, in AMA activities from the beginning (as discussed in Chapter 4).

Therefore, these four basic components are not themselves new or controversial in the Cispus region. The region has long been a highly productive site for timber harvest, and attracts a wide variety of recreational users. It has historically been home to a multitude of scenic and productive waterways, as well as forest stands over 100 years old. The special challenge of the Cispus AMA is the continued ***integration*** of these goals as their pressures on each other increase over time. The course of the Cispus AMA since receiving its designation has been to explore and negotiate these challenges. We will explore how these four priorities can work ***together*** on the landscape and ensure that sustainable commodity production will not compromise recreational experiences, maintenance of late-successional forests, or aquatic conservation objectives.

More specifically, how can these priorities work together in the context of adaptive management? A recent (1995) statement of emphasis recommended by the AMA monitoring and research team for the Cispus AMA added a fifth management objective:

> Management is responsive to the role of people in landscapes and promotes social science research.

From one perspective, this statement offers another way in which Cispus AMA managers can approach innovative management and the integration of multiple values and goals through planning and implementation of projects. The ways in which the Cispus AMA addresses this theme are discussed in Chapters 3 and 5.

3. Adaptive Management and the Gifford Pinchot Forest Plan

Integrating the GPFP and the NWFP In 1994, the NWFP amended the GPFP. The Record of Decision from the NWFP, which established the Cispus AMA and designates its management emphases, also provides direction for the management of AMAs and all National Forest and Bureau of Land Management lands. However, this direction does not stand alone: it was intended to be integrated with guidance for planning and management which already existed at the Forest level. Management of AMA lands thus reflects guidance and priorities, and standards and guidelines, from the GPFP. Although no new standards and guidelines are included in the Guide, it will provide a framework for identifying areas and topics for testing implementation, effectiveness and validity of existing standards and guidelines. Amendment 11 of the GPFP Land and Resource Management Plan reconciles the Forest Plan with the ROD.

What does this mean? The bulk of the direction the GPFP provides to forest managers is found in a set of Management Area Categories (or "MAC"s) which subdivide the entire Gifford Pinchot National Forest. Each MAC includes a specific ***management goal***, a ***desired future condition*** and one or more ***management prescriptions*** designed to attain the multiple-use objectives outlined in the desired future condition for that MAC. Therefore, the AMA is an overlay on top of existing MACs.

The NWFP makes many changes to the GPFP. One major change is to require that the principles of adaptive management be used to design and implement projects within the AMA, regardless of the MAC in which the project falls. Thus, as AMA managers plan and carry out activities intended to meet the goals of each Management Area Category, they will address if or how those activities will also meet the learning objectives identified in the *Guide*.

Another major change to the GPFP from the NWFP is the designation of Riparian Reserves, which affects all National Forest lands including AMAs. Management activities in the AMA within Riparian Reserves are limited to projects associated with research and management to promote attainment of Aquatic Conservation Strategy Objectives (ROD, B-11). The Riparian Reserve designation supersedes all other designations.

Thus, the basic elements of the GPFP (the Management Area Categories) continue to provide guidance to Cispus AMA planning and projects, but the GPFP is modified to include adaptive

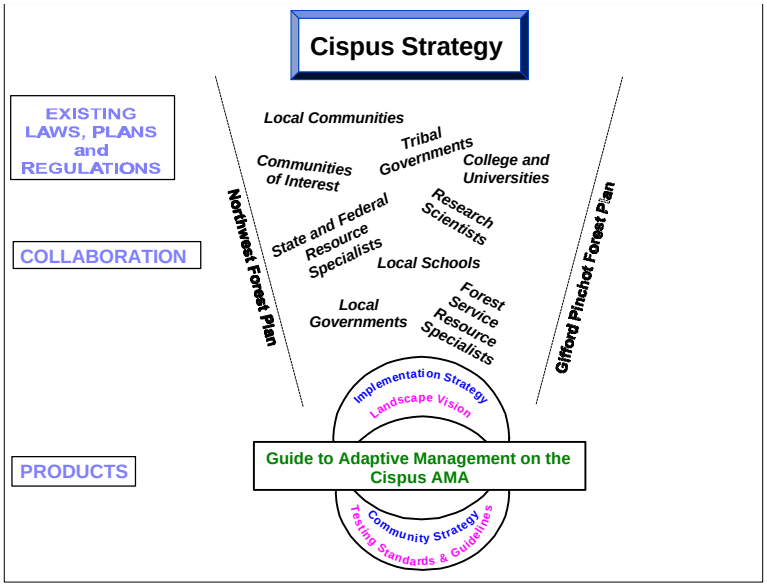


Figure 2-4. Parameters on the AMA process.

management principles and the emphasis areas identified in the ROD for the Cispus AMA. The MACs which occur within the AMA boundaries are summarized briefly below, grouped here into four categories: general forest, scenic values, wildlife, and recreation and special interest.

The most significant difference between management prescriptions within the MACs is the level of acceptable visual landscape alteration, which is measured in degrees of change from a natural-appearing landscape. The level of landscape alteration of different management prescriptions can be described as Modification, Partial Retention, and Retention, depending on the type and amount of management activities allowed in the area.

> **Modification** - Completed management activities may dominate the landscape but must, at the same time, follow naturally established form, line, color, and texture.
>
> **Partial Retention** - Completed activities within the Management Area should remain visually subordinate to the surrounding landscape when viewed by casual Forest visitor.
>
> **Retention** - Completed management activities within the Management Area should not be visually evident to the casual Forest visitor.

The groups of land allocations from the GPFP are shown in Figure 2-5, and described in the remainder of this chapter.

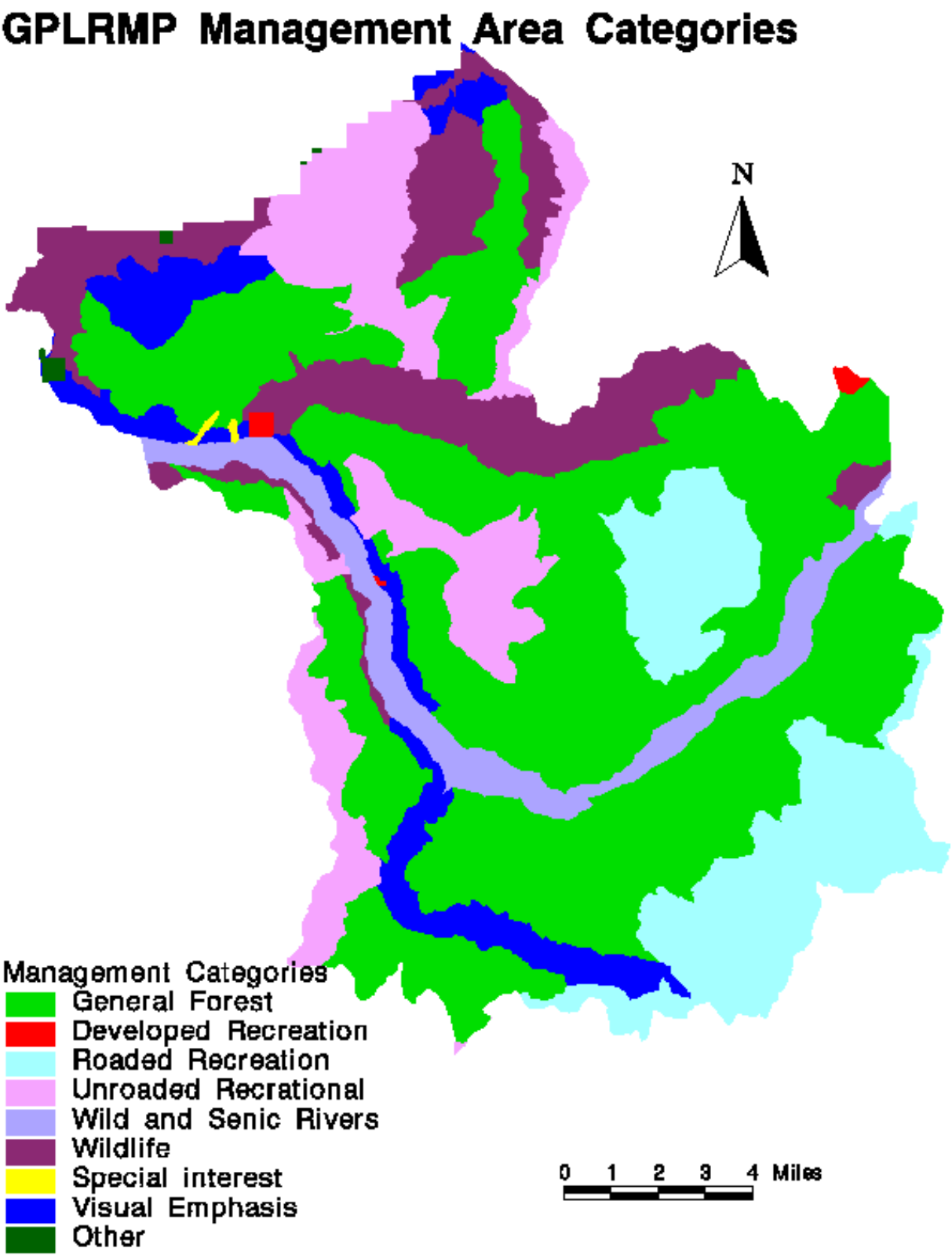


Figure 2-5. Land Allocations from the GP Forest Plan (1990)

Management Area Category Descriptions
(GPFP pp. IV-92:137)

The Cispus AMA overlies ten separate Management Area Categories (MACs), organized into four groups for the purposes of this discussion. The Cispus Landscape Analysis and Design (LAD) incorporated these MACs by applying management objectives to entire landscapes and watersheds using naturally occurring landforms.

a. General Forest: 68,900 acres. 49.8% of the AMA.

General Forest is the Management Area most suitable for commodity production. This allocation includes timber-producing lands as well as areas with such market values as minerals, energy, and forage for livestock grazing. Some lands not suitable for timber management may occur within this area. The ***visual management prescription is Modification,*** and timber harvest is scheduled to contribute to the per decade probable sale quantity. The ***management goal*** for General Forest is to produce a predictable and sustainable level of timber sales and other resources that will not degrade the environment. The ***desired future condition*** allows for evidence of land managed for timber production and other commodities to be apparent. All tree sizes and mixtures of native species from seedlings to mature saw timber are well distributed. Recreational opportunities are available for hunters, anglers, off-road vehicle operators, and other motorists.

b. Scenic Values: 17,734 acres (9,637 in Visual Emphasis, 8,097 in Wild and Scenic Rivers). 12.8% of the AMA.

Visual Emphasis Management Areas designated Visual Emphasis include scenic view sheds that are sensitive because they are viewed by many people from major roads, trails, and recreation sites, including lakes and streams. The ***visual management prescription includes both Partial Retention and Retention,*** and timber harvest is scheduled throughout the designation. The ***management goal*** is to provide a visually natural or near-natural landscape as viewed from the designated travel route or use area. The ***desired future condition*** for Visual Emphasis areas intends that they will accommodate a variety of activities, which, to the casual observer, are either not evident or visually subordinate to the natural landscape. Vegetation is diverse and includes a wide variety of tree species and sizes, both living and dead. Stands exhibiting mature and old-growth characteristics may be common. Viewing scenery, hiking, and camping occur, and access to other recreational facilities is provided.

Wild and Scenic Rivers The Wild and Scenic River allocation includes lands within one quarter mile of designated rivers within the Forest appearing to be both eligible and suitable for addition to the National Wild and Scenic Rivers System. The ***visual management prescription is Retention,*** with some timber harvest scheduled. The ***management goal*** is to protect the Wild, Scenic, or Recreational River characteristics pending possible addition to the National Wild and Scenic Rivers System. The ***desired future condition*** allows some structures and evidence of timber harvest to be visible, but the shorelines are to be largely undeveloped. The rivers are accessed in some places by road and in some instances a major travel route parallels the river.

c. Wildlife 14,598 acres. 10.5% of the AMA.

Deer and Elk Winter Range These Management Areas are typically less than 1,800 to 2,200 feet in elevation, depending on the aspect (the compass direction that the land faces). Other included lands are those areas known to be used by deer and/or elk during an average winter. The ***visual management prescription includes both Modification and Partial Retention,*** and timber harvest is scheduled. The ***management goal*** is to provide a mix of forage and cover over the entire Forest that, over time, maintains a level of deer and elk commensurate with other resource management goals and objectives. The ***desired future condition*** allows management activities, including timber harvest, to be locally apparent. Tree species and sizes are varied and well distributed. Optimal cover (basically, stands at least 120 years old with average tree diameters of 21 inches or more) may be present, particularly to meet the goal of maintaining at least 44 percent of the biological winter range in optimal cover. Dispersed recreation, viewing wildlife, and hunting are among the recreational opportunities, although most secondary roads are closed during the winter months.

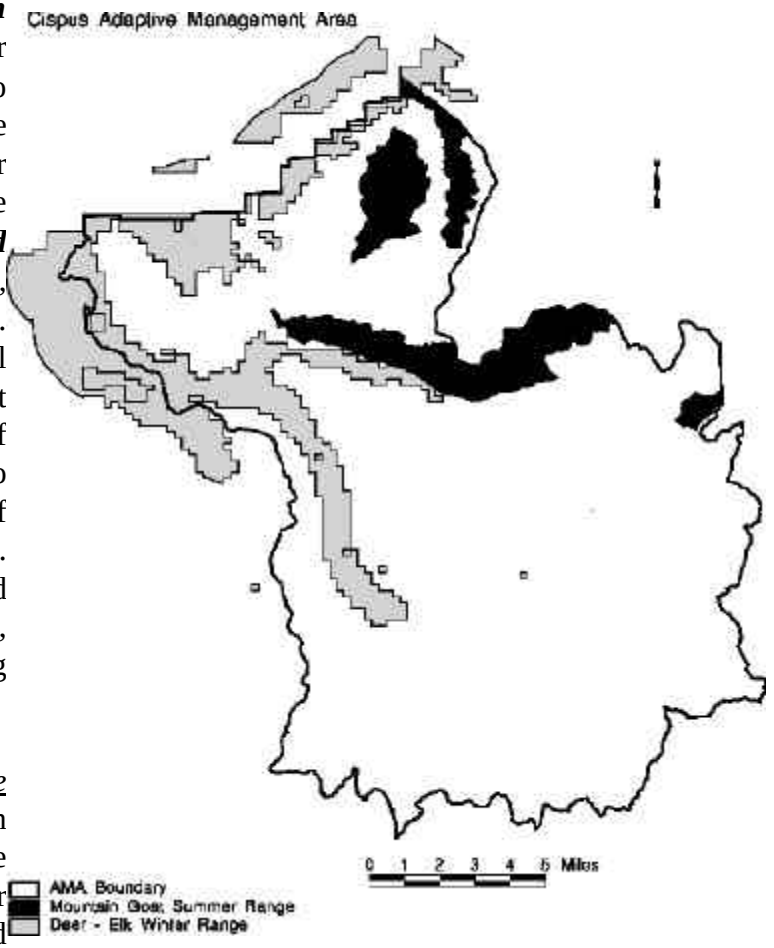


Figure 2-6. Summer/Winter Range of Big Game.

Mountain Goat Summer Range & Winter Range These allocations include places where mountain goats are known to exist or to have existed in the past. Summer range is characterized by higher elevation habitat where coniferous slopes and rocky and ledge-type terrain are interspersed. Gently sloping meadows within the above habitat are commonly used for feeding and, sometimes, resting. Winter range habitat is typically characterized by mid-elevation steep slopes with heavy coniferous forest cover. These areas may have avalanche chutes, rock outcrops, cliffs, and ledges. The ***visual management prescription includes Modification and Partial Retention.*** Timber harvest is scheduled. The ***management goal*** is to manage habitat to provide forage and cover that maintains the present (1990) Forest-wide carrying capacity of 230 animals. The ***desired future condition*** foresees that on summer range and locally on winter range, open ridge areas, rock outcrops, talus slopes, and avalanche chutes are common and are generally in a natural condition. On winter and locally on summer range, some timber harvest areas may be evident but are usually screened by trees. Most trees on forested land will be pole size (5-inch DBH) or larger. Vegetation ranges from natural openings through stands of mature and old-growth timber. There are few roads, and those that do exist usually are closed to

motorized traffic. The area is used by backpackers and hunters and affords outstanding opportunities to view scenery and wildlife.

d. Recreation and Special Interest
36,898 acres in Recreation. 130 acres in Special Interest. 26.8% of the AMA.

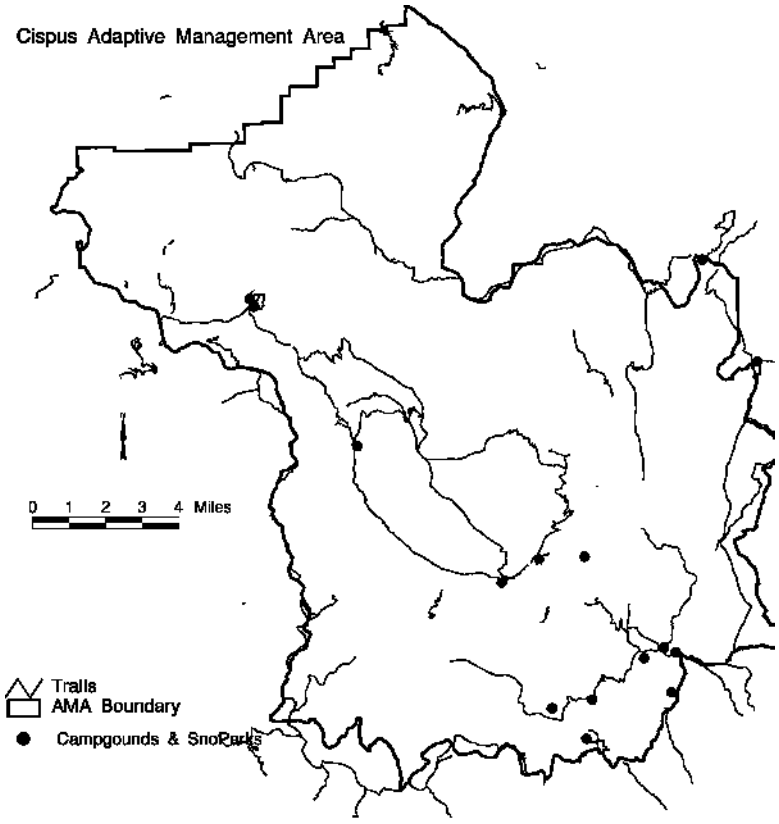


Figure 2-7. Trails and Selected Recreation Sites.

Developed Recreation Developed recreation sites are usually close to water bodies, berry fields, and other areas of scenic or special interest. Except for winter recreation areas, they are usually located on relatively flat land with slopes of less that 10 percent. Soils and vegetation must be able to absorb heavy use. Camp and picnic grounds, ski areas, recreation residences, viewpoints, boat launches, and other facilities may be accommodated. The ***visual management prescription is Retention,*** and there is no scheduled timber harvest. The ***management goal*** is to provide readily-accessible, appropriately-designed facilities for concentrated visitation by people seeking a convenient recreational experience. The ***desired future condition*** allows roads, buildings, ski lifts, tables, docks, and other physical facilities to be evident, but requires that their design and construction will repeat the color, shapes and lines of the surroundings. Openings usually exist to accommodate facilities and provide scenic views; trees and other vegetation will vary widely in type and size.

Roaded Recreation Roaded Recreation areas accommodate dispersed recreation -- hiking, fishing, berry picking, camping, wildlife viewing, rock hounding, winter sports -- beside or near roads. They include unique or distinctive portions of the Forest with features like clustered lakes, berry fields, and roaded scenic corridors. The ***visual management prescription includes Partial Retention and Retention,*** and there is some scheduled timber harvest. The ***management goal*** is to provide a variety of dispersed recreational opportunities in areas conveniently reached by auto. The ***desired future condition*** includes management activities, including timber harvest (if permitted), which are evident, but not conspicuous. Vegetation will remain largely natural in appearance along the major travel ways and may vary from natural openings through stands of mature and old-growth timber. Travel to dispersed sites over roads maintained at a variety of standards is an important aspect of the recreational experience. Much of the area provides for interaction with a near-natural environment. Recreation facilities have been kept at a minimal level of development.

Unroaded Recreation These Management Areas are portions of the Forest with outstanding recreational attributes. They provide quality fishing, hunting, berry picking, backpacking, and other outdoor activities. They may be located near a road but are in a substantially undisturbed condition. The ***visual management prescription is Retention,*** and there is no scheduled timber harvest. The ***management goal*** is to provide a variety of dispersed recreation opportunities in a Semi-Primitive or undeveloped setting. The ***desired future condition*** is the maintenance of a natural to predominantly natural-appearing environment: changes are largely the result of natural succession; campsites, sanitation facilities, and other management activities are few in number and not conspicuous. Wildlife habitats are diverse. Vegetation may vary widely from natural openings to mature and old-growth stands. The area affords visitors an experience that is usually free from the sight and sounds of other people. Principal access is by trail; there are no roads within the area. These Management Areas give visitors the opportunity to practice outdoor skills in a challenging environment.

Special Interest Special Interest areas are places with a special feature or features that are important enough to deserve particular attention. They include a wide range of features, such as waterfalls, scenic spots, caves, and botanical, historical, and geological sites. They are relatively small, with most sized at 20 acres or less. The ***visual management prescription is Retention,*** and there is no scheduled timber harvest. The ***management goal*** is to maintain the special feature(s) in a substantially natural condition, while providing for an appropriate level of public access and enjoyment. The ***desired future condition*** in Special Interest areas is to keep visual evidence of management activities subordinate to the special feature(s). Fences, signs, viewpoints, and other facilities may exist if needed to protect the feature(s) or provide for public use and enjoyment. Vegetation may range from natural openings through stands of mature and old-growth timber. Most features included in this Category will remain in a substantially undisturbed condition.

4. Revision of GPFP Allocations and Prescriptions

This summary of management guidance from the GPFP and NWFP is current at the time of this document. It is important to note that AMA planning efforts, in particular as we implement the Landscape Analysis and Design (described in more detail in Chapters 4 and 5), will suggest revisions to these guidelines for lands within the AMA through knowledge learned from the adaptive management process. All discussions and planning work for Cispus AMA lands (including both the GPFP and the LAD) are based on an evolving understanding of past and current dynamics, conditions, and capabilities of the landscape. See Chapters 4 and 5 for further discussion of future possibilities.

Chapter 3: Processes in Collaboration

This chapter describes the processes used to date which have led to the development of this Guide. The chapter does not present the results of these processes; please refer to Chapter 4, the referenced appendices, or parent documents for results and more detail.

Since the official designation of the Cispus AMA in April 1994, Forest Service personnel have initiated and/or participated in numerous collaborative efforts to figure out how to do adaptive management in the Cispus River watershed. The "processes in collaboration" adapted by the FS were aimed at the development of a coherent and workable vision of what the Cispus AMA can be. Strategies and guidelines for achieving that vision were also priorities for these efforts. Both the actual process of working together and the published documents that came out of that collaboration are vital elements of the journey to shape the identity of the Cispus AMA.

Collaboration has built relationships, introduced new sources of knowledge and experience, and developed increased understanding among participants. The written documents have attempted to reflect the state of understanding and the network of priorities visible and discussed during each collaborative process. These documents, described briefly in Chapter 1 and Appendix A, serve as milestones along the path of putting adaptive management to work on the Cispus.

This chapter outlines the major efforts undertaken by the Cispus AMA, taking them up roughly in chronological order. The discussion of each process is organized around four basic components: the purpose of the effort, important features of the process itself, the nature of learning that took place during and as a result of the effort, and any documents which were produced. The intent of this chapter is to share experiences and their outcomes with others, as well as to highlight the education of participants that continues to take place on the Cispus AMA.

The specific recommendations and guidance provided by these documents for management are discussed in Chapter 4.

A. Upper and Middle Cispus River Watershed Analysis

The Upper and Middle Cispus River watersheds encompass approximately 80% of the Cispus AMA (Figure 3-1). This was pilot project in doing watershed analyses for the Gifford Pinchot National Forest (July 1995). The findings and documentation from this analysis have served as our background and baseline for successive collaborative efforts on the AMA. Analyses of the remaining area in the AMA were documented in the Middle Cowlitz River Watershed Analysis (1997). These findings are currently being entered into the District GIS database and are included in the short-term project plan found in Chapter 5. Future updates of the AMA Guide and the watershed analyses will include other pertinent analyses or lessons learned from research and monitoring projects.

Purpose The purpose of the Upper and Middle Cispus River Watershed Analysis (WA) was stated in the opening of its official report:

> …to develop and document a scientifically based understanding of the ecological structures, functions, and interactions occurring within a watershed, and to identify desired trends, conditions and restoration opportunities. This understanding guides the development of management strategies and projects which respond to human demands for various uses and commodities while maintaining and improving the ecological functions of the system.

Specifically, the information collected in the WA serves as baseline data for project planning and implementation. The data from this and other watershed analyses form a crucial component of landscape-level planning (see section C below) in providing the biophysical background and parameters for management activity. A summary of the WA can be found in Appendix E.

Process The Middle and Upper Cispus River Pilot Watershed Analysis (WA), which began in April 1994, was among the first initiated in the Pacific Northwest region. Nine Forest Service specialists from the Randle and Packwood Ranger Districts worked on the pilot team which developed and conducted the Cispus WA. These staff members were assisted by more than thirty others, plus individuals from the US Environmental Protection Agency and US Fish and Wildlife Service, at various stages in the WA process.

Over the course of several months, the team identified a set of key questions to guide the analysis process, based primarily on the Federal Guide for Conducting Watershed Analysis (1994) and the Aquatic Conservation Strategy (ACS) Objectives in the 1994 ROD. As the questions were being developed and finalized, the team was also gathering together existing data on social use and biophysical conditions within the watershed planning area.

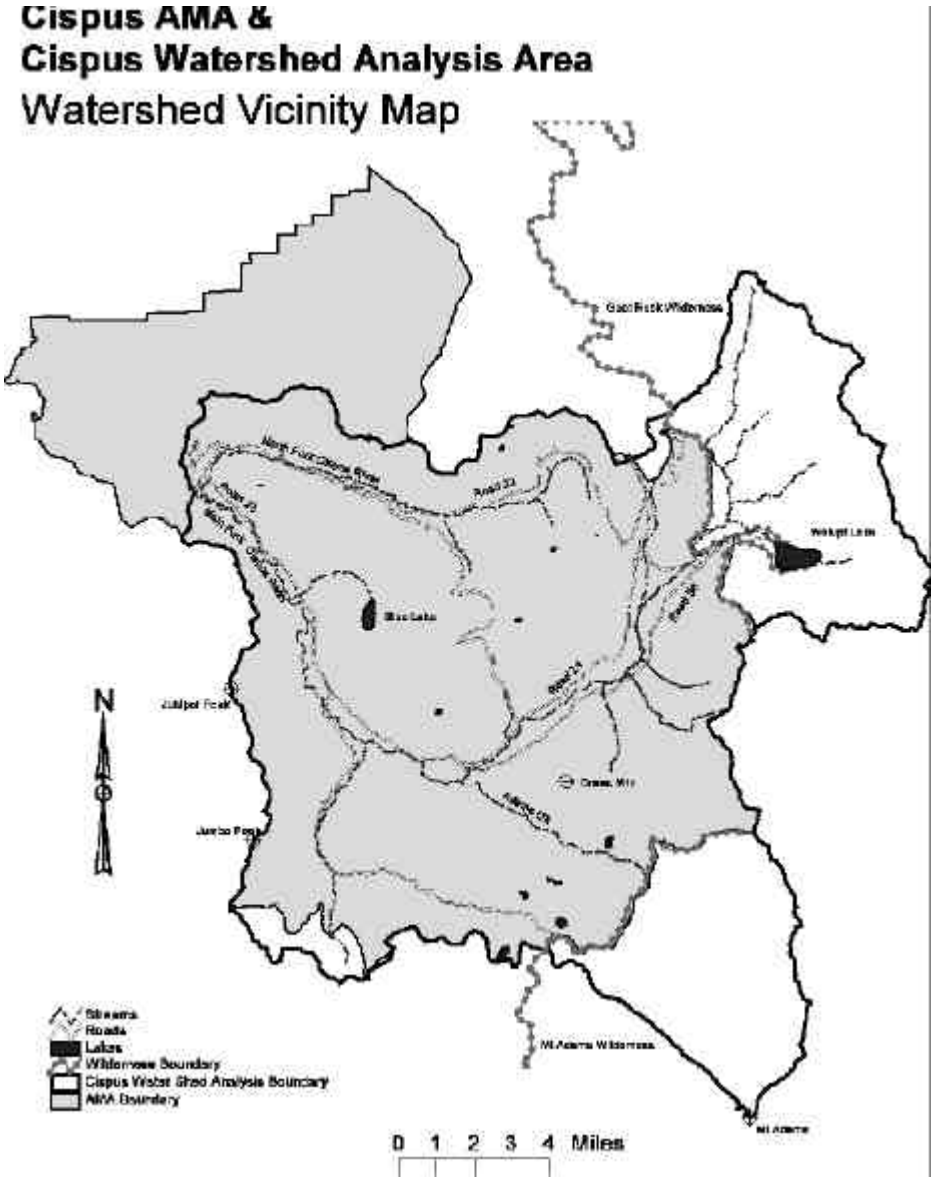


Figure 3-1. AMA and Pilot Watershed Analysis Boundaries.

The public participated in the WA in two ways. An "anecdotal assessment" (WA Appendix F) was conducted with a number of long-time residents and users of the Cispus River watershed, who helped shape the descriptions of past conditions and human use in the watershed. This assessment was conducted using written surveys. In addition, the White Pass High School Multi-media club produced a video of interviews of survey participants titled "The Cispus Watershed." An open house was also held for the public in December 1994, to share the information that had been collected to date. Approximately 15-20 people attended the open house, where discussion was open and friendly.

Nature of Learning Clearly, a significant component of the learning produced by the WA is reflected in the assembly and synthesis of the vast quantities of data about current and historical biophysical conditions in much of the Cispus River watershed. As the first WA to be conducted in this area, the Cispus Pilot WA also served to train agency employees in the requirements and techniques of conducting such an analysis. Learning from the Pilot WA experience, subsequent WAs have streamlined and focused the process, and produced documentation and recommendations increasingly useful to natural resource agencies and the public.

The sheer size of the Pilot WA, and information generated by following watershed analyses, have underscored the need for active data management. Large amounts of data are stored at the Forest Service, but not all of it is easily accessible or usable to other agencies, resource specialists or the public in its current form. Expanded use of GIS within the Forest Service and standardization of database format has facilitated sharing of information and accessibility. A current research project for the AMA is focused on making data access more "user-friendly" to non-GIS personnel.

Documents The Watershed Analysis process resulted in the *Middle and Upper Cispus River Pilot Watershed Analysis*, a document of considerable length (nearly 200 pages with 35 maps and 24 appendices), published in June 1995, and representing the most comprehensive assembly of biophysical data (and including some social data as well) on the Upper and Middle Cispus River watersheds to date.

B. Collaborative Learning with the Public

Purpose At the same time that the Watershed Analysis was getting underway, Cispus AMA staff began an exploration of the "Collaborative Learning" process, developed by Steve Daniels and Gregg Walker of Oregon State University. This process was designed to engage and involve the public in the development of a shared vision for the Cispus AMA. As an approach to interaction between management and the public, Collaborative Learning recognizes multiple perspectives and complex management situations and emphasizes the interconnectedness of the natural and social worlds ("systems thinking"). Collaborative Learning also encourages active and shared learning among these multiple perspectives, which requires an ability to be open-minded to the perspectives and experiences of others.

The purpose in using this approach was not to generate consensus, but to work closely with members of the public to identify issues of concern and share information and ideas in an environment characterized by mutual respect and a commitment to a common cause. Forest Service staff stated up front that they did not know what the outcomes of this process would be, and emphasized their openness to the public and their interest in working together with them.

The following are the basic principles of Collaborative Learning:

- Stress *improvement* rather than solution.
- Emphasize *situation* rather than problem or conflict.
- Focus on *concerns and interests* rather than positions.
- Target *progress* rather than success.
- Seek *desirable and feasible change* rather than desired future conditions.
- Encourage *systems thinking* rather than linear thinking.
- Recognize that considerable *learning* — about science, issues, and value differences —will have to occur before improvements can be implemented.
- Feature *communication and negotiation* interaction as the means through which learning and progress occur.

Figure 3-2. Collaborative Learning Workshop, April 1995. Forest Service Photo.

Process To develop skills in Collaborative Learning, the AMA Strategies core team attended formal training in Collaborative Learning conducted by Steve Daniels and Gregg Walker, of Oregon State University. Drs. Daniels and Walker helped conduct the first public meeting by setting the agenda and helping to prepare the worksheets to be used. During the remainder of the process, the core team attempted to follow the basic framework given in the Collaborative Learning training. As it turned out, the Cispus process did not precisely follow the Collaborative Learning framework, but many of the same principles were maintained or modified as the process was adapted to meet local needs.

Cispus AMA managers kicked off their Collaborative Learning process with the public with an all-day public workshop on April 1, 1995. Notification of the first and all subsequent meetings took place via mailing lists and newspaper notices throughout southwestern Washington. Posters were also distributed locally. Attending citizens were introduced to the AMA and the Collaborative Learning process at this meeting, and worked both individually and in small groups to identify their issues of primary concern regarding the AMA. Meetings took place in a nearby high school library, which provided an informal and educational forum. Over the course of April, May and June, five more meetings were held, each with a particular theme, such as opportunities for learning or defining community.

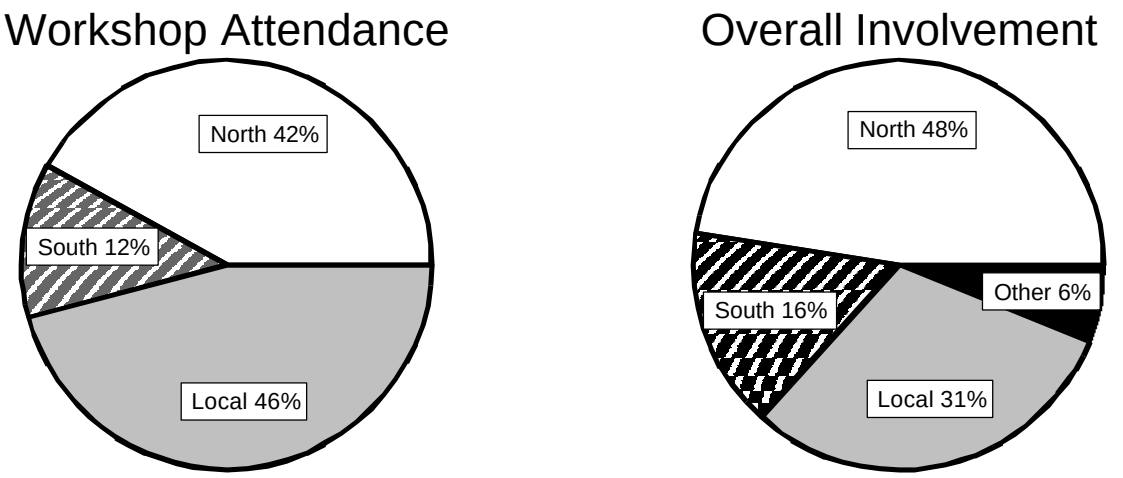


Figure 3-3. Collaborative Learning Workshop Attendance (*left*) and Overall Involvement (*right*).
Local: within 1 hour drive of Randle *South: > 1 hour drive South of Randle*
North: > 1 hour drive North of Randle *Other: > 3 hour drive from Randle*

Analysis of the geographic origin of those involved in the AMA Collaborative Learning process suggested that most of the people interested in the AMA either live nearby to Randle/Packwood or in and near the metropolitan areas to the north (Olympia, Tacoma, Seattle). Thus, although the AMA is located on National Forest lands managed by the Forest Service, the scope of participation was regional, not national. See *Cispus AMA Strategies* (Appendix F) for more information and background on the Collaborative Learning process.

In addition to the Collaborative Learning meetings, approximately 60 people provided written comments on management of the AMA. For the most part, these comments were general in nature, rather than specific to the topic covered at that week's public meeting.

Through the Collaborative Learning process, participants identified prioritized areas of concern, opportunities for learning, and desirable and feasible improvements in the AMA. Attendees themselves prioritized the enormous list of improvements at the last meeting. The Forest Service team took this list of improvements and combined those that were similar or related into a list of 28 improvements, or groups of improvements. Each group was then used by the team leader to define a strategy theme or objective. The result was a list of 28 strategies, each consisting of one or more desirable and feasible improvements proposed during the Collaborative Learning process.

The 28 strategies were presented to the public through the mailing list and at a public workshop held on June 22. Participants' suggestions on wording and further consolidation of strategies were incorporated and the list of strategies consolidated to thirteen. These thirteen strategies are summarized in Table 3-1.

Table 3-1. Cispus AMA Steering Committee Objectives

Number	Title
Strategy #1	Natural Resource Management Education
Strategy #2	Public/Industry Involvement in Research, Inventories, and Monitoring
Strategy #3	Management Using Ecological Principles
Strategy #4	Collaborative Public Involvement
Strategy #5	Forest Products Management
Strategy #6	Community Service Work Opportunities
Strategy #7	Cispus AMA Day
Strategy #8	Recreation Management
Strategy #9	Road Management
Strategy #10	Management for Sustainable Timber Supply
Strategy #11	Restoration Opportunities for Water Quality and Anadromous Fisheries
Strategy #12	Mountain Goat Featured Species
Strategy #13	Wildlife Habitat Management

These improvements are the heart of the Cispus AMA Strategies (see *Cispus AMA Strategies* for more information on the process). The strategies themselves are discussed in more detail in Chapter 4.

Nature of Learning One aspect of the learning that took place during the Collaborative Learning meetings in April, May and June of 1995 was the strength of interest and shared concern among the many different communities involved with the Cispus AMA.

When asked whether their community should be considered one affected by actions within the Cispus AMA, attendees at the May 4 meeting were almost unanimous in answering "yes." Towns in Eastern Lewis County and Pierce County have direct economic ties to the National Forest and are clearly affected by and closely concerned with the management of the Cispus AMA. Other versions of "community" that emerged included the recreation community, or snowmobile, four-wheel drive, or other form of interest or activity-related community. Attendees agreed that all "communities" were equally important to the AMA. The group also accepted the community goals developed by the White Pass Community Self-Assessment team as their goals for the Collaborative Learning and Strategy processes.

The Collaborative Learning process also provided the Cispus AMA with a new approach to take in working closely with the public. The Cispus AMA has continued to use small group workshops and discussion among attendees and one-on-one interaction between citizens and

Forest Service personnel, including District Rangers, in subsequent collaborative work with the public.

Documents The *Cispus AMA Strategies* includes documentation of the process of conducting the Collaborative Learning meetings and developing the strategies, as well as outlines of Gifford Pinchot National Forest direction and the thirteen strategies themselves. It was stressed that this was a dynamic document, intended to change as needed through appropriate deliberation with the public.

In addition, the Collaborative Learning process produced a wealth of focused written comments from the public, such as the compilation of best and worst future images of the AMA from the first meeting, lists of concerns and interests, definitions of involved communities and community goals, and suggested learning opportunities within the AMA (see Appendix F).

C. Landscape Analysis and Design

Purpose The purpose of conducting a Landscape Analysis and Design on the Cispus AMA was to create a graphic, long-term vision for the AMA which tied together the watershed analyses and the strategies developed through the Collaborative Learning process.

There are two basic questions when approaching natural resource management from a landscape level: first of all, what management activities are possible given the current landscape conditions? Secondly, where and when should these activities occur? (Diaz and Apostol, 1992) The Landscape Analysis and Design was intended to provide a projected future condition that is consistent with the underlying legal, social and biophysical components, and within the capability of the ecosystem.

Data gathering on current and historical biophysical conditions within the AMA was conducted during the Pilot Watershed Analysis. In addition, the Collaborative Learning Process identified and prioritized community interests and concerns, and articulated a set of strategies for management activities on the Cispus AMA. Together these processes, the relationships they developed and the written documents they produced provided the majority of the working material necessary to conduct a Landscape Analysis and Design. Indeed, the Landscape Analysis and Design was a natural next step for the Cispus AMA, for it offered a way to integrate these previous efforts and shape a graphic picture of what the AMA landscape could look like.

Process Landscape analysis and design includes both an analysis phase and a design phase. The goal of the ***analysis phase*** is to compile and evaluate information to identify the factors which most influence landscape pattern. In essence, biological and ecological understandings of the land are synthesized with the physical components and social objectives that surround and are at work upon it. This analysis provides a better understanding of how future management actions may ultimately shape and influence landscape pattern. Future actions can then be designed to "fit" constraints and opportunities of the land.

Figure 3-4. Cispus LAD Public Workshop, Jan. 1996. Forest Service Photo.

The analysis phase for this project began with two all-day public workshops (held in January 1996) at which the materials that had been collected for analysis were reviewed and insights and concerns were developed and incorporated into the process by an interdisciplinary, interagency team.

Most of the working materials were in the form of Mylar map overlays. Maps and documentation were sent to the AMA mailing list, and written and verbal comments from the public were also collected and incorporated.

The goal of the ***design phase*** is to provide a visual integration of the analysis data in a projected future condition that reflects the underlying components. Potential objectives for the long-term design were numerous and came from many sources; however, the goal was to achieve a shared vision. Through the integration of the components of the analysis phase and involvement of the public and interagency partners, a few consistent themes became apparent. These themes are summarized below. Several themes which became apparent during the analysis phase were used to guide the designs. The following broad objectives help answer the questions "What ecosystem conditions do we want?" and "What is possible within these conditions?"

- Ensure high quality recreational activities.
- Provide a predictable and sustainable timber yield.
- Maintain healthy riparian areas and protect water quality and associated fisheries.
- Encourage experimentation and flexibility.
- Provide opportunities for government agencies, researchers, and the public to work together.

The analysis phase focused on detail and complexity and was conducted by resource specialists and the public. The design phase focused on broad patterns and was led by a landscape architect working with an interdisciplinary team. The design seeks to recognize the underlying complexity of the analysis, yet produce a map that is flexible enough to accommodate learning over time, and general enough to be readily understood by the layperson. Broad categories of vegetative pattern and structure were defined that best represent the capabilities of the landscape based upon the underlying resource condition and social objectives.

The Landscape Analysis and Design (LAD) process took place in two major stages on the Cispus AMA. In early 1996, the analysis and design was initiated with the process described above (see Appendix G). The design produced through this process was reviewed by the AMA Steering Committee, who requested the team also develop a range of design options and measurable criteria by which to compare the options. The team also documented critical assumptions and rationale to better assess the potential effects of each option. In response to the AMA Steering Committee, this second stage of analysis and design was undertaken by an interdisciplinary, interagency team from October to December 1996. The options were presented at a workshop in December 1996. This workshop generated more recommendations, ideas, and an additional option from the public. The team incorporated these into the options which were again presented to the AMA Steering Committee in March 1997 for review, along with a summary of the public responses to the options. The Steering Committee recommended the team consolidate similar options, apply the comparison criteria, and develop learning objectives for each option.

The Steering Committee also recommended involving the Southwest Washington PIEC (Provincial Interagency Executive Committee) in the recommendation process to better integrate the landscape design of the Cispus with the province. The seven options were presented to the PIEC and the Provincial Advisory Committee (PAC) in July of 1997. Recommendations from the PIEC were considered in the selection of an option by the Gifford Pinchot Forest Supervisor. The option selected for the Landscape Design for the Cispus AMA does not represent a decision under the National Environmental Policy Act (NEPA), but will be utilized during project planning, and research or monitoring study design, as a guide to identification and description of project proposals and alternatives which are subject to appropriate environmental analysis under NEPA. The selected design option is presented in Chapter 4 of the Guide as our vision for the AMA, and is documented in Appendix G.

The selected landscape design graphically portrays a forest vegetative pattern and structure in the Cispus area two hundred years in the future. The next step for the Cispus AMA is to take this vision and develop ideas for management activities within each vegetative pattern. What activities are appropriate within the objectives of each landscape design unit? How do we apply current silvicultural techniques to obtain these vegetative patterns and structure? What new techniques do we need to research and develop? What scope of recreation activities is possible and appropriate? What are the impacts on local community economies? How will we monitor our progress? We will begin to address these questions and develop ideas for implementation in collaboration with our public, Forest specialists, and research scientists using workshops based on Collaborative Learning. This journey in collaboration and implementation of our vision for the Cispus AMA has only just begun.

Cispus AMA Landscape Design

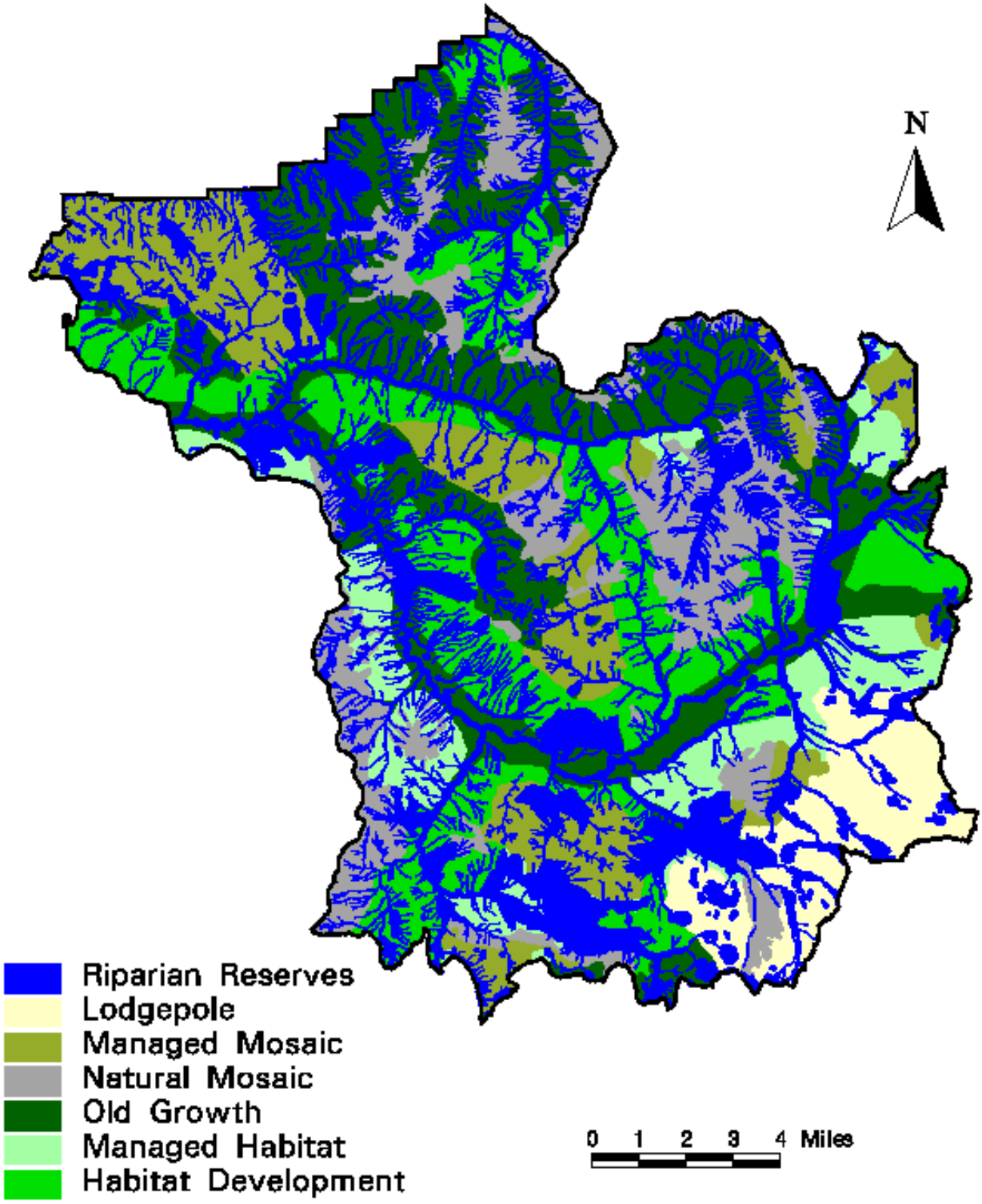


Figure 3-5. Cispus AMA Landscape Design.

Nature of Learning There are numerous lessons to be learned from the Cispus AMA's experience with the LAD process. Measurable criteria which are able to assess a range of aspects of an individual design were identified as priority for the LAD. Though the basic concept of landscape design — to meld landform and biophysical conditions with priorities for social use — seems simple, the LAD method is not an intuitive one.

In the case of the Cispus, the LAD team developed a range of illustrative criteria with which to compare a set of different options, so that decision-makers better understand the potential implications of the selected design. However, the computer tools that were used to model each option were based on assumptions that are not accurate or precise, but hypotheses used to predict conditions in a dynamic ecosystem 200 years in the future. Our task now is to define those assumptions, based on our current knowledge and collaboration with the public, into management prescriptions for project implementation in the present.

The importance of good documentation became clear when it did ***not*** take place. Conscientious and thorough tracking of the steps of a process and the reasons those steps were undertaken is a critical link in promoting understanding of the results of the process among those who were and were not present.

The LAD process on the Cispus also illustrated that even messages which seem clear and specific are still open to multiple interpretations. AMA managers learned during the LAD process that communication is an iterative process, which requires that both parties continually check in with each other to make sure they are still proceeding toward mutually defined goals.

Documents The LAD process produced a long-term design for the Cispus landscape that will shape management projects and activities over time using adaptive management (see Appendix G). Additional products from the LAD include the lessons noted above, the comparison criteria used to understand the various options developed, and the experience of working side by side with citizens, and with representatives from other natural resource agencies, in a hands-on format to capture their ideas, knowledge, and concerns.

D. Research and Monitoring Plan

Purpose Careful and coordinated monitoring can be used to determine whether actions are implemented as planned (implementation monitoring), whether actions are producing the predicted results (effectiveness monitoring), and whether the assumptions underlying the premises of an action are, or were, valid (validation monitoring). Research is a phase in the continuum beyond validation monitoring.

Process The *Cispus Research and Monitoring Plan* was developed through an inter-agency effort. Representatives of the Randle and Packwood Ranger Districts, Pacific Northwest Research Station, US Fish and Wildlife Service, and Environmental Protection Agency participated in the development of the document over the course of four months in the spring and summer of 1996. The development of the draft monitoring plan provided the opportunity for

AMA managers to develop a strong working relationship with the PNW research scientist designated to work with the Cispus AMA (see Chapter 5 for further discussion). The draft monitoring plan was reviewed and accepted by the Southwest Washington PIEC, the Technical Review Panel, and the Cispus AMA Steering Committee (see Appendix H).

Table 3-2. Research and Monitoring Topics and Goals

Topic	Goal
Learning	Learn how to manage on an ecosystem basis in terms of technical, social, and administrative challenges.
Late-Successional Forest	Restore and maintain contiguous areas of unfragmented late-successional (LS) forest sufficient to sustain species associated with LS interior habitat.
Community Interaction	Involve local and affected communities as full participants in ecosystem management.
Healthy Riparian Areas	Restore and maintain healthy riparian areas to provide high quality habitat for terrestrial and aquatic species, while also providing for managed recreation opportunities.
Commodity Production	Optimize timber and non-timber commodity production consistent with meeting ecological principles.
High Quality Recreation	Provide a broad range of recreational opportunities that meet user needs and expectations, while maintaining ecological integrity.

Based on the AMA Objectives outlined in the Northwest Forest Plan and lessons learned from previous efforts in the AMA, broad research and monitoring topics were identified (Table 3-2). As the topics were being developed, learning was obviously a primary concern under each heading. Learning was also broken out as its own research and monitoring topic in order to make sure that it did not get lost among the others.

The six general monitoring categories were then correlated with related recommendations from the Watershed Analysis, Strategies, and the AMA Steering Committee Objectives. It is from these documents that a clear and specific narrative goal was created for each topic. Once this was established, assumptions and monitoring questions specific to each topic were developed.

Documents The primary research and monitoring product is the *Cispus Research and Monitoring Plan,* which will serve as a guide to focus effectiveness monitoring for management projects in the AMA. The monitoring plan provides the specialists, managers and planners with a range of questions to guide learning; the *Cispus Research and Monitoring Plan* is included as Appendix H of this Guide. This list of questions can also serve as a source of project ideas for researchers interested in working with the AMA.

A related product is a research and monitoring database, which is intended to assemble comprehensive information on all projects undertaken on the AMA, and maintain records on learning and monitoring work connected with those projects. Information such as project contact person, protocols, objectives, methods, location, status, cost, and participants will be updated on an annual basis. Updates and revisions to the *Cispus Research and Monitoring Plan* may coincide with the database review.

Chapter 4: Recommendations for Management

This chapter represents our vision of the Cispus AMA reflected within the landscape design option selected by the Forest Supervisor and incorporates the LAD landscape units, the learning themes from the *Research and Monitoring Plan*, and the *Cispus Strategies* developed during the Collaborative Learning process.

The previous three chapters have developed the context for understanding work completed to date on the Cispus AMA as well as legal and administrative parameters. Now we need to apply this background to the management of projects and activities on the AMA. What recommendations can we make for the future that will fit within the structure of our vision? What kind of projects and activities would we pursue? And what does it all mean? This chapter responds to the first two questions by summarizing and organizing the guidance provided for management by the four major collaborative processes discussed in Chapter 3.

Chapter 5 responds to the "what does it all mean" question by suggesting where selected projects could fit into the overall plan for the AMA, and what they might look like in the short term. Together, these final chapters are intended to provide to all AMA participants specific ideas on how to achieve our vision as we collaboratively shape the future of the Cispus AMA.

A. How to Use this Chapter

Each section in this chapter is intended to create a sense of place for the individual landscape units developed in the LAD, our snapshot of the forest in the year 2197. What kind of conditions are intended to be developed there? What kind of experience would you have if you were there? What kind of management activities would be visible? What are the priorities for learning in this area? As you read through each section in this chapter, a general sense of each landscape unit and the management influences and intentions upon it should take shape (the units and their arrangement are illustrated in Figure 3-5). Keep that sense of the individual units in the forefront of your mind as you read — you will want to refer back to this picture as you read Chapter 5.

As project ideas and designs are generated and discussed by AMA participants, this chapter can be used to suggest where on the landscape good opportunities to pursue a particular project exist. In conjunction with the completed watershed analyses and the Landscape Design, this chapter provides information regarding biophysical and landscape-level issues of particular concern. In conjunction with the list of questions from the *Cispus Research and Monitoring Plan* found in Appendix H, this chapter identifies areas and conditions for monitoring. Potential projects, project designs, and opportunities are also provided here.

The descriptions and guidance given here for each landscape unit are intended to provide a way to organize planning for future activities. Comprehensive lists of strategies, monitoring questions and watershed analyses are included in the Appendices and the parent documents for those seeking more specific information.

Each section in this chapter includes three components: a landscape description of the unit, a learning theme for the unit, and suggested projects and activities.

Landscape Unit Descriptions The *Landscape Analysis and Design* generated a set of landscape patterns into which the AMA landscape will be categorized. The landscape descriptions below are based on goals and objectives for each unit as described in the LAD, and give an overall, long term perspective of what that place on the land will potentially look like. These descriptions also include suggestions for the type of activities that may take place within that region.

More work remains to define the parameters that will guide management activities within the landscape units. This work will be done collaboratively with our public and involved agencies to reflect the many interests and values of the Cispus area. Planning areas and project objectives will build on the landscape design, *Cispus Strategies*, and learning objectives from the *Research and Monitoring Plan*. Project decisions in the AMA will follow the NEPA process.

The next GPFP revision is scheduled to begin in 2002. At that time, our assessment of projects conducted using the objectives of landscape design will be evaluated for how well they met the learning objectives and designated emphases of the Cispus AMA and what we learned through monitoring. The lessons learned in this process could then be incorporated into a revised direction for the GPFP; this Guide would also be updated to include that information.

Learning Themes How will our work within each landscape unit contribute to our learning? The *Research and Monitoring Plan* provides several themes to guide management activities based on adaptive management's requirement to design and act for learning (see Table 3-2):

- Learning
- Late Successional Forest
- Community Interaction
- Healthy Riparian Areas
- Commodity Production
- High Quality Recreation

These themes are based on the special emphases designated for the Cispus AMA in the ROD, and also support the objectives identified by the Cispus AMA Steering Committee and recommendations from watershed analyses.

Within each landscape unit, learning themes highlight the unique opportunities for learning which exist there. Researchable questions included within each Learning Theme provide guidance for project planning and monitoring.

For example, when reviewing future planning areas, FS planners and specialists would first identify which landscape units are within and contiguous to the boundaries of the planning area, and the objectives for those units. They would then use the Learning Themes in this chapter to help identify what kinds of learning are well-suited to activities taking place within that particular landscape unit. The scope of themes and projects in a planning area will be expanded during field trips and workshops with the public, other agencies and participating Indian Nations.

Projects and Activities How will we approach the task of learning within each landscape unit? What will we actually **do** on the ground? Specific ideas which incorporate learning into management projects and activities throughout the AMA were identified in the *Cispus Strategies*. Projects and activities appropriate for each landscape unit are included here.

Watershed analysis also identified recommendations which could be considered throughout the AMA. These recommendations are associated with site-specific conditions that are not necessarily associated with any particular landscape unit. Watershed analysis recommendations are included in the discussion of appropriate projects and activities in this chapter as well as in the discussion of specific projects and activities in Chapter 5. Potential project collaborators and funding sources for various strategies will also be discussed in Chapter 5.

Based on the Learning Themes and Strategies for a particular landscape unit, planners and managers will be able to identify a range of questions and issues to be monitored during activities proposed for that unit. Appendices E and H provide more specific, comprehensive lists of recommendations and monitoring questions for managers to use as they continue to design and implement projects and other activities.

B. Management Guidance for each Landscape Unit

1. Old Growth and Riparian Reserves

Landscape Description

Areas designated as **OLD GROWTH** are characterized by old and typically large diameter trees. Stands are 170 years old or more, with average diameters of 30 inches or greater (although size class varies as a result of environmental conditions). The trees provide a variety of unique habitats, whether alive or dead, standing or fallen, on the ground or in streams. Important structural elements include snags and living trees, coarse woody debris, downed logs in various states of decay, patches of shrubs, and long canopy layers. Canopy gaps and small openings throughout the stand also provide for structural diversity. In low-lying areas, trees species such as Douglas fir, western hemlock, western red cedar, and grand fir are found.

Figure 4-1. Old growth.

Areas defined as **RIPARIAN RESERVES** include permanently flowing and intermittent streams, lakes, ponds, wetlands, and unstable or potentially unstable areas. They are critical to providing habitat for riparian-dependent species, improving travel and dispersal corridors for many animals and plants, and providing for greater connectivity of the watershed. Riparian vegetation moderates high stream flows by decreasing water velocity and enhancing the deposition of fine sediments and organic debris. The vegetation is also important as a source of shade. Tree-dominated riparian plant communities are a source of large wood, essential for creation of structural habitats for aquatic organisms. The wildlife habitat provided by riparian vegetation strongly influences terrestrial animal diversity.

Many landscape functions, learning themes and objectives are common between old growth and riparian reserves; they will be discussed together in this section.

Old growth and riparian reserves provide an environment where wildlife such as cougars, woodpeckers and northern spotted owls can nest, forage, hunt for food, and reproduce. Deer and elk hide from predators here, and these and other species use both old growth and riparian corridors to travel from one region to another. The large, dense canopy has a moderating effect on temperature, ensuring the survival of epiphytes, (plants, usually mosses and lichens, growing

on trees) insects, birds and mammals. The sheer biomass of old growth forests also plays an important role in nutrient cycling. Old growth areas also provide protection for the riparian areas and other watershed values.

Old growth and riparian reserves can provide opportunities within the full range of ROS (Recreational Opportunity Spectrum) classes and are a very desirable environment for many activities. However, standards and guidelines for riparian reserves prohibit or regulate activities that retard or prevent attainment of Aquatic Conservation Strategy objectives (Appendix G, Reference E). The old-growth design unit may be most suitable to activities classified as "semi-primitive," which provide for rustic facilities, or none at all, with few social encounters. Ideally, visitors use these facilities to experience the quiet, solitude, and natural diversity of the area. Recreational opportunities include driving for pleasure, hiking, camping, nature study, photography, berry and mushroom picking, hunting, fishing, mountain biking, and horseback riding. Special forest products also occur in old growth forest and are likely to be harvested here.

Some timber volume may be produced as a result of habitat improvement projects, including thinning of young stands to accelerate late successional forest development.

Learning Themes

Late-Successional Forests. Projects and activities in old growth areas could be designed to improve our understanding of late-successional forest ecosystems and how they are affected by human activities. Our current knowledge leads us to believe that through various management practices, it is possible to restore and maintain unfragmented late-successional habitat. We assume that plant and animal species associated with old growth habitat require large, contiguous blocks of forest characterized by late-successional structure. We also assume that old-growth-dependent species' dispersal and genetic exchange rely on connectivity between late-successional areas.

Since this is an Adaptive Management Area, our job is to test these assumptions and to more effectively plan and design future management practices. We can test these assumptions by including questions such as the following into the monitoring and evaluation of projects (either individually or collectively) which take place in old growth areas.

- What silvicultural techniques, if any, better accelerate the development of late-successional structure?
- What road densities affect the ability of late-successional blocks to support associated species?
- Is late successional forest within the Cispus AMA providing connectivity with areas outside the AMA boundaries, and is that important?

Healthy Riparian Areas Riparian Reserves within Old Growth areas provide the opportunity to assess the quality of riparian resources within areas which are minimally managed. This will in turn be compared with the quality of riparian resources within areas subject to more intense

management activity, such as the Managed Mosaic landscape unit. One assumption for management of riparian areas is that to be healthy, they should be characterized by vegetation which is diverse both in terms of the species present and in terms of the physical structure it creates. Healthy riparian areas are also presumed to be associated with sources of large woody debris. We assume that connected riparian habitat areas provide unique habitat as well as transportation and migration opportunities for wildlife. Current knowledge also indicates that good water quality and fish habitat both require healthy riparian areas.

Activities within riparian areas can be designed with the following sample questions in mind:

- How does the diversity of overstory species affect the quantity and quality of riparian functions?
- What is the relationship between riparian vegetation and stream bank stability?
- Which species are using riparian areas as primary habitat, or for transportation, and why?
- How is water quality changing as riparian areas are restored?
- What techniques are effective in reducing sediment delivery from existing roads? (restoration, reconstruction, closing, decommissioning)
- What is an acceptable level of recreation activities in riparian areas, and what is the effect of recreation activities on late-successional dependent species?

Projects and Activities

Strategy #1: Natural Resource Management Education Education activities in old growth settings include courses, field work, or guided tours for students and visitors of all ages. As they learn about the forest, these individuals could also collect data of use and interest to FS managers, planners, and specialists. In this way, the public could learn about and assist with data collection in particular areas of concern in old growth, including assessing the number and use of snags and downed logs, stream conditions, wildlife use patterns, and stream and road restoration opportunities and project effectiveness.

Strategy #3: Management Using Ecological Principles Old growth provides an opportunity to assess ecological functions and species diversity for populations within areas subject to minimal management and activities. Primary activities in old growth will be to observe, measure, and monitor resource conditions in order to provide a comparison with areas subject to different levels of management and activities.

Strategy #8: Recreation Management Both developed and dispersed recreation opportunities exist in old growth areas, primarily along roaded access and frequently sited within or near riparian areas. Activities related to recreation within old growth areas could include monitoring and assessment of effects of recreation on species associated with old

growth, effects of developed facilities and dispersed recreation sites near riparian areas, and relationships between recreation use and habitat capability.

Strategy #9: Road Management Roads within old growth areas and riparian areas may affect both habitat use and the effectiveness of the habitat. Activities and projects could include testing methods of road management which are compatible with the goals of the old growth landscape unit, such as assessing and adjusting the timing, frequency, and intensity of road use. As recommended by watershed analyses, projects could be intended to reduce road-related impacts to nearby riparian areas.

Strategy #11: Restoration Opportunities Water quality and anadromous fish runs are a focal point for restoration activities in old growth. Projects and activities could include the introduction of large woody debris in streams, removal of non-natural barriers to fish passage, and planting vegetation to provide shade over or along streams. Specific locations for needed improvements are described in watershed analyses, and in documentation and maps generated by teams organized after the floods of 1996-97.

Strategy #13: Wildlife Wildlife associated with old growth areas prefer to use late-successional forests and interior habitat for forage/hunting, reproduction, migration, or cover. Primary activities would be associated with assessing and monitoring wildlife population trends and the location and use of migration corridors and interior habitat.

2. Managed Habitat and Habitat Development

Landscape Description Areas designated as **MANAGED HABITAT** are characterized by a mix of young, middle-aged, and older forest stands. Tree species vary throughout a range of elevation bands. As a result, scenery may change frequently as one moves through these areas. Small openings may be created through activities such as timber harvests and habitat enhancement projects, or naturally occurring, including old landslides, rocky outcrops, and meadows.

Figure 4-2. Managed Habitat.

With its diversity of stand structures, Managed Habitat provides for both small, open forage areas (such as young stands favored by deer, elk and mountain goats), dispersal habitat and cover within the older, more dense stands.

Late-successional forests could be maintained within riparian reserves in Managed Habitat to provide riparian protection as well as travel corridors for late-successional dependent species. The natural character and diversity of this unit provides an environment for most kinds of recreational activity. Changing landscapes of vistas, small openings, and different seral stages combine to offer opportunities for a variety of recreational activities throughout a range of development and use intensity. An emphasis placed on wildlife habitat values, however, favors recreational activities that are smaller in scope and development. Travel through the unit to other destinations, scenic viewpoints, driving for pleasure, and hunting are appropriate activities. High levels of use, whether by motorized trail users or campers in concentrated areas, may compromise the habitat values and objectives in some cases.

Moderate volumes of timber production could contribute to economic outputs.

Areas designated as **HABITAT DEVELOPMENT** are similar, in many ways, to the character and management objectives of the Managed Habitat design unit. A range of elevations results in a variety of forest types, habitats, and recreational opportunities. However, harvest openings are generally smaller in size than in managed habitat, intended to mimic small, naturally occurring openings. This design unit places additional emphasis on the restoration, maintenance, and connectivity of late-successional forests, and also includes mountain goat winter range. An active thinning regime may be used to develop structural features characteristic of older forest types. Silvicultural treatments could include manipulation of the distribution and abundance of coarse woody debris, down logs and snags, and the creation of habitat for cavity-dependent species.

Figure 4-3. Habitat Development. Wildlife project for the creation of habitat for species dependent on coarse woody debris.

The Habitat Development design unit functions as a productivity center, contributes to population stability, and provides travel corridors for late-successional dependent species.

Recreational activities include travel to and from recreational destinations, such as the high lakes campgrounds. Major travel corridors provide opportunities to enjoy scenic viewsheds and access to developed and dispersed recreation sites within the design unit.

Moderate volumes of timber could contribute to economic outputs.

Learning Themes

Commodity Production Projects and activities in the Managed Habitat are proposed to integrate timber production with maintenance and restoration of late-successional, riparian and aquatic habitat. The smaller size of timber harvest units and an intensive thinning regime to produce structural diversity will provide Forest and timber industry specialists challenges and opportunities for innovation in logging and silvicultural techniques, while concurrently designing economically feasible timber sales.

A variety of special forest products may also be present in Managed Habitat and Habitat Development areas, ranging from mushrooms and beargrass to ferns and other floral greenery. These areas could emphasize learning about the effects of harvesting these products on both the biophysical environment and the local economy. Nearby communities have expressed an interest in learning more about community economic development opportunities associated with a range of non-timber forest products in order to diversify local economies.

As projects and activities are considered for Managed Habitat and Habitat Development units, planners and managers could address the following questions:

- Are designated areas appropriate to the underlying landscape and natural disturbance patterns?
- Are forest stands responding as expected to management activities?
- Which silvicultural and harvesting techniques can be economically utilized in steep areas with few roads?
- What is the contribution of non-timber commodities to the local economy?
- Can projects be designed to enhance production of non-timber commodities?
- How can silvicultural techniques and non-timber commodity management be coordinated to optimize economic outputs?

Community Interaction The variety of management practices available to be used in these areas also offers a particularly good opportunity to learn about how the FS and community can work together in the planning process — what techniques seem to work, and why? The following sample questions could be asked:

- Do management decisions reflect what is learned through community involvement?
- Has the way the public is involved in forest management changed over time?
- Has the agency adapted to accept and use monitoring data from the public?

High Quality Recreation The recreation priority in Managed Habitat is the maintenance of scenic viewsheds along thoroughfares to major recreational sites. Recreational activities here include travel to and from recreation destinations (such as high lake campgrounds) along

major travel routes which often provide opportunities to enjoy scenic viewsheds, and developed and dispersed recreation sites within these units.

Managed Habitat and Habitat Development units would be good places to test assumptions associated with the range of recreational activities desired by people who use the AMA. Learning here could also address the types of recreation facilities people prefer. An emphasis on reduced road density makes Managed Habitat an appropriate location to learn about patterns of public use of the road system, as well as about methods for working with the public in planning and implementing road management activities, such as road closures or restrictions for certain types of vehicles.

Questions which may promote learning about recreational use and related road issues in these landscape units include:

- What range of recreational opportunities is the public seeking on the Cispus AMA? What is the appropriate level of various recreational activities?
- Are there incompatible recreation uses that make it necessary to provide separate locations for different activities?
- Are road designs, densities, and maintenance levels appropriate in terms of providing a range of activities and protecting ecological values?
- Do road conditions promote the intended recreational uses of the areas they serve?
- Do interpretive materials and collaboration cause changes in behavior of users toward forest resources, forest facilities, and various other recreation interests?

Projects and Activities

Strategy #2: Public/Industry Involvement* and *Strategy #10: Management for Sustainable Timber Supply Habitat Development units provide the opportunity to collaborate with timber industry specialists to design projects testing the technical and economic feasibility of small harvest units and the harvest of small diameter logs. Projects and activities include timber sales which present opportunities to test emerging technology in timber harvest equipment or wood products manufacturing.

Strategy #3: Management Using Ecological Principles Managed Habitat areas are intended to be in a condition which provides for dispersal of late-successional dependent species between other landscape units, particularly Old Growth. Projects here would integrate this goal, which is based on ecological principles, with moderate commodity production and the maintenance of scenic quality. Harvest units within timber sales here could range from 2 to 5 acres, mimicking small-scale natural disturbances.

Monitoring could include contrasting these openings to areas where changes in vegetative structure and composition result from natural disturbances. Reducing sediment delivery to streams and improving other water quality characteristics would be considered during the design and location of timber harvest and associated access roads.

Strategy #4: Collaborative Public Involvement Public participation in planning timber sales and other management activities within Habitat Development and Managed Habitat units will present opportunities to reduce conflicts and confrontation among groups with differing opinions and concerns regarding the use of forest resources. Activities would focus on applying and adapting Collaborative Learning principles by promoting and facilitating dialogue between individuals or groups. Forums would test our ability to incorporate a diversity of views and develop projects that are mutually beneficial to all participants.

Strategy #13: Wildlife Habitat Management* and *Strategy #12: Mountain Goat Featured Species The forage, habitat, and dispersal needs of those wildlife species which favor edge habitat could be balanced within a mix of stand ages and types. Projects and activities which can test these relationships include timber sales with varied silvicultural prescriptions (such as group selection or individual tree harvest) to produce a wide range of vegetative characteristics, from multi-layered canopies to small openings.

Use and population trends of wildlife within these areas — particularly mountain goats within Habitat Development units — could be monitored to determine how they compare to other landscape units, such as Old Growth or Managed Mosaic.

Strategy #5: Forest Products Management Special forest products are likely to be harvested throughout this landscape unit. Projects and activities related to special forest products in these areas will be primarily concerned with two issues. First, activities could include monitoring harvest rates and their ecological effects by experimenting with stewardship sales or designated areas for harvest of specific forest products. Activities by local communities in this area could include testing the feasibility of local collection and/or processing facilities for selected forest products.

Strategy #8: Recreation Management The utilization of developed sites and dispersed recreation opportunities in Habitat Development and Managed Habitat is strongly associated with the scenic attributes of the area and the ease of roaded access. Projects and activities would focus on self-supporting recreation opportunities. This could include increasing dispersed recreation sites and trails that are self- or user-maintained.

3. Managed Mosaic

Landscape Description Compared to other landscape units, **MANAGED MOSAIC** is subject to more human activity and vegetation alteration on a landscape scale. These areas include an abundance of early and mid-successional stands, with fast-growing young trees. The patterns of stands with different tree ages reflect the underlying landforms, with old growth remaining in riparian or specially protected areas. Openings may be large-scale, depending on resource objectives for the area.

Figure 4-4. Managed Mosaic.

This landscape unit is where harvest activity is most evident, intended to mimic past natural disturbances such as wildfires within the Cispus area. Large areas will be open, attracting animals which prefer early successional habitat. The variety of stand structures creates abundant forage and edge habitat.

Because it joins two different habitat types, edge habitat is home to an wide range of birds and animals. Depending on site and climatic conditions, special forest products associated with managed forests (boughs, transplants, evergreens) are available in Managed Mosaic.

The area may serve as a transition zone, providing a travel corridor to more primitive or natural-appearing destinations preferred by many recreationists. It may be more suitable for forms of recreation, such as motorized recreation and larger group use, that may be less appropriate in other, more natural-appearing areas.

While managed mosaic may not be the first choice of recreationists for facilities such as campgrounds, it does offer the advantage of managed stands, good access, and some concessions to fire protection, which facilitate the efficient management of campgrounds and concentrated use. The impacts of such use may be more in keeping with this unit, due to the acceptance of human impacts generated by a variety of uses. Activities may not be forest-dependent, but are enhanced by the forest environment. The area may also provide preferred hunting areas due to the presence of diverse seral stages and more open hunting conditions.

Learning Themes

Community Interaction With its strong emphasis on forest management, including timber production, Managed Mosaic offers ongoing opportunities for learning how to work with the public to plan projects such as timber sales and recreation proposals. What methods work for

increasing the effectiveness of public participation in forest management? Learning could also focus on how to promote acceptance or tolerance between groups with different interests and uses of forest resources.

The higher number of roads in Managed Mosaic areas also makes this unit a natural laboratory for learning about ecological and biophysical effects of roads and road management practices. In addition, high levels of traffic here also make this a particularly appropriate place to test methods of educating the public about forest management practices and the environment.

To address these learning areas, projects and activities in Managed Mosaic units would consider the following questions:

- What management activities are consistent with the general public's ecologic, aesthetic, economic, recreational, and other values?
- Has community involvement led to increased political support of the AMA?
- Have community values and needs been accurately addressed? Are they reflected in management decisions?

Commodity Production Managed Mosaic is an ideal setting to assess how areas subject to high levels of management compare to landscape units with low levels or no management, with respect to maintaining ecosystem integrity. A relatively high level of commodity production is expected from the Managed Mosaic landscape unit. An important assumption to test is whether management activities can mimic the effects of natural disturbances such as wildfire and strong winds. In addition, Managed Mosaic offers opportunities to explore the effects of commodity extraction on recreation use and local and regional economies.

To respond to these learning priorities, projects in Managed Mosaic would incorporate questions such as:

- What intensities of timber production are consistent with desired ecological conditions for different landscape types?
- What effects do management activities have on the occurrence and intensity of natural disturbances such as fire?
- Can management activities substitute for natural disturbances as stand-replacing events?
- What is the contribution of non-timber forest products to the local economy?

Healthy Riparian Areas Managed Mosaic provides a place to study the effects of timber harvest and other commodity production on the health of streams, lakes and wetlands. The intent of the NWFP is to develop and maintain late-successional characteristics within Riparian Reserves, which border all waterways and water bodies. The assumption is that Riparian Reserves will provide conditions which protect the quality of the riparian resource.

Managed Mosaic provides the opportunity to test the effectiveness of Riparian Reserves in maintaining healthy riparian areas.

Questions for activities within Managed Mosaic to test this assumption include:

- How does harvest inside and/or outside of riparian areas affect riparian health?
- How is the attainment of water quality standards affected by various management practices?
- How wide do Riparian Reserves need to be to promote the attainment of Aquatic Conservation Strategy objectives?
- What techniques are effective in reducing sediment delivery from roads?
- What are the alternatives to road-building?

Projects and Activities

Strategy #2: Public/Industry Involvement **and** ***Strategy #10: Management for Sustainable Timber Supply*** Managed Mosaic provides the opportunity to test how well timber produced in the AMA meets the needs of the local forest products industry. Projects in Managed Mosaic would emphasize commodity production and economic return more than similar projects in other landscape units. Projects will be designed collaboratively to provide expertise regarding kinds of products, sizes of trees, wood species and quality, etc.

Strategy #3: Managing Using Ecological Principles Projects within Managed Mosaic could be used to mimic large-scale disturbances, such as wildfire. The location of timber harvest units through time would produce landscape patterns similar to those historically occurring within the area. Over time, projects would be coordinated to maintain stands of varying ages across the landscape in amounts and patterns that are within the range of natural variability. Riparian areas will maintain late-successional connectivity within the Managed Mosaic landscape unit.

Strategy #9: Road Management, Strategy #8: Recreation Management, **and** ***Strategy #11: Restoration Opportunities*** The primary recreation opportunity within Managed Mosaic is dispersed recreation. Projects and activities would include testing methods of road management which are compatible with providing access to projects and dispersed recreation sites. Projects would be intended to reduce road-related impacts to nearby riparian areas. Projects would also restore stream characteristics such as sediment regime and channel conditions to meet Aquatic Conservation Strategy objectives.

Strategy #13: Wildlife Habitat Management Managed Mosaic could provide habitat for wildlife associated with open forage areas and edge. Activities would be associated with assessing and monitoring wildlife population trends. The use of riparian areas as migration corridors for late-successional dependent species through the Managed Mosaic unit would also be monitored.

Strategy #6: Community Service Work Opportunities The level of management activities taking place within Managed Mosaic presents an opportunity to involve juveniles or others with community service obligations to do selected projects (such as tree planting or thinning) or on-going work such as restoration or maintenance. Activities would test our ability to develop long-term relationships with such people or groups.

Strategy #5: Forest Products Management Special forest products associated with managed forests (boughs, transplants, evergreens) are abundant in Managed Mosaic, and they are likely to be harvested throughout this landscape unit. Projects and activities related to special forest products in these areas will be concerned with the same issues discussed in Perforated Forest. These activities could include monitoring harvest rates and their ecological effects by experimenting with stewardship sales or designated areas for harvest of specific forest

products. Activities could also include testing the feasibility of local collection and/or processing facilities for selected forest products in collaboration with local communities.

4. Natural Mosaic

Landscape Description The **NATURAL MOSAIC** design unit is located primarily in high elevation areas dominated by large-scale natural openings and scattered forest. The area consists primarily of high elevation meadows, subalpine parkland, and alpine lakes. Subalpine forests thin out with increasing elevation, due to a short growing season and a snowpack that is deep and slow to melt. The elevation and openness of these areas make for many spectacular views.

Figure 4-5. Natural Mosaic.

Natural Mosaic areas are prime recreation sites, with many semi-primitive, dispersed sites available. People travel by foot, horse, mountain bikes, and motor bikes to take advantage of the area's beauty. Climbing the rocky outcrops found here often rewards the visitor with strong winds and bright sun, and perhaps a mountain goat sighting.

In addition to the views, recreationists are attracted to these areas for alpine lakes, wildflowers, and berry-picking. Big game species, including mountain goats, use these areas as summer habitat. Hunting and special forest products harvest also take place here.

Learning Themes

Commodity Production Several special forest products, including beargrass and medicinal plants, are of particular interest in Natural Mosaic regions. Little is currently known about the levels of harvest that the ecosystem can sustain for these and other non-timber resources. These areas would also make particularly good sites for learning more about the people that harvest these materials, as well as why and how they do it.

- What is the natural production level of special forest products such as beargrass?
- How much of these products can be harvested at what rate without adverse impacts to the resource?

High Quality Recreation The type of recreational opportunities found in Natural Mosaic areas provides an opportunity to learn about the effects of dispersed and semi-primitive recreation

sites, as well as the roads that lead to them, on a fragile environment. Substantial recreational use within these areas also presents the opportunity to study the ways that people learn about the environment as well as the ways in which different user groups interact. Learning here can also include the feasibility of user fees for certain types of recreation on National Forest lands.

Learning about these concerns in Natural Mosaic areas would be facilitated by asking questions along the lines of the following:

- What range of recreational opportunities is the public seeking on the Cispus AMA?
- How can recreational facilities be improved to meet changing user needs?
- What interpretive materials are most effective in communicating with the public?
- Is self-supporting recreation operation and maintenance possible and acceptable to the public?

Projects and Activities

Strategy #8: Recreation Management The Natural Mosaic landscape unit is characterized by a particularly sensitive ecosystem. Projects and activities here would continue to assess and monitor the effects of recreation on fragile plants (one such study is already in progress), watershed dynamics, and other ecological functions.

Strategy 11: Restoration Opportunities For the most part, Natural Mosaic includes relatively dry lands, with few streams or wet areas. Projects and activities related to restoration here would be concerned with identifying, assessing and monitoring impacts of recreation (such as sno-parks) or other uses on lower level areas of the watershed. Natural and prescribed (human controlled) fire may take place here, to test control of natural fire and for meadow enhancement.

Strategy #13: Wildlife Habitat Management **and** ***Strategy #12: Mountain Goat Featured Species*** Mountain goats depend on the Natural Mosaic landscape unit for much of their summer habitat. Research and inventories on goat populations and behavior patterns are already underway, and will be continued. Projects and activities here would also include mountain goat habitat improvement and the development of education programs on mountain goats, their habitat, and how they are managed.

Strategy #5: Forest Products Management Numerous special forest products are important in Natural Mosaic areas, including various berries, beargrass, transplants and other greenery. Projects and activities concerning special forest products here would be similar in design to those identified in the Perforated Forest and Managed Mosaic landscape units.

5. Lodgepole

Landscape Description True to its name, the **LODGEPOLE** landscape unit is characterized by mixed stands of Lodgepole pine and mountain hemlock that are the result of frequent wildfires. The Lodgepole unit consists of one area located in the high elevation, southeast corner of the AMA. Huckleberries are plentiful here, within stands of trees frequently covered with mosses and lichens. Beargrass is another special forest product commonly found and gathered here. Containing high elevation lakes and adjacent to the Mt. Adams Wilderness, the Lodgepole area is the site of substantial recreation, mainly in developed sites. The region also contains potential lynx habitat.

Learning Themes

Commodity Production Management in this area could emphasize habitat enhancement for both huckleberries and wildlife. Natural and prescribed fire are important tools for maintaining open vistas, extensive meadows, and scattered tree stands in this region. Lodgepole is a natural area for learning about the effects of fire.

The relationship between fire and huckleberry growth is of particular interest to several AMA participants. The Lodgepole area is one of the most appropriate regions on the AMA to explore this relationship.

- Is fire an effective tool for non-timber commodities management (especially huckleberries)?
- What are the effects of prescribed fire in this type of ecosystem?

High Quality Recreation The Lodgepole area is the site of significant recreational activity due to the presence of several high lakes in this unit as well as its proximity to wilderness areas. As an important component in the overall recreational picture on the AMA, the Lodgepole unit could serve as a location to test assumptions related to recreational activities associated with developed recreation, such as who utilizes these opportunities, what kinds of activities they pursue there, and whether or not these activities are compatible with one another.

- Which different activities (at what level of use) can be grouped at the same site without conflict?
- Are there incompatible recreational uses that make it necessary to provide separate locations for different activities?

Projects and Activities

Strategy #5: Forest Product Management The Lodgepole landscape unit includes regions of traditional use for huckleberry gathering. Projects and activities in this area would continue the design of research to study the feasibility of maintaining and enhancing the area's huckleberry productivity.

Strategy # 3: Management Using Ecological Principles Landscape patterns in this unit have historically been shaped by fire, both natural and human-induced. Projects and activities here would incorporate controlled fire to reduce the likelihood of large-scale destructive wildfires.

Chapter 5: A Window into the Future

A. Adaptive Management on the Cispus Over Time

While this Guide plays a vital role in the unfolding of the vision of adaptive management on the Cispus, the managers, specialists, scientists and citizens here have not waited for the completed Guide before getting started. Numerous research and management projects have already been designed with adaptive management principles in mind, and more are planned for the future.

Several examples of ongoing and projected activities are highlighted in this chapter. The discussion of these potential projects and activities includes ***tasks*** and other significant elements of project or activity design; a ***vision*** of how these projects or activities would take shape over time; ***potential partners*** and participants; ***potential funding*** sources; and how findings from ***watershed analyses*** would apply to the implementation of the selected projects or activities.

Figure 5-1. North Fork Cispus Drainage. Forest Service Photo.

This chapter does not provide a comprehensive review of current activities or possible futures for the AMA; rather, it selects a handful of specific ideas to give the reader a sense for how the management guidance outlined in Chapter 4 will be implemented. In addition, this chapter endeavors to capture the activities and learning that have been innovative on the Cispus, as well as ideas for future projects to test new ways to manage the land and collaborate with the public.

We eagerly anticipate the next steps on our journey of learning and innovation, and invite all readers to add their ideas for new activities and approaches, from both a social and a biophysical standpoint.

B. Current and Potential Projects and Activities

1. Strategy for Learning

The Cispus AMA's strategy for learning integrates social learning with biophysical learning. This section describes four sets of activities which reflect this approach in different ways. The first example is found in ongoing relationships with local educational institutions, including the White Pass School District and Centralia College, which have been successful in testing how the Forest Service and the educational community can collaborate to provide hands-on environmental education experiences for a range of school-age children.

A second example examines how the Forest Service research community has played an increasingly important role in the AMA, assisting with the design of research and monitoring projects and activities to enable the AMA to meet its learning goals. Innovative forums have provided a third example of the Cispus AMA's learning strategy for participation of interested and concerned members of the public. The final example discusses adaptation in the approaches taken by District staff in their daily work contributing to the management of AMA lands and resources.

Educational Partnerships

In the early days of the Cispus AMA, an exciting new connection was made between the Forest Service and the local school district. In the White Pass area, the school system plays a particularly significant role in local civic activity. Working closely with the schools is thus an important way for the Forest Service to be connected with the community at large. The Forest Service association with local schools has produced several collaborative projects, which are described below, and a participating agreement that promotes exchange of information and expertise.

Figure 5-2. Cispus Environmental Study, June 1996. Photo Courtesy of Carolyn Mullenix.

The Forest Service also maintains a relationship through membership on a White Pass School District vocational education review committee. This committee helps prioritize and give strategic vision to vocational education programs in the local high school.

The ***Cispus Environmental Study*** is an ongoing project that the Forest Service and school district have jointly undertaken. In collaboration with Centralia College (CC), students in grades 7-10 from across Lewis County are brought to Randle for a two-week summer course focused on doing hands-on environmental science in the AMA.

Learning goals for students include understanding the scientific method, gaining hands-on experience with natural resources, and developing a general appreciation for science and the natural environment. The central activity for students is data collection which contributes to monitoring the effectiveness of stream restoration, and monitoring changes in amphibian populations.

Students have direct contact with AMA specialists in training sessions and when reporting their findings to the Forest Service at the completion of their two weeks. CC tests student knowledge both before and after the program, and assesses student perceptions of their experience. Funding from the college comes through Educational Talent Search. The AMA supplies monitoring equipment as a long-term loan to the school district through our participating agreement.

Now entering into its third year, the Cispus Environmental Study teaches young people that science does not have to be distant or intimidating. It is, in fact, found right in students' back yards, and can even be fun. An overnight backpacking trip during the project brings classroom lessons to life, and provides some students with their first major outdoor experience. Parents serve as volunteer aides, and are encouraged to share in the students' experiences.

The prospects for continuing to expand and develop this program are very good, with all three partners in the project strongly committed to its continuation.

In coming years, we envision that this project will contribute to further understanding and appreciation of young people for natural resources, as they become familiar with both the resiliency and the fragility of the ecosystems that surround them.

Figure 5-3. Cispus Environmental Study, June 1996. Forest Service Photo.

Another component of the collaboration between the Cispus AMA and local schools is the ***White Pass Discovery Team***. This summer program is in its third year, providing 20-25 students, divided into smaller teams, with several weeks of employment with the goal of learning about community issues of local concern and interest. The project was initiated by the White Pass Community Self-Assessment Committee, a group of community leaders and social service providers. Funding for this project comes through state and federal employment agencies and social service organizations. The WP School District supplies classroom support, and the AMA funds one of the work teams.

The Discovery Team project provides the opportunity for students to research historical and current features of the Big Bottom Valley. Student research reports have covered issues as diverse as local festivals and recreation providers, the history of logging technology, and the effects of the 1980 eruption of Mt. St. Helens. This year, students interviewed elders of the Yakama Indian Nation and Cowlitz Tribe. They will produce videos and a resource book highlighting the social and biophysical aspects of the Cispus area. During these sessions, students are trained in basic approaches to gathering and analyzing social data. They develop skills such as interviewing, computer use, and writing and producing reports on their findings.

In the future, the Discovery Team could provide an opportunity to learn how to better integrate learning about social aspects of the local community with learning about the biophysical environment in which that community is located. A regular school-year curriculum for community studies is being developed, and may be tested in the White Pass High School. Student research publications will continue to be refined and eventually may be distributed beyond the local area.

A third area of collaboration between local schools and the Forest Service has centered on the development of a math and science curriculum for middle and high school students which would use the Cispus AMA as a learning laboratory. Science and math teachers at White Pass High School, PNW Scientists, and local Forest Service specialists are developing a curriculum, projected to be launched in the 1997-98 school year. Classroom work and data collection will focus on stream ecology and conducting effectiveness monitoring on watershed restoration projects. Field work will include charting stream cross sections, identifying and tagging large woody debris, and monitoring changes over time.

Hydrologists, fish biologists, and engineers from the Forest Service identified appropriate locations in the AMA for student assessment work. Specialists work directly with students to explain the importance of the AMA, and provide training in stream ecology and equipment use. Data collection at these sites will go beyond the basic level of monitoring that the Forest Service is required to do, and will provide information that the Forest Service does not have the time or money to collect. Forest Service specialists have enthusiastically embraced this project, and will help teach the curriculum, providing insights to students such as why the information is necessary and how it will be used.

In the long term, AMA managers are working with the schools to develop GIS and Arc Info capability. Students would then be able to enter their findings by location, and map their results using GIS.

Research Initiatives

Developing a strong research program has drawn on the ideas and efforts of the Cispus AMA's designated research scientist and interested members of the public, as well as researchers from universities around the region and scientists from other government agencies. A wealth of research ideas emerged during public workshops and field trips, with District rangers, scientists and specialists attending to help identify research priorities. This information was incorporated into the *Cispus Research and Monitoring Plan.* An updated list of current research projects can

be found on the Cispus AMA Internet home page (**http://www.fs.fed.us/gpnf/ama**), and is also included as Appendix H in this document.

Two specific proposals, one to study huckleberry management and one to assess the effects of past timber harvest in riparian areas and the applicability of riparian standards and guidelines, are nearing implementation phase.

The huckleberry study will examine and compare the effects of timber harvest and controlled burning on huckleberry production in the Lodgepole landscape unit. Transects have been established, and the first year of data collected. The results of the research will guide future management in Lodgepole ecosystems. The Warm Springs and Yakama Indian Nations are key partners in this research, along with Forest Service PNW Research, Oregon State University and Washington State University.

Figure 5-4. East Canyon Creek. Photo Courtesy of Brian Kirk.

A riparian study will conduct an inventory of the flora and fauna found in riparian zones. The research is intended to assess whether a blanket silvicultural prescription is appropriate for managing riparian areas, or whether localized conditions are more appropriate guides for the width of buffers from timber harvest. Participation in the development of the riparian study has been high. Many local citizens, Forest Service personnel, and university research communities are interested and have been contributing time and ideas. Possible funding sources include the Forest Service PNW Research, EPA, and the Washington Department of Ecology.

Community Forums

Chapter 3 discussed the major educational and participatory forums sponsored by the Forest Service in conjunction with the AMA. The AMA's approach to public participation has been strongly shaped by these processes, particularly the Collaborative Learning workshops. Future forums will continue to emphasize the importance of the knowledge and experience of the public in adaptive management on the Cispus AMA.

Our 1996 Attainment Report reported the many current research and management projects that were a direct result of ideas and recommendations put forth by our public and District specialists during research and Collaborative Learning workshops. AMA managers will continue to broaden the diversity of participants and maintain forums which are characterized by this openness, mutual respect and the spirit of creativity and innovation. A future goal is for public citizens to

come together on their own, taking the initiative to assist with education, project planning and implementation on the AMA.

District Specialists

Staff on the Randle and Packwood Ranger Districts have changed methods of project planning and implementation. To incorporate adaptive management principles, planners and specialists turn to the *Cispus AMA Strategies* to identify potential learning opportunities as well as integrating the concerns and needs of the public into the planning process. The *Landscape Analysis and Design* and this Guide will provide integrated guidance to specialists asking the question: What can we learn here?

2. Timber Harvest

Modeled on the Landscape Design, planning areas in the AMA have been projected to produce just over 40 million board feet of timber over the next five years, or 8 million board feet per year. These planning areas are illustrated in Figure 5-5. These and other projects could also produce important lessons for future management on the AMA, the Randle and Packwood Ranger Districts, and throughout the Forest, by testing the effects of different combinations of management activities in different areas. The timber harvest projects outlined below could also be used to implement the vegetative patterns and structure envisioned by the *Landscape Analysis and Design.*

Long-term timber yield, based on the landscape design, is approximately 12 million board feet per year. Harvest and management activities could provide a predictable supply of timber that is sustainable both economically and ecologically. Evaluation of these projects will assess if this level is of management is sustainable, and how this balances with other priorities for the Cispus area.

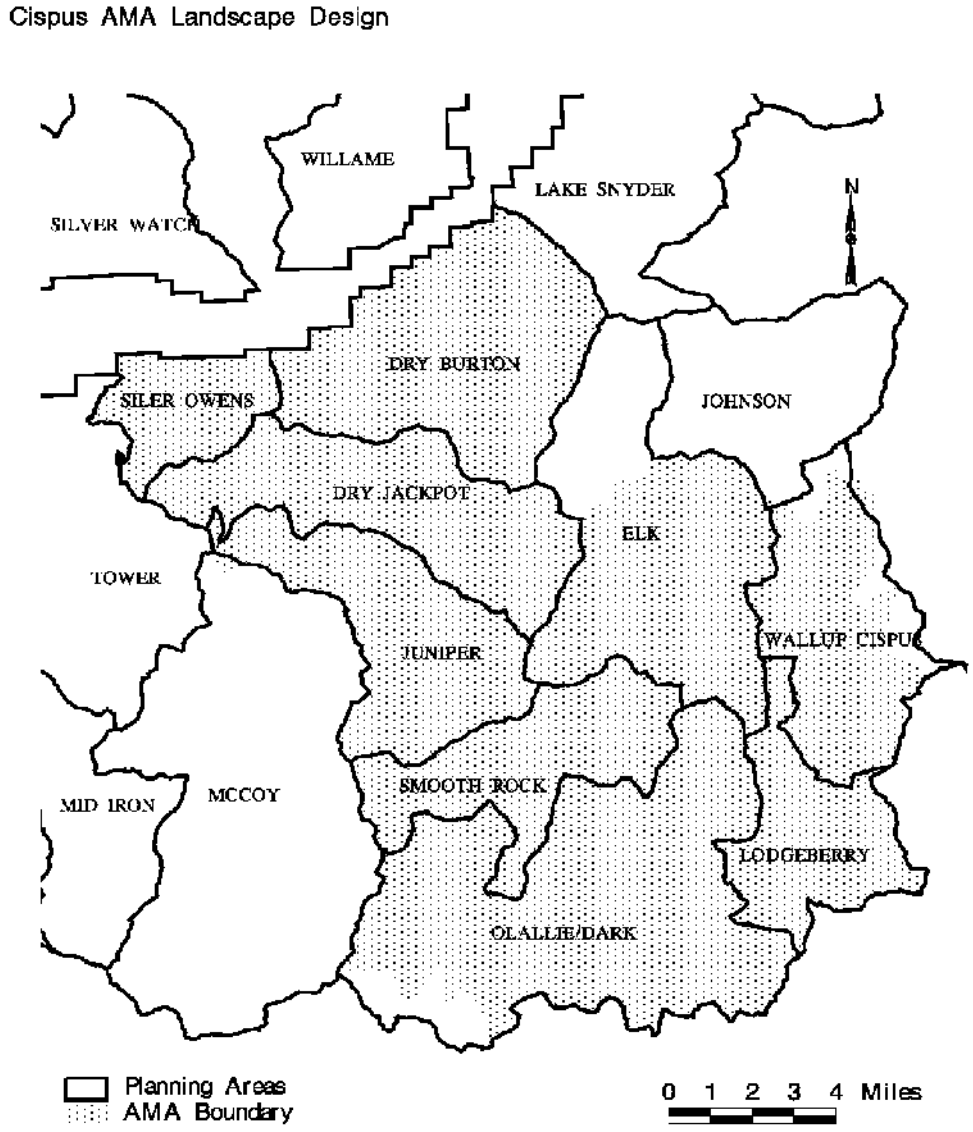


Figure 5-5. Project Planning Areas in the Cispus AMA.

The following chart (Table 5-1) summarizes several aspects of each currently scheduled timber sale, including potentially affected landscape units and primary learning opportunity that have been identified for current projects. Learning opportunities and potential projects for future planning areas will continue to incorporate public field trips and workshops into the initial project scoping process. Project areas and objectives for those areas are reviewed on an annual basis by the SW Washington PIEC.

Table 5-1. Four Year Timber Sale Plan

Planning Area Name and Potentially Affected Landscape Units	Potential Affected Acres	Potential Learning Opportunity
Siler Owens Managed Habitat	300	Located along Highway 12. Test public acceptance of managed habitat openings in area of high visibility.
Cispus Flats Managed Habitat, Old Growth, Habitat Development, Lodgepole	258	Monitor huckleberry production with removal of forest overstory; test different harvest prescriptions for acceleration of late seral forest structure and wildlife habitat.
Dark Canyon Managed Mosaic, Old Growth, Habitat Development, Managed Habitat	347	Opportunity to test effectiveness of riparian buffers throughout landscape units.
Olallie Habitat Development, Managed Mosaic, Old Growth	395	Opportunity to test small openings for harvest and economic feasibility; test landscape design of managed mosaic units.
Dry Jackpot Managed Habitat, Habitat Development	239	Opportunity to test methods of reducing riparian effects from roads. Other opportunities to be determined.
Smooth Juniper Managed Habitat, Habitat Development, Managed Mosaic, Old Growth	1,407	Located in area of high recreation use (along FS Road 23). Opportunity to test compatibility of management activities with high recreation use. Opportunity for research proposal to test effective width of riparian buffers.
Dry Burton Managed Mosaic, Habitat Development, Old Growth	721	Located in area characterized by dense forest of older, small trees. Opportunity to test effectiveness of management activities on overstocked stands.
Upper North Fork Cispus Old Growth, Managed Habitat, Habitat Development, Managed Mosaic	195	to be determined
Green Mountain Habitat Development, Managed Mosaic	170	to be determined
East Canyon Managed Habitat	130	to be determined

3. Community Development Initiatives

Through the AMA, the Forest Service has been involved in several community-based development efforts. The ***White Pass Community Self-Assessment Committee,*** which initiated the White Pass Discovery Team, developed an idea to do community-based social assessments with local high school students. The FS provided research funding and implementation support to the Discovery Team projects. In addition, the Committee conducted a survey of local residents to gather demographic data with the goal of assisting health and human service providers to serve the area more effectively (see Appendix D).

The White Pass Self-Assessment Committee also took the initiative to coordinate with county commissioners, schools districts throughout Lewis County, and a handful of telecommunications providers to investigate the feasibility of providing Internet access throughout the area. By the summer of 1996, this effort had resulted in Internet access across east Lewis County with no long distance telephone access charges. The Self-Assessment Committee example illustrates the power of working in ad hoc committee fashion to accomplish community goals, and shows the empowering role the FS can play within the local community.

A public development authority was formed for East Lewis County in the summer of 1996. The East Lewis County Public Development Authority (ELCPDA) was chartered under the Lewis County commissioners, and has spent recent months putting together an action plan and a prospectus to seek support.

Figure 5-6. Mushrooms on Special Forest Products Field Trip, September 1995. FS Photo.

The mission of the ELCPDA includes a specific focus on creating local employment opportunities from processing and marketing special forest products and other natural resources. Forest Service staff from regional, forest and district levels, including rural community development and special forest products specialists, have provided guidance to the ELCPDA as they develop their vision, which will include developing education and training programs with Centralia College in natural resource management in conjunction with the PDA's employment programs. The PDA was recently award a grant from the Economic Development Council to fund development of a business plan. The PDA also received training support through a Forest Service program which helps with technical assistance and support in community development. This grant allowed to PDA to send their chairperson to a session on rural economic development which may help expand their ideas and opportunities.

4. Restoration

Restoration projects in the AMA will involve District specialists (hydrologists, botanists, fish biologists, and engineers) and PNW Research scientists. Project design, protocols, and staff training will be targeted for innovation. Local students will also be involved with the long-term monitoring component of restoration projects, through the activities discussed earlier.

Lands within the AMA were among the hardest hit by the devastating floods in southwestern Washington in the winter of 1995-96. Repairing the damage from the floods will offer numerous opportunities for testing new approaches to restoration activities. Road management is one focus for restoration. For example, road crossings over streams will be designed to incorporate additional uses, such as fish passage, in addition to road drainage.

Another emphasis is the application of new bioengineering techniques for stream restoration. One innovative method, being developed in collaboration with a graduate student from the University of Washington, is building log structures into stream banks. This should decrease streambank erosion, and even facilitate the collection of debris material, thereby stabilizing the streambanks.

Figure 5-7. Flood Damage on Cispus AMA Road. Forest Service Photo.

Development and implementation of these restoration projects has already begun. In the process of getting these efforts underway, District staff and AMA managers have learned that a significant area of innovation has simply been placing the different types of specialists together on the same team. Working collaboratively has been challenging and rewarding for this team, both in terms of the range and scope of projects that are emerging, and the feeling of accomplishment shared by these team members. More information on flood restoration efforts can be obtained at the Gifford Pinchot Forest Headquarters in Vancouver WA and through the Forest Web page at http://www.fs.fed.us/gpnf.

C. Adapting this Guide

As applicable projects and activities are conducted, monitored, and evaluated for their effectiveness in meeting the designated priorities of the Cispus AMA, this Guide will be adapted in order to incorporate lessons learned. Revisions of the Monitoring Plan could coincide with annual reviews of the Research and Monitoring Database. New projects and innovations on the AMA will be added, and existing lists of involved communities, research and monitoring questions and project ideas will be updated over time.

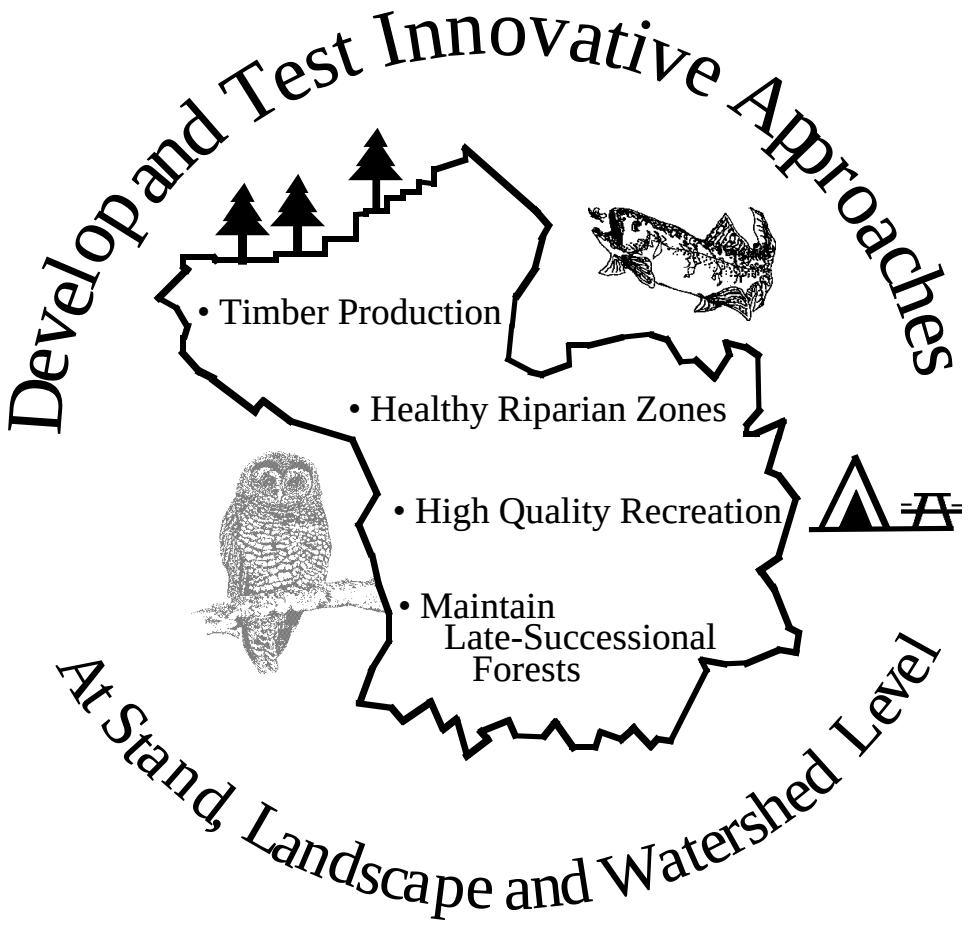
Adaptive Management Areas require creativity and innovation. The regulatory guidelines developed for the AMAs specifically encourage that AMA managers be given the flexibility to try ***new*** things instead of doing business as usual — even when those new things lead to what might traditionally be called failure. The success of adaptive management depends on the establishment of processes for and maintenance of documentation and evaluation. This ensures that learning is not only possible but is designed into all stages of research and management. Increasing our institutional capacity to support and learn from our successes as well as our failures is one of the most significant challenges we face.

Figure 5-8. Cispus River. Photo Courtesy of Brian Kirk.

As the party with regulatory responsibility for the management of the Cispus AMA, Forest Service personnel will continue to contribute time, energy, and other resources to meet the adaptive management challenges of learning and innovation. We will also work to identify ways to improve our working relationships with the many other partners in adaptive management on the Cispus. We have been consistently impressed with the capacity of our partners and many interested participants for openness, respect and creativity. With dedicated agency personnel and committed partners from the public and other agencies, the possibilities are limited only by our imagination. We look forward to sharing the bright future of the Cispus AMA.

Guide to Adaptive Management on the Cispus AMA

APPENDICES



Southwest Washington Province
USDA Forest Service
Gifford Pinchot National Forest
Randle / Packwood Ranger Districts

Preface: Appendices A - I

Appendices to the *Guide to Adaptive Management on the Cispus AMA* are intended to serve as tracking, historical and "futuring" or strategic documents. They were produced in collaboration with the public and other agencies over a period of several years (1994 - 1997). For example, the Community Assessment, Appendix D, was prepared in collaboration with the White Pass School District and Community Self-Assessment Committee in 1997. Appendix F, *The Cispus Strategies*, was completed in 1995 and documents the objectives for the AMA as recommended by participants at that time.

The language of many of the Appendices (e.g. Appendices F and G) is consistent with that used in visioning or strategic planning exercises; recommendations for the future are stated as accomplishments. In practice, much of the material contained in the appendices is used during planning activities as a guide to identification of project proposals and alternatives.

However, nothing in the appendices is intended to constitute management direction; rather, they are strategies considered during landscape and project planning. Information and recommendations may be incorporated into project planning or research and monitoring proposals, and are subject to appropriate environmental analysis under the National Environmental Policy Act (NEPA). Additionally, no new Standards and Guidelines are included, and recommendations and actions are designed to meet standards and guidelines of the Gifford Pinchot National Forest Land and Resource Management Plan, as amended by the Northwest Forest Plan. Therefore, current Forest Plan standards and guidelines are applicable to the Cispus AMA. Readers and users of the Appendices and the Guide should keep in mind that the AMAs may, through appropriate NEPA processes, implement research or administrative studies that depart from existing standards and guidelines to evaluate implementation, effectiveness, underlying assumptions or feasible alternatives and will be subject to all applicable procedures for conducting environmental analysis under the National Environmental Policy Act (NEPA) and its implementing regulations.

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Appendix A
Parent Documents and Other References

Parent Documents

Randle and Packwood Ranger Districts. 1995. *Middle and Upper Cispus River Pilot Watershed Analysis.*

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Appendix B
Technical and Social Objectives for AMAs

April 1994

(Excerpted from the Record of Decision, p. D-3)

Technical Objectives The primary technical objectives of the AMAs are development, demonstration, implementation, and evaluation of monitoring programs and innovative management practices that integrate ecological and economic values.

Technical topics encompass a broad spectrum of disciplines and scales, ranging from the welfare of individual species to considerations of the landscape as a whole. Topics include:

- Creation and maintenance of a variety of forest structural conditions including late-successional forest conditions and desired riparian habitat conditions.
- Integration of timber production with maintenance or restoration of fisheries habitat and water quality.
- Restoration of structural complexity and biological diversity in forests and streams that have been degraded by past management activities and natural events.
- Integration of the habitat needs of wildlife (particularly of sensitive and threatened species) with timber management.
- Development of logging and transportation systems with low impact on soil stability and water quality.
- Design and testing of effects of forest management activities at the landscape level.
- Restoration and maintenance of forest health using controlled fire and silvicultural approaches.

Social Objectives The overarching social objective of the AMA Network is to experiment with policies and management, allowing opportunities for agencies, other government entities, non-government organizations, local groups, landowners, communities, and citizens to work together to develop unique management strategies that are respectful of, and responsive to, local issues and concerns. Full participation by all stakeholders involves many types of learning, including learning how to work together, gaining understanding of the information that is involved to provide equal footing, and learning from the results of our work.

Appendix C
List of Active Cispus AMA Participants

(does not include individuals or informally organized groups except for team members)

Education, Research and Monitoring

Cispus Learning Center
Columbia Learning Center
White Pass School District
University of Washington
Oregon State University
Washington State University
Pacific Northwest Research Station, Portland
Pacific Northwest Research Station, Seattle
Pacific Northwest Research Station, Corvallis
NW Indian Fisheries Commission
Yakama Indian Nation
Warm Springs Indian Nation
Tacoma City Light
Washington State Department of Ecology
The Evergreen State College
Centralia College
Wolftree, Inc.
Geologic Society of America
National Marine Fisheries Service
Environmental Protection Agency

White Pass Community Self-Assessment Committee

East Lewis County PRIDE
White Pass School District
Lewis County Economic Development Council
East Lewis County Public Development Authority
White Pass Community Service Coalition
Lewis County Commissioners
Human Response Network

White Pass Community Self-Assessment Committee (cont.)

Washington State Employment Security
Providence Hospital
University of Washington
Pacific Northwest Research Station, Seattle
Pacific Northwest Research Station, Portland
Lewis County Health Department
Centralia College
Washington State University, Vancouver

Cispus Strategies, Landscape Analysis and Design, and Project Planning

US Fish and Wildlife Service
US Environmental Protection Agency
Lewis County Economic Development Council
Lewis County Planning Department
Lewis County Commissioners
The Evergreen State College
Junco Snowmobilers
Weyerhaeuser
University of Washington
Pacific Northwest Research Station, Portland
Pacific Northwest Research Station, Seattle
Washington State Department of Natural Resources
Gifford Pinchot Task Force
Alder Benders 4WD Club
Friends of the Cowlitz
Northwest Ecosystem Alliance
SW Washington Provincial Advisory Committee
Oregon State University
Washington State University
Back Country Horsemen
Pacific Lumber Sales
White Pass School District
Tubafor Lumber Company
Pacific NW 4WD Association

AMA Team Members (1994-1997)

County and Federal Agencies:

Susan Pultz	USFWS
Ron Lee	USEPA
Bill Wamsley	Lewis County
Tod Williams	USFWS
Bobbi Bararra	USFWS
Jeff Momot	USFWS
Janet Burcham	USFWS
Neil Darby	USFWS

US Forest Service:

Buddy Rose	Planner/Team Leader
Paul Miller	Wildlife Biologist
Jeff Ricklefs	Writer/Editor
Shawn Jones	Geologist
Dave Olson	Forester (Recreation)
Wendy Pistrang	Hydrologist
Shannon Donnelly	Writer/Editor
Mark Pistrang	Botanist
John Hawkins	GIS/PC Analyst
Donna Harsch	Hydrologist
Alex Foster	Fisheries Biologist
Ed Tompkins	Forester (Silviculture)
Dave McCollough	Forestry Technician (Fire)
Rick Smedley	Forester (Fire Management)
Bill Uyesugi	Forester (Planning)
Brenda Smith	Forester (Planning)
Jack Thorne	Forester (Recreation)
Doug Brown	GIS Technician
Dean Lawrence	Planner (Transportation)
Bob Klatt	Engineering

US Forest Service (cont.):

Kip Morris	Forestry Technician (Fire)
Debbie Slack	Clerical Support
Mike Rowan	Planner (Recreation)
Terry Lawson	Fisheries Technician
John Rowland	Forester (Planning)
Tom Savage	Landscape Architect
Dean Apostle	Landscape Architect
Nancy Diaz	Ecologist
John Kramer	GIS Analyst

Appendix D
Community Assessment of the White Pass Area (Glenoma, Randle, and Packwood)

January 1997

Survey Coordinator:
Shelley Pierman
Graduate Student in the Master of Public Affairs Program
Washington State University Vancouver
14204 N.E. Salmon Creek Avenue
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INTRODUCTION

This report summarizes the responses to a community assessment questionnaire mailed to all mailing addresses in Glenoma, Randle, and Packwood in August 1996. Of the approximately 2,300 questionnaires mailed out, 308 responses were returned. Please review the socio-demographic data at the end of the questionnaire for possible inconsistencies with what you as residents know about the White Pass Community. If you find the possibility for inconsistency, keep in mind that these results may be skewed toward those members of the community with these characteristics. For example, the educational levels represented are at or slightly above the national average (this may or may not be an accurate representation of the community). In addition, in any sample, it is recognized that there is the possibility for a certain amount of sampling error.

The following percentages represent those who responded to each question. The number of those who did not answer each question is indicated. Because of rounding, percentages may add up to 101% or 99%. While Questions Ql and Q3 have been ranked, the ranking numbers are not necessarily evenly spaced on a scale from 1 to 10 -- while some may be far apart, others could be closely grouped.

Section 1: Community Services / School / Development

Ql. Please indicate your level of agreement with the following statements, and then rank the items in order of importance as follows: 1 = the most important and 10 = the least important.

		Strongly Agree		Neutral		Strongly Disagree	# Missing Responses
1.	Unemployment is a problem in the community	41%	27%	23%	6%	2%	13
2.	Teens need more social activities	55%	25%	13%	2%	5%	9
3.	The White Pass School facilities are adequate	13%	13%	38%	20%	17%	14
4.	Crime in the community is a growing concern	30%	34%	22%	10%	3%	9
5.	Economic growth is not rapid enough	22%	21%	34%	12%	10%	10
6.	Making ends meet is a big concern for me	38%	16%	24%	12%	10%	8
7.	The valley should promote tourist business	36%	20%	27%	7%	10%	10
8.	The declining property tax base is a concern	21%	19%	36%	10%	14%	17
9.	The quality of the local education system is adequate	10%	18%	28%	224%	21%	10
10.	The isolation if some elderly residents is a growing concern	25%	33%	34%	6%	4%	10

Ranking of items in Q1: (Ranking and scoring: number of respondents in each category times that category, then categories added. 1 = most important, 10 = least important)

			Percentage by Category										# Missing
Rank	**Score**		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Responses**
1	511	Unemployment is a problem in the community	23%	13%	16%	11%	14%	9%	5%	4%	2%	3%	153
2	630	Teens need more social activities	20%	18%	13%	11%	12%	8%	3%	3%	3%	8%	150
3	659	The quality of the local education system is adq.	20%	14%	9%	10%	13%	10%	7%	7%	7%	3%	156
4	668	Making ends meet is a big concern for me	17%	7%	9%	9%	10%	5%	5%	11%	7%	19%	157
5	750	The White Pass School facilities are adequate 9%	15%	10%	13%	14%	7%	11%	8%	9%	5%	157	
6	773	Crime in the community is a growing concern 13%	10%	15%	5%	15%	11%	9%	12%	6%	4%	151	
7	893	Economic growth is not rapid enough 7%	9%	7%	5%	13%	9%	10%	13%	14%	12%	159	
8	932	The valley should promote tourist business	8%	10%	6%	10%	8%	10%	12%	8%	12%	16%	153
9	948	Isolation of some elderly residents is a concern	3%	3%	11%	9%	10%	13%	14%	8%	16%	12%	159
10	976	The declining property tax base is a concern	4%	6%	7%	9%	5%	8%	13%	14%	16%	17%	162

Q2. Please circle your level of agreement with the following statements relating to the community.

		Strongly Agree		Neutral		Strongly Disagree	# Missing Responses
1.	Incorporation is a good idea for area communities.	10%	9%	40%	13%	38%	11
2.	Population growth in the valley is not for the community.	15%	14%	29%	20%	22%	6
3.	The valley is a better place to live than 10 years ago.	9%	16%	38%	17%	21%	13
4.	County government is responsive to local needs.	3%	9%	28%	26%	35%	6

Q3. Please indicate your willingness to use tax dollars to support the following issues, then rank the items in order of importance as follows: 1 = the most important, 10 = the least important.

		Strongly Support		Neutral		Do Not Support	# Missing Responses
1.	New school	22%	16%	23%	8%	31%	19
2.	School remodeling	25%	26%	28%	6%	15%	16
3.	Upgrading water system	17%	14%	40%	6%	22%	20
4.	Sewer system	14%	13%	37%	9%	27%	21
5.	Increased emergency services	32%	34%	25%	5%	5%	14
6.	Public transportation	31%	24%	25%	8%	13%	12
7.	Community recreation center	27%	26%	26%	8%	12%	16
8.	Community swimming pool	26%	19%	25%	10%	19%	21
9.	Garbage and recycling services	29%	20%	32%	8%	11%	21
10.	Upgrading Morton General Hospital	26%	28%	27%	6%	23%	14

Ranking of items in Q3: (Ranking and scoring: Number of respondents in each category times that category, then categories added. 1 = most important, 10 = least important)

			Percentage by Category										# Missing
Rank	**Score**		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Responses**
1	748	School remodeling	15%	21%	12%	10%	8%	6%	9%	7%	5%	7%	139
2	760	Increased emergency services	15%	16%	18%	14%	10%	10%	5%	8%	1%	3%	139
3	869	Public transportation	14%	14%	8%	11%	11%	7%	7%	8%	7%	13%	138
4	884	Garbage and recycling services	7%	10%	10%	14%	15%	12%	7%	9%	8%	8%	143
5	900	Community recreation center	5%	9%	15%	13%	18%	9%	7%	9%	11%	5%	137
6	964	New school	24%	8%	5%	4%	5%	5%	8%	8%	7%	27%	139
7	982	Upgrading Morton General Hospital	13%	11%	6%	8%	8%	9%	12%	5%	8%	20%	138
8	1021	Community swimming pool	5%	8%	8%	10%	11%	13%	5%	12%	8%	19%	142
9	1037	Upgrading water system	5%	9%	7%	7%	8%	10%	12%	13%	17%	12%	144
10	1108	Sewer system	7%	3%	6%	3%	10%	8%	12%	13%	18%	19%	147

Section 2: Community Health Care / Elderly Resident Care and Housing

Q4. Please circle your level of agreement with the following statements regarding health care.

		Strongly Agree		Neutral		Strongly Disagree	# Missing Responses
1.	The Morton hospital is doing a good job.	12%	21%	32%	15%	21%	7
2.	There are not enough local health care providers	28%	21%	37%	9%	5%	7
3.	The Randle Clinic is doing a good job	23%	22%	50%	4%	1%	12
4.	My health care needs are being met by local physicians / facilities	19%	20%	23%	12%	25%	10

Q5. Do you feel there should be more local health care services for any of the following? (please circle any you feel are needed)

		Circled	Not Circled			Circled	Not Circled
1.	Physician Care	37%	63%	5.	Dental Care	58%	42%
2.	Pharmacy Services	61%	39%	6.	Optical Care	50%	50%
3.	Health Education	24%	76%	7.	Mental Health Services	25%	75%
4.	Care for Obstetrics	19%	82%	8.	Other _____	10%	90%

Number of respondents who did not circle any of the choices: 54

Q6. Where do you go for most of your medical health needs? (please circle)

		Circled	Not Circled			Circled	Not Circled
1.	Randle Clinic	22%	78%	5.	Tacoma	15%	85%
2.	Packwood	28%	72%	6.	Olympia	17%	84%
3.	Morton	26%	74%	7.	Yakima	3%	97%
4.	Centralia	22%	78%	8.	Other: _____	24%	76%

For “other”, out of 70 responses, 20 were “Seattle”

Number of respondents who did not circle any of the choices: 11

Q7. Please circle your health care provider, if any:

1.	No health insurance	7%	5.	Medicaid	3%
2.	Medicare	16%	6.	OPSI	16%
3.	King Co. Blue Shield	10%	7.	Other: _____	24%
4.	Blue Cross of Washington	23%			

Number of missing responses: 8

Q8. Do you have any grade school children? If NO, skip to question Q9.

Yes 25% (77) No 74% (223)

If YES:

(a) Where did you go for the birth of your last baby? (Of those answering yes above, 9 did not respond)

1.	Home birth	5%	6.	Olympia	8%
2.	Morton	25%	7.	Yakima	0%
3.	Centralia	17%	8.	Puyallup	3%
4.	Longview	1%	9.	Lived outside area	17%
5.	Tacoma	9%	10.	Other: _____	14%

(b) What was the main reason(s) you chose to have your baby there? (Of those answering yes above, 13 did not respond)

1.	Doctor referral	10%	90%	6.	No local ob/gyn physician	11%	89%
2.	Most convenient	25%	75%	7.	Don't like local hospital	22%	78%
3.	Wanted home birth	3%	97%	8.	Lived outside of the area	26%	78%
4.	Not enough local services	2%	98%	9.	Other: _____	17%	83%
5.	Don't like local providers	14%	86%				

(c) Please circle your level of agreement with the following statements relating to child care: (of those answering yes above, 9 did not respond)

		Strongly Agree		Neutral		Strongly Disagree
1.	I am in need of child care services	28%	9%	18%	12%	33%
2.	$2.00 per hour for child care is affordable	25%	16%	32%	11%	17%
3.	Licensed child care providers are important	63%	17%	14%	1%	4%

Q9. Do you feel any of the following programs for elderly residents are or would be worthwhile? (please circle)

		Circled	Not Circled
1.	"Elder Outreach Program" - volunteers who contact elderly residents by telephone	56%	44%
2.	"Friendly visitor program" - volunteers who visit house-bound elderly residents	74%	27%
3.	"Transportation Volunteer Program" - volunteers who help drive house-bound elderly residents to community activities, church, or other events	84%	16%
4.	"Meals-on-Wheels Program" - volunteers who deliver nutritious meals to elderly residents	75%	25%
5.	"Medication Delivery Program" - volunteers who deliver medications to elderly residents	73%	27%
6.	Local Senior Center	65%	35%
7.	Other: _____	8%	92%

Number of respondents who did not circle any of the choices: 11

Q10. Are you or any family member helping to consider living options for an elderly person?

Yes 24% (68) No 76% (215) (Number of missing responses = 25)

If YES:

(a) Which of the following are you considering? (of those answering yes above, 2 did not respond)

		Circled	Not Circled
1.	Adult family home	8%	92%
2.	Independent retirement apartment	20%	80%
3.	Government subsidized apartment	7%	93%
4.	Skilled nursing home	15%	85%
5.	Assisted living facilities	23%	77%
6.	In-home health care	6%	94%
7.	Other: _____	6%	94%

(b) What financial resources do you have available? (of those answering yes above, 6 did not respond)

Personal or family finances	42%
Medicaid	33%
Private insurance	17%
Other: _____	8%

Section 3: Forest Issues / Adaptive Management Area

Adaptive management is based on a continuing process of planning, monitoring, evaluating, and then adjusting actions to meet forest objectives. There are 10 adaptive management areas located throughout the Northwest, with one located in the Gifford Pinchot National Forest near the communities of Glenoma, Randle, and Packwood. Adaptive management areas will test new ideas will test new ideas concerning long-term forest management, economic stability, and public participation in decision making.

Q11. Have you head of adaptive management before now?

Yes 47% No 53%

Number of responses: 18

Q12. We would like your opinion regarding the adaptive management approach to forest decisions as well as other issues relating to the National Forest. (please circle your level of agreement)

		Strongly Agree		Neutral		Strongly Disagree	# Missing Responses
1.	Adaptive management is a step in the right direction	26%	26%	35%	7%	6%	36
2.	Adaptive management should include citizen participation	59%	24%	14%	2%	1%	27
3.	The economic health of the community should be given more consideration in Forest Service decisions	55%	23%	12%	5%	5%	26
4.	Greater protection should be given to fish and wildlife in federal forests	19%	14%	30%	18%	18%	25
5.	Forest management in the uplands may have contributed to the severity of the flooding this winter	31%	14%	23%	10%	21%	22
6.	Forest personnel have been responsive to forest access problems since the flooding	20%	21%	32%	12%	16%	23
7.	River and dam management contributed to the severity of flooding this winter	36%	18%	23%	10%	12%	24

Q13. How important do you feel the following are in forest management? (please circle the level of importance)

		Not at all Important		Neutral		Very Important	# Missing Responses
1.	Maintaining habitat for wildlife	12%	12%	21%	23%	32%	16
2.	Many different kinds of trees in the forest	10%	11%	30%	21%	28%	20
3.	Different aged stands of trees in the forest	11%	9%	20%	24%	37%	17
4.	Other: _____	10%	1%	3%	7%	78%	234

Q14. In your opinion, a realistic role for the community in forest management should be: (please circle)

1.	None, let the USFS managers make forest decisions		1%
2.	Provide suggestions and then let the USFS managers make forest decisions	17%	
3.	Serve on advisory boards that review and comment on forest decisions		31%
4.	Act as a full and equal partner with the USFS in making fores decisions		39%
5.	The community should make forest decisions		11%

Section 4: In order to check the representativeness of our assessment, we need to ask some questions about your background. Remember that all responses will be CONFIDENTIAL.

Q15. Year of birth. Average age = 51 (number of missing responses: 5)

18-29	5%	50-59	23%
30-39	15%	60-69	17%
40-49	29%	70 and over	11%

Q16. Please indicate your sex: (number of missing responses: 3)

Female	57%	Male	43%

Q17. Residence: (number of missing responses: 3)

Glenoma	20%
Randle	50%
Packwood	29%
Other	1%

Q18. How many years of your life have you lived in the area? (number of missing responses: 9)

1.	Less than 1 year	3%	4.	11-20 years	22%
2.	1-5 years	20%	5.	21-30 years	18%
3.	6-10 years	13%	6.	More than 30 years	25%

Q19. How many children or other family members live in your household? (number of missing responses: 9)

1 person	20%	5 people	5%
2 people	36%	6 people	4%
3 people	20%	7 people	1%
4 people	15%		

Q20. Do you own or rent the place where you live? (number of missing responses: 5)

Own/buying	87%
Rent/lease	10%
Other	3%

Q21. Do you have access to a personal computer?

Own	44%
Have access	18%
No access	38%

Q22. What is your highest level of education? (number of missing responses: 4)

1.	Some grade school	0%	5.	Some vocational training	13%
2.	Completed grade school	1%	6.	Associates degree	7%
3.	Some high school	7%	7.	Some college	29%
4.	Completed high school	17%	8.	College degree or higher	26%

Q23. What is your current employment situation? (number of missing responses: 2)

1.	Full-time	36%	6.	Unemployed	1%
2.	Part-time	10%	7.	Disability leave	3%
3.	Seasonally	3%	8.	Homemaker	7%
4.	Self-employed	11%	9.	Other	2%
5.	Retired	26%			

If employed, do you commute more than 45 miles each way per day? (number of missing responses: 99)

Yes 12% No 88%

Q24. Do you or any of your immediate family depend on the timber industry for your economic livelihood? (number of missing responses: 12)

Yes 52% No 48%

Q25. Do you or any of your immediate family depend on other forest resources for your economic livelihood? (number of missing responses: 28)

Yes 28% (if yes, what forest resource?) No 72%

Q26. What is your present or former occupation? (number of missing responses: 4)

1. Timber	8%	8. Business owner	12%
2. Factory worker / mill worker	8%	9. Office worker	8%
3. Farming / ranching / fishing	1%	10. Manager / supervisor	9%
4. Tourism / recreation	3%	11. Construction	4%
5. Educator	10%	12. Government	9%
6. Homemaker	6%	13. Other:	22%
7. Truck driver	2%		

Q27. Please indicate your approximate household income per year before taxes: (please circle one)

1. Less than $10,000	7%	5. $40,000 to $49,000	14%
2. $10,000 to $19,000	16%	6. $50,000 to $74,000	19%
3. $20,000 to $29,000	17%	7. $75,000 to $99,999	6%
4. $30,000 to $39,999	19%	8. $100,000 and above	3%

Q28. Do you or does your household depend on public assistance? (please circle)

	Circled	Not Circled
1. No	83%	16%
2. Food stamps	4%	96%
3. Social security	12%	87%
4. DSHS (Dept. of Social Services)	6%	94%
5. Medicaid (Healthy Options/Welfare)	6%	94%
6. Other	2%	98%

Relationship of tax support for public transportation (Q3.6) with age category (Q15)

tax support for public transportation	18-29	30-39	40-49	50-59	60-69	70+	Row Totals %
Agree %	53.3	51.2	46.6	60.9	61.2	62.5	55.0
Neutral %	26.7	27.9	29.5	20.3	18.4	28.1	25.1
Disagree %	20.0	20.9	23.9	18.8	20.4	9.4	19.9

Relationship of tax support for public transportation (Q3.6) with age category (Q15)

tax support for public transportation	18-29	30-39	40-49	50-59	60-69	70+	Row Totals %
Marginal Percents	5.2	14.8	30.2	22.0	16.8	11.0	

Relationship of tax support for public transportation (Q3.6) with approximate household income

tax support for public transportation	under 10,000	10,000-19,999	20,000-29,000	30,000-39,000	40,000-49,000	50,000-74,999	75,000-99,000	100,000 +	Row Totals %
Agree %	66.7	75.6	50.0	40.4	65.9	42.0	68.8	42.9	55.0
Neutral %	16.7	14.6	28.3	32.7	17.1	32.0	25.0	14.3	24.7
Disagree %	16.7	9.8	21.7	26.9	17.1	26.0	6.3	42.9	20.3
Marginal Percents	6.6	15.1	17.0	19.2	15.1	18.5	5.9	2.6	

Relationship of tax support for "transportation volunteer program" for the elderly (Q9.3) by age category (Q15)

support for "transportation volunteer program" for the elderly	18-29	30-39	40-49	50-59	60-69	70+	Row Totals %
Not Circled (No) %	14.3	16.3	13.1	13.6	20.0	19.4	15.5
Circled (Yes) %	85.7	83.7	86.9	86.4	80.0	80.6	84.5
Marginal Percents	4.9	15.2	29.7	23.3	15.9	11.0	

Relationship of tax support for a new school (Q3.1) with age categories (Q15)

tax support for public transportation	18-29	30-39	40-49	50-59	60-69	70+	Row Totals %
Agree %	53.3	46.5	46.6	30.6	23.9	22.6	37.2
Neutral %	13.3	23.3	21.6	25.8	21.7	35.5	23.9
Disagree %	33.3	27.9	31.8	43.5	54.3	41.9	38.6
Marginal Percents	5.3	15.1	30.9	21.8	16.1	10.9	

Relationship of tax support for a new school (Q3.1) with gender (Q16)

tax support for a new school	female	male	Row Totals %
Agree %	40.0	33.6	37.2
Neutral %	26.1	20.5	23.6
Disagree %	33.3	45.9	38.9
Marginal Percents	57.3	42.4	

Relationship of tax support for a school remodeling (Q3.2) with age categories (Q15)

tax support for a school remodeling	18-29	30-39	40-49	50-59	60-69	70+	Row Totals %
Agree %	46.7	65.1	59.8	46.9	31.9	48.4	51.2
Neutral %	40.0	18.6	20.7	29.7	40.4	38.7	28.6
Disagree %	13.3	16.3	19.5	23.4	27.7	12.9	20.2
Marginal Percents	5.2	15.0	30.3	22.3	16.4	10.8	

Relationship of tax support for a school remodeling (Q3.2) with gender (Q16)

tax support for a school remodeling	female	male	Row Totals %
Agree %	57.9	42.4	51.0
Neutral %	22.0	36.0	28.3
Disagree %	20.1	21.6	20.7
Marginal Percents	56.6	43.1	

Relationship of attitudes toward whether the Morton Hospital is doing a good job (Q4.1) with total length of years lived in the area

attitude toward whether hospital is doing a good job	< 1 yr	1-5 yrs	6-10 yrs	11-20 yrs	21-30 yrs	over 30 yrs	Row Totals %
Agree %	62.5	58.6	44.7	48.5	33.3	33.8	44.2
Neutral %	37.5	24.1	28.9	22.7	41.2	21.1	27.1
Disagree %	0.0	17.2	26.3	28.8	25.5	45.1	28.8
Marginal Percents	2.7	19.9	13.0	22.6	17.5	24.3	

Relationship of attitudes toward whether the Morton Hospital is doing a good job with gender (Q16)

attitude toward whether hospital is doing a good job	female	male	Row Totals %
Agree %	49.4	36.8	44.2
Neutral %	25.3	29.6	27.1
Disagree %	25.3	33.6	28.8
Marginal Percents	56.8	42.8	

Relationship of attitudes toward whether adaptive management should include citizen participation (Q12.1) with educational attainment

attitudes toward AMA citizen participation	grade school	some H.S.	H.S.	Voc. training	A.S. degree	some college	college or higher	Row Totals %
Agree %	50.0	70.0	76.1	81.6	88.9	91.4	81.1	82.8
Neutral %	0.0	20.0	21.7	18.4	11.1	6.2	14.9	14.0
Disagree %	50.0	10.0	2.2	0.0	0.0	2.5	4.1	3.2
Marginal Percents	0.7	7.2	16.5	13.6	6.5	29.0	26.5	

Relationship of attitudes toward whether adaptive management should include citizen participation (Q12.1) with timber dependency (Q24)

attitudes toward AMA citizen participation	timber independent	timber dependent	Row Totals %
Agree %	82.7	81.9	82.3
Neutral %	14.2	14.6	14.4
Disagree %	3.1	3.5	3.3
Marginal Percents	46.9	53.1	

Appendix E
Social and Biophysical Context for Adaptive Management on the Cispus

Adaptive management recognizes the importance of local context in shaping land use management. Specifically, it recognizes that the social context -- patterns of historical use and current concerns and interests -- and the biophysical context -- patterns and dynamics of ecological systems on the landscape -- of a particular place are both vital in developing, testing and adapting appropriate ecosystem management policies and practices. Landscape-level dynamics and disturbances are of particular concern in the case of the Cispus, which has been dramatically influenced by floods, fire, and volcanic activity. This appendix presents an overview of the social and biophysical environment in which the Cispus AMA is located. The social context includes both human use within the boundaries of the AMA, and information on settled areas adjacent to the AMA. **Much of this appendix is adapted from the following watershed analyses: Middle and Upper Cispus Pilot (1995), Lower Cowlitz East (1996), Lower Cowlitz West (1996), Middle Cowlitz (1997) and Upper Cowlitz (1997).** Additional information was drawn from the Cispus AMA Strategies (1995), the draft Cispus AMA Landscape Analysis and Design (1996), a preliminary analysis of 1990 U.S. Census data for the Big Bottom region (1996), LaVonne Sparkman and Irma Boyer's *Where the Big Bottom Begins* (1995) and the community self-assessment reports of the White Pass Discovery Teams of 1995 and 1996. The reader should refer to these documents and their appendices for more detailed information about the topics discussed here.

A. Social Context

1. Historical Context

Evidence of human use of the Cispus watershed dates back at least 7,000 years. This long history is divided into four periods in this appendix: prehistoric subsistence use, from first use by humans through 1850; historic Native American Indian use, after 1850; Euro-American settlement and Federal Administration, 1880 and on; and profile of current human use and neighboring communities.

a. Prehistoric Subsistence and Land Use Patterns

Human activity in the Cascade Mountains was probably associated with the arrival of big game (elk, mule and black-tailed deer) around 12,000 - 10,000 years ago. Over the course of thousands of years, humans developed and maintained patterns of lowland settlements, upland camps for warm-weather hunting and gathering, and trail routes to connect the two. Berries (especially huckleberries), roots, bulbs, seeds, small mammals and birds, and fish were gathered to supplement the primarily deer- and elk-based diet. Mountain goats were hunted for both fur and horn. Native Americans also peeled bark from cedar trees in this area to make baskets. These and all other human activities were temporarily halted during a period of intense volcanic activity at Mt. St. Helens between approximately 4,000 and 1,700 years ago. The horse was introduced to the Northwest about 1720 AD, but its impact on land use in the Cascades is not well understood. In the Cispus, evidence of early activity with horses can be found on a long-abandoned stretch of the Klickitat Trail near Jackpot Lake.

b. Historic Native American Indian Subsistence and Land Use Patterns

The primary subsistence and use patterns of Native Americans in the Cispus River watershed and the surrounding region continued to focus on seasonal hunting and berry collecting and trans-mountain movement of people and materials. Tribes that have been directly associated with the Cispus River watershed include the Taitnapam (or Upper Cowlitz), and Yakama. The Taitnapam had villages along the Cowlitz River, which runs roughly east-west along the north-northwest border of the Cispus drainage. The Yakama came to the area for seasonal huckleberry picking.

Figure E-1. Huckleberries. Photo courtesy of Brian Kirk.

Use of berry fields, root food sources, and animal and fish resources continued much as they had in the prehistoric period. To ensure continued berry crops, tribal people made a practice of burning berry patches each year or every few years. At the berry camps, huckleberries were traditionally processed for storage through drying. Traditional methods of drying the berries survived into the 1930's and 1940's. Two traditional fishing sites are found in the analysis area: the Cispus River at the mouth of Orr Creek (present-day Adams Fork Campground), and Walupt Lake. Fish were taken with gaff hooks, nets and fish traps, and prepared for storage by being smoked on racks.

Trails used in this period developed from earlier routes which had been modified by the introduction of the horse. By the late nineteenth/early-twentieth century, the horse had become very much a part of the seasonal subsistence pattern. As beasts of burden, horses did their part to blaze and maintain the trail system which in places can still be seen and used today. The Klickitat Trail, for example, runs west-east across the Gifford Pinchot National Forest, roughly paralleling the northern boundary of the analysis area until it crosses over the drainage and runs into Yakama Indian Nation lands. Trade was also a factor in the use of trails. In the historic period, a wide variety of goods such as shells, dried foods, mountain goat horn, pipes, and baskets was traded across the mountains.

The most significant impacts of prehistoric and historic subsistence use in this region were the effects of controlled fire to maintain berry patches, and the network of trails across the landscape.

c. Recent Settlement and Federal Administration

White settlers first arrived in the Cispus River region in 1882 or 1883, when William Joerk established a homestead in the present town of Randle. By 1889, 100 people had settled in the wide, flat Cowlitz River valley, which came over time to be known as the "Big Bottom" Valley. Many settlers migrated to the area from the Cumberland-Allegheny Plateau, and had been previously engaged in some form of livelihood related to wood products or livestock raising. More than 80% of the emigrants from the southern mountain states continued to work in forest products, specializing in manufacture of railroad cross-ties and rough lumber using small, family-owned mills. Settlers and settlements were isolated, and by necessity depended primarily on themselves to manufacture or supply food, household and farm goods. These strengths of independence and self-sustainability are still evident today in the character of the unincorporated towns of Packwood, Randle and Glenoma.

In the early days of settlement, white pioneers had only trails blazed by Native Americans for transportation. They were dependent on local Native Americans for horses to transport food and equipment and sometimes for mail. According to a Morton Journal centennial article from January 1983, "the Indian families of George Washington Kiona, Columbus Kiona and Bat Kiona . . . were said to be extremely friendly to their white neighbors." Several families in today's Big Bottom communities can trace their roots back to settlers of these early days, including the Youngs, McMahans and Blankenships.

While subsistence activities continued indirectly through livestock grazing by settlers, the majority of non-native forest use patterns became oriented toward management of the forest's natural resources. Human land use in the Cispus AMA region around the turn of the century included dairy farming (with local milk supporting a cheese factory located in Randle) and sheep-herding. The first sawmill in the region was built in Packwood in 1911, and timber harvest slowly grew in importance as a primary local land use and component of the local economy. One of the limiting factors was transportation, especially roads, which until 1922 were primarily wagon trails. By the 1930's timber harvest had become important enough in the region that an annual celebration of the logging profession known as the "Logger's Jubilee" commenced in 1937 or 1938. The Jubilee was started "by older men who wanted to show the younger generation how to log and lumber 'the right way'" (White Pass Discovery Team 1995).

Designation of Federal Lands The federal government has played an important role in the management of lands in this region since the 1897 designation of the Mt. Rainier Forest Reserve, which included the Cispus watershed. In 1908 the reserve was transferred to the newly created U.S. Forest Service and renamed the Columbia National Forest. The Gifford Pinchot National Forest received its current name in 1949. Forest management during the early days of the Columbia National Forest was primarily oriented around fire protection and sheep grazing, but by the 1950's Forest Service management emphasis shifted toward timber-production.

Livestock Grazing Grazing of livestock began in the watershed around 1884, coinciding with white settlement. Fires in the 1800's had created meadow openings which provided prime range for livestock, easily accessible from eastern Washington and Oregon. During the beginning of the 1900's, 100,000 sheep were summered around Mt. Adams. Ranges were severely overused as a result of competition among sheep herders reach the best sites. Historic records indicate that ten different sheep allotments in the watershed, in use between 1925 to 1955, encompassed 41 percent of the area. By 1935 there were approximately 8,652 sheep grazing in the watershed. Forest Service inspection records reported damage to steep slopes as a result of localized overuse. Gradual encroachment of trees reduced available forage on the allotments and eventually led to their closure. Historic grazing undoubtedly altered patterns of natural plant succession in the former burn areas and introduced non-native species. By 1982, all grazing in the Cispus watershed area had been terminated.

Transportation Forest trail construction followed existing animal and Native American routes to provide access for fire lookouts, permanent camps and grazing allotments. Over time, the system was developed to accommodate increased Administrative, Forest protection and recreational traffic. The roads themselves further increased traffic and human use of the forest. There were no bridges in the area before 1914, limiting river transportation to the use of Native American Indian dugout canoes and later, river ferries. The first road into the watershed area was built in 1922, extending from the Forest boundary south of Randle to the North Fork Cispus. In 1934 Midway Loop Road 101 was completed, opening the berry fields and high lakes to the motoring public.

The Civilian Conservation Corps (1935 - 1945), located at what is now the Cispus Center, was responsible for some expansion of the road system, and also built five small campgrounds, several guard stations, fire lookouts and recreation trails in the area for the USFS.

Roads in the Big Bottom Valley also took decades to develop. U.S. Highway 12 was built in stages, beginning in 1922 and finally reaching completion over White Pass in 1951.

Fire Management Native Americans had managed huckleberry patches through burning. However, two major fires in the early 20th century, the Cispus Burn (1902) and the Greenhorn Fire (1918), generated enough public concern that the Forest Service adopted a policy of suppressing fire, both natural and man-made. While the 1918 fire was lightning-caused, the Cispus Burn was reportedly set by a prospector "wishing to make traveling easier." The Greenhorn Fire burned a total of about 82,000 acres in the Cispus Watershed. After the 1918 fire, more trails and at least nine fire lookouts were constructed to improve fire crew access and early detection in the event of future fires.

Recreation Early recreation use in the area centered on hunting, fishing and mountaineering, all utilizing Native American Indian and wildlife trails. As early as 1910, recreational groups such as the Mountaineers were using the Forest trails. Visitors came by horse to fish in high-elevation lakes and ride trails around Mt. Adams. The first established Forest Camps, in use by 1937, were at North Fork, Chambers Lake, Council Lake, and Takhlakh Lake. Beginning in the 1930's and 1940's, trails originally built for administrative use and grazing, such as the Cascade Crest Trail and the Boundary Trail, were increasingly being used for recreation. By 1955 visitor use in the high lakes area of the watershed was estimated at approximately 30,000 visitor days per calendar year, with most visitation occurring in July, August and September. Management of the trail system as a recreation resource began in the mid-1960's.

Timber Production Toward the middle of the twentieth century, timber production became one of the Forest's major land use activities. Over time, timber management responded to Federal policy changes and shifting economic demands. The first commercial timber sales in the area focused on salvaging cedar snags remaining from the 1918 Greenhorn Fire. The first clear-cut logging operation began in 1949 with a timber sale in the vicinity of Cat Creek. Modern logging and forest management began in the 1940's. Timber sales occurring between 1960 and 1990 provided the need for, and the funding to construct, much of the current road system in the watershed. (see figure E-4)

2. Profile of Current Human Use and Involved Communities

The primary area of influence for the local Forest Service extends from the eastern border of Packwood at White Pass, west to the town of Mossyrock. Within this area, approximately 89% of the land is classified as forest land. Of this, 32% is in Federal ownership, 8% is state owned, and 60% is privately owned. The White Pass School District is a subset of this area, which includes the unincorporated communities of Packwood, Randle and Glenoma. Enclosing a population of approximately 5,000 permanent residents, the school district boundaries also define the site of numerous local initiatives, such as the White Pass Community Self-Assessment project and the East Lewis County Public Development Authority (further discussion in Chapter 6). Morton is the nearest incorporated town, located approximately 17 miles west of Randle on Highway 12. A hospital, a newspaper, and some services banking are available in Morton.

Numerous people travel to the area regularly -- some from several hours' traveling distance -- for recreation and to be in a place that has long been special to them. A non-scientific student survey in the summer of 1995 found a majority of campground users came from outside Lewis County but inside Washington State, and about a third had been coming back to the area for at least five years (White Pass Discovery Team 1995). Many people who return to the area year after year participated with local residents in the "Collaborative Learning" process, and the overall group accepted that communities affected by management in the Cispus AMA include "activity-related" communities (such as recreation or special forest product gathering) as well as proximate communities (*Cispus AMA Strategies*).

Still other people make infrequent visits to the watershed for activities such as camping, sightseeing, hiking or hunting. Another use of the forest that continues after centuries is the collection of forest products such as firewood, mushrooms, berries, transplants for landscaping, and greenery for floral arrangements. Local residents, nearby Native American Indian families, and individuals from significant distances come to the Cispus region to harvest these materials.

Local Population and Employment Many people rely on the watershed for part or all of their livelihood. The employment profile of the communities neighboring the Cispus AMA has traditionally centered on the logging and timber industries, which have been the backbone of the local economy since the middle of this century. The dairy industry has been reduced to four dairies from a previously strong local source of employment. There is little or no non-wood product manufacturing in the area at this time. Compared to the rest of Lewis County and the state of Washington, this region supports a higher percentage of government employees, particularly at the Federal level. Among privately employed individuals, manufacturing of durable goods is the most prevalent occupation, followed by agriculture/forestry/fisheries and retail. Although many residents are still employed in resource-related industries, the poverty level in 1990 was slightly higher for this local region than for the rest of Lewis County and the state, especially for families headed by single women.

Additional information on local employment may be found in Appendix D, Summary of Community Self-Assessment.

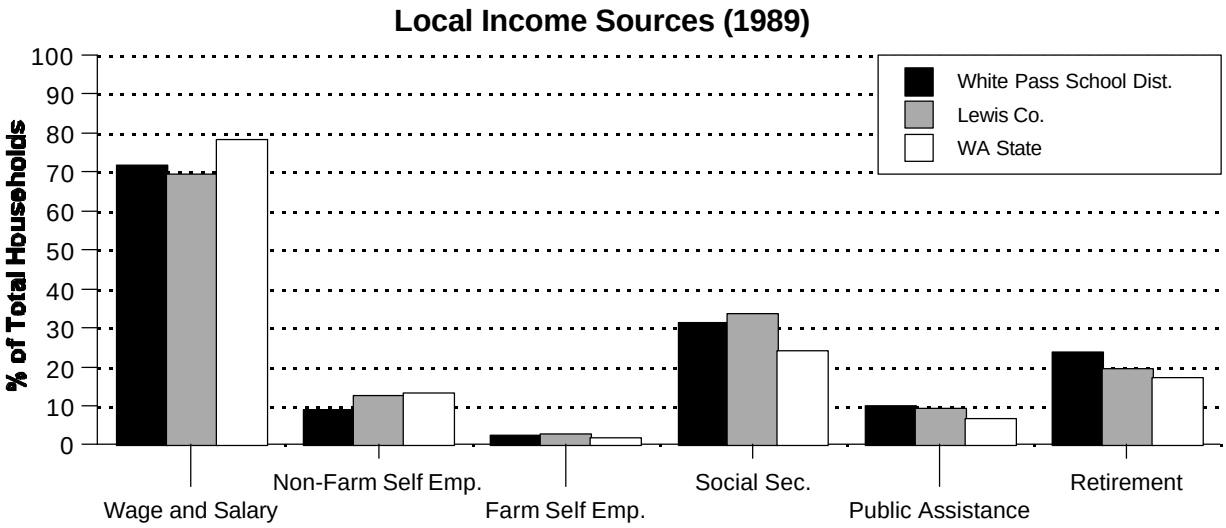


Figure E-2. Local Income Sources.

Source: 1990 Federal Census Data.

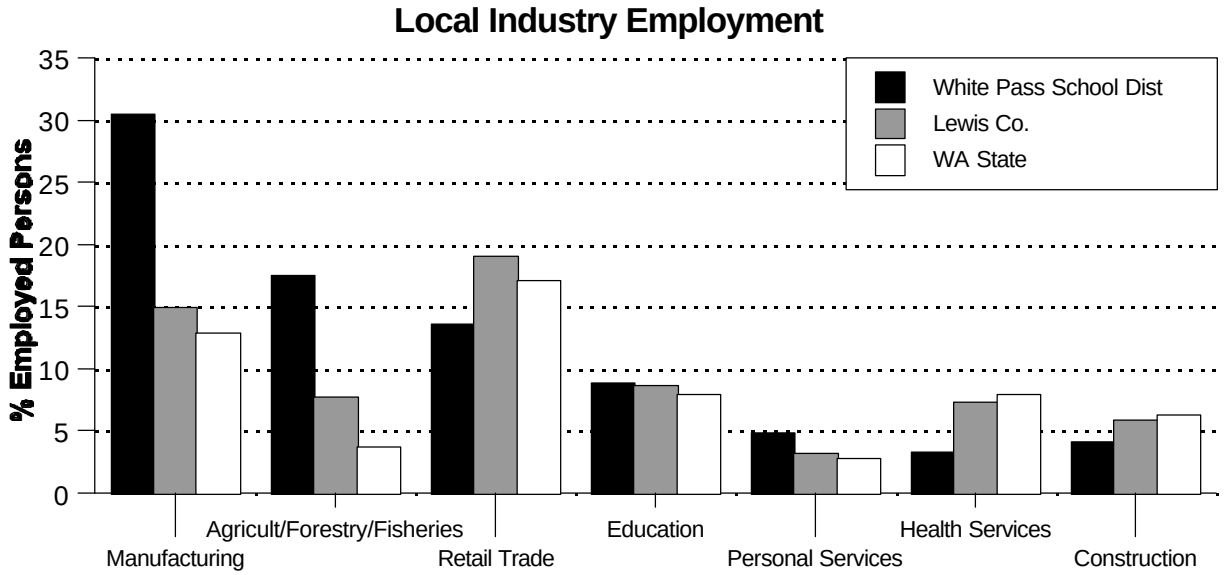


Figure E-3. Local Industry Employment.

Timber Production Although there are several major wood-products firms located in east Lewis County employing over 600 people in 1995, local unemployment has increased in recent years. Opportunities to offset the loss of timber-related jobs are limited by the relative remoteness of the area and the lack of industrial land and infrastructure. Timber sales on the Cispus AMA have dropped significantly in the last decade, following regional trends.

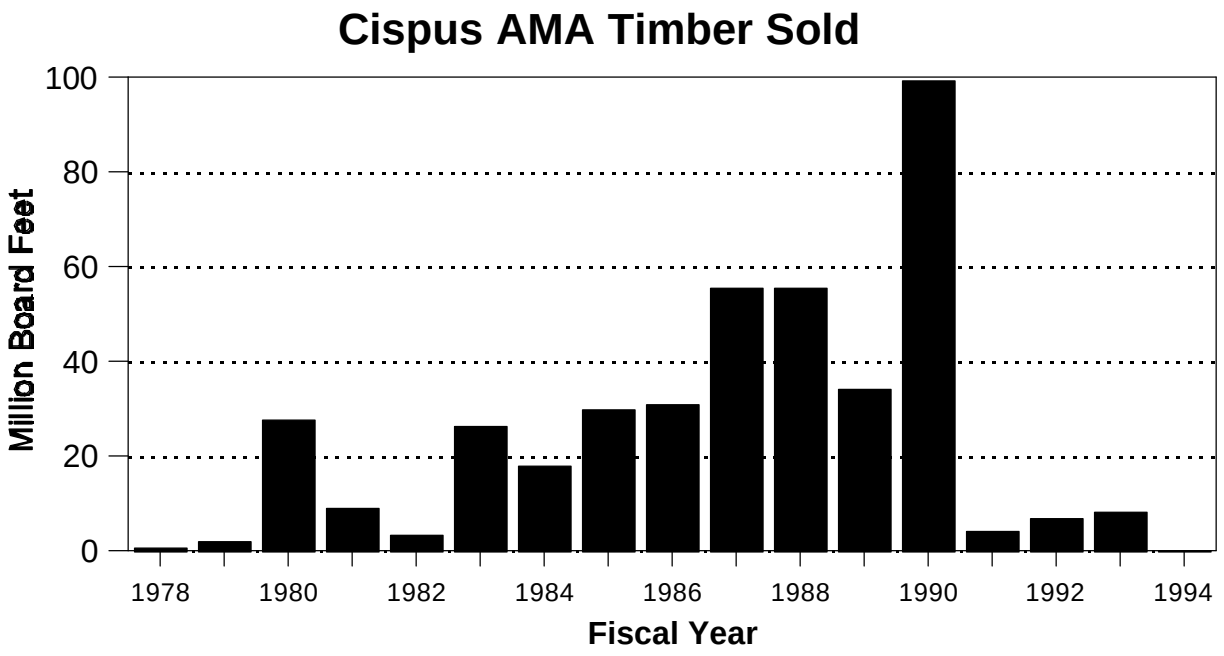


Figure E-4. Historic Timber Sale Volume on the Cispus AMA.

Source: Randle and Packwood Ranger District 2400-17 Timber Sale Data Sheets. Adjusted for removal of defaulted sales and sales bought back.

Roads, Trails and Recreation Today there are approximately 450 miles of roads in the Cispus AMA. Road 23, which forms a north-south link across the forest and provides primary access to the upper Cispus River, had a measured vehicle count of 504,000 visitors in 1994. Development of most camping areas occurred at the popular lake settings. Many dispersed areas for camping are also found in the watershed, and demand for both developed and dispersed campsites is high and expected to increase. There are presently at least 18 trails totaling over 100 miles in length within the Cispus River watershed. Many of these trails provide unique semi-primitive experiences. Approximately three-quarters of trail users during the summer months live outside the local area, with most originating from urban western Washington.

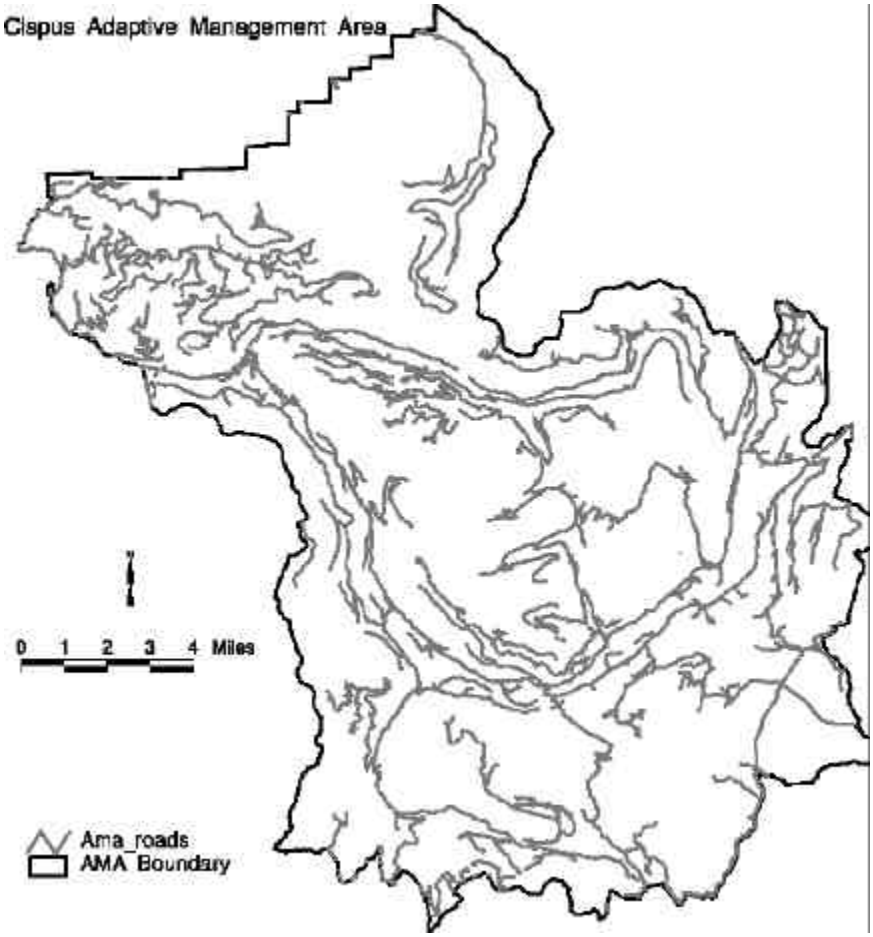


Figure E-5. Forest Service Roads.

B. Biophysical Conditions and Dynamics of the Cispus Watershed

The Middle and Upper Cispus River watersheds comprise a very diverse and resilient ecosystem, adapted to and shaped by a variety of disturbances. While the Pilot WA found the area to be relatively healthy overall, the combined effects related to some management activities have placed stress on parts of the aquatic, riparian and terrestrial systems. The purpose for conducting the WA was to learn more about the watershed conditions and dynamics in order to be able to work more closely with ecosystem processes while providing the goods and services desired by people. The remainder of this appendix provides background information for understanding the general condition of the watershed as well as the areas and ecosystem functions that are of particular concern for management.

1. Overview

Location and Boundaries Lying within both Lewis and Skamania counties, the AMA is located south of the Cowlitz River and U.S. Highway 12 between the towns of Randle and Packwood. Gifford Pinchot National Forest lands border the southwest and north sides of the AMA. The AMA shares a boundary with the Yakama Indian Reservation to the east and southeast.

Topography and Climate The AMA landscape is mountainous, ranging in elevation from approximately 1000 ft (305 m) in the Cowlitz River valley to over 5,900 ft (1800 m) on ridge tops. Warm, dry summers and cool, wet winters are typical. Annual precipitation averages 83 inches (212 cm), with much of it falling as snow during the winter months.

Geology Bedrock and the accompanying soils are almost entirely volcanic in origin, representing eruptions from about 40 million years ago to ash deposits from more recent eruptions of Mount St. Helens. The landscape has been greatly modified by repeated episodes of glaciation over the past 2 million years; all of the higher ridges and the Cispus River valley have been effected by alpine glaciation. The age and nature of different volcanic deposits, and modification by glacial activity, have had a profound effect on a number of other ecological elements in the watershed such as hydrology, soil development, and vegetation types.

Water The Cispus River, the major waterway within the AMA, flows west/northwest approximately 40 miles (64 km), from the crest of the Cascade Mountains to the confluence with the North Fork Cispus. It flows west another 20 miles (32 km) downstream before joining the Cowlitz River, which in turn flows another 90 miles (144 km) to join the Columbia River. Other major streams within the watershed include the North Fork Cispus, East Canyon Creek, and Adams Creek. There are approximately 1,100 miles (1,760 km) of stream (perennial and intermittent); of which about 96 miles (154 km) are fish-bearing. There are 19 lakes and ponds in the watershed, ranging in size from 3.5 to 384 acres (1.4 to 155.5 ha), all of which are located above 2,500 feet (762 m).

Vegetation Most of the AMA is heavily forested, except where high elevations and past wildfires have combined to produce alpine-like areas with grasses and shrubs, but few trees. The diverse topography and wide range of elevations found throughout the AMA support a number of vegetational zones, including western hemlock, Pacific silver fir, mountain hemlock, subalpine, and alpine. Coniferous trees common in the watershed include Douglas-fir, Pacific silver fir, noble fir, subalpine fir, western hemlock, mountain hemlock, western red cedar, Alaska yellow cedar, western white pine, and lodgepole pine. Hardwood species in the watershed include big leaf maple, red alder, and vine maple. Non-forested areas include wetlands, meadows, and shrub lands. Forest vegetation in the Cispus AMA is heavily influenced by patterns of disturbance, particularly volcanic activity and wildfires. Prior to extensive management activity, fire (both natural and human-ignited) played an important role in the development of these plant communities, affecting species composition and the amount and distribution of successional stages.

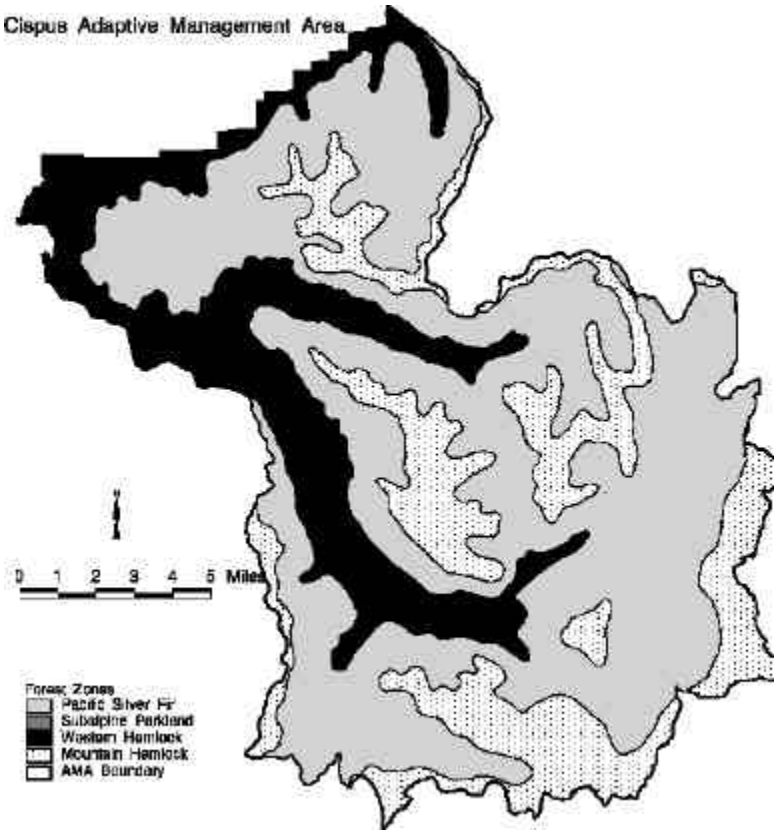


Figure E-6. Forest Zones within the Cispus AMA.

Wildlife A wide diversity of wildlife species exist within the Upper Cispus Watershed due to the wide range of vegetation communities, plus unique habitats such as lakes, ponds, wetlands, rock outcrops, cliffs and talus slopes. These habitat conditions support a total of 264 vertebrate wildlife species (mammals, birds, reptiles, amphibians). Many of these species are known to be present, while others are simply suspected based on habitat availability.

2. Geologic/Topographic Conditions

a. Historic Volcanic Activity

The Cascade Range has seen intermittent volcanic activity for about 40 million years. Two types of disturbance from volcanic activity have directly effected the watershed in the last 10,000 years: ash and pumice deposits from Mount St. Helens, and lava flows from Mt. Adams.

Mount St. Helens Mount St. Helens has erupted many times over its 40,000+ year history. At least three eruptions during the last 3,900 years have affected the Cispus AMA. The oldest mapped volcanic deposit dates back 3,500 years, and is associated with the largest eruption yet discovered from St. Helens. This eruption produced a volume about 13 times greater than the 1980 eruption. Another layer of volcanic material was deposited in the Cispus region in 1480 A.D., from an eruption which produced about six times as much material as the 1980 eruption. The 1980 eruptions of Mount St. Helens left between 0.5 to 3 inches of ash and pumice scattered over the Cispus area. The deposits were thickest toward the North Fork Cispus confluence and Blue Lake, and thinned to trace amounts near Mt. Adams.

Immediate effects from the 1980 eruptions included moderate to severe damage to more than 121,000 acres of deer and elk habitat, as well as mortality to 2,000 black-tailed deer and numerous elk, bear and mountain goats. Six years after the eruption, USFS foresters noticed that a significant number of Pacific silver fir trees were sick and dying in the watershed. This occurrence was attributed to a fine silt deposit, which was commonly retained by the foliage of Pacific silver fir. The fine ash damaged the foliage of the trees. Of the 2,400 acres seriously impacted by the deposits, approximately 1,330 acres (55%) were treated by removing affected trees or stands.

Based on the effects described above from a relatively small amount of ash, it is likely that earlier, heavier deposits had a tremendous effect on terrestrial and aquatic systems in the watershed. Volcanic activity is expected to play a continued role in the disturbance pattern of the Cispus AMA.

Mt. Adams Within the last 10,000 years, at least two lava flows have traveled into the watershed area from Mt. Adams. While not precisely known, the likelihood of future eruptions of lava is assumed to be relatively low for any given century. Mt. Adams is not known for eruptions that produced pyroclastic or mudflow deposits over the last 10,000 years; however, given the size of the mountain and the thick mantle of glacial ice on all sides, the potential for hazards from landslides and mudflows is still very real.

Mt. Rainier Mt. Rainier is an active stratovolcano located approximately 15 miles north of the Cispus AMA. Mt. Rainier is potentially the most dangerous volcano is the Cascade Range because of its great height, frequent earthquakes, active hydrothermal system, and extensive glacial mantle. Many debris flows and their distal phases have inundated areas far from the volcano during post-glacial time (Scott, et al 1995). Most of the Cowlitz River valley (floodplain), bordering the AMA, could be inundated by a mudflow to a depth of 60 to 200 feet, with or

without an associated volcanic eruption.

b. Sediment Flow

The two primary types of erosion within the watershed are chronic and episodic. Management related sediment delivery takes two basic forms: chronic (yearly) erosion of relatively fine sediments from road ditches and surfaces, and episodic mass wasting events that contribute larger proportions of coarse sediment and sometimes organic material. Four major naturally-occurring sources of erosion within the watershed are soil creep, glaciers, volcanic ash, and mass wasting events.

Soil creep erosion refers to continuous, slow, downward movement of the soil mantle under the influence of gravity. This type of erosion is a naturally-occurring, chronic event which delivers both fine and coarse sediments to streams. It does not appear to be the significant process contributing sediments into the streams within this watershed. It is unknown whether there is any particular period in time of year soil creep is more prevalent than another.

Glaciers, which reside on Mt. Adams, are important contributors to the sedimentation of streams within the Cispus AMA. This type of erosion is considered a natural, chronic source of inorganic fine and coarse sediments. During the summer months, glacial sediments comprise a high percentage of the sedimentation in the Cispus River system.

Volcanic ash The deposition of volcanic ash onto the watershed has occurred many times in the past. The Cispus watershed is located about 30 miles northeast of Mount St. Helens, and is often subject to prevailing winds blowing in this direction. Following the catastrophic eruption of St. Helens in 1980, volcanic ash ranging from ½ to 3 inches deep blanketed the Cispus watershed. For several years afterward, streams in the area carried higher than average amounts of fine sediment as rains washed the ash off the hillsides. Over a period of 5-10 years, sedimentation from this source decreased as remaining ash was covered by needles and twigs from the trees above, and new growth on the forest floor.

Mass wasting is an integral part of the episodic sediment flow in the Cispus watershed, and consists of several types of processes and events, including snow avalanches, debris torrents, large deep-seated landslides and small, sporadic landslides. Events may be as frequent as every year for snow avalanches and debris torrents to once every 400 to 600 years for large, deep landslides.

Failure rate in the Cispus drainage was likely exacerbated by the numerous flood events of the 1970's and 1990's. The effects of flooding in the winter of 1995-96 were notably greater than other flood events, resulting in severe

Figure E-7. Flood Damage on AMA Road.

road damage. Impacts included the destruction of stream crossings, road failures, and severe ditch erosion. The western half of the AMA received particularly heavy damage.

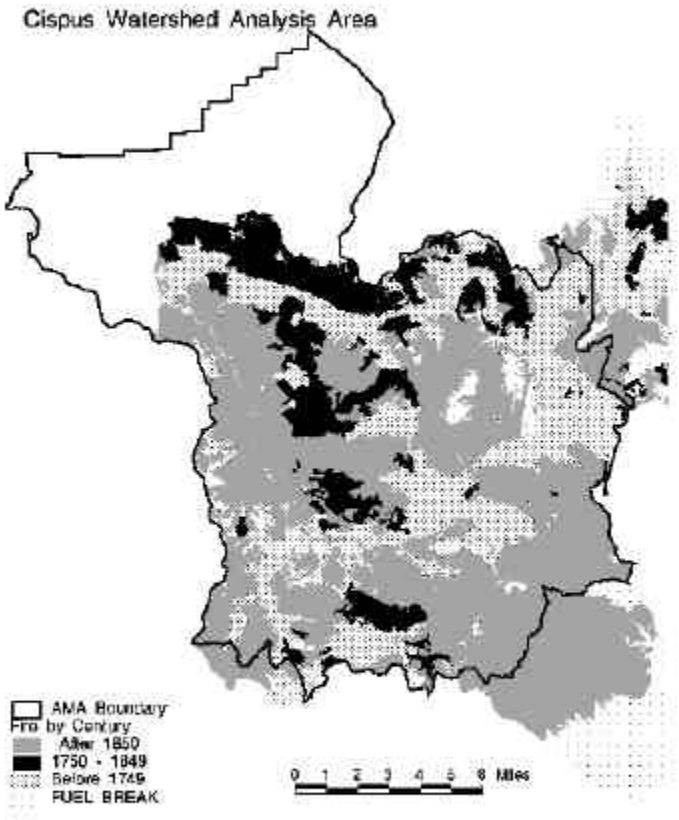


Figure E-8. Historic Burn Areas within the Cispus AMA.

3. Fire and Other Disturbances

A discussion of how disturbance processes have operated in an ecosystem is vital to understanding how ecological conditions have developed and biological diversity is maintained. Volcanic eruptions and fire have been the most important large-scale disturbance agents in the Cispus AMA region for at least the last 500 years. More localized disturbance agents include insect and disease outbreaks, blowdown, snow avalanches and mass wasting events, and flood events. Volcanic eruptions and mass wasting were discussed above; fire, insects and disease, and blowdown are discussed in this section.

Fire has significantly modified the seral stages of vegetation and associated fauna in the Cispus River watershed in the past. Since 1710, 86 percent of the middle and upper Cispus River watershed has burned, some areas two or three times. Fire was the main disturbance mechanism that created the patchwork of stand ages we now see across the Cispus landscape. Past fire events were generally distributed outside of riparian areas and associated wet areas, impacting slopes and valley headwalls more frequently. The result is younger stands on the slopes, and older stands in the riparian areas.

Fire Management The Forest Service has managed fire in two ways: through prescribed fire or fuels treatment, and fire suppression. Approximately 70 percent of the past clear-cuts have been burned through the Forest Service's fuels treatment program. Burned areas in a clear-cut contain few of the remnant structural components of an unsalvaged wildfire area. As a result, the managed clearcut pattern visible in much of the Cispus AMA today is different from the vegetative mosaic created and maintained by numerous overlapping wildfire re-burns prior to intensive forest management and fire suppression (see Vegetation and Landscape-Level Dynamics sections below for more information).

Fire Suppression has limited the amount of natural openings in the stands present in the AMA, as well as significantly limiting the size of fires. Fire suppression has also reduced the duration of fires from weeks to days, resulting in less smoke in the air and improved air quality. It is clear that full fire suppression has significantly diminished the number of acres burned by wildfire.

Fire Frequency (the recurrence of fire in a given area over time) ranges from a low of 25 years to a high of 450 years in the Cispus watershed, depending on the ecology of the stand. In fire regimes with long return intervals, stand replacement fire events tend to be more episodic than cyclic. Under the right conditions of fuels, weather, topography, and ignition source, stand replacement fire events may occur, but at irregular intervals and within a wide range of stand ages.

Fire Effects on Wildlife Fauna are impacted directly by fire through the death of individual organisms. In addition, modification of the vegetative seral condition by fire indirectly affects fauna through the loss of viable habitat which leads to the displacement of organisms from the site, or eventual death if mobility to an acceptable habitat is not possible. Fire may also create new habitat for early seral species.

Fire Effects on Riparian Areas Severe fires that burn through riparian areas increase siltation to streams and other bodies of water, because erosion increases when soils are exposed to heavy rains. There have been significant areas of the mid- and upper slopes in the Cispus watershed that have experienced fire, as have some of the larger valley bottoms. Reduced amounts of vegetation along streams may decrease the amount of streamside shade, elevating stream temperatures (especially in large burned areas). Fire can also increase the amount of large woody debris in streams over a time span of approximately 50 years. Between fires, the lack of large trees in the new stand limits the addition of large woody debris to riparian resources. Increased recreation use may result in more fire starts in riparian areas.

Insects and disease are natural ecosystem components which serve as landscape disturbance agents. For the most part, native insects and diseases occur at endemic or normal levels. Only occasionally do they appear as spectacular or seriously damaging epidemic outbreaks. However, even at endemic levels, forest damage from some insects and diseases can be quite serious. Insect and disease disturbance scales vary greatly from large conspicuous outbreaks to small, almost imperceptible outbreaks. Tree damage varies from light to severe.

Disease and insect infestations affect and participate in a wide range of ecosystem components and relationships. Disease and insects foster diversity in the ecosystem by altering stand and forest structure vertically and horizontally, as well as changing the species composition of a stand. Through the killing and damaging of trees, diseases and insects create snags and down wood. This provides habitat for a variety of wildlife species and plays an important role in the cycling of nutrients. Effects from disease and insects also cause changes in the amount of sunlight that enters the canopy and reaches the forest floor, causing changes in the types, sizes, and amounts of vegetation.

It appears that current insect and disease occurrences are within their range of historic variability. The exact limits of those ranges are unknown. Available records and data suggest past insect or disease disturbances in the watershed have not resulted in significant adverse ecosystem effects, although effects may have been masked by related, subsequent wildfires (see WA, Appendix R, for more information).

Blowdown Wind serves as an agent of disturbance across the landscape when it becomes strong enough to topple trees. Blowdown effects vary greatly from a few, scattered individual trees to large, contiguous patches of several hundred acres. Blowdown fosters diversity in the ecosystem by altering stand and forest structure vertically and horizontally. Blowdown can affect forest succession, soil, wildlife, fish, and the safety of people and structures.

Riparian areas do not appear to be significantly impacted by blowdown. Only 16.0% (63 acres across 26 sites) of the watershed's blowdown occurred either partially or wholly in riparian areas. There were no identified instances of blowdown in riparian areas away from the influence of a clear-cut opening. Valley bottom and broad flat locations together account for only 24.0% of the blowdown in the watershed. Sidehill and bench locations together account for 58.1% of the blowdown. Riparian reserves located on sidehills or benches may be more vulnerable to blowdown than reserves located in valley bottoms or on broad flats.

4. Vegetative Conditions and Systems

Potential Vegetation and Successional Stages As they develop and change, terrestrial ecosystems are affected by geology, landform, climate and soils. A range of vegetation characteristics and conditions shaped by both natural succession (the order in which plant communities typically replace one another in a certain type of location over time) and disturbance currently exists in the Cispus AMA. The following four categories are typically used to identify and age and structural characteristics of stands within the watershed area:

Early Structural/Successional This category refers to young, single-storied forest stands where trees are less than 8" in diameter and up to 50 years of age.

Mid Structural/Successional This category includes one- or two-storied forest stands with trees between 8" and 21" in diameter that are 51 to 170 years of age.

Late Structural/Successional This category includes large conifer and old-growth stands. Late successional stands have two- or more-stories with trees greater than 21" in diameter that are over 170 years old.

Non-Forest This category primarily includes rock, water, meadows, grasslands, and shrub lands.

Estimated vegetative conditions in 1880 and 1940 were interpolated from current stand age data.

Estimated 1880 Conditions In 1880, much of the Cispus AMA landscape was dominated by large, continuous patches of forest. Most of the forest was in the mid-successional stage, forming the "matrix" or predominant successional/structural type, within which the other structural forest patches were imbedded. Early- and late-successional forest areas could be found in large, continuous patches within the mid-successional matrix, ranging in size from about 2,500 acres to over 10,000 acres. The late-successional blocks were well-connected by the mid-successional matrix. Thus the 1880 landscape was largely unfragmented, with wide expanses of similar-aged forest.

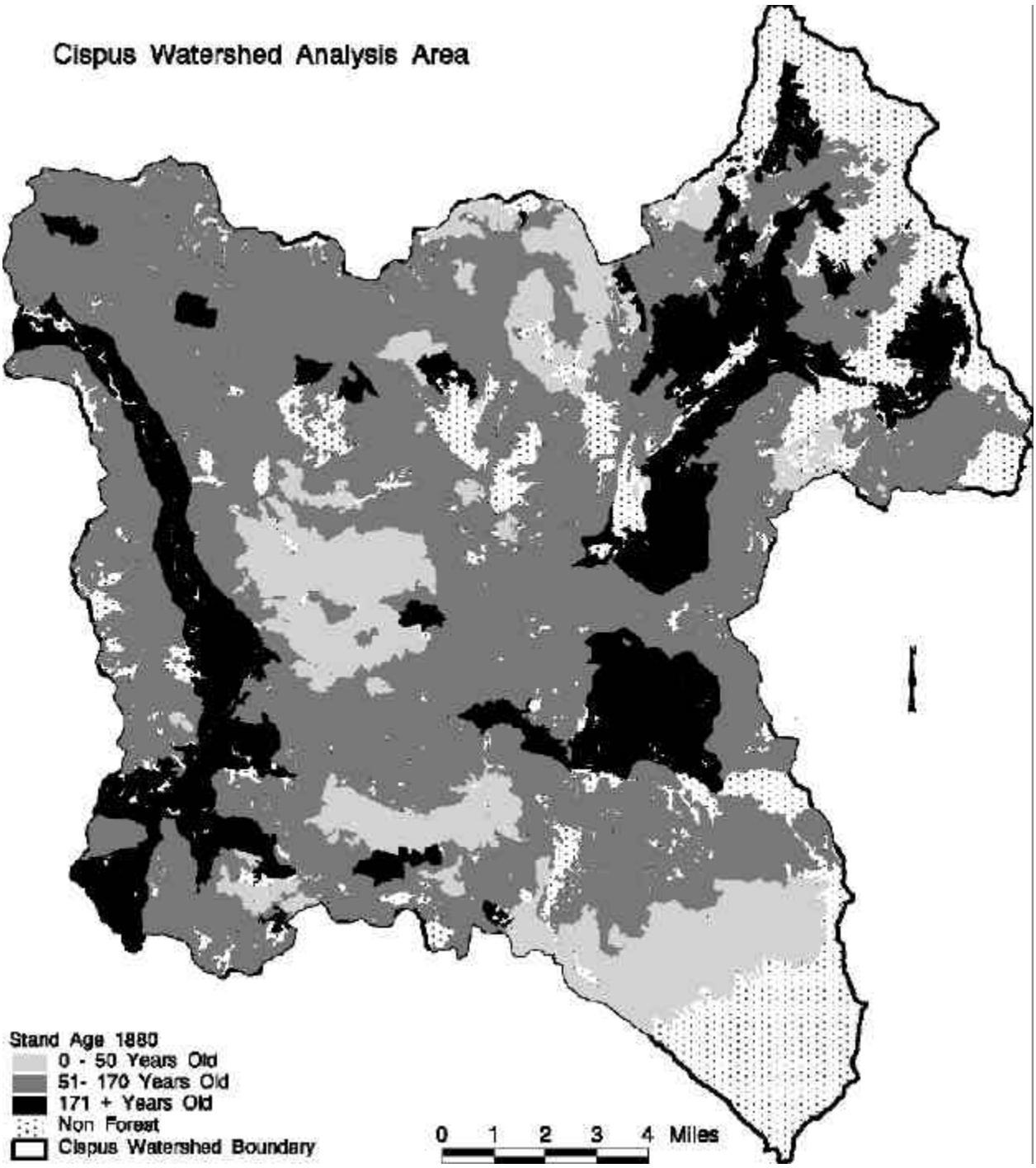


Figure E-9. Stand Age at 1880.

Estimated 1940 Conditions By 1940, the character of this landscape had changed considerably, due in large part to a series of wildfires between 1880 and 1920. These fires consumed much of the existing mid-successional forest, which had formed the matrix. Most of the remaining mid-structural vegetation was contained in several large, continuous patches in the central portion of the watershed. As burned areas reforested, the early-structural forest became the dominant structural class. In 1940, there were more patches of forest in this landscape than existed in 1880, with a smaller average size (about 1,500 acres to over 10,000 acres). The late-successional blocks had increased in number since 1880 and were well connected.

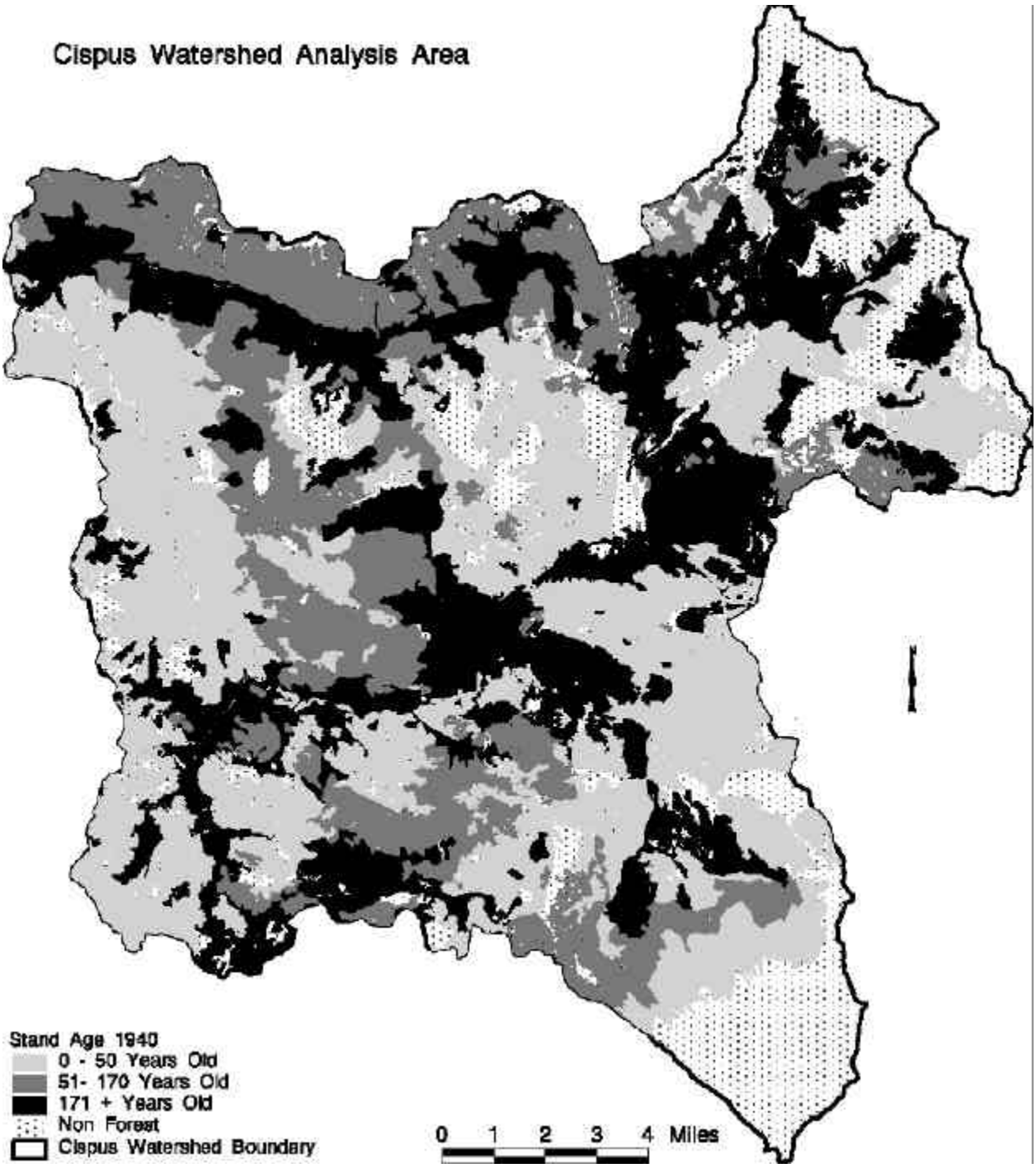


Figure E-10. Stand Age at 1940.

1997 Conditions Although the total acreage of the various vegetation successional/structural classes in this watershed is very similar to that found in 1880, the character and pattern of the current landscape has changed considerably from the 1880 and 1940 landscapes. Most of the recent change results from timber harvest activity. In contrast to the large blocks of unfragmented early-successional vegetation of 1880 and 1940, today's early-successional vegetation patches tend to be relatively small in size and more regular in shape (often square or rectangular with straight edges). There are a few larger patches of early-seral vegetation where regeneration harvest blocks have been connected together over the years. Very few of these approach the early-structural block size or configurations of 1880 or 1940. By 1993, a total of about 19,000 acres (14% of the AMA) had been subject to regeneration harvest (mostly clearcut). In addition, the location of structural stages has changed. In 1880 and 1940, late-successional forest was dominant in valley bottoms and lower side slopes. Today, the valley bottoms are often harvested, and thus have been modified to an early structural stage.

The early successional patches, created primarily by clearcut harvest and broadcast burning prior to 1994, also differ structurally from those of 1880 and 1940. Very few have snags or large, live remnant trees in them, or large, down woody material. Green tree and snag retention has increased with the implementation of the Northwest Forest Plan in 1994. The mid-seral forest forms the largest, most connected, and least fragmented blocks in the landscape and is considered the matrix, as it was in 1880. However, it is not as well connected and unfragmented as it was in 1880. By 1997, the number and size of large, intact patches of early- and late-structural forest had been greatly reduced from 1880 and 1940 conditions. Between 1940 and 1994 most of the large, unfragmented, and connected late-successional forest blocks had been fragmented or disconnected by clearcut regeneration harvest. Most of the regeneration harvest came out of the late-successional forest, converting it to early-successional forest in a staggered block pattern. In comparison to 1880 and 1940 conditions, the 1997 landscape is a fine-grained landscape with a high amount of edge and contrast, with reduced connectivity. This has lead to a decreased ability for many plant and animal species to migrate back and forth between habitat blocks.

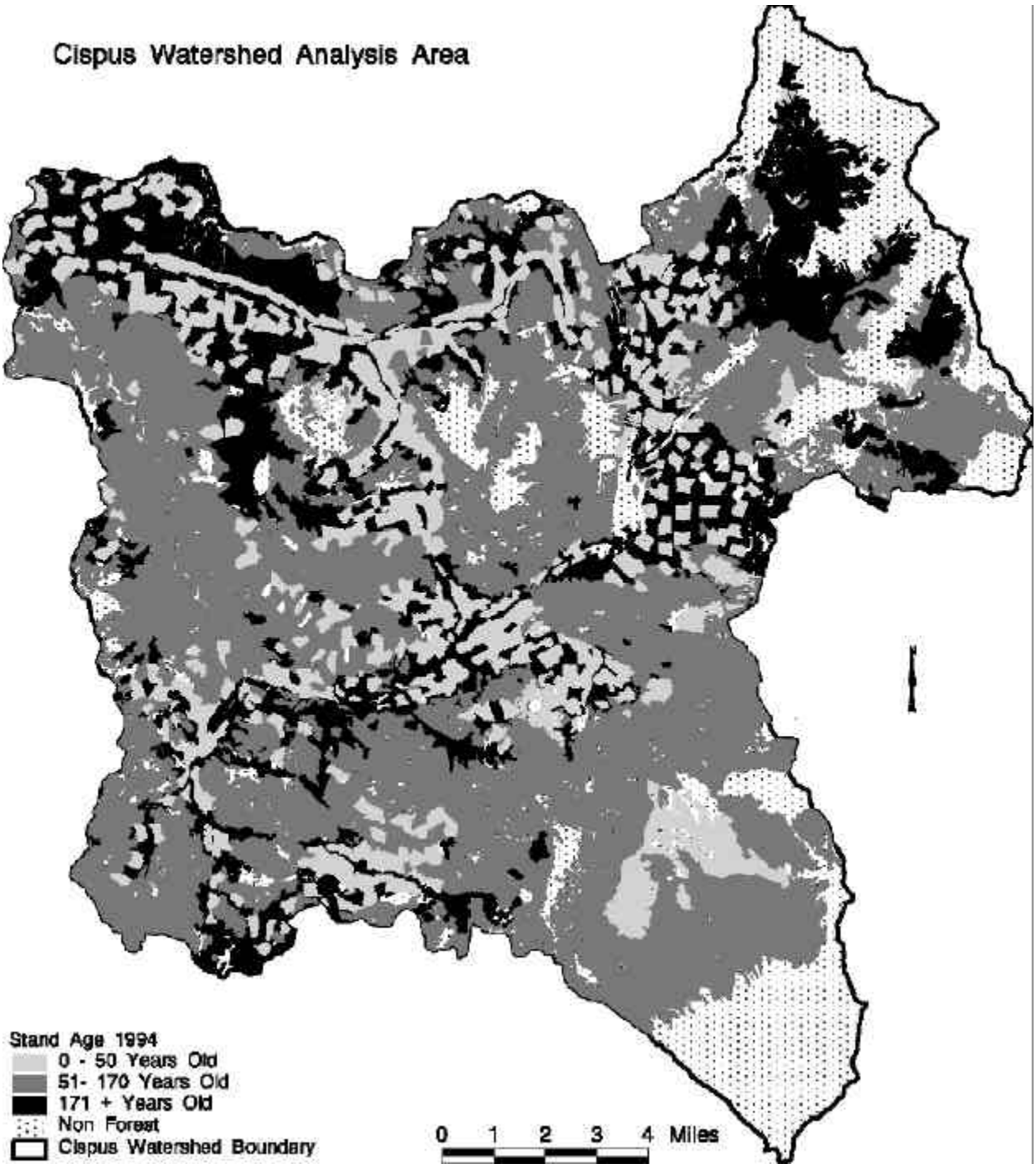


Figure E-11. Stand Age at 1994.

Special Forest Products In the past decade, commercial demand for traditional and non-traditional special forest products has increased substantially. Plants such as beargrass and salal are popular as floral greens, while edible mushrooms such as the Matsutake have a high commercial value. Other commonly harvested SFP include Christmas trees and boughs, transplants (trees, shrubs, ferns), mushrooms (Matsutake, Chanterelle), edible berries, and firewood.

SFP management is complex and varies by product. A permit is required to remove any product from National Forest land. However, information on the distribution, abundance, ecological significance, and methods of harvest or collection of special forest products is limited.

Current research efforts on the Cispus AMA include studies of the distribution and abundance of Matsutake and Chanterelle mushroom populations, and the effects of various harvest techniques on beargrass populations under various habitat conditions. Only after acquiring this type of information can we begin to make meaningful recommendations regarding sustainability of these important resources.

5. Aquatic/Riparian Systems

The total drainage area for the Cispus River and North Fork Cispus River watershed is 321 square miles, including area outside of the AMA. The main stem of the Cispus River measures 38 miles in length, with a slope of 84 feet per mile (1.6% gradient).

Stream Temperature is one important element in determining water quality. A combination of factors contribute to stream temperature, including stream discharge (the volume of water that passes by a given point within a given period of time), stream morphology (or structure), air temperature, intensity of solar radiation, and amount of shade. Stream water that is too warm renders the waterway unsuitable for various types of fish, including anadromous species, at different stages in their life cycle. The primary causes of elevated stream temperatures include the reduction of streamside shade through timber harvest and the creation of wider and shallower stream channels by increased sedimentation and peak stream flows. Wider, shallower streams are more at risk to increased temperature effects due to the added surface area exposed to the sun and the loss of shade from vegetated edges.

As measured in the summer of 1994, stream temperatures in the main channels of the Cispus River above the North Fork, and East Canyon Creek increased with distance downstream. This pattern of temperature increases is natural, although stream channel widening in the 1970's undoubtedly contributed to the magnitude of increase. All streams within the Upper Cispus watershed are within the historic range of natural variability (11-19° C), and most of the streams (with the exception of the East Fork of Canyon Creek) have adequate temperatures for fish populations.

Stream Turbidity, or cloudiness, is another major factor in water quality. All streams in the watershed normally run clear and meet state standards for turbidity with the exceptions of the Cispus, Muddy Creek, and Adams Creek. These streams are affected by an active glacier on Mount Adams, which contributes glacial flour (fine sediment) to their stream systems. Turbidity in these streams is highest in the summer, when warm temperatures are increase glacial runoff.

Turbidity also increases in all the streams in the watershed from time to time, due to either natural or management related erosion and sedimentation processes. These increases occur as pulses, as both coarse and fine sediments are washed into waterways and are carried downstream.

Flooding has played a continuous role in the history of the area. The majority of the large, historical floods identified in anecdotal reports, as well as those measured at stream flow gauging stations in the area, occurred during the months of November through January. Early settler's descriptions and newspaper accounts indicate that rain-on-snow effects were associated with most of these large events. The Pilot Watershed Analysis indicated that significantly higher stream peak flows may be expected in drainages with a high percentage of early-seral stands during unusual storm conditions. Flooding was documented in 1891, 1896, 1906 and 1933, in November or December in all cases. The February 1996 floods were the largest yet recorded in the Cispus drainage. Stream flows in excess of 25,000 cfs were measured at the gauging station on the Cispus River. An event of this magnitude or larger is expected to occur once every 200 years. Damaging floods, however, appear to occur on the order of 1 to 3 per decade.

Stream Channel Conditions are an important determinant of water and fish habitat quality. Changes in stream channels are also an indicator of other processes taking place, such as increased peak flows or sedimentation rates. Narrow channels are associated with rapid flow and low sediment load; wider channels are associated with slower moving streams and increased sediment burdens. In general, channel widening and other associated channel damage occurred in the middle and lower portions of much of the Cispus AMA between 1959 and 1979. The Cispus River, North Fork Cispus River, and East Canyon Creek all experienced channel aggradation (sediment build-up). The likely triggering mechanism for the damage was a series of flood events in the 1970's.

Stream Pools Channel widening and braiding causes shallower pools, more gravel bars and a loss of wood in streams, decreasing the habitat complexity of the stream. Several stream areas show signs of pool filling and loss of pool volume from both coarse and fine sediment input. Sources of these sediments include: natural landslides, road and harvest related landslides, sediment delivery to streams from road surfaces, as well as input of ash from the 1980 eruption of Mount St. Helens.

The presence of large woody debris in a stream is directly related to pool area and depth. Riparian vegetation serves as the source for large woody debris, and where this vegetation is removed, streams show a low level of large woody debris.

Pools act as thermal refuges for adult fish, which are particularly important for the Chinook salmon. Wider channels increase solar heating and result in higher pool temperatures. Based on the channel widening in the lower reaches of the mainstem Cispus, pool habitat is limited and falls below desired conditions. In the North Fork anadromous zone, all segments have a limited number of deep pools. Existing pools, however, appear to be of good quality with an average residual depth of more than 3 feet.

Pool quality and frequency is highly variable throughout streams where non-anadromous fish reside. Streams with large boulders have the most high quality pools. Large woody debris and beaver activity also provide high quality pools in the upper Cispus and other stream areas. Limited records indicate a decline in pools since 1933, a trend with important implications for fish populations.

Riparian Vegetation In addition to serving as a source of large woody debris, riparian vegetation provides stream bank stability, without which accelerated bank erosion, channel widening, and channel shifting could take place. Riparian vegetation also plays an important role dissipating energy and reducing and storing sediment which would otherwise be transported directly to the main stem of the river. Tree roots have been observed to be a primary bank protector. Where riparian vegetation has been removed, associated channel widening has occurred. Riparian vegetation within the Cispus AMA varies from open areas (due to roads, fires and harvesting), to closed-canopy stands with brush, hardwoods and old growth.

Aquatic Biology Both anadromous and resident fish species utilize streams in the Cispus River watershed. Out of a total of 96 miles of fish-bearing streams in the AMA, only about 25 miles (including the mainstem Cispus and the North Fork Cispus) are accessible to anadromous species. All anadromous habitat is also used by the various resident species.

Through the Cowlitz Reintroduction program (BPA 1993), three anadromous fish species historically found in the Cispus and Cowlitz Rivers are being re-established in the Upper Cowlitz and Cispus basins. Chinook and Coho salmon were traditionally present in the Cispus River, while steelhead used both the Cispus and the Cowlitz. Resident species include Cutthroat, Rainbow and Brook trout (an introduced species), which are all distributed throughout lakes and streams in the watershed.

Fish Habitat Most anadromous spawning areas occur primarily in less confined, lower gradient channels in both the North Fork and lower mainstem Cispus. Low levels of in-channel large woody debris in the mainstem Cispus anadromous zone limits summer rearing and juvenile hiding cover. Large woody debris appears to be adequate in the North Fork anadromous zones. Overall, in-channel frequency of large woody debris is good in most fish-bearing streams in the resident zone.

6. Wildlife

The Cispus AMA is home to a wide diversity of wildlife species due to the range of vegetation communities and unique habitats. A total of 264 species wildlife species (mammals, birds, reptiles and amphibians) are known or suspected to occur (based on habitat suitability) at the present time.

Rock outcrops, cliff sites and talus slopes in the Goat Rocks, Mt. Adams Wilderness, Hamilton Peak, North Fork Cispus, and along the Juniper Peak/Jumbo Peak ridge system provide habitat for peregrine falcons, mountain goats, pikas, bushy tailed woodrats, black swifts, and the only known population of larch mountain salamanders in the Cispus AMA. Peregrine falcon releases occurred three consecutive years (1991-1993) from a site within the Cispus watershed.

Within this watershed, 65 species have been identified as dependent on the aquatic and/or terrestrial portion of riparian habitats. Other terrestrial wildlife species also use riparian habitats but are not dependent upon them, although they may reach maximum population densities there.

Natural habitat fragmentation has occurred in this watershed for centuries or even thousands of years as a result of wildfires, volcanic eruptions and flooding events. These disturbances have also helped shape the pattern of wildlife habitats and species populations and distributions. Wildfires created landscape patterns of great expanses of mid and late-successional habitats which were usually well-connected, as discussed above.

Timber harvests within riparian zones since the late 1940's have resulted in increased habitat fragmentation and reduced the effectiveness of the riparian habitat to provide travel and dispersal routes for wildlife species. Currently, 23 percent of the total watershed (including 27 percent of riparian habitat) is considered late-successional habitat. Many species depend on the structural characteristics of late-successional forests, such as large trees, large diameter snags, high canopy closure, abundant down wood, canopy layering and food producing shrubs. Habitat fragmentation has increased competition for remaining late-successional stands, reduced the forage base, nesting and breeding sites, and increased the risk of predation or human-caused mortality.

Wildlife Populations Black-tailed deer and Roosevelt elk have both experienced population increases and greater distribution as a result of forage openings created by timber harvest over the past 45 years. However, timber harvests and wildfires have also reduced the amount of optimal cover stands available in deer and elk winter ranges. Mountain goat populations were stable from 1920 to 1960. After that time, roaded access, poaching, and legal hunting permits combined to reduce goat populations to a level where the Washington Department of Wildlife closed goat hunting in the North Fork Cispus area. Twenty goats were transplanted into that area in 1985 and 1987. Goat populations are now increasing and expanding their range although populations are likely still below historical levels.

Several dozen northern spotted owl pairs have been identified with activity centers within the Cispus AMA. Overall, dispersal habitat for spotted owls is fair, although some constrictions occur from timber harvests. Large forest carnivores such as lynx, wolverine and fisher are dependent on late-structural habitat for some or all of their life cycle. Lynx and fisher have been documented and a wolverine sighting was reported several miles west of the watershed boundary in 1991. Because of its location in the Southwest Washington Province, the Gifford Pinchot National Forest plays an important role in maintaining habitat and viability for these species. Within the Forest, the Cispus AMA provides a crucial linkage among several suitable wilderness areas and Late Successional Reserves. The Cispus AMA provides an opportunity to research the degree to which populations of large forest carnivores in this area are isolated from other populations within the state.

7. Landscape-level Dynamics

Landscape level dynamics highlight connections among ecosystem elements. It is clear from the previous discussions in this appendix that both people and wildlife are influenced by existing and changing vegetative and aquatic patterns in the Cispus AMA. It is also clear that people and wildlife also have significant impacts on the landscape. When these interactions are analyzed at a systemic and functional level rather than at the level of individuals or stands, the implications of those stand-level interactions on populations which surround or flow through individual sites begin to emerge.

Habitat connectivity, resource and population flows, and disturbance of natural and human origin are several of the major landscape-level dynamics of concern. Landscape function and connectors are important because they determine the sustainability of resources. Watershed analysis has revealed issues related to existing landscape pattern and habitat connectivity.

The management strategy provided in the ROD (1994) addressed certain landscape-level dynamics through its system of land allocations and standards and guidelines. In addition to AMA's, the land allocations included Congressionally Reserved Areas, Managed Late-Successional Reserves (LSR's), Administratively Withdrawn Areas, Matrix, Riparian Reserves and Late-Successional Reserves. LSR's provide large contiguous blocks of late-seral habitats for late-seral associated species, including the northern spotted owl.

Three LSRs border the Cispus AMA: Woods Creek LSR to the west, Packwood LSR to the northeast, and the Lewis River LSR to the southwest. Riparian reserve functions include improving travel and dispersal corridors for many terrestrial animals and plants, and providing greater connectivity within the watershed. Riparian reserves also serve as connectivity corridors between late-successional reserves (ROD, p. B-13).

Connectivity The NWFP describes connectivity as a measure of the extent to which late-successional and old-growth ecosystem landscape patterns provide biological and ecological flows which sustain associated animal and plant species. Areas of connected late-successional habitat that once existed on non-federal lands are now virtually gone, having been converted to some other land use such as agriculture and suburban housing. Remaining areas of late-seral habitat occur primarily on Federal lands, making these connections critical in maintaining distribution and viable populations of late-successional dependent species.

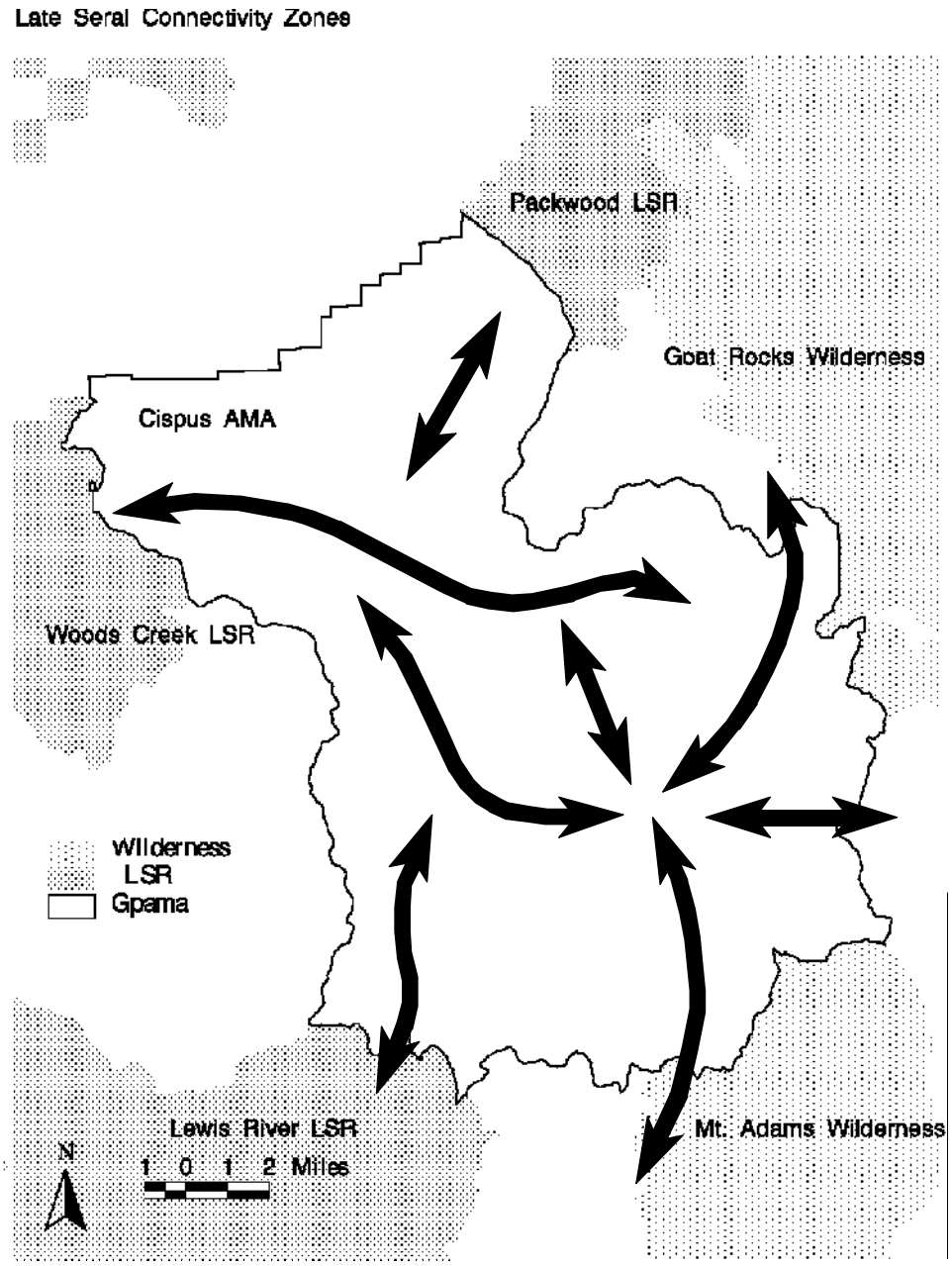


Figure E-12. Connectivity Zones.

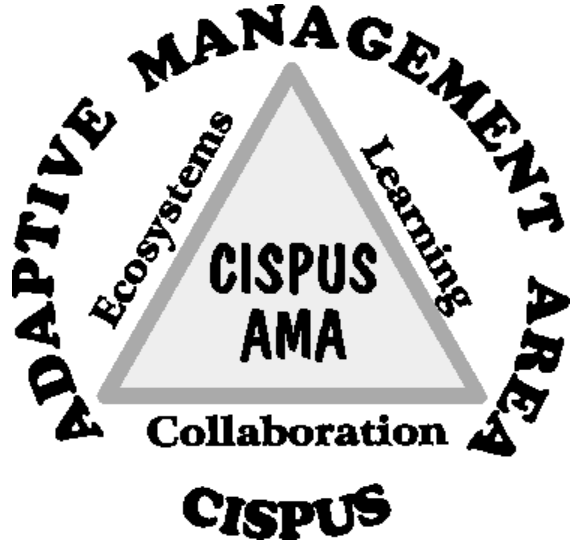
The watershed analysis identified eight wildlife (plant and animal, terrestrial and aquatic) connectivity zones. The majority encompass riparian zones. Although additional species pathways are present in the watershed, these eight zones were highlighted as important for providing connections within the watershed and for linking adjacent watersheds. Riparian zones are important corridors for a myriad of species. Plant propagules may be dispersed here, and amphibians are provided important refugia. They provide nesting and migration routes for many neo-tropical birds; big game animals tend to use riparian areas for calving/fawning sites, as well as important winter range. Many fur-bearers are dependent on the habitat components found in riparian zones.

Over the long term, the Pilot WA recommended the re-establishment of late-structural stands in the pathways to form a well connected landscape, approximating conditions prior to Euro-American settlement. In the short term, the Pilot WA recommended linking remaining unfragmented mid and late-successional habitat patches to facilitate the movement of late-successional terrestrial species across the watershed. These habitat corridors would not be permanent, but would shift as adjacent areas mature into older aged stands. Until a greater percentage of late-successional habitat develops within riparian reserves, the Pilot WA proposed that current unfragmented blocks of mid and late-successional habitats are important to maintaining species flow and habitat connectivity to the adjacent Lewis River and Cowlitz River Watersheds.

Appendix F
Cispus AMA Strategies Executive Summary

Randle and Packwood Ranger Districts
Gifford Pinchot National Forest

November 1, 1995



Part I - Introduction

1. Background

The Cispus Adaptive Management Area is located in the Randle and Packwood Ranger Districts of the Gifford Pinchot National Forest. It is one of ten such areas identified in the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (ROD NWFP) (USDA, USDI 1994), commonly called the President's Northwest Forest Plan. Adaptive Management Areas are landscape units designated to encourage the development and testing of innovative technical and social approaches to achieving desired ecological, economic, and social objectives, in a manner consistent with applicable laws. An emphasis is placed on developing localized approaches to accomplishing the conservation objectives set forth in the President's Northwest Forest Plan.

A more specific emphasis of the Cispus AMA is:

> Development and testing of innovative approaches at stand, landscape, and watershed level to integrate timber production with the maintenance of late-successional forests, healthy riparian zones, and high quality recreational values.

The Cispus AMA Strategies documents many of the social and technical emphases and objectives recommended by process participants as those appropriate for guiding management of the AMA. The Strategies are focused on social values and needs. Ecological objectives and needs will be addressed in a landscape design for the AMA. The landscape design, together with the Strategies and the Upper Cispus Watershed Analysis, will constitute the Cispus AMA Management Guide.

The primary use of the Strategies will be in planning actions within the Cispus AMA. Future decision documents for site specific projects within the Cispus AMA, such as Environmental Impact Statements (EIS), Environmental Assessments (EA), or Categorical Exclusions (CE), will use the Cispus AMA Strategies as a guide in the identification of project proposals and alternatives. Additional uses for the Cispus AMA Strategies will include competing for financial resources, garnering political support, providing a shared vision, and identifying experiences to be tracked.

It is important to note that the Cispus AMA Strategies is intended to be a dynamic document. Changes or additions will be made as projects are implemented, as learning occurs, with the generation of new ideas, or as priorities change. It will not be changed without involving the public in a manner similar to that which has produced the original document.

All proposed actions will be developed to meet standards and guidelines of the GPFP, as amended by the ROD NWFP, and are subject to analysis under NEPA. The Strategies, in themselves, do not constitute management direction. (March 1998 revision)

2. Adaptive Management Principles

As defined in the President's Forest Plan, Adaptive Management is a continuing process of action-based planning, monitoring, researching, evaluating, and adjusting; with the objective of improving implementation and achieving the goals that have been identified.

In forest management, our limited understanding of ecosystem behavior leads to uncertainty about the effects of management activities. For our purposes, then, adaptive management becomes a strategy for dealing with uncertainty by explicitly designing management activities as experiments and opportunities for learning.

3. Collaborative Learning

The **Collaborative Learning** approach was utilized in developing the Cispus AMA Strategies. Collaborative Learning is a framework designed for natural resource policy decision-making situations and public involvement in policy discussions.

Collaborative Learning:

- Stresses improvement rather than solution.
- Emphasizes situation rather than problem or conflict.
- Focuses on concerns and interests rather than positions.
- Targets progress rather than success.
- Seeks desirable and feasible change rather than desired future condition.
- Encourages systems thinking rather than linear thinking.
- Recognizes that considerable learning-about science, issues, and value differences-will have to occur before implementable improvements are possible.
- Features communication and negotiation interaction as the means through which learning and progress occur.

4. Public Involvement

In developing the Cispus AMA Strategies, several modes of public involvement were engaged simultaneously over a period of approximately three months. These included sending letters and information about the process to a large mailing list, posting public notices, conducting public meetings, and collecting input and comments in person, in writing, and over the phone.

a. Mailing List

The Randle and Packwood District Rangers informed the public about the process of developing the Cispus AMA Strategies by mailing letters to approximately 300 people, organizations, and agencies on mailing lists maintained at the Randle and Packwood Ranger Districts and at the Forest Headquarters in Vancouver. After each public meeting, letters were sent out containing meeting notes, information on the next public meeting, and an update on the progress of developing the AMA Strategies.

b. Public Notices

Notices giving the date, time, location and general subject matter for each of the public meetings were distributed to local papers and posted in public places in Eastern Lewis County and Pierce County that are normally used to give notice of Forest Service activities.

c. Public Meetings

There were six public meetings held in Morton, Washington to share information, solicit comments, and conduct discussions toward the development of the Cispus AMA Strategies. Approximately 80 people attended one or more of the public meetings.

d. Written or Other Comments

Approximately 60 people provided written comments for the AMA Strategies. There were also a few personal and phone contacts that provided specific input to the Strategies.

e. Public Involvement Demographics

The geographic origin of those involved in the AMA Strategies process was analyzed. This results of this analysis suggest that most of the interest in the Randle-Packwood Districts or the AMA is from people living either near Randle and Packwood or near the metropolitan areas to the north. The consistency of geographic origin between those attending public meetings and those on the AMA mailing list indicates that the public involvement effort of the AMA Strategies resulted in an accurate representation of public opinion within the primary influence area of the AMA.

5. Model Forest Network

The Cispus AMA is one of three Adaptive Management Areas in the United States to become part of the International Model Forest Program. The Model Forest Network provides a forum for the exchange of information and ideas as a program dedicated to international cooperation in achieving sustainable management of resources, conservation of natural systems, and minimizing environmental degradation.

Part II - Historic and Present Conditions

For purposes of this document, the separation between historic and present conditions is made at 1920. Significant portions of the descriptions of resource conditions that are included are based upon information assembled in the Watershed Analysis conducted for the Upper and Middle Cispus watersheds in 1995.

1. Physical Description of Area

The Cispus Adaptive Management Area is within the Randle and Packwood Ranger Districts of the Gifford Pinchot National Forest. It is in Lewis and Skamania Counties, in an area that lies south of the Cowlitz River and U. S. Highway 12 between the towns of Randle and Packwood. It contains about 143,000 acres and is roughly 12 miles east to west and about 20 miles north to south. Most of the AMA is heavily forested except where high elevations and past wildfires have combined to produce alpine-like areas with grasses and shrubs.

Major streams within the area include the Cispus River and the North Fork of the Cispus River. There are several other streams and lakes in the AMA. Prominent ridges descend into the valleys of the major streams. Elevations range from 1,000 feet in the Cowlitz River Valley to nearly 6,000 feet on the ridges. Part of the southeastern boundary of the AMA coincides with the boundary of the Yakama Indian Reservation.

Major roads extending into and through the AMA are Road 23 from Randle or Trout Lake, Road 21 from Highway 12 near Packwood, and Road 5603 from the Yakama Indian Reservation. Major trail systems in the AMA include the Klickitat Trail #7, the Blue Lake-Bishop Ridge Trails

#271 and #272, the Juniper Ridge Trail #261, and the Boundary Trail #1.

There are several popular recreation sites within the Cispus AMA, including major campgrounds, many dispersed areas for camping, a horse camp, and a winter recreation snow-park.

2. Pre-1920 Conditions

a. Human Uses

The Cispus River watershed has been a focus of human activity for at least 6,500 years. Groups associated with the area include the Taitnapam, or Upper Cowlitz. Historic accounts report that Yakama families traditionally used the upper Cispus watershed for huckleberry harvest. The area also provided deer, elk and fish as food sources, and mountain goat was hunted for fur and horn.

The first non-native settlers came to the upper Cowlitz River basin in the 1880's. Many came from the Cumberland-Allegheny Plateau, and were engaged in some form of livelihood related to forest products prior to settling in the Cowlitz basin. More than 80% of the emigrants from the southern mountain states continued to work in forest products upon arrival in the basin, specializing in the manufacture of railroad cross-ties and rough lumber.

b. Forest Vegetation

Vegetation within the Cispus area has been subject to many disturbances in the past. Eruptions of Mount St. Helens have altered the vegetation and landscape dramatically at least three times during the last 4,000 years. Wildfires have played a consistent role in the evolution of watershed vegetation.

Reforestation of large fire areas before 1920 was a result of natural seeding. The results were usually large, continuous patches of one age class and little species diversity. Stands that survived subsequent fires and grew older were gradually invaded by shade-tolerant conifers or hardwoods, forming the mix of tree species and ages associated with late-successional stands. Many late-successional stands of the past were concentrated in riparian zones, particularly at low elevations.

Large areas of high elevation lands were maintained in grass and shrub stages by livestock grazing and by the burning of berry patches by tribal people.

c. Roads/Recreation

There were no modern roads in the Cispus AMA until 1922. Only trails originating from wildlife and American Indian use were available for hiking to destinations. Most non-Forest Service visits to the area were probably related to hunting, fishing, or other forms of subsistence use of the forest.

3. Post-1920 Conditions

a. Human Uses

About 5,000 people are permanent residents of the nearby Cispus and Cowlitz Valleys. Many others visit the area for recreational activities. There are many who rely on the area for part of their livelihood. The logging and timber industries have been the backbone of the local economy for the last half century. Other resources extracted in the area include firewood, and other forest products such as mushrooms, berries, transplants for landscaping, and greenery for floral arrangements.

Although there are four major wood-products firms located in eastern Lewis County, unemployment for timber workers has increased to over 10% as a result of logging restrictions and effects associated with the nationwide slump in housing construction. Opportunities to offset the loss of timber-related jobs are limited by the relative remoteness of the area and the lack of industrial land and infrastructure.

The increased use of the Cispus area has expanded the demand for goods and services in the area. It is becoming increasingly evident that the forest resources of the Cispus AMA, although renewable for the most part, cannot meet the needs and desires of all the users of the area.

b. Forest Vegetation

Selected portions of the area where large fires had occurred in 1918 were planted starting in 1920. This activity continued into the 1930's. Modern logging and forest management began in the 1940's. By 1993, a total of about 19,000 acres (14% of the AMA) had been regeneration harvested, primarily as clearcuts. In addition, about 3,000 acres of commercial thinning had been accomplished. All clearcuts were reforested either by natural seeding or hand planting.

Due to timber harvest and modern wildfire suppression, the vegetative landscape in the AMA is quite different today than it was in the past. Much of the timber harvest has occurred in stands within riparian areas and at low elevations. As a result, the location of late-successional stands is generally higher on the slopes than found historically. The spatial arrangement of age classes has also changed from that found prior to 1920. Currently the landscape includes many small (20 to 40-acre), rectangular patches of early and mid successional forest within stands of late-successional forest.

c. Roads/Recreation

The trail system has expanded to accommodate the increased use of the forest. There are currently at least 18 trails in the AMA area, providing over 100 miles of trail. The road system has also grown. Today there are approximately 450 miles of roads in the Cispus AMA. Development of most camping areas has occurred at the popular lake settings.

Part III - Management Direction

Activities within the Cispus AMA will follow the current management direction (including applicable Standards and Guidelines) found in the Gifford Pinchot National Forest Land and Resource Management Plan (USDA 1990) unless otherwise noted in the decision document of a particular project. The GP Forest Plan includes amendments related to the management of the Cispus AMA identified in the President's Northwest Forest Plan (GP Forest Plan, Amendment 11, February 1995).

1. The GP Forest Plan

The Gifford Pinchot National Forest Land and Resource Management Plan (GP Forest Plan), approved in July, 1990, established long-term management direction for the Forest. The President's Northwest Forest Plan (1994) subsequently amended the GP Forest Plan. The GP Forest Plan subdivides the entire Forest into individual Management Areas, each associated with a management emphasis, called a Management Area Category, or MAC. For more detailed information about the Management Area Categories, refer to the GP Forest Plan.

The lands within the Cispus AMA have been assigned to ten separate MAC's, including:

Deer and Elk Winter Range	6,382 acres	4.61%
Mountain Goat Summer Range	352 acres	0.25%
Mountain Goat Winter Range	7,864 acres	5.68%
General Forest	68,900 acres	49.78%
Developed Recreation	462 acres	0.33%
Roaded Recreation	18,557 acres	13.41%
Unroaded Recreation	17,879 acres	12.92%
Visual Emphasis	9,637 acres	6.96%
Wild and Scenic River	8,097 acres	5.85%
Special Interest	130 acres	0.09%

Private Land	150 acres	0.11%

The two parcels of privately owned land which are included within the boundaries of the AMA are not under the jurisdiction of the Forest Service.

Part IV - Strategies for the Future

1. Introduction

This section provides the connection between the previous parts. Thirteen *Strategies* for the management of the various resources associated with the AMA are presented. The design and scope of the strategies are intended to include the management emphasis, technical objectives, and social objectives of the AMA. They also fulfill the requirements listed for AMA plans in the President's Northwest Forest Plan.

2. Descriptions of the Strategies

Each strategy consists of several parts.

Description - **WHAT** the strategy is
Purpose - **WHY** we propose the strategy, and what we expect to learn
Location - **WHERE** we will implement the strategy in the AMA
Involvement - **WHO** will be responsible for accomplishment
Funding - **HOW** the strategy will be funded or otherwise carried out
Timing - **WHEN** the strategy will be done or could begin

Strategy #1 - Natural Resource Management Education

Description. Establish courses of education for high school and college students, and adult education, centered on resource management and related issues. These will range from classroom studies to guided field tours, or "hands-on" field work where participants will work on actual projects. Forest Service specialists could participate as instructors. Student tasks could include collection of inventory and monitoring data to see how this information is used in resource management. Additional possibilities could include summer camps, summer employment or volunteer work in the forest.

Information about natural resources, forest management or research will be presented in programs given at major recreation sites within the AMA. Other self-directed information will be provided at sites along roads and trails or at recreation sites. The focus of the information will be on public education concerning forest management issues or other areas of interest.

We will also identify shared learning opportunities (environmental, social values, laws and regulations) between the Forest Service, students, user groups, and the public concerning the Cispus Adaptive Management Area. Some likely opportunities include:

- public education programs to describe research results
- "Tread Lightly" programs shared with the public and with school students
- information provided by various forest user groups to educate others on their types of uses
- demonstrations of different harvest methods, and logging techniques and equipment
- on-site information where management practices/experiments are taking place
- workshops on forest sciences for the public or for targeted groups such as elected officials
- restoration projects and possible improvements to restoration techniques

To help in communication, we will develop a bulletin board on our computer system that will be accessible by local schools and the public. The primary purpose will be to distribute information and public education opportunities about the Cispus AMA. Other suggested contents will include research or other data, maps, or a listing of active projects that might be visited to learn current forest management techniques. One important feature identified by the public is that whatever information is being presented should be in easily understandable language, free of technical terms and jargon.

Purpose. The purpose of this strategy will be to expose and involve students, the public, and user groups in natural resource management, particularly within the Cispus AMA. This will serve to increase communication and information exchange between the Forest Service and the public, schools, and universities. It will also increase public participation in the management of projects and research within the AMA, increase the community knowledge base, and educate the public on the relationships between people and the conservation and use of resources. Other opportunities for learning include:

- teaching tolerance between user groups who have different interests
- introducing a diversity of views during public involvement
- developing long-term commitments of people or groups in the management of the Cispus AMA
- incorporating students and the public in projects and research
- compare different forms of involvement between schools, universities and the Forest Service (curriculum, employment, training, monitoring, research, camps
- developing long-term commitments of people or groups
- empowering groups of students or others to work on their own with little or no Forest Service involvement
- the computer-based information system will be compared to other types of communication links (written, personal, other) to find out which is most effective, or how to increase their effectiveness

Location. Education opportunities will be applied at various learning centers, e.g., local schools, nearby colleges and universities, environmental learning centers. Within the AMA, information related to natural resource management could be provided at selected sites along roads or trails, or at recreation sites. Shared learning opportunities could be applied in the AMA or the surrounding communities. The computer bulletin board will reside in the Randle and Packwood PC computer network. Eventually, the local school district will share in the operation of the bulletin board.

Involvement. The local schools and nearby colleges and universities will use existing or establish new curriculum. Various nonprofit or non-government organizations may offer assistance or funding. Much of the signing and interpretation related to on-site resource educational programs could be done by volunteers solicited by the Forest Service through schools, the community, or user groups. The Forest Service will provide information and coordination about the types of projects, research, or other activities that are taking place or planned in the AMA. Schools, user groups, and the public will help identify needs and desirable topics for shared learning.

Funding. Each school or group will provide their own funding, teachers or classroom time as necessary. Many activities will require volunteers or funds from various public and user groups. Interpretive signing for projects could be funded by the project or any associated revenue collected (using K-V funds). The various programs or projects within the AMA will fund Forest Service personnel, however, grants may be pursued as a possible funding source for the development and maintenance of the computer bulletin board. Individuals or schools will be responsible for providing their own access to the bulletin board, with Forest Service assistance.

Timing. Some classes will be established during the beginning of the fall 1995 school year at the White Pass High School. Other schools could add curricula later. Resource education programs and shared learning opportunities within the AMA could begin in 1995, with the computer bulletin board coming later, in 1996.

Strategy #2 - Public/Industry Involvement in Research, Inventories, and Monitoring

Description. To illustrate the importance of experimentation in the AMA, involve industry and interested individuals from the community in research being conducted there. Involvement could simply be describing to the public individual research methods used along with the range and accuracy of data and how to draw conclusions for each project conducted. Other forms of involvement could include identification of methods and procedures for the research and participation in data collection and monitoring.

Similarly, these groups could help in conducting inventories of what is in the Cispus AMA and monitoring the results of projects or management. This could include both resource and condition surveys or monitoring for economic, social, or biological information. Data collection and record-keeping will be conducted using agreed-upon standards and formats. Identified needs for inventories include:

- other forest products (mushrooms, berries, greenery, etc.)
- road and trail condition surveys, use levels and patterns
- streams, including human-caused barriers, key habitat features, refugia, and current fish species and distribution
- snag and down log populations within various vegetative types
- identified species from Forest Plan and threatened or endangered species lists
- exotic or non-native species

Workshops could be arranged to provide the necessary skills in data collection, monitoring, and other research or inventory-related activities.

Purpose. The purpose of this strategy is to increase knowledge of the resources and social and economic conditions associated with the AMA, to increase communication between the public and the Forest Service, and to improve public participation in the management of the AMA. Additional opportunities for learning include:

- public participation in projects and research activities
- comparing different forms of public involvement to decide what works best
- increased community knowledge base for resource issues and their relationship between people and resource uses, making it easier and more effective for the public to understand and participate
- how to solicit and organize volunteer groups
- making research and learning available and accessible to industry and the public
- how to use data and information from inventories and monitoring to improve management
- what levels of public use occur in the AMA, by whom, and for what purpose
- do the types and amounts of use on roads and trails match their design and maintenance
- how is wildlife use or occupancy affected by various uses or management practices

Location. This strategy could be carried out within the AMA, depending upon the specific need, or on selected demonstration sites on other public and private lands outside the AMA.

Involvement. The Forest Service will initiate and coordinate contacts with industry or public groups and organize for individual projects. Universities, the PNW, and the Columbia Learning Center will provide assistance. Others involved could include user groups, schools, research organizations, and local experts.

Funding. Forest Service involvement in research will be funded by the particular research activity. Industry and public involvement will be funded by industry, grants, or performed using volunteers. Funding for inventories and monitoring will be provided by Forest Service programs and projects, grants, partnerships or with volunteers.

Timing. Identification of available projects will begin in 1995.

Strategy #3 - Management Using Ecological Principles

Description. Manage resources within the AMA on ecological principles to produce the greatest use of the AMA for all considerations, with the least amount of disturbance to ecosystems. Resources will be maintained or restored to their range of natural variability. Various proposals to carry out this strategy include:

- identify natural forest users (animals) of forest products and permit or restrict harvest based on maintenance of this use
- manage timber stands for multiple species and extend rotation lengths to produce and maintain large contiguous blocks of late-successional stands
- protect or restore water quality and habitat for water and riparian-dependent species
- consider the relationships between management of the AMA, the rest of the forest, and the Southwest Washington Province
- maintain biological corridors in the AMA connecting unmanaged areas and late-successional reserves
- concentrate activities within an area then allow it to rest for lengthy periods
- avoid activities and experiments within unique areas

Purpose. The purpose of this strategy is to learn how to balance management of resources and resource effects within the AMA. The principle of least disturbance will be measured against estimates of change without management. Other opportunities include:

- what can we learn from natural disturbances, such as wildfires, and past management practices
- what effects do various management practices have on resources
- what is the limit to increasing use of the AMA and its resources
- what areas or resources are particularly sensitive to management
- how can we imitate natural processes with management practices and still meet social and economic objectives

Location. This strategy will be implemented throughout the AMA.

Involvement. The Forest Service will incorporate this strategy during project planning and implementation, using public participation and opinion during various phases of the project.

Funding. Forest Service personnel will be funded by the various programs and projects. Public involvement will be through voluntary participation.

Timing. This strategy will begin in 1995.

Strategy #4 - Collaborative Public Involvement

Description. Incorporate into project planning a collaborative learning process similar to that used for public participation during the development of the Cispus AMA Strategies. The Forest Service will facilitate discussions between user groups with different views or conflicting goals to arrive at mutually agreeable resolutions. Topics or proposals could also be addressed using selected core groups representing specific interests, then presented to a more general AMA group for refinement. In cases where resolutions fail to solve conflicts, the identified course of action should strive to improve the current situation to the benefit of all parties.

Purpose. The purpose of this strategy is to improve public participation in the AMA and reduce conflicts and confrontation over various activities or uses. Other opportunities for learning include:

- trying different forms of involvement between the Forest Service and the public
- how to promote acceptance or tolerance between groups with different interests and uses of forest resources
- how can we incorporate a diversity of views throughout the planning process
- how to focus and involve interest groups in projects to benefit all

Location. This strategy will apply to various projects and programs throughout the AMA.

Involvement. This strategy primarily involves the public using the Forest Service as a facilitator.

Funding. Forest Service participation will be funded from the program or project being discussed. Public participation will be voluntary. The need for core groups will be identified by the Forest Service or AMA public participants.

Timing. This strategy will be implemented beginning in 1995.

Strategy #5 - Forest Products Management

Description. To reduce unsupervised commercial forest product gathering in the AMA, stewardship contract areas will be sold and administered. These areas could be managed for one or more forest products and will include the right for the contractor to self-administer various approved management practices to enhance the amount or value of specified products.

Additionally, in locations where historically productive huckleberry fields occur within the AMA, techniques will be explored and developed to maintain, enhance, or restore huckleberries, especially where encroachment of trees and other vegetation has occurred. We will use various methods to see what works best for particular situations. These could include:

- burning under varying conditions
- pulling up, cutting, or otherwise eradicating competing vegetation
- pruning or other forms of culture
- thinning or removing all trees to create openings

Related to the above, we will encourage the development of local collection and/or processing facilities for selected commercial forest products. This will be done with the Lewis County Economic Development Council. The AMA will be used to help provide a regular, sustainable level of commercial offerings of the selected forest products.

Purpose. This strategy will help us learn how to diversify and expand the economic potential of the local, timber-dependent communities by producing sustainable harvest levels of other forest products. We will also learn how to maintain the economic and cultural value of huckleberry fields without the occurrence of large catastrophic fires as in the past. Additional opportunities for learning include:

- economic diversification based on renewable resource alternatives other than traditional wood products
- identifying new kinds of forest products to produce economic gain
- effects of commercial extraction of forest products
- how to increase the value derived from forest products by secondary manufacturing, etc.
- how Forest Service policy decisions can affect economies
- increasing communication and participation between the Forest Service and the public
- how to provide multi-seasonal or year-round employment using other forest products
- reaction of huckleberries to fire, timber harvest, or other management practices
- how to work with the Yakama Indians or other groups for mutual benefits
- how fire affects ecosystems
- what benefits to huckleberries can be gained by managing other forest products in an area (transplants, small trees for firewood, etc.)
- would thinning and burning in the huckleberry areas improve habitat for snowshoe hares, lynx and wolverine

Location. This strategy will be carried out in selected areas within the AMA depending upon the specific products and public interest. The number, amount, and quality of areas will consider the needs for provide personal use. The location of the collection or processing facility is intended to be somewhere in or near Eastern Lewis County.

Huckleberry management will be carried out primarily in the Midway-High Lakes and Hamilton Buttes-Pimlico areas. Other related projects are anticipated to take place on the Yakama and Warm Springs Indian Reservations.

Stewardship areas will be identified and inventoried using Forest Service personnel and volunteers from the public. Additional information could be supplied by contacting applicants for forest product permits. Stewardship contracts will be prepared by the Forest Service and sold by public auction to the highest bidder. Assistance for the location and development of a processing facility will be supplied by the Lewis County Economic Development Council, the PNW, and the Forest Service.

Involvement. Huckleberry management will be implemented by Forest Service personnel, the Yakama and Warm Springs Indians, the PNW, Oregon State University, and local experts.

Funding. Funding for Forest Service work on this strategy will come from the forest products program. Other work could be done by volunteers, funding from the PNW, or associated projects such as stewardship contracts or the sales of other forest products. Grants should be pursued to fund the development of a processing facility.

Timing. The strategy could begin in 1995 in the huckleberry fields, with other parts of the strategy beginning in 1996.

Strategy #6 - Community Service Work Opportunities

Description. Juveniles or others with community service obligations will do selected projects or other work such as maintenance. Alternatively, appropriate individuals or groups of prisoners will do similar work. Supervision will be provided by interest groups or local stewards with little Forest Service involvement.

Purpose. The primary purpose of this strategy is to build relationships between people and resource management and uses. Other opportunities for learning include:

- involving and focusing the public or interest groups on projects for the benefit of all
- how to develop long-term commitments of people or groups
- how to conduct activities with minimum costs to government or user groups

Location. This strategy could be carried out within the AMA.

Involvement. The Forest Service will provide work opportunities. County or State agencies will coordinate the supervision.

Funding. Grants, cost-shares, or partnerships will be used to fund this strategy.

Timing. Explore possibilities for application in 1996.

Strategy #7 - Cispus AMA Day

Description. Designate one day during the year as "Cispus AMA Day." On this day, schedule volunteer work on selected projects. Also, provide open houses, tours, and exhibits to promote public interest and education in National Forests and the AMA.

Purpose. The purpose of this strategy is to generate or maintain interest in the AMA and to incorporate the public in forest management and projects to promote learning. Other learning opportunities include:

- experimenting with different forms of involvement between schools, public, and Forest Service
- improving communications and participation between the public and the Forest Service
- exposing students and the public to natural resource education, management, and uses
- how to focus and involve volunteers and user groups in projects to benefit others

Location. This strategy will be implemented throughout the AMA.

Involvement. The Forest Service will provide guidance and organization. Volunteers, user groups, and schools will help in projects, tours, and educational exhibits.

Funding. Forest Service involvement will be funded in various programs. Grants, cost-shares, or partnerships could help in project or exhibit funding. Other work will be done by volunteers. Incentive programs, such as free camping, could be used to attract volunteers.

Timing. This strategy could begin in 1996.

Strategy #8 - Recreation Management

Description. Expand and explore different approaches to managing developed and dispersed recreation to provide diverse and high quality recreation opportunities with reduced administrative costs. Emphasize self-supporting recreation operation and maintenance through a variety of methods:

- expand maintenance adoption of developed and dispersed sites, and trails
- expand user fees to cover sites besides campgrounds
- explore utilizing revenue from National Forest product sales (i.e., special forest products) to fund recreation activities
- encourage volunteer efforts in the AMA by offering free camping to users for volunteer time committed
- improve the snow-park facilities at Orr Creek by adding an overnight camp area, with most of the construction done by volunteers

Within the AMA, more dispersed, unimproved recreation sites will be provided. These could be located where current dispersed use is occurring, and additional sites where appropriate. The sites will be user-maintained and contain few facilities, but will have site controls such as barrier rocks for site protection. They could be identified as dispersed sites by signing or on maps and their use could be monitored.

Trails in the AMA will provide multiple users with a variety of experiences and challenge levels. New trails should connect existing trails as proposed in the Gifford Pinchot Forest Plan, provide winter snowmobile and cross country skiing opportunities, and expand the number of low elevation trails. Future road closures or removals, as outlined in the 1994 Access and Travel Management Reports, will provide additional off-road vehicle opportunities that will encourage motorized recreation on trails only. Gates are needed with proper signing to formally close winter trail routes and distinguish appropriate trail users. User samples and trail condition monitoring will be used to decide how to best address issues related to trail maintenance and use.

Purpose. The purpose of this strategy is to learn how to maintain and expand recreation opportunities for the public while recognizing less government funding will be available. Other opportunities include:

- what is the carrying capacity of various campground sites
- what is the supply and demand for day-use and overnight facilities
- how can recreation sites be improved through site controls or site design
- can dispersed sites be created and managed (or adopted) by users
- what law enforcement problems would result from an increase in use
- how to reduce garbage at recreation sites
- how high or low elevation snow-parks affect plowing and grooming costs
- how do created openings (timber harvest) contribute to winter recreation
- how to close roads to allow exclusive snow-related recreation

- how can users be best involved to reduce development and maintenance costs
- what new trails or roads for four-wheel drive vehicles (or other trail users) can be created by using existing facilities.
- effects of four-wheel drive vehicle use on road conditions and maintenance needs of roads used by these vehicles
- how does this activity affect wildlife occupancy and use
- what kinds or designs of roads are best suited for conversion to four-wheel drive use
- how does this activity affect water resources

Location. This strategy could be applied at any recreation site or areas within the AMA where it applies. The emphasis will be in areas where current use is concentrated or needs some form of control.

Involvement. The Forest Service will coordinate and administer many proposals with assistance from various partners and volunteers. Forest Service personnel would likely carry out proposals that may require changes in current laws before they could take place such as new revenue collections. The Forest Service will administer the use of recreation sites, but the creation and maintenance could be done by volunteers. Options for concession operation during the summer months of the planned improvements at Orr Creek Snow-park will be explored.

Road closures or removals will be done by the Forest Service or contractors. Maintenance of these facilities during use will be provided by the users.

Funding. Much of the funding will be provided by user groups, concessionaires, and/or from the sale of forest products. Forest Service administration and coordination will come from recreation program funding. The actual maintenance of recreation facilities will be performed by concessionaires. Volunteers could do most other duties, either site-by-site or during periodic "cleanup days" or weekends.

Grants, cost-shares, or partnerships will cover costs of development and redevelopment projects. User groups will supply labor and equipment as necessary.

Timing. Portions of this strategy will begin in 1995 and continue into the future. Actual on-ground application of some parts of the strategy will begin in 1996.

Strategy #9 - Road Management

Description. In deciding the need for existing or proposed roads within the AMA we will explore and develop improved methods for analyzing their costs and benefits. This could include new or more comprehensive ways to evaluate the negative and positive impacts of roads. For existing and proposed roads needed within the AMA, we will explore, propose and experiment with various methods to maintain them. This could include recalculation (or elimination) of commensurate use as the basis for costs to be shared between road users and beneficiaries (such as fire protection). Other possibilities include requiring Central Tire Inflation on certain commercial vehicles on roads to reduce the need for maintenance, or using non-Federal funding,

labor or equipment to maintain certain roads.

Purpose. The purpose of this strategy is to learn how to improve the use of roads for forest management and access within the AMA and to maintain them with decreasing availability of road maintenance funding. Opportunities for learning include:

- how to reduce the effects of roads to resources by improved locations, designs, or construction techniques
- what methods of road closure are effective in preventing motorized vehicle entry
- when and how should roads be removed (decommissioned)
- what effect does road density have on wildlife occupancy and use
- what values should be considered in decisions to construct, maintain or remove roads
- the impact of reduced timber harvest on the need for road maintenance
- new or different road construction designs and techniques that reduce or eliminate the need for maintenance
- what methods of road maintenance are most cost effective
- what other funding is available for road maintenance

Location. This strategy will be applied throughout the AMA, on existing and proposed road locations.

Involvement. The Forest Service will implement this strategy with assistance from research organizations and the PNW. Maintenance programs will be managed by the Forest Service, who will also coordinate volunteers, special interest, or user groups.

Funding. Cost/benefit research will be funded by grants, cost-shares, and project or program funds. Various possibilities for maintenance funding will be explored.

Timing. Parts of the maintenance proposal could begin in 1995 with the remainder beginning in 1996.

Strategy #10 - Management for Sustainable Timber Supply

Description. Timber sales will be scheduled in the AMA to provide a stable, predictable supply of raw materials for local and regional wood products manufacturers. The Probable Sale Quantity will be determined using the area control method to produce a sustainable harvest level. Natural disturbances, which often leave more trees than are necessary to meet guidelines for woody material, will provide opportunities for the removal of the highest value material (such as butt logs) for timber products.

Selected areas within the AMA will be managed to produce high volumes of high quality, high value wood. Timber production will be the primary resource consideration in these areas, consistent with existing laws, regulations and management direction. The areas will be used to display and test various young stand management techniques with the goal of producing specific products, such as clear wood, wood with specified ring widths, or special species like alder,

maple, cedar, pines, etc.

Purpose. The purpose of this strategy is to learn how much and in what ways timber products can be harvested from public lands to produce economic benefits to the public. Other opportunities for learning include:

- how industry can help in providing expertise to the Forest Service
- is single-use management appropriate on certain lands
- what kinds of forest management activities are perceived by the public to be acceptable or controversial
- can timber produced in the AMA meet the needs of the local forest products industry
- what additional economic benefits could be gained through renewable forest resources
- how can timber harvest be used to produce various resource objectives
- what role could non-traditional hardwood species play in timber harvest relative to the local economy
- can Forest Service policies respond to community goals

Location. The locations of stands or areas where this type of strategy could be applied will be identified using a landscape analysis process. This process will incorporate all relevant ecosystem functions, like fire return cycles and site productivity, to learn where this management might be applied. The areas selected will be those where regulated timber harvest is allowed, and where intensive forest management would be economical.

Involvement. The Forest Service will be responsible for managing the areas, with timber industry providing assistance regarding harvest methods, equipment and other expertise.

Funding. Timber program funding will support this strategy, including timber sale planning and preparation.

Timing. Landscape analysis could be conducted during the winter of 1995-1996. This might help in identifying part of the timber sale program for 1997 and beyond.

Strategy #11 - Restoration Opportunities for Water Quality and Anadromous Fisheries

Description. The importance of water quality and anadromous fisheries from a regional perspective will be assessed. Since the AMA is the headwater of many streams, particular attention will be focused on areas contributing to stream degradation (sedimentation, peak flows, cumulative impacts), critical spawning habitat, barriers to fish habitat and opportunities for restoration projects. Restoration or anadromous fish projects will be identified during project planning, watershed analysis or as the result of inventories or monitoring. Types of projects could include:

- trail construction, reconstruction or maintenance
- road repair, reconstruction or decommissioning (obliteration)
- erosion control or soil stabilization projects
- restoring human caused damage to animal, fish, wetland or riparian habitats
- restoring anadromous fish runs

Purpose. The purpose of this strategy is to learn how to reduce or eliminate unacceptable effects from past management that affect water quality and fish habitat (anadromous fish habitat in particular). Additional opportunities for learning include:

- what types of restoration projects are most effective
- what is the most appropriate way to monitor restoration projects
- what is the relationship between cost and effectiveness of various types of restoration projects
- what kinds of management practices have resulted in favorable (or not so favorable) conditions today
- how can we emulate natural processes with management practices concerning water quality/fish habitat
- how do riparian areas contribute to water quality/fish habitat and what size riparian buffers are needed
- where are instream fish structures more effective
- what areas of the stream do anadromous fish use and how does this effect resident fish
- what elements of fish habitat limit the use by fish
- where are the barriers to fish passage and how or should they be removed

Location. This strategy will be implemented within streams that can support anadromous fish runs and areas needing restoration within the AMA, with specific locations depending upon proposed projects.

Involvement. Restoration or anadromous fish projects will be planned by Forest Service personnel, with assistance from other agencies, volunteers or user groups. Accomplishment will be by Forest Service personnel, contractors, volunteers of individuals or user groups.

Funding. Funding for restoration projects, monitoring and inventories could come from Forest Service programs, partnerships, cost shares or by using volunteers.

Timing. This strategy could be carried out in 1995. Restoration projects and re-introduction of anadromous fish into the Cowlitz and Cispus Rivers is ongoing.

Strategy #12 - Mountain Goat Featured Species

Description. Within the AMA, mountain goats will be a featured species. Research and inventories will be conducted to measure goat populations and how goats use the lands within the AMA. Public education programs will be developed to generate interest in mountain goats and their management. In those areas identified as mountain goat winter and summer range, management activities will concentrate on habitat improvement.

Purpose. The purpose of this strategy is to increase public knowledge and awareness of mountain goats. Additional opportunities include learning how mountain goats use their habitat and how they travel between suitable habitat areas. Also, how are mountain goats, their populations, or their habitat affected by various management activities.

Location. This strategy will be implemented within the mountain goat summer and winter ranges identified in the GP Forest Plan, and other areas where mountain goats occur or are known to have occurred in the past.

Involvement. The Forest Service will set up management activities associated with mountain goat habitat. Washington State Department of Fish and Wildlife, special interest groups, and volunteers could help in research or inventories.

Funding. Wildlife program funds will cover most Forest Service involvement. Grants, partnerships, and cost-shares could cover other activities, along with volunteers.

Timing. Inventories could begin in 1996 as funding or volunteers are available.

Strategy #13 - Wildlife Habitat Management

Description. A strategy could be developed to maintain a late-successional and old-growth forest ecosystem well distributed across the AMA within the range of natural variability. Existing large, contiguous areas (500-1000 acres) of unfragmented, late-successional habitat will be retained across the landscape to provide for wildlife species associated with late-successional, interior forests. Timber harvest in other areas will be aggregated. Over time, this will produce similar large blocks to be managed for the development of late-successional or old-growth characteristics to serve as replacement areas. Silvicultural techniques could be used to accelerate development toward this condition. Wildlife habitat relationships could be studied on various species relating to natural disturbances and forest management.

Purpose. The purpose of the strategy will be to restore parts of the AMA to vegetative arrangement and composition similar to which existed before contemporary forest management. We would also like to increase our understanding of how natural processes work and how we can emulate them to reach specific objectives. Other learning opportunities include:

- what is the population trend for interior and late-successional habitat wildlife species and those associated with early-seral conditions
- can long-term objectives be met sooner with or without management
- where are the wildlife migration corridors and interior habitat and how can we manage for those desired conditions over time.
- how does the public perceive various timber harvest strategies
- how can we apply different rotation ages? Which areas would be appropriate to try different techniques
- what kinds of silvicultural prescriptions provide desirable late-successional habitat stand characteristics
- which forest carnivores (lynx, fisher, wolverine and wolf) are present in the AMA and how important is the AMA in providing habitat for these species within the Southwest Washington Province
- what can be learned from past historical disturbances and management practices

Location. Analysis prepared for the Middle and Upper Cispus River Pilot Watershed Analysis showed historical natural disturbances including wildfires and volcanic eruptions were important events that have helped shape the vegetative character of this watershed. A landscape analysis could help decide which areas may be appropriate to try to mimic disturbance patterns that occurred before active forest management.

Involvement. The Forest Service will manage the identified areas but research organizations, special interest groups, state agencies, PNW lab and volunteers could help in the projects learning processes.

Funding. Funding will come from Forest Service programs such as timber and wildlife, or grants, cost-share agreements, and partnerships.

Timing. The landscape analysis could be expanded upon during the winter of 1995-1996 to help identify where future timber sale projects for 1997 and beyond could be located to reach various wildlife and timber objectives.

3. Relationship of the Strategies to Management Direction

This section describes how each requirement, objective, and emphasis item for the Cispus AMA is addressed.

a. Requirements from the President's Northwest Forest Plan

- **A shared vision of the Adaptive Management Area.**

Because of the many controversies associated with natural resource management, it is difficult or impossible for all parties to agree on a shared vision for the Cispus AMA, or any other area. The Strategies process focused on improvements to the current conditions that are agreeable to most or all parties. The process will continue and be refined as the constraints and opportunities inherent to the landscape are integrated with the objectives identified in the Strategies during the landscape design process.

> **The Landscape Analysis and Design was completed in May, 1997, and provides a graphic vision of the AMA for the future. The adaptive management process will continue to test, evaluate and adapt the design as well as our techniques, objectives, and working relationships (March 1998 revision)**

The "desired future conditions" for each Management Area Category are included in the GP Forest Plan. This provides current management direction, and would require amendments or revisions to change. Therefore, no attempt was made to identify new desired future conditions for areas or resources within the AMA during the Strategies process. Subsequent landscape analysis, or other analyses, may identify a need or desire to modify the GP Forest Plan. If this occurs, the modification will include the necessary documentation and appropriate level of public involvement.

- **Learning that includes developing social and political knowledge, in addition to biological and physical information.**

Each of the 13 Strategies includes many associated learning opportunities identified by the participants during the development of the Strategies.

- **A strategy to guide implementation, restoration, monitoring and experimental activities.**

References to how these types of activities will take place are included in the Cispus AMA Strategies in various locations throughout this document.

- **A short-term (three to five-year) timber sale plan and long-term yield projections.**

Timber sale projects have been planned within the AMA through 1996, based on information gathered during the Middle and Upper Cispus Pilot Watershed Analysis. When watershed analyses have been completed for all watersheds within the AMA and Matrix lands, comprehensive long-term timber sale planning for the Packwood and Randle Districts will be

done. Timber sales within the AMA will be included in this planning, which should occur in 1997. Until such time, priorities for timber harvest within the AMA will be determined by the District Rangers. A list of currently active and planned timber sale projects within the AMA is available in the Appendix of the Strategies document.

Long-term yield projections for timber resources in the Cispus AMA were estimated during the development of the Strategies. These yield projections will be used to determine the Potential Sale Quantity for the AMA. They will be updated as better or more thorough data is gathered.

- **Education of participants.**

Most of the 13 Strategies include education of participants as part of the strategy, either directly, or incorporated into the learning opportunities associated with each strategy.

- **A list of communities influenced by the Adaptive Management Area projects and outputs.**

Information on communities is included in a later section of this summary.

- **An inventory of community strategies, and resources and partners being used.**

Community strategies are included in the discussion of communities, later in this summary. Potential community resources and partners to help in implementation are included in each of the 13 Strategies.

- **Coordination with other activities within the province.**

All proposed projects within the Cispus AMA will be presented to the Provincial Interagency Executive Committee for review. In addition, many Strategies identify other agencies, individuals and organizations within the province as potential partners during planning and implementation of projects.

- **A funding strategy.**

Each of the 13 Strategies includes potential methods for funding. Actual funding for projects will be decided during the planning stage.

- **Integration of the community strategies and technical objectives.**

The development of proposed strategies was guided in part by the technical objectives (ROD, D-4), which were presented to the participants early in the process. Community strategies and goals were then used to modify the proposals to better serve the communities involved, without compromising the technical objectives.

b. Management Emphasis for the Cispus AMA

> **Development and testing of innovative approaches at stand, landscape, and watershed level to integration of timber production with maintenance of late-successional forests, healthy riparian zones, and high quality recreational values (ROD, D-13).**

This was presented to the participants during the early stages of development of the strategies. Many of the 13 Strategies incorporate these emphasis items, either directly or indirectly.

c. Technical Objectives for Adaptive Management Areas

The intent of standards and guidelines from the GP Forest Plan, as amended by the President's Forest Plan is to meet all of the following technical objectives (ROD D-3).

- **Creation and maintenance of a variety of forest structural conditions including late-successional forest conditions and desired riparian habitat conditions.**

Besides the standards and guidelines mentioned above, Strategies #3, #11 and #13 specifically address these objectives.

- **Integration of timber production with maintenance or restoration of fisheries habitat and water quality.**

Besides the standards and guidelines mentioned above, Strategies #3 and #11 specifically address these objectives.

- **Restoration of structural complexity and biological diversity in forests and streams degraded by past management activities and natural events.**

Besides the standards and guidelines mentioned above, Strategies #3 and #11 specifically address these objectives.

- **Integration of the habitat needs of wildlife (particularly of sensitive and threatened species) with timber management.**

Besides the standards and guidelines mentioned above, Strategy #13 specifically addresses these objectives.

- **Development of logging and transportation systems with low impact on soil stability and water quality.**

Besides the standards and guidelines mentioned above, Strategies #9 and #11 specifically address these objectives.

- **Design and testing of effects of forest management activities at the landscape level.**

Besides the standards and guidelines mentioned above, Strategies #2 and #11 specifically address these objectives.

- **Restoration and maintenance of forest health using controlled fire and silvicultural approaches.**

Besides the standards and guidelines mentioned above, Strategy #5 specifically addresses these objectives.

d. Social Objectives for Adaptive Management Areas

The primary social objective of the AMA is the provision of flexible experimentation with policies and management. Innovative approaches include social learning and adaptation, which depend upon local communities having sufficient political capacity, economic resources, and technical expertise to be full participants in ecosystem management.

There are aspects of the above social objectives in each of the 13 Strategies for the Cispus AMA.

4. Strategy Development

The strategies were developed during the public involvement process that took place from April to June 1995. During the first public workshop, attendees initiated the process by identifying the best and worst futures for the Cispus AMA, they then identified those things, or **issues**, within the AMA that they felt were important. The last step was applying the collaborative learning approach of identifying **desirable and feasible improvements**, rather than solutions, to these issues. This list of improvements became the foundation for the strategies.

Subsequent workshops and written input on communities and community goals, and timber and other forest products, generated new ideas for improvements and learning opportunities that were added to the lists. Prioritizing, combining, and incorporating these improvements has allowed us to select as many proposed improvements as possible for implementation, focusing on those things that the participants identified as most important.

5. Affected Communities

Nearby communities having direct economic ties to the National Forest, specifically through timber harvest include:

Lewis County:	Mossyrock	Morton
	Mineral	Glenoma
	Randle	Packwood
Pierce County:	Ashford	Elbe

It should be recognized that other communities could be affected by actions within the Cispus AMA, including those linked by social or political interests, common recreational pursuits, or historic ties.

6. Community Goals

Goals for the communities affected by the Cispus AMA were gathered from several sources, including social and economic assessments conducted within Eastern Lewis County and lists produced by participants. The following goals specific to the National Forest, and the Cispus AMA in particular, were identified by the public:

a. Identify the best balance between recreation, tourism, and forest products.
b. Focus economic opportunities toward small business, targeted through local educational institutions and employment programs.
c. Develop an East Lewis County plan for economic, residential and business development, and land management.
d. Improve the area's natural resources to provide both products for processing and a variety of habitats.
e. Encourage pro-active education of youth, especially urban youth, in the management of natural resources.
f. Develop a local processing plant for other forest products based on many different seasonal products to provide year-round employment.
g. Develop a shared information system between government agencies, schools, and the public that is widely accessible.
h. Develop a botanical/medicinal research facility specializing in forest species.
I. Involve the community in active communication and education of visitors to the area in natural resource management and related issues.

Subsequent findings from the community self-assessment will be incorporated into the Strategies in a manner similar to that which produced this document.

7. Timber Yield Projections and Sale Plan

To predict the long-term timber yield capability of the Cispus AMA, the Probable Sale Quantity was calculated. Probable Sale Quantity (or PSQ) is the allowable harvest level that can be maintained without decline over the long term if the schedule of harvests and regeneration is followed.

a. Volume Control Method

Two methods of estimating PSQ were presented to the public at the May 11, 1995 public workshop, Focus on Forest Products, held in Morton. The first estimate of Probable Sale Quantity (PSQ) used the volume control method. Using the volume control method, an annual harvest rate of 21,600 MBF/YR (thousand board feet per year) or 21.6 MMBF/YR (million board feet per year) was predicted.

b. Area Control Method

The second method of calculating PSQ is the area control method. Using the area control method, an annual harvest of approximately 342 acres per year of regeneration harvest and 548 acres per year of thinning is predicted. Based on the current estimated volume in existing stands, this would yield a current PSQ of about 16,800 MBF/YR (16.8 MMBF/YR). As all stands available for harvest come under management, the annual harvest volume would approach or equal that calculated for the volume control method, assuming the management intensity is the same under both scenarios.

Participants in the public workshop selected the area control method as the most appropriate way to calculate PSQ for the Cispus AMA. The majority felt that the area control method was simpler to apply and did not rely upon widespread future application of intensive management practices.

Timber sales for 1996 in the AMA are currently being analyzed. Planning for a three to five-year period beyond that has not been completed for the Cispus AMA. We expect to do this in 1997 as part of timber sale planning for both the Packwood and Randle Districts.

(Most recent calculation of short-term PSQ, based on the Landscape Analysis and Design completed in July 1997, is 8 million board feet pre year. Long-term projection for the AMA is 12 million board feet per year.)

8. Updating the Strategies

The Cispus Adaptive Management Area Strategies is intended to be a dynamic document which is used as a guide for activities within the Cispus AMA. Much of the information used to produce the document is either incomplete or subject to change. As information is updated, changes to the Strategies will be incorporated into the document as needed. The process for making these changes will depend on their extent or perceived importance. In all cases, minor revisions to this document will be documented and sent to those who have expressed an interest. Any changes that appear to alter the direction or management of activities within the AMA will be presented to the public for comment or discussion before they are included in a document revision. A few examples are described below.

a. Community Assessments

The status and goals for the communities affected by the Cispus AMA were developed using community assessments done both formally and informally. As additional information is gathered, changes in the status and goals for the various communities will be inevitable. The Cispus AMA is intended to be responsive to the needs of these nearby communities. Therefore, as these needs change, the Strategies will be updated.

b. Forest Plan Monitoring

Each year, the activities that take place within the Forest are monitored to determine how the GP Forest Plan is being implemented. Since the Cispus AMA is now part of the management direction for the GP Forest Plan, it will be included as part of the monitoring plan, beginning in 1995. Differences between the expectations for the AMA and the outcomes, compared with Forest Plan direction, will be reviewed by the Forest Supervisor. If needed, changes to the management of the Cispus AMA, or changes to the Forest Plan, may be proposed.

c. Project Monitoring and Evaluation

During the planning stage for each activity that takes place within the Cispus AMA, certain items will be identified for monitoring and evaluation. Most of these will result from a learning opportunity identified during the development of the Cispus AMA Strategies. This step is the heart of the principle of adaptive management. Based on the outcomes of this monitoring and evaluation, changes in management for future projects will be proposed, then further tested by additional monitoring and evaluation. This process will identify those things that we no longer want to evaluate, and additional learning opportunities (or new Strategies) suggested by the results of current or past management.

d. Research

Research within the Cispus AMA will take place similar to any other activity. The research will be designed to produce knowledge about some resource or form of management within the AMA. As this knowledge is gained, changes in management may be suggested, or additional research needs may be identified.

APPENDIX SUMMARY

Due to the length of the Appendices, they are not included in this document, or with the Strategies document itself. They will be maintained at the Randle District office and updated as needed. Copies of any part of them are available on request. The following are the topics currently contained in the Appendices.

A. List of Participants
B. Best and Worst Scenarios
C. Concerns and Interests
D. Improvements and Learning Opportunities
E. Worksheets from Public Workshops
F. PSQ Calculations
G. List of Currently Active and Proposed Projects
H. Research
I. Social Assessment Summaries
J. Photos

Appendix G

Cispus AMA Landscape Analysis and Design

August 1997

Executive Summary

The *Landscape Analysis and Design* (LAD) for the Cispus Adaptive Management Area is a graphic representation of the future of this unique and special area. The design depicts the shared vision of many participants; Forest Service and other agency resource specialists and managers, and members of our communities of interest and place. Through the Provincial Interagency Executive Committee (PIEC), we extended and incorporated our vision into the southwest Washington Province.

The concept of using Landscape Analysis and Design as a planning tool is new and innovative. The technique allows managers to use an understanding of ecological systems to integrate spatial and temporal scales into planning and decision-making. The design will give a graphic vision of our desired future condition. The need for doing this is captured by the saying:

"If you don't know where you're going, any road will take you there..."

Because our conditions are dynamic - vegetative conditions, changing social values and needs, developing technology -our vision must be equally dynamic and flexible. Our most creative and innovative work will not be the landscape design, or how we worked collaboratively to develop the design, but how we will use new ideas, methods, and technology. Innovation and change will be based on how we incorporate what we learn along the way, using the principles of adaptive management and landscape-based monitoring.

The landscape design described in this appendix represents **a snapshot in time** of vegetative patterns and structures in the Cispus area 200 years in the future. The landscape design was developed in the context of meeting the objectives of the Northwest Forest Plan (NWFP): the integration of timber production with maintenance of late successional forest structure, high quality recreation, and healthy riparian areas, with the additional focus on conservation and protection of old-growth forests. Several questions this design asks include:

- How does the rate of natural recovery compare to active strategies for restoration and accelerating late-seral conditions?
- What is "high quality recreation" and how can it be accommodated within different landscape design units?
- What is the appropriate balance between the objectives of the Cispus AMA?

Background

What is Landscape Analysis and Design?

Landscape Analysis and Design (LAD) is a technique to graphically represent a long-term vision of landscape level planning. The strategy integrates the capabilities of the ecosystem with current social values and needs. The process involves learning about and evaluating landscapes as ecological systems to ensure that the area remains ecologically sustainable and healthy while providing predicted aesthetic and economic outputs. Landscape design for the Cispus AMA essentially creates a "snapshot in time", at approximately year 2200. This spatial and temporal picture will provide a focus for us to develop, with all of our communities, a **desired future dynamic** condition for the AMA. Visualizing this future condition will help guide our short-and mid-term management activities.

Components of the LAD Process

Ecosystems are made up of the interactions of people, plants, animals, water, and soil, in and around mountains and other geophysical features. Ecosystems are dynamic, constantly changing through growth, natural, and human induced disturbances. Therefore, an understanding of natural processes, particularly large scale disturbance and succession, is important in providing part of the background of landscape patterns. The Cispus LAD process began with the Upper and Middle Cispus River Pilot Watershed Analysis, which provided landscape architects and an interdisciplinary, interagency team an analysis of many structural and functional components.

Within forest environments, vegetation structure and composition are influenced by, and in return, are influences on habitat, water quality, and resource use. The distribution and interaction of various ecosystems defines the landscape. Some portions may be relatively contiguous, while other patches are uniform internally but differ considerably from their surroundings. Additional elements may act as corridors or connections between elements. It is the **pattern and characteristics** of these components that determine the function of the landscape as an ecological system.

It is also important to examine the ecological phenomena that flow, or **move across and interact** with the landscape. Such phenomena include the migration of plant and animal species. And because of very dynamic landscape processes in the Cispus area, wind, water, volcanic (and tectonic) activity and fire behavior patterns were integrated into the analysis and design process. The Cispus area is dynamic and resilient, frequently undergoing and recovering from a broad range of natural and human caused disturbances. It must be continually emphasized that the components and borders of the landscape units represent **"a snapshot in time"** of a condition for the Cispus AMA far into the future. These conditions most certainly will change through time.

People are part of our ecosystem, therefore **social objectives** and roles play an important role. Social objectives are reflected by public sentiment and in the various policies and land management plans that apply. A key strategy of the Cispus AMA is the process of collaborative public participation, where public input is incorporated into project planning through discussions and workshops. Goals and objectives from the Cispus AMA Strategies were incorporated in the LAD.

Objectives for the Landscape Design

Objectives for the Cispus AMA are to "...integrate timber production with maintenance of late-successional forests, healthy riparian zones, and high quality recreational values" (ROD D-13). The long-term vision for the LAD was developed by incorporating the work done by the LAD interagency team with public responses solicited between December 1996 and February 1997. Several themes became evident:

1. **Maintain late successional forest structure and dependent species**
2. **Ensure high quality recreational activities**
3. **Maintain healthy riparian areas and protect water quality and associated fisheries**
4. **Provide a predictable and sustainable timber yield**
5. **Encourage experimentation and flexibility**
6. **Provide opportunities for interaction between communities and agencies**

The landscape design was developed within the context of the above objectives.

Learning Opportunities

An overall goal of the LAD process is to test our current ideas about ecosystem management. As you read through the landscape design and unit descriptions, you will see numerous assumptions and questions. The Research and Monitoring Plan for the Cispus AMA is intended to help address these questions and test underlying assumptions (Appendix H). Learning opportunities will develop over time in every landscape unit. As we continue to test and learn, our vision for the AMA will need to be as flexible and dynamic as the landscape.

History of the Process

At two public workshops in November 1995, landscape architects and an interdisciplinary, interagency team worked with ideas and suggestions from public participants to produce an initial design. The product of these workshops was reviewed by the AMA Steering Committee, which recommended further analysis, development of a range of design options, and measurable criteria by which to compare the different options. This second stage of analysis was undertaken by the team, with the results presented at a public workshop in December 1996. This workshop generated more recommendations, ideas, and an additional option from the public. The team incorporated these into the options which were again presented to the AMA Steering Committee in March 1997 for review. The Committee recommended the team consolidate similar options, define learning objectives, and use the comparison criteria to analyze possible consequences.

The Steering Committee also recommended involving the Southwest Washington Provincial Advisory Committee (PAC) to better integrate the design into the SW Washington province. The 28-member committee, composed of representatives from various public, county, state and federal agencies, assists Federal agencies in the implementation of the Northwest Forest Plan. In July 1997, an option was selected by the Gifford Pinchot National Forest Supervisor, based on recommendations from the PAC. The option selected for the Landscape Design does not represent a decision under the National Environmental Policy Act (NEPA), but will be utilized during project planning, and research or monitoring study design, as a guide to identification and description of project proposals and alternatives which are subject to appropriate environmental analysis under NEPA.

Our next task for the Landscape Design is to incorporate comments, concerns, and recommendations from the PAC and Forest Supervisor into the various design units and proposed management activities. These include questions such as:

- What will be the social and economic impact of the design on local communities and communities of interest?
- How can prescribed, or controlled, fire be used to attain the vegetative objectives of the design units?
- How well will the design meet the objectives from the NWFP for the Cispus AMA?
- Will the design provide the flexibility necessary for research and adaptive management?
- What types and intensities of recreation use are appropriate and desirable in the Cispus?
- How shall we define "old growth" and "salvage"?
- What type of management is appropriate in roadless areas?
- How will we monitor and evaluate progress on our journey to the year 2197?

The assumptions that were used to model the options were not proposed to be accurate or precise predictions, but were used only for consistent (or standard) comparison of probable outcomes 200 years hence. These assumptions will need to be defined and applied to management activities for tomorrow. Reviewing our objectives, and refining our assumptions, will provide our next opportunity for collaboration and active interaction with our public, interested and involved Indian Nations, and local and Federal agencies.

Landscape Design Units

The landscape design utilizes the following **landscape design units** to provide a graphic description, function, and management strategies for various resource areas "...in harmony with existing policies, direction, Forest Plan Standards and Guidelines, and land allocations" (Diaz and Apostol, 1992) . There are seven types of unit: old growth, riparian reserves, habitat development, managed habitat, managed mosaic, natural mosaic, and lodgepole.

Landscape Design Unit Descriptions

Old Growth

Description: Areas designated as **OLD GROWTH** are characterized by old and typically large diameter trees. Stands are 170 years old or more, with average diameters of 30 inches or greater (although size class varies as a result of environmental conditions). The trees provide a variety of unique habitats, whether alive or dead, standing or fallen, on the ground or in streams. Important structural elements include snags and living trees, coarse woody debris, down logs in various states of decay, patches of shrubs, and long canopy layers. Canopy gaps and small openings throughout the stand also provide for structural diversity. In low lying areas, trees species such as Douglas-fir, western hemlock, western red cedar, and grand fir are found.

Function: Old growth provides an environment where wildlife such as cougars, woodpeckers and northern spotted owls can nest, forage, hunt for food, and reproduce. Wetland areas are home to birds such as the kingfisher and heron. Deer and elk hide from predators here, and these and other species use old growth to travel from one region to another. The large, dense canopy has a moderating effect on temperature, ensuring the survival of epiphytes, (plants, usually mosses and lichens, growing on trees) insects, birds and mammals. The sheer biomass of old growth forests also plays an important role in nutrient cycling. Old growth areas also provide protection for riparian areas and other watershed values.

Old growth areas can provide opportunities within the full range of ROS (Recreational Opportunity Spectrum) classes and a very desirable environment for many activities. The old-growth design unit may be most suitable to activities classified as "semi-primitive", with rustic facilities, or none at all, and few social encounters between individuals or groups. These facilities are used, ideally, to experience the quiet, solitude, and natural diversity of the area. Recreational opportunities include driving for pleasure, hiking, camping, nature study, photography, berry and mushroom picking, hunting, fishing, mountain biking, and horseback riding.

Economic outputs relating to old growth would be a result of thinning in young stands to accelerate late successional forest structure, recreation, and harvest of special forest products.

Learning Opportunities: Projects and activities in old growth areas would be designed to improve our understanding of late-successional forest ecosystems and how they are affected by human activities. It could also be an area for testing our current knowledge and assumptions such as; 1) using silvicultural practices to restore and maintain unfragmented late-successional habitat, 2) managing for timber production while maintaining late-seral conditions, 3) requirements of certain plant and animal species for large, contiguous blocks of late-successional structure, 4) correlation of species dispersal and genetic exchange with connectivity. Old growth also provides a good place to study what the effects of minimal management are on the health of streams, lakes, and wetland areas.

Management Opportunities: Activities within old growth landscapes would be designed to comply with management direction described by ROD, GPLRMP, recommendations from the *Middle and Upper Cispus Pilot Watershed Analysis* and the *Cispus Strategies*. The overall goals would be to maintain and restore old-growth forest habitat and connectivity, and emphasize low-impact recreation. The intent would be to manage these landscapes in a manner approximating Late-Successional Reserve (LSR) standards and guidelines. Roads identified as resource concerns through watershed analysis or access and travel management planning would be considered for decommissioning or relocation. Recreation emphasis would be to develop and maintain trails and other non-motorized recreational opportunities.

Riparian Reserves

Description: Areas designated as **RIPARIAN RESERVES** involve portions of the landscape where the conservation of aquatic and riparian-dependent terrestrial resources receive special emphasis. Riparian reserves are designated for all permanently flowing and intermittent streams, lakes, ponds, wetlands and unstable or potentially unstable areas. The design unit includes the body of water itself, the inner gorges, all riparian vegetation, 100 year flood plain, landslides, and landslide prone areas. Widths of riparian reserves, as necessary to meet Aquatic Conservation Strategy objectives, are based upon ecological and geomorphic factors associated with different water bodies. These widths are designed to provide a high level of fish habitat and riparian protection. Generally, the reserve parallels the stream network, but may also include other areas necessary for maintaining hydrologic, geomorphic and ecological processes.

Function: Riparian Reserves are key elements of the Aquatic Conservation Strategy. They are used to maintain and restore riparian structures and functions, provide habitat for riparian-dependent species (terrestrial and aquatic), improve travel and dispersal corridors for many terrestrial animals and plants, and provide for greater connectivity of the watershed. The riparian reserves also serve as connectivity corridors among Late Successional Reserves.

Riparian vegetation moderates high flows by decreasing water velocity and enhancing the deposition of fine sediments and organic debris. The vegetation is also important source of both shade and foliar debris, providing favorable stream temperatures and a food source for aquatic organisms. Tree-dominated riparian plant communities are a source of large wood, essential for the creation of structural habitats for aquatic organisms. The wildlife habitat provided by riparian

vegetation strongly influences terrestrial animal diversity.

As a general rule, standards and guidelines for riparian reserves prohibit or regulate activities that retard or prevent attainment of Aquatic Conservation Strategy objectives.

Learning opportunities: Projects and activities in riparian reserves would be intended to improve our understanding of riparian ecosystems and how they are affected by human activities. It would also be an area for testing our current knowledge and assumptions regarding; 1) the role of the various components of healthy riparian systems, including a diversity of vegetative species, structures, and sources of large woody debris (LWD), 2) the function of high quality, connected riparian areas as dispersal habitat for wildlife species; 3) the necessity of healthy riparian areas for high water quality and fish habitat, 4) the design of silvicultural practices to promote the attainment of Aquatic Conservation Strategy (ACS) objectives (Appendix E), 5) the effects of road management on sediment impacts and 6) the compatibility of managed recreation with the health of riparian ecosystems. Research projects for silvicultural objectives would be coordinated and monitored by PNW scientists.

Management Opportunities: Activities within riparian reserves would be designed to comply with management direction described by ROD, GPLRMP, recommendations from the *Middle and Upper Cispus Pilot Watershed Analysis* and the *Cispus Strategies*, to meet ACS objectives. Roads identified as resource concerns through watershed analysis or access and travel management planning would be considered for decommissioning or relocation. Habitat restoration projects would be emphasized.

Managed Habitat

Description: Areas designated as **MANAGED HABITAT** are characterized by a mix of young, middle-aged, and older forest stands. Tree species vary throughout a range of elevation bands. As a result, scenery changes frequently as one moves through these areas. Small openings are common, either man-made or natural. Openings may be created through activities such as timber harvests and habitat enhancement projects, or naturally occurring, including old landslides, rocky outcrops, and meadows.

Function: With its diversity of stand structures, Managed Habitat provides for both small, open forage areas (such as young stands favored by deer, elk and mountain goats), dispersal habitat, and cover within the older, more dense stands. Late-successional forests are maintained within riparian reserves in Managed Habitat to provide riparian protection as well as travel corridors for late-successional dependent species. The natural character and diversity of this unit provides an environment for most kinds of recreational activity. Changing landscapes of vistas, small openings, and different seral stages combine to offer opportunities for a variety of recreational activities throughout a range of development and use intensity. An emphasis placed on wildlife habitat values, however, favors recreational activities that are smaller in scope and development. Travel through the unit to other destinations, scenic viewpoints, driving for pleasure, and hunting are appropriate. High levels of use, whether by motorized trail users or campers in concentrated

areas, may compromise the habitat values and objectives in some cases.

Moderate volumes of timber production contribute to economic outputs.
Learning Opportunities: Timber harvests in Managed Habitat areas provide an opportunity to test and analyze economic feasibility in a variety of unit configuration, timber type and size. A variety of special forest products may also be present, including mushrooms, beargrass, ferns and other floral greenery. Research and monitoring in these areas could emphasize learning about the effects of harvesting these products on the biophysical environment to local economies. Nearby communities might be particularly interested in learning more about community economic development opportunities associated with a range of non-timber forest products in order to diversify local economies. Managed Habitat areas would be an appropriate place to test assumptions associated with the range of recreational activities desired by people who use the AMA, including patterns of public use of the road system, and methods for working with the public in planning and implementing road management activities, such as road closures or restrictions for certain types of vehicles. The higher road density in Managed Habitat areas also makes this unit a natural laboratory for testing, monitoring, and learning about ecological and biophysical effects of roads and road management practices.

Management Opportunities: Activities within Managed Habitat would be designed to comply with management direction described by ROD, GPLRMP, recommendations from the *Middle and Upper Cispus Pilot Watershed Analysis* and the *Cispus Strategies.* The objective is to integrate timber production with the maintenance and restoration of late-successional, riparian, and aquatic habitat. Timber harvest activity would be designed to maintain dispersal habitat, with high canopy closure and structural diversity and include retention of sufficient large green trees, snags, and down woody debris to accomplish that objective. Additional goals include the maintenance of interior forest conditions, scenic views, and the minimization of forest fragmentation. Roads identified as resource concerns through watershed analysis or access and travel management planning would be considered for decommissioning or relocation. Trails and other forms of minimum impact recreation would be developed and/or maintained.

Habitat Development

Description: Areas designated as **HABITAT DEVELOPMENT** are similar, in many ways, to the character and management objectives of the Managed Habitat design unit. A range of elevations results in a variety of forest types, habitats, and recreational opportunities. However, openings from timber harvests may be generally smaller in size than in managed habitat, intended to mimic small, naturally occurring openings. This design unit places additional emphasis on the restoration, maintenance, and connectivity of late-successional forests, and also includes mountain goat winter range. An active thinning regime would be used to develop structural features characteristic of older forest types. Silvicultural treatments include manipulation of the distribution and abundance of coarse woody debris, down logs and snags, and the creation of cavities for dependent species.

Function: The mix of seral stages present provides a variety of habitat conditions, from open forage areas, to edge, cover and late-successional habitat. The Habitat Development design units would function as productivity centers, contribute to population stability, and provide travel corridors for late-successional dependent species.

Recreational activities would include travel to and from recreational destinations, such as the high lakes campgrounds. Major travel corridors provide opportunities to enjoy scenic viewsheds and access to developed and dispersed recreation sites within the design unit.

Moderate volumes of timber contribute to economic outputs.

Learning Opportunities: With its focus on developing late-successional habitat, learning opportunities may center on various silvicultural techniques and the effects of altering the structural characteristics of stands. It would be an area for testing our current knowledge and assumptions regarding: 1) the use of active management to accelerate the development of structures associated with older forest stages, such as coarse woody debris, snags and trees with cavities, large diameter trees, patches of shrubs and long canopy layers; 2) assessing the benefits and costs associated with alternative ways of managing stands in the younger developmental stages; 3) testing management alternatives for the ability to move forest stands forward in time and if accelerated development of the structures that are missing in younger stands will increase populations of late-successional dependent species; 4) testing scientific hypotheses about the relative importance and function of specific stand structures, compositions, and arrangements; 5) determining if adding cavities and changing forest structure through silvicultural manipulation will increase plant and animal diversity, provide foraging and roosting habitat for northern spotted owls, and increase the density of their primary prey species, the northern flying squirrel.

Management Opportunities: Activities within Habitat Development would be designed to comply with management direction described by ROD, GPLRMP, recommendations from the *Middle and Upper Cispus Pilot Watershed Analysis* and the *Cispus Strategies*. Objectives would include the restoration of late-successional forest habitat conditions, riparian areas, and landscape connectivity, and the provision of areas for minimum impact recreational opportunities. Timber harvests in managed and young even-aged natural stands would be designed to enhance the development of late-successional structural diversity (i.e. emphasis on providing habitat for cavity dependent organisms, prey for late-successional predators, and other sensitive species), while maintaining interior forest conditions (defined as 600 feet from the edge of a plantation, road, stream, river, or other significant opening) and minimizing forest fragmentation. Roads identified as resource concerns through watershed analysis or access and travel management planning would be considered for decommissioning or relocation. Trails and other forms of minimum impact recreation would be developed and/or maintained.

An active and intensive thinning regime could be used to produce late-seral forest characteristics. Commercial thinning could begin once a stand reaches commercial size (usually 40-60 years), and continues at 20 year intervals until the stand reaches 140 years of age. Openings from regeneration harvests would be small in size, and designed to meet visual quality objectives.

Managed Mosaic

Description: Compared to other landscape units, **MANAGED MOSAIC** is subject to more human activity and vegetation alteration on a landscape scale. These areas include an abundance of early and mid-successional stands, with fast-growing young trees. The patterns of stands with different tree ages reflect the underlying landforms, with old growth remaining in riparian or specially protected areas. Openings may be large-scale, depending on resource objectives for the area.

Function: This landscape unit is where harvest activity is most evident, intended to mimic past natural disturbances within the Cispus area such as wildfires. Large areas will be open, attracting animals which prefer early successional habitat. The variety of stand structures creates an abundance of "edge" habitat. Because it joins two different habitat types, edge habitat is home to an wide range of birds and animals. Depending on site and climatic conditions, special forest products associated with managed forests (boughs, transplants, evergreens) are abundant in Managed Mosaic.

The area may serve as a transition zone, providing a travel corridor to more primitive or natural-appearing destinations preferred by many recreationists. It may be more suitable for forms of recreation, such as motorized recreation and larger group use, that may be less appropriate for more natural-appearing areas. While managed mosaic may not be the first choice of recreationists for facilities such as campgrounds, it does offer the advantage of managed stands, good access, and some concessions to fire protection, which facilitate the efficient management of campgrounds and concentrated use. The impacts of such use may be more in keeping with this unit, due to the acceptance of human impacts generated by a variety of uses. Activities may not be forest-dependent, but are enhanced by the forest environment. The area may also provide preferred hunting areas due to the presence of diverse seral stages and more open hunting conditions.

Learning Opportunities: With its strong emphasis on forest management, including timber production, Managed Mosaic offers opportunities for learning to work with the public to plan projects such as timber sales and recreation proposals. Learning could focus on how to promote acceptance or tolerance between groups with different interests and uses of forest resources. Another assumption which could be tested here is that learning more about local communities will enable forest management to be more sensitive to social interests and values. What methods work for increasing the effectiveness of public participation in forest management? Managed Mosaic is an ideal setting to test and monitor assumptions on the effects of high levels of management with respect to maintaining ecosystem integrity and the effectiveness of riparian reserves. Planning areas could also be designed to test whether management activities can mimic the effects of natural disturbances such as wildfire and strong winds.

Management Opportunities: Activities within Managed Habitat would be designed to comply with management direction described by ROD, GPLRMP, recommendations from the *Middle and Upper Cispus Pilot Watershed Analysis* and the *Cispus Strategies*. One objective would be to employ timber harvest activities to mimic natural disturbance, concentrate timber harvests, and provide for motorized recreation. Areas subject to timber harvest could utilize variable cutting intensity and high retention of late-successional structural features including large green trees, snags, and down woody material. Stands of varying ages could be maintained across the landscape in amounts and patterns likely to be found in an unmanaged forest. Recreational emphasis would provide opportunities for automobiles and other road-dependent vehicles. Roads identified as resource concerns through watershed analysis or access and travel management planning would be considered for decommissioning or relocation.

Natural Mosaic / Lodgepole

Description: The **NATURAL MOSAIC** consists primarily of high elevation areas, including high meadows, subalpine parkland, and alpine lakes. Subalpine forests thin out with increasing elevation, due to a short growing season and a snowpack that is deep and slow to melt. Scattered clumps of higher elevation tree species, along with open heath and meadows, occur along upper slopes and ridges. The large scale, natural opening offer long, sweeping vistas. The **LODGEPOLE** design unit is very similar in character to the Natural Mosaic unit, but is dominated by lodgepole pine and mountain hemlock due to past fire history and other broad-scale vegetative influences. It consists of high elevation areas, located in the southeast corner of the AMA.

Function: The area provides an attractive destination for many recreational activities, such as berry picking, hiking, hunting, rock climbing, camping, horseback riding, mountain biking, and Christmas tree cutting. Some motorized trails may extend into this zone, but because of the fragility of the environment, low development, low intensity uses such as small, primitive campgrounds, may be more compatible with protection of the flora and fauna. Many recreation opportunities are focused primarily in the high lakes area and the adjacent Mt. Adams wilderness. Special forest products are abundant in lodgepole forest, including beargrass and huckleberries, and the area is a traditional hunting and gathering place.

Natural mosaic areas provides habitat for high elevation species such as mountain goats, as well as summer forage for big game. Lodgepole forests provide important habitat for lynx and snowshoe hare.

Learning Opportunities: Learning opportunities will include determining natural production levels of special forest products, and testing how much and at what rate these products can be harvested without adversely impacting the resource. The use of fire as an effective tool for non-timber commodity management (i.e. Huckleberries) can be tested in these areas. Because of the high level of recreation activities, often in fragile environments, many learning opportunities exist in these areas for testing effectiveness of recreational facilities and public education.

Management Opportunities: Activities within Managed Habitat would be designed to comply with management direction described by ROD, GPLRMP, recommendations from the *Middle and Upper Cispus Pilot Watershed Analysis* and the *Cispus Strategies*. Within the Natural Mosaic LDU, the objective would be to maintain high elevation habitats and primitive recreational opportunities. The area is popular with non-traditional forest product use. Within the Lodgepole LDU, one objective would be to monitor the effects of natural and prescribed burns and special forest products consumption. Prescribed burns may be permitted on an experimental basis, in both Natural Mosaic and Lodgepole LDUs, with a case-by-case review for control of natural fires. Roads identified as resource concerns through watershed analysis or access and travel management planning would be considered for decommissioning or relocation.

Cispus AMA Landscape Design

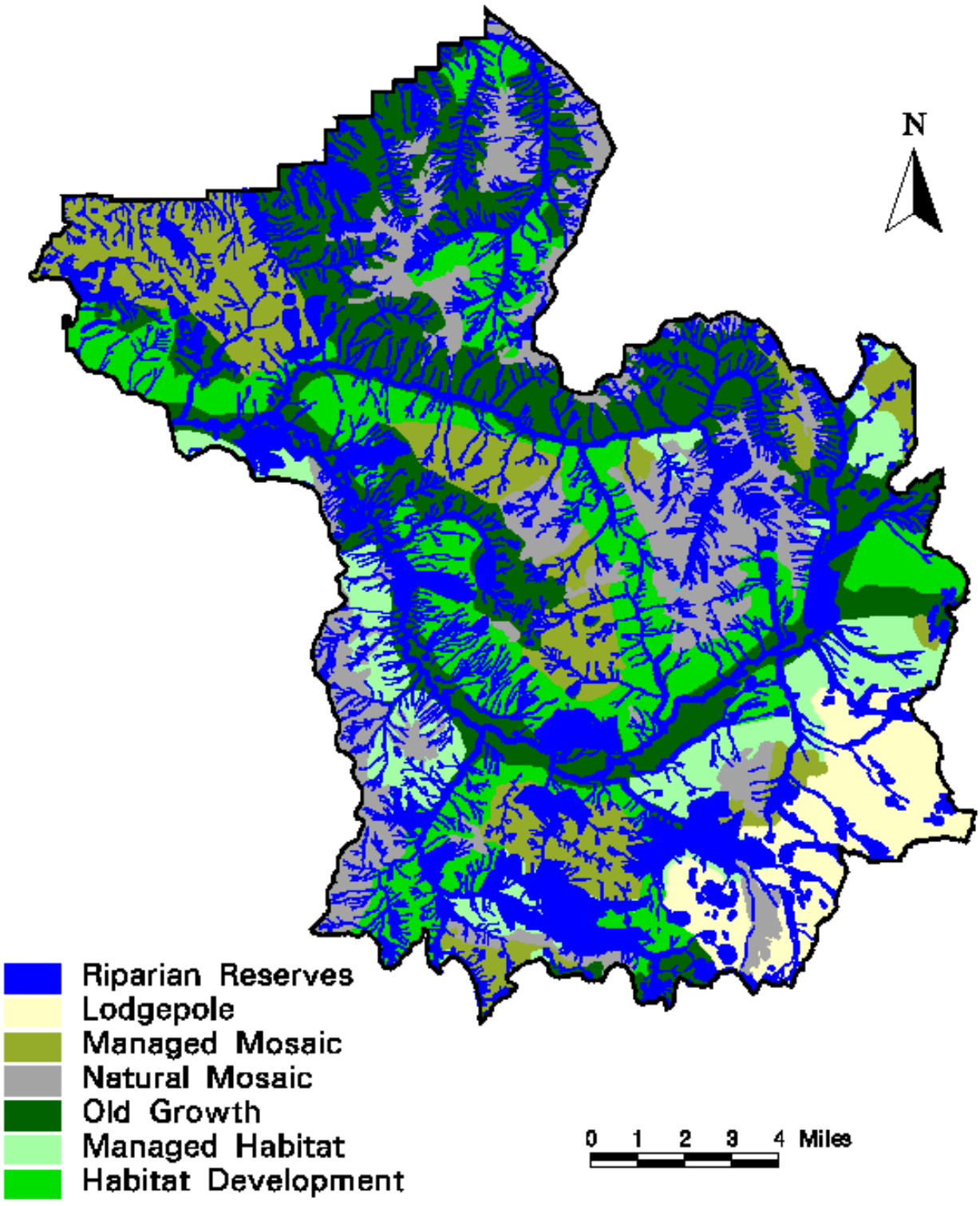


Figure G-1. Cispus AMA Landscape Design.

Cispus AMA Landscape Design

Emphasis:

- Aquatic Conservation Strategy
- providing sufficient late-successional, riparian and aquatic habitat to maintain and restore biological diversity
- restoration and/or maintenance of late-successional characteristics
- connectivity of late seral forests
- old growth corridors and areas of upland old growth
- producing a stable, sustainable wood supply

Learning opportunities Many of the learning opportunities associated with this landscape design relate to testing the following assumptions:

1. Can active management accelerate the development of structures associated with older forest stages, such as coarse woody debris, snags and trees with cavities, large diameter trees, patches of shrubs and long canopy layers?

    - How to economically implement an intensive thinning regime with low road densities.

2. What would be the effects of minimal management on the health of riparian areas and late-successional forests?

3. Emphasis on minimum impact recreation

    - Would the public accept restrictions on activity within large tracts of non-wilderness National Forest land?
    - What would be the impacts of various recreation use on wildlife?
    - What are the range of recreational activities adaptable to “minimum impact”?

Relationship to ROD objectives:

1. Maintenance of late-successional forest structure and dependent species

This landscape design would maintain at least 76% of the landscape in late-successional forests (74% within unmanaged areas, 2% within managed areas). Gradually, old growth habitat would develop in design units where it is currently lacking. This would form a generally connected landscape, linking the North Fork and mainstem Cispus Rivers to the Woods Creek LSR and east to the Goat Rocks Wilderness area. While the old growth design unit is relatively narrow in many areas, it would likely provide species production centers, particularly where the old growth LDU borders the habitat development LDU.

A high percentage of late-successional forests (76%), suggests that this landscape design would be at a high risk of stand-replacing fires. However, the risk may be reduced if thinning in the Habitat Development LDU is designed to reduce understory fuels (see silvicultural discussion in reference section A).

2. High quality recreation

The mix of landscape design units provides for a variety of recreational activities and experiences. The recreation emphasis for each landscape design unit will need to be defined during the planning process based on the underlying objectives for those design units and NEPA analysis. This process will offer an opportunity for recreation groups and users to work collaboratively with the planning team and with each other.

3. Maintenance of healthy riparian areas

Opportunities to reduce road densities and ground disturbing activities within riparian areas could result in a proportional decrease in sediment delivery to streams and peakflow events. A decrease in road access would constrain restoration efforts that require these facilities. Water quality, channel conditions, riparian conditions and flood plain, meadows and wetland conditions would recover and adapt at a natural rate.

4. Predictable and sustainable timber yield

Probable Sale Quantity (PSQ) is an estimate of the quantity of timber (in thousands of board feet) that can or might be sold from an area of capable, available and suitable land. Suitable lands are managed using various retention levels. Precommercial thinning is practiced on stands 10 to 20 years of age. Commercial thinning may be practiced twice during a given rotation. (see silvicultural discussion in reference section A)

Long term PSQ represents the potential resource output once the landscape reaches a fully managed condition.

total acres available for scheduled harvests	37,000
average rotation length (yrs)	116 - 143

acres light retention regeneration harvest per decade	800 - 1,800
acres medium retention regeneration harvest per decade	100 - 200
acres high retention regeneration harvest per decade	50 - 100
acres regeneration harvest per decade (subtotal)	950 - 2,100

acres precommercial thinning per decade	800 - 1,900
acres commercial thinning per decade	6,100 - 8,500

estimated short term annual PSQ (mbf)	7 - 9000
estimated long term annual PSQ (mbf)	12,200

The range of values in the above table is based on modeling assumptions used in comparison criteria (G-4, G-17). These assumptions were applied to the option selected by the Forest Supervisor and will be considered during project planning and NEPA analysis. The values above reflect a 50 year moratorium on the harvest of stands 170 yrs or greater until 80% of the Old-Growth LDU exhibits old-growth characteristics.

COMPARISON CRITERIA

Criteria were developed to display possible consequences and outputs of the landscape design. **It must be emphasized that general silvicultural prescriptions were used for modeling purposes only, specific management prescriptions will be developed for specific projects. Exactly which assumptions will be tested and the method for such testing will be further explored through the AMA Research and Monitoring Plan, or as an addendum to the selected Landscape Analysis and Design document.**

1. Seral stage composition is used as an indication of habitat diversity. It is also provides a means comparing current and future conditions to historic ranges. Historic vegetation models were developed by examining fire history.

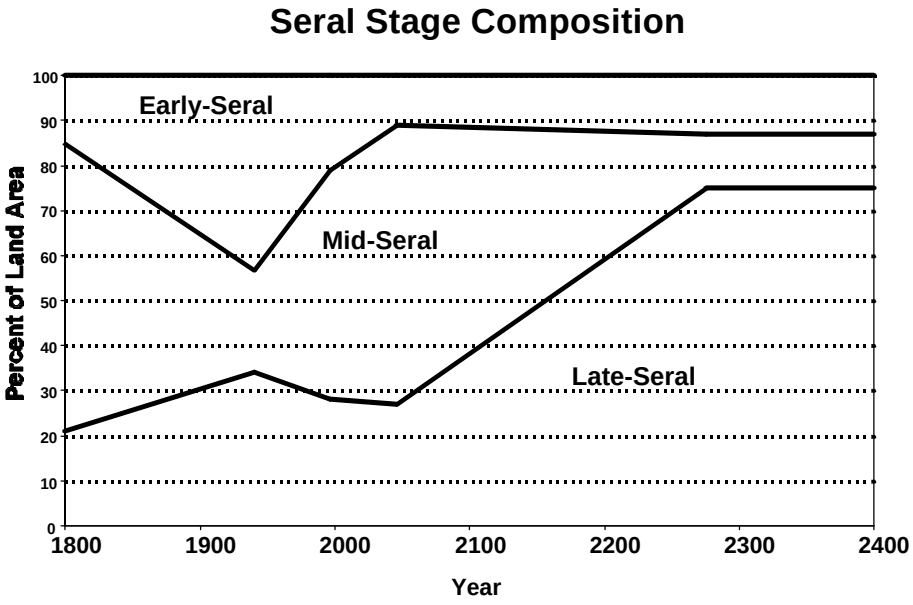


Figure G-2. Seral Stage Composition.

2. Late Seral Habitat. Several characteristics relating to late-seral habitat were examined as a means of indicating the ability of the landscape design to support late-seral dependent species.

2a. Acreage of interior late-seral habitat Certain late-seral dependent species, such as the pileated woodpecker, the northern spotted owl, martin, and fisher, require interior habitat. The amount of interior habitat is directly related to the distribution of openings and the associated edge effects. Openings can include meadows, and both natural and human-induced gaps. The interface between landscape elements of different composition and structure, between an open harvest unit and a closed-canopy forest for example, is referred to as an edge. Edges have environmental conditions (temperature, light, humidity, wind) that are different from the adjacent land areas and may persist for up to 450' into the forest. The shape of the design unit is also important because of the effect it has on the amount of edge and interior habitat. Design units that are regular or are more consolidated have less edge than irregular shapes. In a landscape with irregular-shaped patches of forests, the amount of interior habitat may be much less than it

appears (Fig. G-3).

To simplify modeling, only unmanaged areas were considered for interior late-seral habitat. The acreage given is therefore a minimum value. Unmanaged areas include reserved areas for threatened or endangered species, and the old growth, riparian reserve, and natural mosaic landscape design units. For all of these areas, it was necessary to examine suitability, eco-class, and other vegetative parameters in order to only consider forested lands. For the purpose of modeling, all lands adjacent to unmanaged areas were considered openings. This assumption simplifies the modeling but underestimates the actual amount of interior habitat. Streams were

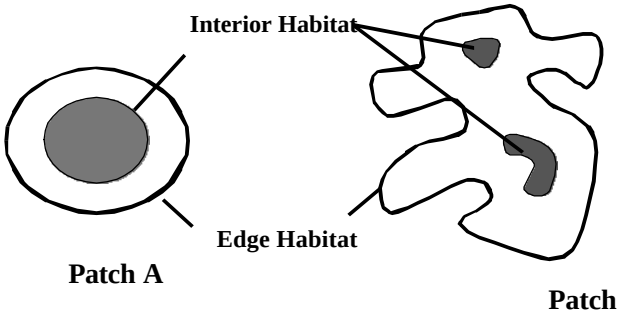


Figure G-3. The effect of patch shape on the amount of edge habitat. The more regular a patch, the greater the amount of interior habitat. Patch B actually has the greater total area, but less interior habitat.

considered openings when they were large enough to produce non-forested habitat along their reaches. The acres of interior LS habitat projected for the landscape design in the 2197 is 55,000 acres.

2b. Acres of Old Growth The distribution of old-growth stands throughout the landscape is an important component of ecosystem diversity, and plays a significant role in providing for biological and structural diversity across the landscape. Isolated remnant old-growth patches are ecologically significant in functioning as refugia for a host of old-growth associated species, particularly those with limited dispersal capabilities that are not able to migrate across large landscapes of younger stands. These include, but are not limited to, many species of fungi, lichens, bryophytes, arthropods, and vascular plants, and will likely include vertebrate species such as small mammals and amphibians, and various bird species. Isolated patches will function as refugia where old-growth associated species are able to persist until conditions become suitable for their dispersal into adjacent stands. Loss of these old-growth stands may result in local loss of an array of species. (ROD p. C-44) Although there is no consensus on an old growth definition at this time, for this modeling exercise, old-growth was defined using the “large tree” structural class in the GP Forest Headquarters vegetation database. The acres of old-growth projected for the landscape design in 2197 is 75,000 acres.

2c. Connectivity of Late-Seral Habitat. The Middle and Upper Cispus Watershed Analysis and the Cispus AMA Strategies identified the importance of several late-seral connectivity zones. These zones provide critical connections within the AMA and link several adjacent wilderness areas, Late Successional Reserves (LSR) and watersheds. Figures are included which illustrate the historical position of late seral corridors in the Cispus AMA.

Figure G-4. Historic LS Connectivity Zones.

Note how the position of the corridors has changed over time, as a result of natural disturbances such as wildfires; and more recently from large scale management activities. Dashed arrows indicate historical, partially discontinuous corridors. This figure helps illustrate the variation and flexibility inherent in natural processes, and the futility of attempting to impose permanence on dynamic landform processes.

The number and size of corridors retained in the landscape design, as illustrated below, gives a measure of connectivity. The location and width of each arrow, in a very general way, indicates the relative location and width of each corridor.

Figure G-5. Late Seral Connectivity Zones in 2197.

3. Resource management

a. The following pie-charts illustrate the acres of regeneration harvests per decade and available and unavailable land.

Lands proposed as "Unavailable" include:

1. LDU's without scheduled harvest (i.e. Riparian Reserves, Old Growth, Natural Mosaic, and Lodgepole)
2. non-harvest allocations from the underlying GPLRMP (i.e. Administratively Withdrawn Areas, including Unroaded and Roaded Recreation, Developed Campgrounds, and Special Interest Areas)
3. Areas that are non-forested or otherwise unavailable for scheduled timber harvests.

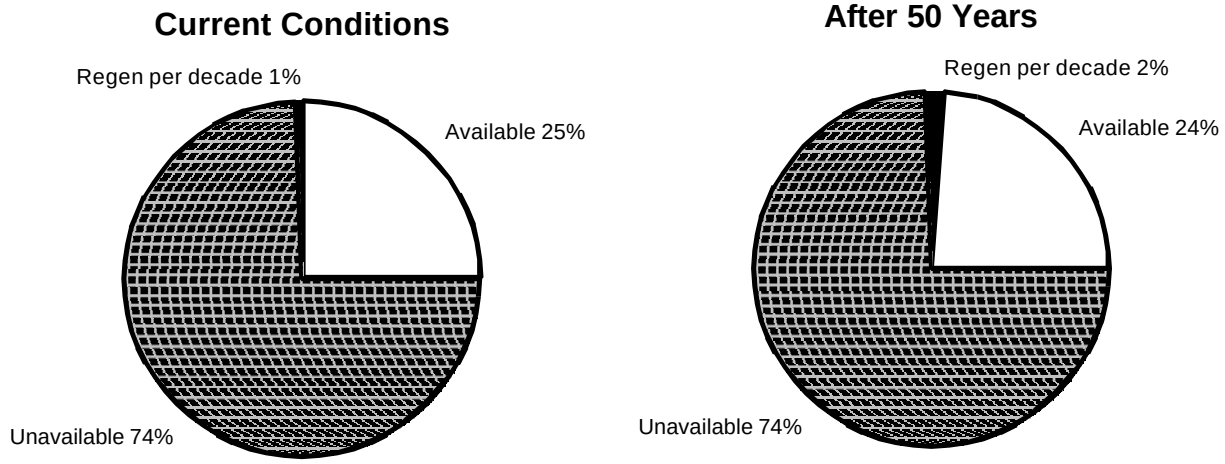


Figure G-6. Area Available For Harvest

"Available" lands are forested and available for scheduled timber harvests. Regeneration harvests occur on "available" lands, but are shown separately here for clarity. Additional management activities, such as commercial and pre-commercial thinning may occur on "available" lands. Unscheduled harvest activities, such as thinning for the creation of habitat or to promote a desired structural condition, may occur on "unavailable" lands but do not contribute to the PSQ.

The two figures reflect changes in the regeneration harvest over time due to a moratorium of harvesting of old-growth stands (greater than 170 years of age) "for 30 to 50 years or until 80% of forest in the Old-Growth LDU exhibit old-growth forest conditions." It is assumed that this condition will be met after 50 years.

4. Distribution of Landscape Design Units

The following table is included as an aid in comparing the size and distribution of the landscape design units. Refer to the discussion of of each LDU for specific descriptions, functions, learning opportunities, and management objectives.

Landscape Design Unit	**acres**
old-growth	28,500
riparian reserves	41,600
habitat development	21,700
managed habitat	9,600
managed mosaic	16,000
natural mosaic	18,200
lodgepole	8,100
total	143,700

Reference Section A

LAD Selected Option Modeling Assumptions and Rationale

To compare and evaluate the various design options for the Landscape Analysis and Design process, a set of assumptions was developed for each. These were then used to run various computer models and approximate future conditions and outputs. The options were presented for recommendations to the Southwest Washington Provincial Advisory Committee (PAC). The selected option was modified to meet legal constraints, the issues and concerns expressed by PAC members, and to provide additional management flexibility, while ensuring the stated objectives of the option are met.

The following are the original assumptions and rationale used for computer modeling and comparison. They are included to illustrate potential management activities (though not management direction) for site-specific project proposals and to provide background into the origins of this collaborative effort. These assumptions can serve as catalysts for future discussion when developing site-specific project proposals. These and other actions consistent with the objectives for the affected lands must undergo National Environmental Policy Act analysis, including additional public involvement, prior to implementation.

1. All features of the aquatic ecosystem including streams, wetlands, ponds, lakes, and unstable and potentially unstable areas are included within Riparian Reserves as described in the NFP (ROD, p. D-9 and Analysis, p. 6-26). Activities within Riparian Reserves will comply with management direction described in the NFP (ROD, pp. C-30 to C-38) and the Analysis (pp. 6-19 to 6-26).
2. No timber harvest of old-growth forest (i.e. forests greater than 170 years old) for 30 to 50 years (Analysis, p. 6-12) or until 80% of forests in Old-growth landscape unit exhibit old-growth forest conditions — whichever is longer.
3. No timber harvest or road building in Roadless Areas defined in Appendix C of hte *Gifford Pinchot Land and Resource Management Plan* until comparable large unroaded areas are restored through road decommissioning and forest restoration. These conditions are necessary to meet the objectives of the Aquatic Conservation Strategy. Roads are implicated as causal agents in severe aquatic ecosystem degradation in the Analysis (i.e. p. 2-16, Appendix N, and Appendix O), and the Report of the *Forest Ecosystem Management Assessment Team* (i.e. pp. V-16 to V-19). Both roads and logging activities are implicated in recent scientific publications (e.g. Jones, J.A. and G.E. Grant, 1996. *Peak flow responses to clear-cutting and roads in small and large basins, western Cascades, Oregon.* Water Resources Research 32(4):959-974.).
4. Within connectivity corridors (analysis, pp. 5-6 to 5-11) and riparian areas (Analysis, pp. 6-14 to 6-18), management prescriptions will be designed to accelerate development of late-successional forest. Ground disturbing activities such as road construction, regeneration harvest, and salvage logging are prohibited in these riparian

areas.

5. Management activities in the Cispus AMA will be designed to meet the objectives of the Aquatic Conservation Strategy (ROD, p. B-9).

6. Interior forest conditions occur in natural stands that are more than 600 feet from the edge of a plantation, road, stream, river, or other significant opening (FEMAT, p. IX-11).

7. Road densities greater than 1 mile of road per square mile of area reduce habitat effectiveness for elk (see e.g. Lyon, L.J. 1983. Road density models describing habitat effectiveness for elk. Journal of Forestry 81:592-595), wolves (see e.g. Thiel, R.P. 1985. Relationship between road densities and wolf habitat suitability in Wisconsin. The American Naturalist 113:404-407), and bears (see e.g. Brody, A.J. 1984. Habitat use by black bears in relation to forest management in Pisgah National Forest, NC. M.S. Thesis, University of Tennessee, Knoxville).

8. Meeting Probable Sale Quantity (PSQ) timber targets is NOT a primary goal for Adaptive Management Areas. Rather, AMAs are intended to provide a "stable" timber supply. The NFP states that PSQ levels are general estimates and that they

   > "... represent neither minimum levels that must be met nor maximum levels that cannot be exceeded. They are rough approximations because of the difficulty associated with predicting actual timber sale levels over the next decade, given the discretion that agency land managers possess in administering plans and deciding when and where to offer timber sales, as well as the complex nature of many of the standards and guidelines. They represent out best assessment of the average amount of timber likely to be awarded annually in the planning area over the next decade, following a start-up period." (ROD, p. 19).

   This is particularly relevant to Key Watersheds where the PSQ figures expected to change based on information gained through watershed analysis. For example, the NFP recognizes that:

   > "... the Aquatic Conservation Strategy objectives and the requirement to do watershed analysis before management activities can take place implies a higher level of uncertainty and a potential for future change with respect to future levels of sale offerings within Key Watersheds. In this way, offerings affected by any changes or concerns in Key Watersheds, or dependent upon Key Watershed-related funding such as that needed for Watershed Analysis, can be identified and monitored." (ROD, pp. E-29 to E-30).

9. Minimum impact recreation refers to recreation in primitive and undeveloped sites where emphasis is placed on protecting natural scenic and environmental conditions.

Reference Section B

Gifford Pinchot Land and Resource Management Plan Allocations

In the development of the Gifford Pinchot Land and Resource Management Plan, forest resource specialists spent nearly a decade identifying available resources and analyzing the existing functions and current uses of the area. The process identified management objectives for projected outputs, various resource conditions, and management prescriptions for the following resources:

Unroaded Recreation	Mt. St. Helens National Volcanic Monument	Timber Production
Roaded Recreation	Wilderness	Research Natural Areas
Visual Emphasis	Spotted Owl, Pileated Woodpecker, Pine Martin	Experimental Forest
Developed Recreation	Wildlife Special	Administrative Sites
Special Interest	Mountain Goat	Utility Sites & Corridors
Wild and Scenic Rivers	Deer and Elk Winter Range	

These resources were the basis for the Gifford Pinchot Land and Resource Management Plan landscape design. Areas where these resources existed or where the public suggested they should exist, became the areas where these resources would be emphasized. For instance, the areas along main travel routes were allocated as "visual emphasis"; low elevation areas where deer and elk migrate to in the winter time were allocated as "deer and elk winter range"; and many of the inventoried roadless areas became "unroaded recreation". The initial design became the "Management Area Map" for the forest plan, was subsequently modified to become the "final forest plan map", and then later amended by the President's Northwest Forest Plan into what is now called Amendment 11.

The GPLRMP provides: specifications on harvest unit size, composition and dispersal; designation of priority landscape flows (such as deer, elk, and mountain goat migration, and dispersed recreation along river corridors); expectations of the look and feel of the landscape (visual quality objectives and recreation opportunities); structural age class composition; and wildlife habitat categories.

Figure 2-4 (page 2-9 of the AMA Guide) illustrates the management area categories used in the GPLRMP. For clarity, several management area categories have been grouped as outlined in the following table: A complete discussion management prescriptions for each of the categories is beyond the scope of this document. Refer to the *Land and Resource Management Plan, Gifford Pinchot National Forest, Amendment 11*, USDA, 1995, for a complete listing of management standards and guidlines.

MACs	Name	Description
TS	General Forest	These lands contribute to a predictable supply of timber and other resources while maintaining a healthy ecosystem.
2L	Developed Recreation	Lands with opportunities for recreation at developed sites; campgrounds, ski areas, boat launches, viewpoints, and other facilities are included.
DL, DM, RM, RL	Roaded Recreation	Management on these lands emphasizes high quality dispersed recreation opportunities in a predominantly natural setting.
UD, UH, UL	Unroaded Recreation	These lands provide high quality dispersed recreation opportunities in a natural or predominantly natural setting.
6F, 6M, 6L, 8D, NA, NL	Wild and Scenic Rivers	These lands may be recommended for addition to the Wild and Scenic River System. Until a determination is made regarding their addition to the system, their unique resource values will be maintained.
EM, EL, ES, IL, IM, IX, MM, ML, MX, QL, QM, QX	Wildlife	These areas are managed to 1) provide habitat for wintering deer and elk; 2) provide habitat for wildlife species dependent upon special habitats such as marshes, and particular old-growth stands; and 3) provide summer and winter habitat for mountain goats.
9L, BL, GD, GL, SD	Special Interest	Areas with special scenic, botanical, geological, or other features are protected while providing dispersed recreation opportunities, usually in a natural setting.
VL, VM	Visual Emphasis	These lands provide visually appealing landscapes along roads and trails.
not applicable	Other	Includes privately owned lands within the National Forest boundary.

Reference Section C

Silvicultural Treatments

Introduction

This discussion is a general description of a number of typical silvicultural treatments which are available to be used in western Cascade forests. They will be discussed in roughly a chronological order, starting with reforestation and ending with forms of regeneration harvests. This should not be considered a complete list of all possible variations of treatments. There are many combinations of treatments or variations of individual treatments which are being experimented with lately and are not discussed here.

Uneven-aged vs. Even-aged Systems

These are two broad categories of silvicultural treatments, each of which has vastly different implications for yields of timber products, intensity of management, species composition, and vegetation structure, to name a few. The decision to use one system or the other is a LONG TERM decision. It implies a commitment to a specific series of treatments over many decades or even in perpetuity.

Uneven-aged Management

Uneven-aged management is a system which attempts to create and maintain forest stands which contain at least three age classes of trees. It involves periodic maintenance activities, in perpetuity, to maintain the desired age class distribution. Entries for this maintenance schedule could be on a relatively frequent basis (e.g., every 10-15 years) on productive sites.

Because this system attempts to maintain many age classes on each acre, most cable logging systems are incompatible, and ground-based equipment is usually the preferred logging equipment. This, of course, limits the practice of uneven-aged management to relatively flat ground and where soil compaction can be tolerated. A system of relatively permanent, designated access roads would be planned for within each stand.

The uneven-aged management system has a tendency, in the long term, to convert the composition of trees to a higher proportion of shade-tolerant species than even-aged systems, because of the limited size of openings that are created. In the Cispus Adaptive Management Area (AMA) this means that, over time, more western hemlock, western red cedar, and pacific silver fir would dominate the stands rather than Douglas-fir, noble fir, and western white pine which are associated with an even-aged system.

Timber product yields in uneven-aged management are reduced per entry, but the entries are presumed to be at more frequent intervals and perpetual, as compared to even-aged systems which have higher yields per entry but the entries are spaced far apart. It is not clear whether one system has an economic advantage over the other with respect to costs of harvesting timber, however, the eventual shift in species composition in uneven-aged management may make the difference if there is a significant difference in product values between species.

Even-aged Management

Before forest management began in the AMA, most stands had developed naturally in an even-aged condition. Following wildfires, areas with complete or near-complete tree kill were regenerated naturally by an even-aged stand of fast-growing, shade-intolerant tree species. Silviculturally, an even-aged stand is defined as one in which the ages of the trees can range up to 20% of the rotation age for which the stand is managed. For example, if a stand were planned for a 100 year rotation (regeneration harvest at age 100), the ages of the trees in the dominant layer can cover a range of 20 years. Technically, this means that a stand with a 200 year rotation could have an age range of 40 years and be called even-aged.

These kinds of stands typically produce a layer of shade-tolerant tree species in the understory after many decades in an unmanaged condition. Some of these trees are quite old and having been suppressed by the overstory, are not necessarily representative of a second age class. Some of the understory trees, however, are newly germinated trees. Over a very long period, these even-aged stands eventually develop into the structure we refer to as old growth stands which do have multiple aged layers of trees. This only happens after most of the original even-aged layer loses most of its trees and allows the understory to develop.

When we manage with even-aged systems, the treatments attempt to emulate the natural progression of stand development. The treatments can include reforestation (natural or planted), young stand tending (up to age 20 typically), fertilization (usually nitrogen), commercial thinning (between age 40 and 100 typically), and regeneration harvest (ages range from 90 to 250 or 400 years). The choice of treatments and their timing varies for each stand and depends on site factors and resource objectives. All past management in the AMA has used various combinations of these treatments, and they are maintaining an even-aged condition. The main differences between these managed stands and the natural stands is that the overstory trees are growing faster in diameter, the understory trees are growing faster in height, and there is possibly less woody debris on the forest floor in the managed stands.

Treatment Activities

Reforestation

Reforestation has been successfully practiced in the AMA with both natural seeding and planting. Some of the first planting was done along Road 23 starting around 1920 after the last Cispus Fire of 1918. Nursery practices, planting techniques, and genetic improvements have improved the success rate of planting over the decades. Planting has been the favored method of reforestation because (1) species composition can be controlled, (2) genetically improved planting stock has improved survival rates and growth, and (3) the time it takes to establish a site as certified reforested is more predictable with planting than with natural seeding. In 1976, the National Forest Management Act mandated that reforestation must be accomplished within five years after the timber harvest. This requirement made planting more desirable than natural regeneration.

Natural regeneration requires very careful site preparation for the desired species. Douglas-fir, for example, requires a seed bed of mineral soil or shallow duff for successful germination. The most efficient way to produce these conditions is with broadcast burning of slash, leaving surface conditions much like a wildfire would. Sometimes just scarifying the soil/duff surface is enough for successful results. Naturally regenerated stands sometimes get established over a long period of time (up to 5 or 10 years in some cases) and they initially display an uneven distribution of the trees.

Planting can be done without special site preparation like broadcast burning if the slash is not too deep. Planting allows the flexibility of using different species in different portions of a harvest unit for special purposes, like frost-prone areas, root rot infection areas, or special wildlife or visual emphasis areas. With a successful project, a stand can be considered established in about three years after planting, and the stocking is relatively uniform compared to natural regeneration.

Historically, harvest units have been planted at densities ranging from 600 to 1200 seedlings per acre. Recent densities have been as low as 200 to 400 per acre. For certification of reforestation, a minimum of 125 trees per acre is required. Since 20% to 40% of the seedlings can be expected to die within five years after planting (depending on site conditions), it is necessary to plant more than the minimum needed for certification.

Young Stand Tending

Activities under this topic include release of desired tree species from competitive species, thinning the desired species to a stocking level based on the expected timing of the next treatment, and pruning. These treatments generally occur between the ages of 5 and 20 years.

Release is considered when the survival of the desired tree species appears threatened by other competitive species. It is usually practiced within a few years after planting. It has been used only on a small percentage of all young stands. Most stands do not need this treatment.

Thinning (pre-commercial) is practiced on stands between the ages of 10 and 20, and it is used to reset the stocking level to a desired level for various resource objectives. It is recommended for stands with stocking levels of 400 trees per acre or more, in general. These densities are considered overstocked for most resource objectives. These overstocked conditions sometimes result from high planting densities, and sometimes from natural seeding which fills in the stand with hundreds of extra seedlings per acre. It is anticipated that about 90% of reforested acres would need to be pre-commercially thinned.

Young stand thinning has an added benefit, from a wildlife perspective, of extending the supply of big game forage habitat for years beyond what would have been provided with no thinning.

Pruning is an activity which removes the lower branches from the stem of the desired trees. It is done for wood quality objectives and for disease control objectives. It is recommended to be done when the trees are young (15-20 years) and the branches have small diameters so that they heal over quickly. The treatment is used only on selected trees in the stand, and is rarely applied to all trees in the stand for economic reasons. Pruning is an activity that appears very compatible with many other resource objectives on land allocations which have a timber product emphasis.

Fertilization

This activity has been used in the past very successfully. It is applied only on stands which grow on soils which have been tested to show a response to nitrogen fertilization. It has been shown to be economical on lands managed intensively for timber products. There are currently studies on the effectiveness of other combinations of fertilizers for use in controlling diseases such as root rots.

This treatment can be applied at any age, and it has been shown to have long lasting effects up to ten years. It is usually applied with helicopter, and the activity has been monitored for effects on water quality with no measurable adverse effects when proper precautions are taken to avoid class III or higher streams.

Commercial Thinning

The objective of *commercial thinning* is the same as that of young stand (precommercial) thinning - to reset the stocking level of the existing stand to a density that keeps the desired trees growing rapidly in a healthy condition. The difference is that commercial thinning are accomplished by selling the trees that get cut, while precommercial thinning are paid for - an investment.

Every stand of trees, in the absence of management, grows to a density at which the trees compete with each other for limited resources. When this maximum density is reached, most trees in the stand experience dramatic changes in their appearance and health. Live crowns are reduced in size; diameter growth slows; root systems are limited in their growth; understory trees and associated vegetation is suppressed; intermediate and overtopped trees die.

Timing

The point at which a stand of trees reaches the above condition is measurable and predictable. For managed stands which have had young stand tending, the first commercial thinning is typically scheduled when average stand diameter reaches about 12 inches. For low elevation stands, this can happen as early as age 35. For high elevation stands, it might be 45 or 50 years before merchantable sizes are achieved.

For unmanaged stands (no young stand tending), the timing of the first commercial thinning can be much later than in managed stands. Trees in an unmanaged stand may not reach merchantable diameters until age 45 or 50 for low elevation stands and even older for high elevation stands.

Frequency

Depending on the long term objectives and site conditions, forest stands can be treated with a wide range of numbers of thinning. In past timber management objectives, for example, this Forest had planned on an average of two commercial thinning during a 90-100 year rotation. There may be reasons in some cases to plan only one thinning in a rotation or to plan three or more.

The importance of frequency is that it is used to determine the target density to be used in any of the thinning. If we plan to thin a stand every ten years, we would thin lightly each time; if we plan to thin every 20 years, then we would thin to a lower density than in the first case. The objective in both cases is to keep the trees growing rapidly and in a healthy condition.

Regeneration Harvests

The objective of regeneration harvests is to start a new stand of early seral tree species. As discussed earlier, in even-aged management systems, most of the desired tree species for regeneration need high light levels to survive. Adequate light levels for successful establishment of a new stand can be provided with various amounts and patterns of overstory retention. For this discussion, canopy closure percent will be used to describe overstory retention since it is a concept which is already used as a guide in defining some new regeneration harvest methods, it is easily measured, and most people can understand it.

Canopy closure percent is simply the percent of ground area (acre) that is covered by live tree crowns, viewed from a vertical perspective. For example, in a fully stocked stand of trees, where very little light reaches the forest floor, the percent is 90%-100%. Silviculturalists estimate that stands of Douglas-fir on the west side of the Cascades can be successfully established under canopy closures less than 40%.

Harvest Methods Summary

Harvest Method	Range of Canopy Closure	Comments
Clear-cut (CC)	0	Rarely practiced
CC with Reserve Trees	1 - 9 %	Consistent with GPLRMP wildlife tree guidelines
Light Retention	10 - 20 %	Similar to traditional "Seed Tree" harvest. Consistent with ROD 15% retention guidelines.
Medium Retention	20 - 40 %	Similar to traditional"Shelterwood" harvest.
Heavy Retention	40 - 60 %	Rarely used. Favors shade tolerant tree species.
Commercial Thinning	60 - 80 %	FOR REFERENCE ONLY. No Regeneration

The choice over which level of retention to use in any given harvest unit is driven by site-specific resource concerns. Sometimes a medium retention is needed because harsh environmental extremes, like heat or cold, threaten the survival of the seedlings. Medium retention may also be selected for mitigation of visual concerns. However, some thought must be given to the long term objectives for species composition and tree growth. Medium and high retention levels will slow the growth of the new stand in the understory, and resource objectives may not be reached. A light retention level is probably appropriate in most situations within the Cispus Adaptive Management Area, because historic photographs immediately after the fire of 1918 show conditions similar to this over a wide portion of the valley. In general, we would expect about 85% of regeneration harvests to be Light Retention, 10% to be Medium retention, and 5% to be Heavy Retention. There is an infinite variety of combinations of the above regeneration harvests that can be applied between stands and within individual stands. The retention trees can be left evenly dispersed or in patches.

Vegetation Implications of No Management

In the landscape design for the AMA, a large number of acres are intended to be left unmanaged. That is to say that none of the silvicultural treatments described above will be practiced on those acres. Fire suppression is likely to be practiced aggressively on any wildfires in these stands. This discussion will describe some of the vegetative conditions that would be expected to develop in stands that are left unmanaged and the implications of these conditions.

Under this landscape design, approximately 74% of the AMA would be left unmanaged, ie, unavailable for scheduled timber harvest. These areas include non-forest (water, rocky areas, meadows, etc.), areas precluded from scheduled timber harvests by either the landscape design (i.e. Old-growth, Riparian Reserves, Natural Mosaic, and Lodgepole) or the underlying GPLRMP (i.e. Administratively Withdrawn Areas such as Unroaded and Roaded Recreation without timber harvest, Developed Campgrounds, and Special Interest Areas).

A large portion (about 40%) of the unsuitable land in these figures is related to riparian reserves and non-forested acres. These are present on every parcel of land.

Fire Behavior

Analysis of past wildfire behavior in the Cispus AMA land area shows that fire does not discriminate between riparian and non-riparian land if the fuel and relative humidity conditions are suitable for fire spread. Historic photographs of much of the Cispus valley show complete consumption from ridge top to ridge top during the 1902/1918 fires. No stands, within or outside of riparian reserves, had any kind of management (as described earlier in this document) prior to these fires.

Therefore, the non-management strategy in these reserves will not protect them from this kind of natural disturbance. On the other hand, an argument can be made that managed stands will have increased resistance to fire kill by managing stocking levels in the stands. There is evidence of rapidly moving crown fires dropping to the ground when encountering a managed stand with less ladder fuel and thicker bark, leaving the managed stand intact. (Ladder fuels are those which extend from the ground to tree crowns, allowing fire to spread from the ground to the tops of trees.)

Structural Conditions (Hemlock Series Stands)

The differences in vegetative conditions between unmanaged stands and managed stands develop over a very long time - longer than human life spans. With no management, the typical stand in this AMA will develop slowly in an even-aged condition (as defined above) for the better part of 200 years. Even though some understory shade-tolerant trees develop in this time period, the stand is still dominated by the even-aged overstory (mostly Douglas-fir). Most of the original number of trees per acre will have died by this time, and moderate amounts of dead and down woody material accumulate on the forest floor. As this stand develops for the next 200 or 300 years, the structure of the stand becomes more complex, with the very largest trees dying, falling, and creating larger openings which stimulate regeneration and/or growth of understory shade-tolerant trees.

The form of these shade-tolerant trees (hemlock, cedar) is very different from that of the early seral trees which dominated the stand for so long. The shade-tolerant trees hold onto their lower branches much longer, creating deep crowns which serve as ladder fuels in a crown fire. In addition to the live understory development, there is an ever increasing accumulation of dead wood and litter on the forest floor in these old-aged stands, because the rate at which it decomposes is slower than the rate of accumulation.

These conditions can be seen in many existing old growth stands on this Forest, and in the right fire conditions, there is no amount of people and equipment that will prevent a complete or near complete stand kill from a fire.

In contrast, in a managed stand, the diameters of the overstory trees would reach large sizes earlier through stocking control. When this happens, the trees achieve thicker bark earlier as well, which increases their (Douglas-fir) resistance to scorching from ground fires. By removing some of the trees during periodic thinning, the amount of dead and down woody material can be controlled over time. With good landscape planning, some stands could be identified as fuel breaks in which the understory vegetation could be managed to minimize the ladder fuel effect by harvesting some of the shade-tolerant trees.

Structural Conditions (Silver Fir/Lodgepole Stands)

In the higher elevations of the AMA, the tree composition shifts to a greater number of different species, each of which is less resistant to fire damage than Douglas-fir. The silver fir ecotype has many different structures between stands and within a single stand. Silver fir stands generally accumulate thick litter layers because of the cold climate (which inhibits decomposition), and many of the associated tree species maintain deep crowns which serve as ideal ladder fuels in a fire. Some stands with a high percentage of silver fir can exclude understory vegetation for along time, while other stands can maintain a rich shrub layer through most of their lives.

Lodgepole pine stands have similar characteristics to silver fir stands, but some can be almost pure lodgepole pine which is susceptible to beetle attacks which can kill whole stands.

Management Options

In general, a design that proposes maintaining a large portion of the landscape in an unmanaged condition over the long term will be predisposed to large, stand-replacing disturbances. Concentrating unmanaged stands in contiguous blocks risks losing most, if not all of these stands in a single event. Dispersing unmanaged stands among areas with stocking control management presents less risk of stand-replacing disturbance.

This landscape design proposes that 74% of the landscape from scheduled for regeneration harvest. This area, in the long term, will tend to develop into the high fire-risk conditions of very old stands as described above in the absence of management. However, much of the area will not develop into very old stands, because natural disturbances like insects, disease, windthrow and fire will intervene. There are no records that suggest that this land area ever contained this much old growth habitat at one time.

If the thinning in the habitat development LDU are designed to reduce understory fuels, the fire risk may be reduced.

Reference Section D

Wildlife

Assumptions

Riparian Reserves Design Unit

It is assumed that commercial thinning within the riparian reserves will occur, with several restrictions. The overall objective must be to increase residual tree growth and to meet Aquatic Conservation Strategies. There will likely be a buffer along the stream where no thinning would occur. The buffer will be site-specific and defined during field reconnaissance.

Managed Mosaic Design Unit

This landscape design unit would provide abundant big game (deer and elk) forage. However, utilization would be dependent on the size and distribution of adjacent cover blocks. If a well distributed mix of cover and forage openings are available, deer and elk would be maintained within these units. This may be partially offset, depending on open road densities. High road densities increase the level of legal and illegal hunting that may occur in this design unit.

The intensive timber harvest projected may create large harvest openings favorable to early-successional species. This condition would last as long as snags and a grass-forb-shrub condition are maintained, plus or minus about 20 years.

Riparian reserves would be maintained and would likely develop into late-successional and possibly old growth habitat. This would benefit late-successional species which have small home ranges and can reside in riparian reserves. This species group would include Van Dyke's salamanders, Pacific giant salamanders, northern flying squirrels, and Pacific slope flycatchers as examples.

Natural Mosaic Design Unit

These lands are not expected to develop into a heavily forested condition and would include sub-alpine parklands, meadows, rocky outcrops, and brushfields. Prescribed or natural fire could be used to maintain or enhance this unique habitat type for wildlife species. Some of the species documented or assumed to occur in natural mosaic lands include: mountain goats, yellow-bellied marmots, mountain quail, white-tailed ptarmigan and many neotropical birds.

Lodgepole Pine Design Unit

This landscape design unit has no scheduled timber harvest however, some level of harvest may actually benefit other resources. For example, the high lakes country used to be one large huckleberry field after fire swept the area about 60 years ago. Forested stands of primarily lodgepole pine and sub-alpine fir have been re-established that are now shading out the huckleberry plants. Thinning these stands may allow an increase in berry production for the recreating public.

As assumption is made that several forest carnivore species including the wolverine and North American lynx are present in the Cispus AMA. While neither species has been positively confirmed in the AMA, suitable habitat is present to support both species. There is also habitat present for snowshoe hares which are preyed upon by the lynx and wolverine. Research has shown hare populations reach their highest densities in lodgepole stands less than 20 years of age. Thinning and/or some regeneration harvest would actually improve habitat for hares which in turn would benefit lynx and wolverine.

Managed Habitat Design Unit

These lands would be managed on a rotation of 120 years or until reaching CMAI, whichever is greater. It is expected little late-successional habitat would be retained in this design with the exception of the riparian reserves. Timber harvests would provide early-successional and edge habitat favorable to many species including deer, elk, and many neotropical birds. While timber harvest would occur prior to developing late-successional habitat, mid-successional stands would provide some dispersal capability for species such as the spotted owl.

Habitat Development Design Unit

It is assumed that younger aged stands will be thinned beginning at 40-60 years and approximately every 20 years after that until age 140. Thinning would remove approximately 30 percent of the basal area, and about 10 percent of the area left in unthinned patches and 10 percent in small gaps.

Several concerns develop including accessing the amount of acreage that is in this design unit. In those areas where road densities are light or non-existent, construction of system roads may be needed to provide access for repeated thinning entries. This may result in a higher road density than is currently present however, road closures could be employed to reduce vehicular access.

There is the assumption these "habitat development" acreage would develop into stands with late-successional characteristics and would function in supporting dependent species until final harvest removal. If the down logs and snags are retained in sufficient densities across the design unit to provide prey base habitat, then species such as the spotted owl and marten could utilize these stands. If snags are continually removed with each harvest entry, then maintaining habitat for prey species could be a problem. Some concern also exists about disturbance to wildlife populations with repeated harvest entries.

Old Growth Design Unit

LSR standards and guidelines would be applied. For younger aged stands within the design unit, commercial thinning could be utilized as a tool, where appropriate, to hasten the development of LS characteristics. Small gaps may be created based on forest health or other biological concerns. Size of openings and the salvage of old growth after catastrophic events would be identified through an interdisciplinary process. The overall assumption is that old growth will be retained or developed.

The presence, density, and distribution of old growth or late-successional dependent species would be dependent on the spatial arrangement of old growth across the AMA and which landscape design unit borders old growth. Where old growth is in a narrow configuration bordered by managed mosaic, for example, we would assume only small home range late-successional species would be supported in this patch type. However, large home range species may travel or disperse through this configuration but all of their life's needs would not be met.

Where the old growth design results in larger blocks of consolidated, interior habitat, we could assume large home range late-successional species would be able to persist through time. If old growth is adjacent to habitat development stands, this would effectively increase the persistence level of large home range species since more habitat would be available.

Wildlife Learning Opportunities

1. Conduct research to determine the presence, density and range distribution of selected forest carnivores within the Cispus AMA. This could include the North American lynx, California wolverine, Pacific fisher, and American marten.

2. Mountain goats are an "emphasis" species in the Cispus AMA. Several management related questions and data gaps concerning goat habitat relationships have been identified for the AMA. Some of the potential learning opportunities are:

    - What are the home range habitat requirements for mountain goats in the AMA, including optimal cover, foraging areas, and specialized habitats such as mineral licks?
    - Do goats utilize traditional travel and migration routes, and if so, what are their habitat requirements for these corridors and travelways?
    - What is the population status of mountain goats in the AMA and is it increasing, stable, or decreasing over the short and long-terms?
    - What is the trend for natural meadows, which provide important foraging habitats, and how do trends relate to management (e.g. fire suppression)?
    - Are their distinct summer and winter ranges for goats in the AMA, or should goat habitat be managed as one inclusive range?
    - Do regeneration timber harvest units supply foraging habitat for mountain goats?
    - Can commercial thinning of mid-seral forests be used to improve goat thermal cover habitat?
    - To what extent do goats in the AMA mix and interact with animals from the Goat Rocks Wilderness and other areas on the forest?
    - Is competition with other ungulates, specifically elk, affecting mountain goats in the area?

3. The lack of effectiveness monitoring of created snags and documentation has restricted knowledge and information on the success of the wildlife tree program for cavity nester species. A research proposal could be designed and implemented if a funding source could be secured.

4. Study the population response of deer and elk populations to management prescriptions proposed by the landscape design..

Other learning opportunities were listed under the AMA strategies, those specifically relating to wildlife can be found under the strategies titled "Late-Successional Interior Habitat Stands", "Timber Harvest/Wildlife Relationships", and "Wildlife Habitat Management".

The multiple thinning entry proposed for the landscape design provides several learning opportunities:

- How do various wildlife species respond to repeated thinning (e.g. neotropical or resident bird species, cavity excavator populations, big game populations)
- What is the most effective and economical harvest method and still be the least disruptive to wildlife (aerial harvest vs. new road construction)?

Wildlife Species and Habitat

Deer & Elk: In the short-term there would be little noticeable change in big game populations. Over the long-term, the majority of the winter range will likely develop into late-successional or old growth habitat. There may be no harvest proposed in the old growth design unit and limited small regeneration openings in the habitat development design unit. This will likely reduce the number of animals surviving on the winter ranges as compared to current levels.

Early-Successional Species (mountain bluebirds, MacGillivray warblers, Lazuli buntings, white-crowned sparrows, and pocket gophers): This group of species will be confined to natural mosaic lands and where timber harvest is scheduled to occur. Across the AMA, there will be well distributed, large blocks of early-seral habitat in the managed mosaic design unit. Small scale openings will also be present in the managed habitat design units primarily located in the southern two thirds of the AMA.

Mountain Goats: Mountain goat habitat will be enhanced as the majority of the goat habitat is in an old growth allocation. Old growth stands will provide winter maintenance forage as well buffering the effects of extreme weather conditions. Management and enhancement of natural meadows plus avalanche chutes, rock outcrops would provide a forage base for the goat population.

Reference Section E

Recreation

Recreational Experiences, Opportunities and Benefits

The objective for "high quality recreation", in the context of resource management, may be measured by examining both the number of recreationists served and diversity of recreational opportunities. While "quality" is directly influenced by the level of management (i.e. the investment of money and resources), different activities cannot be compared as being of higher or lower quality. For example, trail hiking is not considered higher or lower quality than fishing.

The nature and diversity of recreational opportunities are described with reference to the Recreational Opportunity Spectrum (ROS). The ROS is a system for characterizing recreational experiences into a range of classes, from highly developed, urban settings through intensively managed forest settings to very primitive, undeveloped settings. It includes considerations such as the number of social encounters, facility development, and management controls. For the most part, vegetative condition, visual character, and the suitability for developed or motorized uses are key considerations.

The following descriptions are intended to be representative of a general range of recreational opportunities and experiences. They are based on the general descriptions of the vegetative character and management objectives associated with each landscape design unit. They are not prescriptive or restrictive. Some kinds of recreation may be possible within each LDU that are not discussed or emphasized in this description. These descriptions are designed to be used as a basis for comparing and contrasting management options, not as a comprehensive description of all possible recreation opportunities.

Old Growth

Old growth stands provide an environment that is typically dark, cool, quiet, and impenetrable to a degree. Use for many recreational purposes generally requires developed facilities such as trails, campgrounds, or roads. People use these facilities to, ideally, experience the quiet, solitude, and natural diversity adjacent to the facility they use. An exception is when such areas are used for activities such as nature study, photography, berry or mushroom picking, or hunting where traveling around and through the dense mixture of trees, shrubs, etc. is a desirable or necessary part of the experience.

Recreational use of developed sites such as campgrounds and trails may be relatively sedate or it may be loud and out of character to the old growth forest by virtue of the access and convenience provided by developed facilities. However, the old growth character provides a very desirable environment and backdrop for many recreational activities.

Clearcuts or thinnings within old growth stands, while they compromise old growth values, may provide a welcome change in recreational character, providing a more diverse overall character,

vistas, or enhanced hunting opportunities. Managed conditions, which detract from the natural old growth environment, may in moderation make possible a broader range of recreational experiences associated with old growth.

Old Growth areas can provide opportunities for experiences in the full range of ROS classes, including campgrounds which fall into the Roaded Natural or Roaded Modifed classes. However, they may be most suited, and make their greatest contribution, to activities in the Semi-Primitive class, which provides for more rustic facilities, or none at all, and fewer social encounters.

Managed Mosaic

Managed Mosaic is a landscape where a variety of recreational, forest product harvest, and commercial timber activities take place. It is managed for human benefits and uses, with well established roads, potentially heavy traffic, and evidence of consumptive resource uses.

This kind of area typically may be a transition zone for recreation use, providing a travel corridor between urban and rural areas to more primitive or natural-appearing destinations preferred by many recreationists. It can also be more suitable for some forms of recreation which may sometimes be less appropriate for more natural-appearing areas, including motorized recreation and larger group events.

Developments such as campgrounds would need substantial protection, but do offer the advantages of managed stands, good access, some concessions to fire protection, etc. which facilitate efficient management of campgrounds and areas of concentrated use. The impacts of such uses may be more in keeping with this unit than others due to the acceptance of human impacts. The managed mosaic may also provide preferred hunting areas due to the presence of diverse seral stages, forage, and more open hunting conditions.

Managed mosaic areas will typically fall into the Roaded Modified ROS class as a whole. This class provides for a higher density of roads, more intense recreation use, larger numbers, more modification, facilities designed for comfort and convenience, etc. In general, uses tend to be on the more consumptive, more developed, technology-assisted end of the spectrum. Recreational activities may not be forest-dependent but are enhanced by the forest environment.

Natural Mosaic

Natural mosaic areas tend to be high elevation areas, relatively fragile, with short growing seasons, harsh environments, open vistas, and geologic and biologic characteristics that are attractive to many. Generally, access is limited, with trails being the most common mode of access, although some such areas are accessible by road.

This area provides an attractive destination for many recreational activities, such as berry picking, hiking, hunting, rock climbing, camping, and horseback riding. Some motorized trails may extend into this zone and some areas are suitable for development of smaller, more primitive campgrounds. Because of the fragility of the environment, it is most suited to low intensity uses, lower development, and uses that are compatible with protecting the flora and fauna either by virtue of their nature or low frequency of use.

The Natural Mosaic is most closely associated with the Roaded Natural, Semi-primitive and Primitive parts of the ROS spectrum. Development level is low and typically rustic, social encounters are low, and visitor controls are infrequent.

Lodgepole

The lodgepole unit is very similar to the Natural Mosaic unit in character but is dominated by lodgepole pine and mountain hemlock due to fire history or other broad-scale vegetative influences. It supports a very similar range of recreation activities and experiences.

Managed Habitat

The natural character and diversity of this unit provides for an attractive environment for most kinds of recreational activity. Changing landscapes of vistas, small natural or man-made openings, different seral stages, etc. combine to offer opportunities for a variety of recreational activities throughout the range of development and use intensity covered by the ROS spectrum.

The emphasis on wildlife habitat values in this unit would suggest compatible recreational activities that are smaller in scope and development. Travel through the unit to other destinations, scenic viewpoints, driving for pleasure, and hunting are appropriate recreation opportunities. Some trails may traverse such an area, including portions of motorized trails, and small scale developed and dispersed camping in some locations may be acceptable. However, high levels of use, whether by motorized trail users or campers in concentrated areas, may tend to compromise the habit values and objectives in some cases. This unit, with its objectives for habitat management, is most suited to provide recreational opportunities in the Semi-primitive or Roaded Natural ROS classes.

Habitat Development

This unit is very similar in characteristics and management objectives to Managed Habitat, with the exception that it includes mountain goat winter range, provides for increased connectivity between late-successional reserves, and follows more specific guidelines for stand composition.

Recreational opportunities are similar, with more of an emphasis on non-motorized uses, more limited development, and less intense use. This unit would typically provide recreation opportunities and experiences included in the Semi-primitive Non-motorized and Primitive ROS classes, although some motorized use may occur on roads within the areas and meet standards for Semi-primitive Motorized.

Recreation Experiences, Opportunities, and Benefits

How recreation opportunities are described

The following are descriptions of recreation opportunities and experiences provided by, favored by, or most compatible with the landscape design. They are generalizations determined by the management objectives or characteristics and the extent and distribution of each of the landscape design units.

The tremendous variety of conditions within the AMA and site-specific objectives that may be appropriate prohibits site specific description of all potential recreation opportunities. The following descriptions are intended to be representative of a general range of recreation opportunities and experiences. Recreation management priorities and available funding will play a major role in determining what activities will receive priority for additional administrative or development effort.

A range of vegetative conditions might support a broad range of recreational activities. However, the focus is on "conservation" or protection of flora and fauna, including direction to emphasize recreation in primitive and undeveloped sites where protecting natural scenic and environmental conditions would be assured. With minor exceptions, most recreation opportunities would be dispersed and non-motorized in nature. Non-motorized trails would be the primary recreation developments. Restrictions on activities and numbers of recreationists to protect resources would be expected.

The specific management objective of limiting recreation management to "minimum impact recreation", while providing for valuable, desirable recreation opportunities in the Semi-primitive and Primitive ROS classes, tends to limit or prohibit forms of recreation requiring greater development, motorized use, large numbers, wildlife disturbance, or other resource impacts.

Learning Opportunities

An emphasis on minimum impact recreation provides for learning opportunities concerning:

- public acceptance of restricted activity on large tracts of non-Wilderness NF lands.
- the interaction of recreationists and wildlife.
- effects of displacement of recreationists to other forest areas due to limitations on recreation uses
- the range of recreation activities adaptable to a "minimum impact" objective.
- how to modify traditionally more impacting recreation activities to meet a "minimum impact" standard.

Reference Section F

Aquatic Resource Restoration Techniques

The following discussion is on the general treatments that are used in restoring the aquatics resources. This should not be considered a complete list of techniques because of continuously improving technology and the need to apply unique solutions to complex problems.

Current Condition of River Ecosystems in AMA

Several streams and small watersheds within the Adaptive Management Area are currently experiencing stream health or watershed health problems. Typical examples are increased sediment delivery to streams through road failures (ie. landslides) and road erosion, stream temperature problems, peak flow problems, channel condition problems (lack of pools and large woody debris for fish, excessive stream bank erosion) and poor riparian area conditions. These problems can be chronic or short lived. Opportunities exist throughout the AMA to use restoration techniques to speed up natural processes in dealing with these problems to achieve healthier conditions.

Descriptions of Restoration Treatments

- Road Decommissioning - This typically involves pulling culverts, removing road fill from over-steepened road shoulders and decompacting the road surface. The road is closed and put in an undrivable condition. Vegetation is planted immediately on disturbed soils. The purpose of road decommissioning is to deter mass wasting by preventing culverts from washing out and landslides from occurring through road fill failures, improving peak flow problems (though decompacting road surfaces) and minimizing sediment movement and turbidity problems in the short term (through planting vegetation).

- Road Weatherization - This mainly involves removing road fill from over steepened road shoulders and correcting drainage problems along a road. The road is left open in a driveable condition because of people needing access to the area. The purpose is similar to road decommissioning in preventing sediment from being delivered to the stream.

- Riparian Planting - This is the process of planting trees or other vegetation within the riparian area. The reasons for doing riparian planting vary on the condition and the desired out come. Some riparian areas in the past have been clear-cut or have thin riparian buffer widths that have been blown down and may be effecting stream temperatures. Other conditions exist such as soil instability which need root strength and vegetative cover to help hold soils in place. Other reasons for doing riparian planting is to meet certain silvicultural conditions, wildlife conditions or to promote plant diversity.

- Riparian Thinning - This method takes an existing stand of trees and thins them out allowing for more sunlight to get to the forest floor. By thinning in riparian areas, remaining trees will grow faster and larger. In the long run, this will promote large woody debris recruitment into the streams more quickly. There are also wildlife and silvicultural related benefits to riparian thinning.

- Stream Restoration - This typically involves placing large wood or large boulders strategically in a stream to improve fish habitat conditions. This would be done to promote habitat complexity and structure within a stream. Stream restoration techniques could also be used to improve stream bank erosion or other hydrologically based problems.

- Erosion Control - These projects are directed at erosion, sedimentation and instability problems upslope of streams or roads. Typically, vegetation is planted or erosion control blankets or other structures are installed to eliminate the problem or slow the process. A typical project is stabilizing a landslide.

Reference Section G

Aquatic Conservation Strategy Objectives

The Aquatic Conservation Strategy was developed to restore and maintain the ecological health of water-sheds and aquatic ecosystems contained on public lands. Forest Service and BLM administered lands within the range of the northern spotted owl will be managed to meet the following objectives (ROD p B-11):

1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure the protection of the aquatic systems to which species, populations and communities are uniquely adapted.
2. Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include flood plains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.
3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.
4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.
5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.
6. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.
7. Maintain and restore the timing, variability, and duration of flood plain inundation and water table elevation in meadows and wetlands.
8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.
9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.

Current Conditions

The landscape design will attain and/or maintain ACS objectives. The goal of maintaining healthy riparian areas can be discussed in terms of specific Aquatic Conservation Strategy objectives. These objectives were analyzed through two watershed analyses done on the Cispus and North Fork Cispus drainages. There are currently areas of concern within the AMA which were identified in the watershed analyses. The following are general descriptions, which can change within this complex and dynamic system. More detailed descriptions and specific locations are listed in the Recommendations to the Pilot Watershed Analysis, 1994.

Sections of stream that are currently in poor condition lack habitat complexity, such as pools and large woody debris, or have gone subsurface, physically cutting off upstream areas from downstream. Stream restoration efforts or major flood events can often improve areas in poor condition. Over the long term, woody debris recruitment will increase as riparian areas mature and develop late seral qualities. As the large wood is incorporated into the streams over time, physical integrity and habitat complexity will increase.

Sections of stream that are currently experiencing temperature concerns will continue to have problems in the short term. Over time, the riparian reserves that are now in an early seral condition will grow and help shade these areas. Other temperature problems caused indirectly by the influx of sediment, through decreasing channel depth and increasing channel width, will slowly recover as sediment input decreases through restoration and stabilization efforts.

When floods and storm events challenge the watershed, elevated levels of sediment will be delivered at some level to the stream systems. As road restoration and maintenance efforts continue, sediment levels will decline. Response reaches, segments of stream that accumulate sediment, may take 20 to 30 years to “flush out” as sediment levels return to natural ranges.

Areas within the AMA that are experiencing peakflow problems will, over the long term, continue to improve as harvest units grow and become hydrologically mature. Roads that are decommissioned or weatherized in the future will also improve peakflow conditions.

Reference Section H

Fire Ecology and Management within the Cispus AMA

In Adaptive Management Areas, fire managers are encouraged to actively explore and support opportunities to research the role and effects of fire management on ecosystem functions. Cooperation across agency and ownership boundaries should be emphasized. The standards and guidelines in current plans and draft plan preferred alternatives for hazard reduction should be followed until approved Adaptive Management Area plans are established. Fire Management experts will participate on the local Interdisciplinary Technical Advisory Panel on all Adaptive Management Areas, Management of Adaptive Management Areas is intended to be innovative and experimental. Wildfire suppression actions, however, should use accepted strategies and tactics, and conform with specific agency policy. (ROD p. D-8)

Fire has historically been a major disturbance factor in the Cispus AMA. Fire history determined by stand year of origin for the Upper and Middle Cispus, and Middle Cowlitz Watershed Analysis indicates that most of the area burned at least once since 1700. Wildfires were frequent until about the 1930's when suppression efforts became more effective. The name "Cispus" is a name of American Indian origin meaning "vast burned over area" which would imply that the Cispus watershed had been burned many years before recorded history. For more information on fire and its effects on the ecosystem in the Cispus AMA, see Appendix P of the Middle and Upper Cowlitz Watershed Analysis.

To analyze the landscape design from the perspective of fire history, the Fire Groups from the Fire Ecology of the Mid-Columbia (Evers, 1994) were overlayed. This report summarizing the fire ecology and management information that applies to the Mt. Hood and Gifford Pinchot National Forests. This gave the number of acres of each Landscape Design Unit in each Fire Group. The fire rotation for each Fire Group was used to determine the range of variability for disturbance by fire in acres. This was compared to the proposed acres of regeneration harvest. Only regeneration harvest acres, not commercial thinning acres, are compared to the range of variability for disturbance by fire. Regeneration harvest, by setting a stand back to an early seral stage of development, may mimic the natural fire regime for the area of long return interval, stand replacement fires. Commercial thinning may mimic low to moderate intensity fires and their effects. The descriptions of the Fire Groups are presented later in this appendix.

It is important to remember that in fire regimes with long return interval, stand replacement fire events tend to be more episodic than cyclic. Under the right conditions of fuels, weather, and topography, and provided an ignition source, stand replacement fire events may occur, but at irregular intervals and within a wide range of stand ages. The numerical outputs of this analysis are more an indicator of possible trends than actual acres of natural disturbance expected in addition to regeneration harvests.

Table F-1 is based on 600-year stand replacement in Fire Group Six, 300-year stand replacement in Fire Group Seven, and 400-year stand replacement in Fire Group Eight and Nine. Historical vegetation patterns, with stand age, species composition, patch size distribution, and connectivity

may be a better indication of whether an ecosystem is within the range of natural variability. Our ability to determine historic vegetation conditions is also limited.

Table F-1: Acres per Decade of Natural Disturbance in Excess of Regeneration Harvest						
Lodgepole	Managed Mosaic	Natural Mosaic	Old Growth	Managed Habitat	Habitat Development	Total
318	*	579	1,114	*	25	2,066

* within the range of variability for natural disturbance

Proposed management is by natural fire and prescribed fire for habitat enhancement projects (i.e. huckleberry, wildlife enhancement), and prescribed burns for the control of natural fires.

It may not be possible to implement prescribed fire without some mechanical vegetation manipulation to create a fuel bed for projects such as restoring meadows, huckleberries, or creating fuel breaks. Mechanical vegetative manipulation may be a better option than prescribed fire. This would have to be considered during project design.

There may be no scheduled harvest in Old Growth or Riparian Reserves. The assumption is natural fire will act as the primary disturbance agent. Old Growth appears to be well distributed across the landscape, making it less likely that large amounts will be lost at one time due to fire.

Less than 20 acre harvest openings are proposed in Managed Habitat and Habitat Development, with prescribed fire/fuel treatment used, as determined appropriate during project design. Fuel treatment, if needed, may be very expensive in small openings, particularly if helicopter logged, providing limited access and options for treatment.

A reduced road density is proposed in all landscape design units except Natural Mosaic and Lodgepole. While the cost of maintaining roads is probably not justified for fire suppression, limiting access may limit suppression capability.

Natural fire is a consideration in landscape design. Fuels, weather, and topography control fire behavior. Fuels are the only element we can choose to manipulate to reduce the risk of fire spread, while maintaining desired amounts of course woody debris and snags. Therefore, a design with more suitable acres for harvest may be more resistant to natural fire events than a design with less suitable acres.

There is currently no direction to allow natural fires. Fires will be suppressed at minimum cost consistent with land and resource management objectives and fire management direction as stated in current fire management action plans. Wildfire shall not be used to accomplish resource management objectives. A fire management plan will be developed for natural and prescribed fire for the desired option.

Description of Fire Groups

Twelve Fire Groups were developed based on vegetation, its response to fire, and successional pathways as described in Fire Ecology of the Mid-Columbia (Evars 1994) for the Mt. Hood and Gifford Pinchot National Forests. Because differences in fire behavior and successional pathways can result from small differences in fuel, temperature, moisture, sunlight, topography, and seed availability, it is possible for stands in the same plant association to be described by different Fire Groups. A summary of each of the four Fire Groups in the Cispus AMA follows. It is important to remember that these are descriptions of fire and the role that it plays within the particular Fire Group and not meant to be a description of the current condition of the area.

Fire Group Six: Cool, Moist Lower Subalpine

Fire Group Six occurs on cooler sites at a mix of higher and mid-elevation sites west of the Cascade crest. It occurs along *Juniper Ridge* in the Cispus AMA.

The typical environment includes heavy snowpacks, short growing seasons, frequent frost, and cold, moist soils. Soils are generally rocky compared to other soils in the Pacific silver fir and western hemlock zones.

Vegetation: Fire Group Six contains a diverse overstory. Species present may include western white pine, Douglas-fir, Englemann spruce, mountain hemlock, noble fir, and Pacific silver fir. Understory trees consist primarily of Pacific silver fir, western hemlock, and mountain hemlock. Pacific silver fir, western hemlock, and mountain hemlock dominate the overstory in older stands, but Douglas-fir, noble fir, and Englemann spruce also occur in significant amounts. Subalpine fir may be common in stands on the Gifford Pinchot. As elevation increases and conditions become colder, mountain hemlock seedlings become common in the understory, but Pacific silver fir remains the most prominent regenerating species.

Shrubs constitute 50% cover or more in the understory. Typical species present include several species of huckleberries, fool's huckleberry, rhododendron, Cascades azalea, dwarf bramble, dwarf Oregon grape, and prince's pine. On the north end of the Gifford Pinchot, forbs can cover 35% or more of the understory. The dominant species include beargrass, bunchberry, queencup beadlily, and sidebels pyrota.

Forest Fuels: Most nutrients are tied up in the deep duff and litter layer. Most downed woody fuel loading is the greater than 3" diameter class. Associations in Fire Group Six are warm enough that most smaller dead woody fuel decays almost as rapidly as it accumulates until later in the successional pathway. The abundant shrubs provide a very large heat sink under normal conditions, greatly reducing the rate of fire spread. During prolonged drought, the shrubs and forbs can provide a significant fuel load.

Much of the large woody fuel tends to be rotten. The higher moisture holding capacity of these rotten logs also reduces fire risk through much of the year. However, once this fuel dries out, severe soil damage from prolonged heating may result if it burns. Once the canopy begins to break up due to other factors, such as insects and disease, an understory of conifer regeneration may develop. This understory, combined with the high levels of moss hanging from the boles, allows crown fires to develop and spread.

Role of Fire: Fire history information for higher elevation forests is scarce. Ecology plot data suggests a fire return interval of 170-430 years. Fire would prepare a mineral seedbed, increase scenic and wildlife habitat diversity through creation of mosaics, and rejuvenate the shrubs.

Current Fire Behavior: Current evidence on the Mt. Hood National Forest suggests that Fire Group Six experiences high intensity stand-replacing fires almost exclusively. Recent fires on the Gifford Pinchot have tended to burn through the crowns with relatively limited surface fire. Aerial fuels, such as moss and lichens, have been the main carriers of the fire, since downed woody fuels are relatively light. In most cases, these fires would not have spread as they did without strong, gusty winds which cause the fires to "flash through the crowns" in a matter of minutes. Once the winds died down, burning became limited to snags and larger surface fuels.

Past Fire Behavior: Fire exclusion probably has not altered the typical fuel loadings and fire behavior. The heavy shrub loadings still served as a heat sink, preventing the start and spread of most fires during average burning conditions. As with Fire Group Eight, this group may become susceptible to high intensity fires on a 30 year cycle of prolonged drought combined with high winds. The lack of continuous fine fuels would have greatly reduced the risk throughout much of the stand history. Small fires may have started and spread by torching and spotting. Most fires would have smoldered for several days to several weeks. Larger fires may have developed if a small fire lasted until late summer or early fall and dry east winds fanned the flames into a higher intensity fire. The Two Lakes, or Hamilton, Fire north of Mt. Adams (1918) and the Cispus Fires of 1902 and 1918 are examples of high intensity, wind-driven crown fires which originated in adjacent stands with heavier fuel loadings.

Generalized Forest Succession: The theoretical climax in Fire Group Six consists of all-aged stands of either Pacific silver fir or mountain hemlock. The climax condition takes such a long time to develop that it is rarely found. The near-climax condition is not uncommon.

Following a stand replacing fire, shrubs and forbs will dominate until seedlings become established. A variety of species may establish, such as western white pine, Douglas-fir, noble fir, and Englemann spruce. A fire at this stage is highly unlikely, should one occur the site would return to the shrub/forb stage.

The faster growing seral species will dominate the pole-sized stands. If a seed source is available, such species as Pacific silver fir, mountain hemlock, and western hemlock may appear and noble fir become more numerous. A fire at this stage is also highly unlikely. A low intensity fire would thin the stand, remove the regeneration of more fire sensitive species, such as hemlocks and true firs, and favor the more fire-resistant species, such s Douglas-fir.

Over a very long period of time a climax forest of mountain hemlock or Pacific silver fir would develop. Low to moderate intensity fires would perpetuate the climax stand conditions while a high intensity fire would replace the stand. If lodgepole pine were eliminated from the stand before the next fire,, then the next successional pathways would follow those discussed in Fire Group Six.

Fire Group Seven: Cool Associations Often Dominated By Lodgepole Pine

Fire Group Seven occurs on higher elevation plateaus subject to frost primarily on the south end of the Mt. Hood and the north and east edges of the Gifford Pinchot National Forest. It occurs on the *eastern edge of the Cispus AMA*.

Most stands occur in the mountain hemlock zone although some stands appear to fall within the Pacific silver fir zone.

Vegetation: Generally, lodgepole pine comprises over 50% of the overstory. Other species that may be present include western white pine, subalpine fir, noble fir, Douglas-fir, Englemann spruce, western hemlock, mountain hemlock, and Pacific silver fir. Huckleberries and beargrass dominate the understory vegetation, although trace amounts of other species typical of cold moist conditions are present. Sites within this group lie within the subalpine zone on severe sites (frost pockets) or poor soils (course-textured or very thin). Some sites may occur in areas with fluctuating water tables, such that soils are saturated in the spring and very dry by fall.

Forest Fuels: Low productivity characterizes Group Seven stands. These sites generally do not produce very heavy downed woody loadings or deep duff. Fuel loadings increase when the overstory of lodgepole breaks up from disease related mortality and snow breakage. When fuel loadings do build up, fire can burn very rapidly through the area under dry conditions. Wildfire risk also increases when the climax species invade the understory and provide a fuel ladder into the overstory. However, these stands would tend to burn and replace themselves before mountain hemlock or Pacific silver fir takes over.

Role of Fire: Fire serves to perpetuate the dominance of lodgepole in these stands. Without periodic disturbance, mountain hemlock or Pacific silver fir would eventually replace the lodgepole pine. Lodgepole pine does not regenerate well in duff or shade. Once the lodgepole pine stand is established, conditions do not favor rapid fire spread or uniform burning except under extreme conditions.

Large, stand replacing fires probably burn every 100-300 years. Occasional low to moderate intensity fires may thin the stands or otherwise rejuvenate it without doing serious damage to large areas of the overstory. Fuel buildup tends to start about age 60 to 80 due to natural thinning, snow breakage, and disease. Eventually a fire will start, escape initial attack, and become large. Most of the known area of Fire Group Seven lies in the region of highest lightning occurrence. These areas also experience the combination of prolonged drought and high winds on a 30 year basis (see Fire Group Eight).

Current Fire Behavior: Most current stands that have not been harvested support generally light fuel loadings. Those that have been cut and not treated have variable fuel loadings and could support a low to moderate intensity fire.

The example of Fire Group Seven north of Mt. Adams is about 75 years old, but with light fuel loadings. The present surface fuels would not readily carry a fire, lacking both duff and 0-3 inch size classes of downed woody fuels. This condition is the result of the 1980 eruption of Mt. St. Helens. The area was covered with enough ash to bury the previous fuel layer. The stand is infected with a gall rust an does appear to be breaking up. However, the resulting fuel loadings will likely contain a high percentage of larger fuels exceeding three inches in diameter and a patchy, rather than continuos, fuel arrangement. What effects this condition will have on probable fire behavior and successional pathways is unknown.

Past Fire Behavior: Fire exclusion does not appear to have altered successional patterns and potential fire behavior. Timber harvesting may have reduced the risk of large wildfires in some areas by reducing stand densities and breaking fuel continuity.

Many of the areas containing Fire Group Seven last burned around the turn of the century. Many of the burns were very severe. Leve (1921) reports the area north of Mt. Adams experienced some level of fire in 1870, 1892, 1902, 1918, and 1919. Native peoples probably burned parts of this same area prior to white settlement to perpetuate huckleberry fields and enhance wildlife habitat.

Generalized Forest Succession: Information for this discussion comes from Bradley and Fisher (1987) and the pathway shown for seral lodgepole pine. Fire Group Seven is very limited in distribution and much of the area burned around 1900 (1870-1920). Since so much of the area falls within the same general age class, little information exists on the possible pathways for this fire group.

Leve's report (1921) contains the only known descriptions of forest conditions following fire within Fire Group Seven in the mid-Columbia. He noted "alpine fir", noble fir, Douglas-fir, lodgepole pine, western white pine, whitebark pine, Englemann spruce, mountain hemlock, "western yellow pine", and "Alaska cedar" within the burn areas he described. In addition, "lodgepole pine and Englemann spruce are the only species remaining where repeated fires have been through" (Leve 1921). The ground cover was mostly grasses with little or no brush.

Following a stand replacing fire, shrubs and forbs dominate for a short period of time. Lodgepole seedlings quickly establish and overtop the undergrowth. Any fire at this stage would return the site to the herb/shrub stage. Recurring fire would keep the site at that stage. However, the probability of a fire at either stage is low.

Fire might burn when the lodgepole stand reaches the pole, or stem exclusion, stage. A low to moderate intensity fire would thin the stand while a moderate to high intensity fire would replace it. Because pole-sized lodgepole contains some serotinous cones, periodic fire at this stage can create a fire maintained lodgepole pine stand that lacks other conifer species. Similar effects occur with the same scenario in a mature lodgepole pine stand.

Once the canopy becomes broken and other conifer species dominate the understory, a low to moderate intensity fire would further reduce the overstory and remove the other species in the understory, creating an open lodgepole pine stand over lodgepole pine and other conifer species regeneration. Additional low to moderate intensity fires would tend to maintain the lodgepole pine while reducing the presence of other conifers.

Over a very long period of time without fire, a climax forest of mountain hemlock or Pacific silver fir would develop. Low to moderate fires would perpetuate the climax stand conditions while a high intensity fire would replace the stand. If lodgepole pine were eliminated from the stand before the next fire, then the next successional pathways would follow those discussed in either Fire Group Five or Six.

Fire Group Eight: Warm Moist Western Hemlock and Pacific Silver Fir

Fire Group Eight includes most of the western hemlock and Pacific silver fir plant associations found in the Mid-Columbia. As such, it includes a wide range of topographic positions, moisture regimes, and temperature regimes. In general, the plan associations reflect a warm, moist climate to the west, gradually shifting to a cooler and drier climate to the east. Fire Group Eight includes *most of the area in the Cispus AMA excluding the valley bottoms of the Cispus River and North Fork Cispus River, the Lodgepole area in the southeast portion of the planning area, and a small area on Juniper Ridge.*

Vegetation: Three conifer species, Douglas-fir, western hemlock, and western red cedar, tend to dominate the overstory in the western hemlock zone. The Pacific silver zone includes a wider variety of overstory species, including noble fir, western white pine, Englemann spruce, and mountain hemlock. Other species present may include grand fir, white fir, Pacific yew, red alder, and bigleaf maple. Understory trees consist mostly of Pacific yew, western hemlock, Pacific silver fir, and western red cedar. The wettest sites often have open canopies and multi-stories stands.

Shrubs tend to dominate the understory in some associations.

Devil's club and skunk cabbage indicate very wet sites that tend to halt or greatly slow the spread of surface fires in most years. Standing water year-round is not uncommon in these locations. Generally moist-site indicator forbs, such as vanilla leaf, trillium, oxalis, fairy bells, and queencup beadlily dominate the herb layer. Drier site indicator species, such as bigleaf sandwort, white hawkweed, pathfinder, and starflower, may also grow in some associations.

Forest Fuels: This fire group generally lacks fine fuels through most of the stand history. The sites containing devil's club and skunk cabbage may have very heavy fuel buildups, but the presence of water keep these fuels too moist to burn readily and facilitates relatively rapid decay. "Classic" old growth stand conditions, closed canopy overstory of large diameter trees over a lush understory, are common in undisturbed areas, indicating infrequent disturbance.

Fuel loadings in Fire Group Eight build rapidly once the overstory begins to die from insect and disease attack and the canopy breaks up. Conditions become drier in these canopy gaps and can easily provide a suitable fuel bed for fire starts.

Deep duff and large logs are typical of this group. The resulting wildfire hazard is usually low to moderate, depending on weather conditions in a given year and on whether extensive canopy gaps have begun to develop. Most years the associations in this group are well watered and slow to dry. Once the duff dries, it will carry fire. Prolonged smoldering in deep duff and punky logs can cause sever soil damage.

On the Gifford Pinchot National Forest, the 0-3 inch diameter fuel loadings range from 1.4 to 5.0 tons per acre with two most common groups averaging around 3.6 to 3.7 tons per acre (Topic et al. 1986).

Role of Fire: Prolonged drought (drought lasting 3 years) dries the forest floor enough to allow fires to start and spread. Smoldering combustion and creeping rates-of-spread are most common until dry east winds fan the flames into a much higher intensity fire. Fire frequencies averaged 50-200+ years in western hemlock associations and 170-300 years in Pacific silver fir associations. Average fire return intervals in sites with devil's club and skunk cabbage may easily exceed 300 years.

Fire in this group serves to prepare mineral soil seedbeds, produces a mosaic of stand structures and age classes across the landscape, and affects within-stand species diversity. Fire history maps and recent wildfires suggest that most fires are either very small (less than 10 acres), or very large (greater than 1000 acres). Mid-sized fires are not unknown, but appear to depend on a combination of dry conditions and light to moderate winds.

Conditions which result in large fires, prolonged drought and strong east winds, occur approximately every 30 years, based on fire history studies of the forest and similar locations in the Region (Pyne 1982). Big fire years occurred on the Mt. Hood and Gifford Pinchot National Forests in 1902, 1933, 1967, and 1991 primarily within this fire group and Fire Group Six.

Current Fire Behavior: Under current stand conditions, stand replacing fire will dominate during large fires. Most of the active burning occurs during one burning period (one day), although it can occur over several burning periods. Low rates-of-spread and fireline intensities dominated by prolonged smoldering can create a high severity burn. High intensity fires depend on extreme winds, prolonged drought, or both. The highest fire danger occurs from mid-September through October.

Past Fire Behavior: Prior to white settlement, typical fire behavior may have been slightly different. Most fires would have burned for several weeks to a couple of months. Prolonged smoldering coupled with small crown fire runs would have created more mid-sized fires and more of a mosaic of stand conditions across the landscape. If a fire lasted until mid-September to October, then strong east winds could have created a large, fast-moving, high intensity fire. Underburning may have been somewhat more common, although the change from past to present in typical fire behavior is probably not as extreme as in Fire Groups One, Two, and Three. Topography may have exerted a stronger influence over fire size and shape than at present, at least in steeper, broken ground.

Generalized Forest Succession: The theoretical climax in Fire Group Eight consists of all-aged stands of western hemlock, western red cedar, or Pacific silver fir.

In general, a high intensity fire at any stage of stand development probably sets the site back to the shrub/herb dominated stage of stand development. Some shrubfields may last many decades before conifers can reestablish. The next stage consists of stand initiation dominated by Douglas-fir seedlings and saplings. If no fires burn, the stand will eventually develop through the stem exclusion phase, stem reinitiation phase, and old growth phase.

In the stem exclusion phase (pole sized Douglas-fir dominated) a low intensity fire would tend to thin out the understory. Afterwards, if fire is absent, the stand will eventually develop into a two-storied stand with Douglas-fir in the overstory and a mix of Douglas-fir and western hemlock in the understory. In the continued absence of fire, that stand will grow into a multi-storied stand of mature Douglas-fir and western hemlock and rejoin the main successional pathway. Low to moderate intensity fires will tend to keep the understory open and prevent development of a multi-storied stand.

A moderate intensity fire in the stem exclusion stage will thin both the understory and overstory. Afterwards, if fire is absent, it will develop into a two-storied stand dominated by Douglas-fir in both the overstory and understory. In turn, this stand becomes a multi-storied stand with Douglas-fir in the upper and middle layers and western hemlock in all layers. A low intensity fire would keep western hemlock at greatly reduced numbers and favor a two-storied or multi-storied stand dominated by Douglas-fir. Moderate intensity fire would tend to back the stand up one level in the successional pathway.

A low intensity fire in a closed canopy, two-storied stand with Douglas-fir in the overstory and western hemlock in the understory will tend to perpetuate that condition. A moderate intensity fire at the same stage would create a mosaic forest through a mix of crown fire and underburning. This mosaic would tend to develop as a two-storied stand dominated by Douglas-fir in both layers.

Low to moderate intensity fires in multi-storied stands with Douglas-fir and western hemlock in all layers would tend to perpetuate that condition. An old growth stand dominated by western hemlock can tolerate low intensity fire and maintain that condition, but moderate or high intensity fire would tend to create an opening dominated by shrubs and herbs.

Throughout these successional pathways, the probability of low and moderate intensity fire in the stand initiation and stem exclusion phases is very low, due to the lack of available fuel. Low to moderate intensity fires are possible once the stand reaches the stem reinitiation stage.

Fire Group Nine: Dry Western Hemlock and Westside Douglas-fir

Group Nine consists of dry western hemlock plant associations where Douglas-fir is the major seral species with a grassy or brushy understory. Douglas-fir is co-climax with western hemlock in two associations found on the driest sites. Fire Group Nine is found in the *Cispus River and North Fork Cispus River valley bottoms, and along the northwest edge of the Cispus AMA in the Cowlitz River valley.*

Three conifers and two hardwoods tend to dominate the overstory within this fire group; Douglas-fir, western hemlock, western red cedar, bigleaf maple, and Oregon white oak. Western red cedar tends to grow primarily in draws and other locations with deeper soils that hold more moisture. Oregon white oak does not grow within Fire Group Nine on the Gifford Pinchot National Forest, Many sites have open canopies and a mix of grass and brush in the understory.

The most common shrub species in the understory indicate dry conditions for the Westside. Typical species include vine maple, dwarf Oregon grape, California hazel, red huckleberry, salal, baldhip rose, snowberry, and oceanspray. With the exception of red huckleberry and salal, the species are more typical of the Eastside than the Westside.

The typical forb species present also indicate dry conditions, although some species indicative of moister conditions occur. Dry site species such as bigleaf sandwort, white hawkweed, starflower, and pathfinder tend to dominate. Moist site indicators that may be present include such species as vanilla leaf, sword fern, twinflower, and trillium. Grasses such as beaded fescue are not uncommon and may dominate the rockier sites. Shrubs, rather than forbs, tend to dominate the most common Fire Group Nine associations found on the Gifford Pinchot National Forest.

Forest Fuels: The drier conditions in the understory an late in summer provides live fuel in the form of cured grasses and shrubs with fine twigs, such as creeping snowberry. In more open canopies, the crowns can reach closer to the ground, providing a ladder for fire to reach the canopy. Fuel loadings in this fire group are highly variable, depending on individual stand and site conditions. Generally, Fire Group Nine does not contain duff as deep as Fire Group Eight. However, large logs are common. Most sites in this fire group dry out sufficiently and contain enough fine fuels to carry fires in most years.

On the Gifford Pinchot National Forest, fine fuel loadings range from 2.2 to 4.0 tons per acre with a weighted average of 3.5 tons per acre. Fuel loadings for material larger than three inches in diameter show wide variability, ranging from a low of 2.5 tons per acre to 57 tons per acre (Topic et al. 1986).

Role of Fire: Conditions within this fire group are dry enough to allow fires to start and carry most years by late August. Fire in this group serves to prepare a mineral soil seedbed, resprout brush and hardwood, reduce heavier fuel loadings, and create a generally open canopy. In stands with more closed canopies, fire also serves to create more of a mosaic of stand ages across the landscape.

Frequent fires within Fire Group Nine would serve to maintain a relatively open canopy of Douglas-fir by killing fire susceptible conifer regeneration. In this scenario, fire frequency is largely determined by stand conditions. Infrequent fires allow Douglas-fir and western hemlock regeneration to establish and provide a fuel ladder into the canopy. Fire probably returned to Fire Group Nine communities every 25-150 years prior to 1900, depending on location. In order to maintain a grassy understory, fire would need to burn frequently. In more mesic sites, succession would have continued further before the next fire, and allowed for more closed canopies and a greater dominance by western hemlock.

Canopies within Fire Group Nine tend to be more closed on the Gifford Pinchot National Forest, suggesting a longer fire return interval. The frequency is probably closer to the upper end of the range, with reburns fairly common. Prior to 1900, this group may have contained considerably more brush, or even been brush dominated in some locations. Leve's (1921) notes following the 1902 and 1918 Cispus fires frequently describe extremely heavy brush regrowth.

Current Fire Behavior: Prolonged fire exclusion probably has allowed the development of denser stands than before white settlement. Stand replacing crown fires can develop and do not necessarily depend on the combination of prolonged drought and east wind conditions typical of Fire Group Eight. In the absence of east winds, topography and rockiness tend to control fire size and shape. In the presence of east winds, Fire Group Nine may no longer serve as a break in fuels for crown fire spread. Most often, low to moderate rates-of-spread and fireline intensities dominate fire behavior. Firefighting can be very difficult due to the steep rocky terrain typical of this group. Because Fire Group Nine is generally found on the lower 1/3 of the slope, fires starting within the group can potentially spread further before fuel conditions change. On the Gifford Pinchot National Forest, thick growth of salal and dwarf Oregon grape mixed with a lesser amount of grasses often significantly increases the fine fuels (litter), thereby enhancing rates-of-spread.

Past Fire Behavior: Prior to current policy of fire exclusion, Fire Group Nine may have burned relatively frequently. More grass and forbs and fewer shrubs would have dominated the understory. Under such conditions, most fires would have had low fireline intensities, resulting in nonlethal underburning as the dominant fire behavior.

The Cispus River valley was severely burned in 1902 and 1918. The first fire was human caused and the second fire was a reburn of the first caused by lightning. Fire spread in 1918 was mostly due to the high number of snags, which increased spotting into 16 years worth of brush.

Hemstrom and Franklin transected the 1885 Cowlitz River fire to check the regeneration spans of the early seral cohorts. Their study documented the Douglas-fir reestablishment phase still going

on more than 50 years after the burn. The long lasting regeneration phase was especially common to the "dry, open slopes" (Hemstrom and Franklin 1982). Plummer (1900) lists large fires in the Cowlitz drainage in 1885 which he stated were repeated burns of areas burned in 1841 and 1856. Hemstrom and Franklin (1982) determined that the 1885 fire burned nearly all of the upper Cowlitz River drainage and that widespread avalanches, dense stands of vine maple and Sitka alder, and harsh site conditions had virtually halted conifer regeneration in many places.

Generalized Forest Succession: The theoretical climax consists of either an open, all age stand if western hemlock and Douglas-fir in he western hemlock/Douglas-fir/oceanspray plant association, or an all aged stand of western hemlock in the other plant associations.

Following a stand replacing fire, shrubs, forbs, and grasses would dominate the site. Depending on location and the amount of rock, conifer seedlings will eventual establish at varying densities. Any hardwoods should resprout. Douglas-fir would dominate the conifer regeneration and an almost pure stand of Douglas-fir may develop.

In fully stocked stands, a low to moderate intensity fire at the sapling stage would open the stand, allow for new seedlings to establish, resprout the hardwoods and brush, and encourage grasses. Otherwise the stand will develop into poles and then into a mature stand of Douglas-fir forest. A low intensity fire at either the sapling or pole stage would maintain a nearly pure stand of Douglas-fir by removing any western hemlock regeneration that may have appeared. If the canopy becomes closed, certain hardwoods, such as Oregon white oak, will die out of the stand, as will many grasses and some forbs and shrubs.

A moderate intensity fire will also thin the overstory as well as removing any western hemlock regeneration. The canopy may open enough to rejuvenate some understory hardwoods, grasses, and shrubs and allow for Douglas-fir regeneration. In the absence of any fire throughout stand development, an all aged western hemlock stand will eventually replace the Douglas-fir stand. The mature Douglas-fir stand may persist for many decades to well over a century, depending on the dryness of the site. A high intensity fire in the pole and mature Douglas-fir stages, or a moderate to high intensity fire at the sapling and western hemlock stages will restart secondary succession at the grass/forb/shrub stage. If the stand is understocked, then an open Douglas-fir forest or woodland will develop. Shrubs and grasses will persist in the understory throughout stand development. Oregon white oak and other hardwoods would likely persist in the overstory. Low and moderate intensity fires would tend to perpetuate the pre-fire stand conditions by removing any other conifer regeneration and maintaining open stand conditions. Periodic burning would prepare seedbeds for Douglas-fir regeneration.

In the absence of fire, an open sapling stand would slowly develop into a two-storied stand with Douglas-fir in the overstory and Douglas-fir and western hemlock in the understory. A moderate intensity fire at that stage would remove the western hemlock, creating a nearly pure open stand of Douglas-fir. If the stand develops into a two-storied stand with both Douglas-fir and western hemlock in the overstory a moderate intensity fire would likely remove most of the western hemlock and some of the Douglas-fir, creating an open Douglas-fir stand. Without fire, these sites would develop into all aged western hemlock stands but with a more open or clumped stand structure. Grass and shrubs would remain in the understory throughout the successional cycle.

Description of Fuel Treatments

A number of fuel treatment options are available to the fire manager for treatment of fuels if risk assessments determine there is a need for hazard reduction, or to meet other resource management objectives such as wildlife, silviculture, botany, etc. Appropriate fuel treatments will be selected during the project planning process. Some of the fuel treatment options are described as follows:

Mechanical Treatment

Whole tree yard	do not sever the top of the tree from the bole, do not buck the tree in the woods.
Yard top with last log	tree may be bucked to acceptable log lengths. Top remains attached to the last log and is yarded to the landing.
Machine pile loader	fuels are piled with a loader. Leave course woody debris. Limited to gentle slopes and areas where compaction is not a problem.
Machine pile dozer	dozer piling is likely to result in excessive soil disturbance and its use is discouraged by Forest soil scientists. Avoid disturbing course woody debris.
Directional felling	trees are felled a certain direction to distribute fuel concentrations away from an area.
Chipping	residue is puled a specified distance from within a treated unit and chipped. Material may be sold or left on site. If left on site, it should be dispersed to avoid spontaneous combustion.
Stewardship contracts	contractor may remove felled saplings, and prune remaining saplings for bough usage.
Lop	cut felled stems into specified length to promote faster decay of limb and bole.
Lop and scatter	delimb remaining boles and scatter limbs to avoid creating fuel concentrations.

Close access to area until wildfire risk is reduced.

Prescribed Fire

Area Fire	use prescribed fire over an area to reduce fine fuels (0-3 inch material). Since this treatment may have short-term adverse impact on mycorrizal systems, invertebrates, and small mammal populations, consider use of a cool spring burn to lessen impacts and retain large course woody material.
Jackpot burning	burn only those areas where fuel concentrations occur, generally small pockets.
Handpile and burn	pile concentrations of fuel residues that are generally less than 6 inches in diameter and burn during a period that would minimize risk of escape or extensive spread between piles. Some piles may be left for wildlife habitat.
Pile burning	determine if mechanically treated piles need to be burned or if they present little risk if they remain on site.
Underburn	use a spring like underburn to reduce fine fuels and retain large course woody material.

Other Treatment Types

Meadow/Huckleberry restoration- Prescribed fire: use prescribed fire to retard seed/sapling reproduction and enhancement of grasses, sedges, flora and fauna related to this ecosystem. Other: Lopping of seed/sapling to retard reproduction encroachment.

Prescribed fire may increase the viability of *Cyripedium fasciculatum* (Clustered Lady's Slipper), *Cyripedium montanum* (Mountain Lady's Slipper), and *Allotropa virgata* (Sugar Stick).

No fuel treatment- fuels are considered acceptable and beneficial to the site.

Learning Opportunities

Can management activities mimic natural disturbances by fire?

What effect do management activities have on the occurrence and intensity of natural fire?

What is the role of fire in the ecosystem, what aspects are beneficial or detrimental?

Is prescribed fire an effective tool for non-timber commodities (huckleberries, mushrooms) management? Other methods?

Is prescribed fire an effective tool for meadow restoration? Other methods?

Is fuels treatment economically feasible in small openings, helicopter sales?

With longer harvest rotations, will fuel loadings increase following harvest, increasing the need for fuel treatment?

Reference Section I

Glossary of Terms and Acronyms

AMA	Adaptive Management Area. An allocation in the NW Forest Plan for the testing and development of technical and social approached to achieve desired ecological, economic and other social objectives.
Anadromous	Referring to migratory fishes such as salmon or steelhead. Return to fresh water in order to reproduce, but spend most of their lives in salt water.
ARP	Aggregate Recovery Percentage. An estimate of the hydrologic recovery of a managed area, based on the regrowth of vegetation.
Canopy	Continuous forest cover collectively formed by the crowns of adjacent trees and other woody growth.
Corridors	see *Connectivity zones*
Connectivity zones	Connectivity zones are areas of primarily late-successional habitat which provide important dispersal habitat for plant and animal species. Within the AMA, these zones provide critical connections within watersheds, and link several adjacent Late Successional Reserves (LSR's) and Wilderness areas. The majority of the connectivity zones encompass low-elevation riparian areas, providing corridors for a myriad a species. Plant propagules are dispersed here, and amphibians are provided important refugia. They provide nesting and migration routes for many neotropical birds. Big game animals tend to use riparian areas for calving and fawning sites, as well as winter range habitat. Many fur bearing animals are dependent on habitat components found in riparian zones.
DBH	Diameter Breast Height. The diameter of a tree measured 4.5 feet from the ground.
DEIS	Draft Environmental Impact.
GIS	Graphical Information System. Computerized mapping and database system.
GPLRMP	1990 Gifford Pinchot Land and Resource Management Plan.
GPNF	Gifford Pinchot National Forest.
LAD	Landscape Analysis and Design.
LED	Large End Diameter. The diameter of a downed log, measured from the base or large end.
LS	Late-seral, or late-successional. The late transitional or successional stage in plant community development. Follows mid-seral; precedes old growth. In a forest community, it may be defined by a combination of age, size class, and canopy closure.
LSR	Late-Seral Reserves.
Matrix	1) The most connected portion of the landscape; the vegetation type that is the most contiguous. 2) One of the NW Forest Plan allocations.
Natural Fire	Any fire that was caused by Native American Indian burning or some other natural cause, such as lighting or volcanoes.
Nat. Prescribed Fire	Naturally ignited fires that are considered prescribed fires as long as they are burning under a predetermined prescription.
Prescribed Fire	A fire that has a predetermined outcome, based on the needs of management in a prescribed

fire plan. May be either intentionally (management) or naturally ignited.

PSQ — Probable Sale Quantity. The quantity of timber that can or might be sold from an area of capable, available and suitable land under the Forest Plan.

Riparian — Referring to the biologically active transition area between aquatic and terrestrial systems.

RNV — Range of Natural Variability. The natural rage over time of ecosystem functions or elements. (also NRV)

Rotation — The length of time between stand replacing, regeneration harvests.

ROD — Record of Decision.

ROS — Rain-on-snow.

Seral — A developmental stage in the life of a plant community, described by its condition, size, and structure. For modeling purposes, seral stage is defined in the landscape design in terms of diameter at breast height, as described below. The correlation between age class and seral stage can vary depending on site productivity.

early	0 - 9" dbh
mid	9 - 21" dbh
late	> 21" dbh

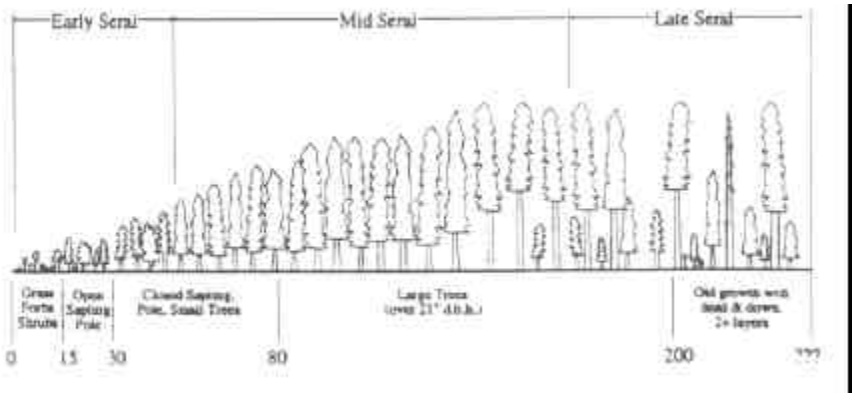


Figure G-7 . Seral stage structure.

Sixth Field Watersheds — Smaller stratification unit of a larger watershed, usually 3000-6000 acres in size. Includes smaller streams.

Stream Order — Stream network classification. First order segments occur at the headwaters. When two 1st order segments join, the stream becomes 2nd order, two 2nd order stream joining make 3rd order, etc.

Thinning — The removal of trees to achieve a desired structure, such as to promote faster growth or late-seral conditions.

Tier 1 — Watersheds that provide habitat for anadromous salmonid and bull trout conservation.

Tier 2 — Watersheds that are important sources of high quality water but may not contain at risk fish stocks.

Appendix H

Cispus AMA Research and Monitoring Plan

July 1996

Research, Monitoring, and Adaptive Management

Adaptive Management is a dynamic process. It involves five basic components: planning, acting, monitoring, evaluating, and adapting, in the pursuit of established goals which are related to each other through a continuous, and very important, loop (Figure H-1). One of the unique attributes of Adaptive Management is the emphasis placed on the generation *and incorporation* of new, pertinent information. Generation of this information results largely from the monitoring component. New information is then used in fine tuning decisions and actions taken at other points in the loop, enabling us to reach goals more effectively and efficiently. A full discussion of the principles of Adaptive Management is available in the *Cispus AMA Strategies* and in Chapter 2 of the *Cispus AMA Working Management Plan.*

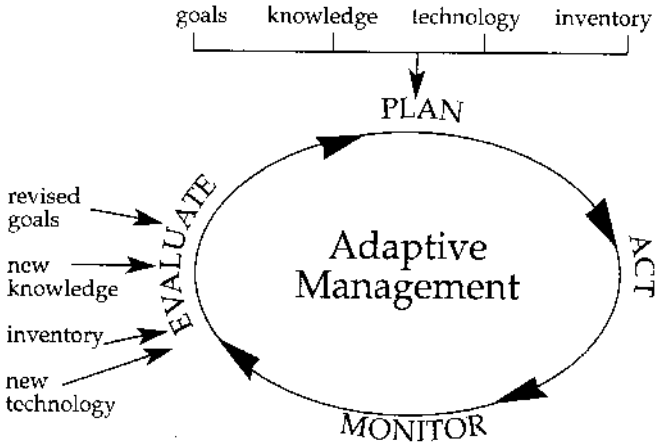


Figure H-1. Model of Adaptive Management (ROD p. E-14)

Careful and coordinated monitoring can be used to determine whether actions are implemented as planned (implementation monitoring), whether actions are producing the predicted results (effectiveness monitoring), and whether the assumptions underlying the premises of an action are, or were, valid (validation monitoring). Research is a phase in the continuum beyond validation monitoring.

Monitoring Plan Development Process

The Cispus AMA Monitoring Plan was developed through an inter-agency effort. Representatives from the Randle and Packwood Ranger Districts, Pacific Northwest Research Station, US Fish and Wildlife Service, and Environmental Protection Agency participated in the development and review of the document.

Based on the AMA Objectives outlined in the Northwest Forest Plan and lessons learned from previous efforts in the AMA, the following were selected as broad monitoring topics:

- **Learning**
- **Commodity Production**
- **Healthy Riparian Zones**
- **Maintenance of Late Successional Forest**
- **High Quality Recreation**
- **Community Interaction**

The six general monitoring categories were then correlated with related recommendations from the Watershed Analysis, Strategies, and the objectives defined for the Cispus by the interagency AMA Steering Committee. It is from these documents that a clear and specific narrative goal was created for each topic. Once this was established, assumptions and monitoring questions specific to each topic were developed and circulated for review to the SW Washington Provincial Interagency Executive Committee, the AMA Steering Committee, and members of the PNW research community.

Table H-1. Topics and Relationship to Cispus AMA Documents

Topics	Related AMA Strategies	Recommendations from Watershed Analysis (pages)	AMA Objectives
Learning	1, **2** ☆,4	5 (1-11),7(1-12)	1,5, 7, 8
Commodity Production	5, **10** ☆,3,9	6(12-13),(32-34),45	1,3,5
Late Successional Forest	3,11, **13** ☆,12,9	5(6-11) 6(11-14),(32-34) Figure VII-I	3,4,5
Healthy Riparian Areas	3, 8, 9, **11** ☆, 13	6(7-11),(14-18),(19-26),(35-36),(40),(44-45) Figure VII-I	3,4,5,6
High Quality Recreation	5, **8** ☆,9,11,13	6(23),(35-41)	4,6,7
Community Interaction	1,2, **4** ☆,6,7,11	6(34-35)	1,2,3,7,8

☆ These are the Strategies that appear to be most closely related to the Topic

It must be emphasized that this document is designed to provide a framework within which research and monitoring can be conducted. The latter stages of monitoring plan development that are identified in Figure H-2 (information needs assessment, indicator determination, and specific protocol) are beyond the scope of this document, although potential indicators have been provided for the testing of some assumptions. To ensure high quality results, the committee proposed that research scientists, or specialists with expert experience, should be involved in the definition of plan specifics at the project level.

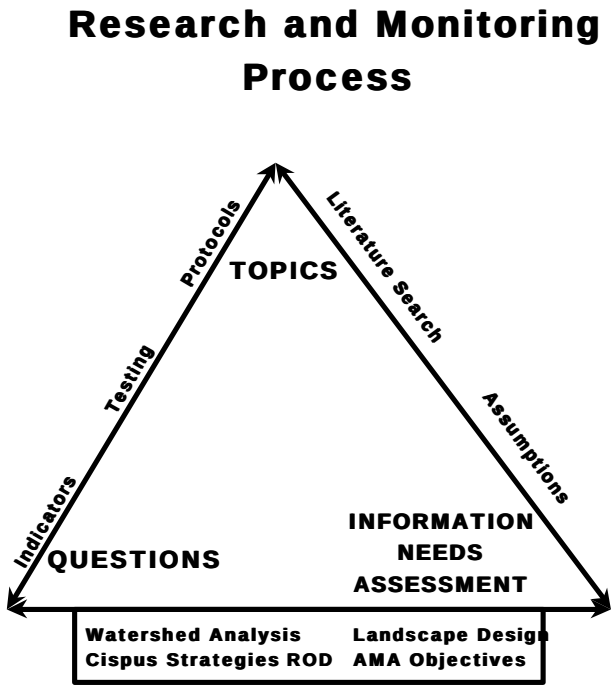


Figure H-2. Research and monitoring progress.

Topic: Learning

Goal: Learn how to manage on an ecosystem basis in terms of technical, social, and administrative challenges.

Assumptions:

1. Projects will be designed specifically to address learning objectives.
    - Does the purpose and need of projects focus on learning?
    - Does each project include a plan for consequent effectiveness monitoring so that learning is documented?
    - Are educational opportunities for external and internal audiences incorporated into projects?
2. Monitoring will be an integral part of the learning process.
    - Is monitoring an integral part of the project planning process?
    - Is the monitoring implemented as planned?
    - Are the agencies involved providing sufficient time and resources for monitoring?
3. Documentation generated by the AMA will be shared with the public, other agencies, and within the Forest Service.
    - Is the information generated through the AMA shared with and utilized by other Districts and Forests within the U.S. Forest Service?
    - Is the information generated through the AMA shared with and utilized by other agencies and private industries?
    - Does the learning process involve interaction and information sharing with the public in a two-way exchange?
    - Is the community supportive of the changes that are being made?
    - Are new mechanisms for information exchange being developed and implemented?
    - Are public education goals, as outlined in the *Cispus AMA Strategies*, being met?

Potential Indicators: Presentations; publications; field trips; displays and other interpretive materials; incorporation of information into White Pass High School curriculum; incorporation of information into Cispus Learning Center activities and materials.

4. Management policies will adapt to reflect what is learned on the AMA.

    - What changes in policy have occurred as a result of learning on the AMA?
    - Are the results of the experiments on the AMA being put into practice in other areas of the Forest Service?

Potential Indicators: File of events, past Steering Committee notes, quarterly updates to Regional Office, and newspaper clippings; adaptations in project planning, Forest Plan revisions.

5. The Landscape Analysis and Design (LAD) will assist decision makers in managing the land by providing a shared vision of the Cispus AMA.

    - Is the LAD being used for guidance in landscape level planning?
    - Has the LAD been adapted to reflect new information?
    - Has the LAD been adapted to reflect new laws?
    - Is project implementation leading to the conditions envisioned in the LAD?
    - Does the LAD address the six topics for the Cispus AMA outlined in this document?

Topic: Late-Successional Forest

Goal: Restore and maintain contiguous areas of unfragmented late-successional (LS) forest sufficient to sustain species associated with LS interior habitat.

Assumptions:

1. Large, contiguous blocks of LS structure are necessary to support LS/old growth associated species.

    - Are large, contiguous blocks of LS forest necessary to support LS/old growth associated species?
    - How large do blocks of non-fragmented LS habitat need to be to support interior LS/old growth associated species?
    - Do high road densities affect the ability of LS blocks to support associated species?
    - Will LS habitat identified in the LAD support associated species over the long-term?

Potential Indicators: Tracking over time of indicator LS species at fixed locations within LS blocks in the AMA, larger LS blocks in an Late Successional Reserve (LSR), and riparian zones

(small LS blocks) in the matrix, and across differing road densities.

2. Sufficiently large blocks of non-fragmented late-successional habitat can be restored and maintained as designated in the LAD.

    - Is the public (local and national) supportive of maintaining large blocks of LS habitat?
    - Can management assist in maintaining existing LS forest?
    - Can silvicultural techniques accelerate the development of LS structure? If so, what silvicultural techniques better accelerate the development of LS structure?
    - Are the areas designated as LS in the LAD being managed accordingly, i.e. leaving existing LS forest where it currently exists and/or managing to promote LS forest?

Potential Indicators: Public support for the LAD as demonstrated via public meetings and other verbal as well as written comments to the Forest; tracking of adherence to the LAD in all ID team meetings; results of research on silvicultural techniques to promote LS structure.

3. Connectivity between LS areas is necessary for species dispersal and genetic exchange.

    - Is LS forest within the Cispus AMA providing sufficient connectivity with areas outside the AMA boundaries?

Topic: Community Interaction

Goal: Involve local communities as full participants in ecosystem management.

Assumptions:

1. Local communities will have an increased role in the planning process.

    - How have local communities been incorporated into the planning process?
    - Do management decisions reflect what is learned through the community involvement?

Potential Indicators: Examples of change in the planning process to incorporate local communities; instances of community involvement affecting management decisions.

2. Community involvement in forest management will improve the relationship between the Forest Service and the communities.

    - Has the way the public is involved in forest management changed over time?
    - Have public perceptions of the Districts changed over time?
    - Is there a long-term commitment on behalf of the communities to working toward shared management goals?
    - Has the community involvement led to increased political support of the Adaptive Management Area?

Potential Indicators: Community Partnerships; nature of public meetings (interactive versus controversial); number of public meetings; meeting attendance; mailing list numbers; attitudinal surveys; community monitoring programs.

3. The shared vision provided by the LAD will help reduce conflicts between the Forest Service and the communities.

    - Did the level of community involvement in the LAD process cultivate long term support of the LAD?
    - Did the level of community involvement in the AMA planning process have an effect on the amount of support specific AMA projects receive?
    - Is the public kept aware that projects on the AMA are designed within the framework of the LAD?
    - Have the number and intensity of conflicts over projects on the AMA been reduced over time? Why or why not?

Potential Indicators: LAD adherence noted in public notices; comments from the public; number of conflicts over AMA projects.

4. Social assessments are necessary to insure that managment decisions reflect the values and needs of the surrounding communities.

    - Have the community values and needs been accurately assessed?
    - Are the community values reflected in management decisions?
    - Are changes in community values being tracked and accommodated?
    - Do management decisions reflect local economic needs?
    - Have alternative natural resource economies been supported through management decisions?

Potential indicators: Community assessments/surveys regarding values and needs.

5. The community is able to contribute resources toward effective ecosystem mangement.

    - Is the agency actively seeking information about the area from the local community?
    - Is community monitoring being utilized?
    - Are the schools being utilized for assistance in collecting data, doing surveys, making assessments, and completing other similar activities as part of the school curriculum?
    - Has the agency adapted to accept and use monitoring data from the public?
    - How has involvement of the community improved or diminished the effectiveness of forest management?

Potential Indicators: Instances of community providing resources (volunteers, shared materials for monitoring etc.) toward forest management; training of public to collect data; adaptations by agency to use public data; effort to use knowledge of community regarding forest resources; monetary costs/savings of involving community; evaluation of intangible effects of involving community.

Topic: Healthy Riparian Areas

Goal: Restore and maintain healthy riparian areas to provide high quality habitat for terrestrial and aquatic species, while also providing for managed recreation opportunities.

Assumptions:

1. Components of healthy riparian areas include a diversity of vegetative species and structures and a source of large woody debris (LWD).

    - How do differences in diversity of overstory species affect the quantity and quality of riparian function, i.e., LWD recruitment, habitat utilization by wildlife, etc.?
    - What is the relationship between riparian vegetation and streambank stability?
    - What is the relationship between riparian vegetation and wildlife use?
    - How do the roles of native and non-native species differ with regard to riparian function (i.e. species utilization, streambank stability, etc.)?
    - What is the residence time of LWD in the Cispus system?
    - How is residence time of LWD related to size, placement, and structure?
    - What LWD recruitment rate is necessary to support healthy riparian areas in the Cispus watershed?
    - What functions does LWD supply that are not provided by inorganic structural components?

Potential Indicators: Indicator species (plant and animal); LWD; streambank stability; sediment regime.

2. High quality, connected riparian areas provide unique habitat as well as dispersal opportunities for wildlife species.

- Which species are using the riparian areas as primary habitat and why?
- Which species are using the riparian areas for dispersal?
- How do varying riparian widths affect species utilization?
- What are the barriers to species dispersal in riparian areas that appear to be healthy, but are not being utilized to the anticipated degree?

Potential Indicators: Indicator species.

3. Healthy riparian areas are necessary for high water quality and fish habitat

- Are LWD recruitment, turbidity, water temperature, and water chemistry such that they provide quality fish habitat for a given area?
- Does stream structure, and associated fish habitat, reflect the underlying geomorphology in reaches that have healthy riparian areas?
- What is the role of sediment in the Cispus watershed, and how is that role affected by the components of riparian areas?
- How is the macroinvertebrate community related to water quality?
- How is water quality changing as riparian areas are restored?

Potential Indicators: Pool/riffle ratios; LWD; fish population and distribution; temperature; sediment regime; macro invertebrate community.

4. Silvicultural practices in riparian areas can be designed to promote the attainment of Aquatic Conservation Strategy (ACS) Objectives as described in the ROD, B-11.

- How is the attainment of water quality standards affected by various management practices?
- How wide does the Riparian Reserve need to be to promote the attainment of ACS Objectives and under what circumstances?
- How wide does the unmanaged portion of a Riparian Reserve need to be to promote the attainment of ASC Objectives and under what circumstances?
- What are the acceptable levels of intensity of silvicultural activities in Riparian Reserves, and under what circumstances?
- What silvicultural and/or harvest techniques are acceptable and appropriate in Riparian Reserves, and under what circumstances? (i.e. various thinning systems, roading versus no roads, etc.)

- What new techniques are available to minimize ecological impacts on the forest system? (e.g. chutes, zig zag, etc.)

Potential Indicators: Water quality standards; stream structure; sediment regime; temperature; macro invertebrate presence; turbidity; in stream flow; vegetative species composition and diversity; connectivity; water table; riparian-dependant species.

5. Road management influences sediment impacts to the riparian area and water quality.

- What techniques are effective in reducing sediment delivery from existing roads (restoration, reconstruction, closing, decommissioning)?
- What construction techniques are most effective in preventing sediment delivery from new roads?
- What are the alternatives to road building?

Potential Indicators: Sediment regime; turbidity.

6. Managed recreation is compatible with healthy riparian areas.

- What recreational activities are appropriate within riparian areas, and under what circumstances?
- What is the acceptable level of intensity of recreation activities in riparian areas, and under what circumstances?
- Do healthy riparian areas attract more visitors? If so, what are the consequences and how may they be mitigated?

Potential Indicators: Native plant and animal species diversity; fish habitat; sediment regime; water chemistry; water quality standards; introduction of non-native plants; recreational activities; level of use.

Topic: Commodity Production

Goal: Optimize timber and non-timber commodity production consistent with meeting ecological principles.

Assumptions:

1. Non-timber commodities (NTCs) have commercial and non-commercial values that can be measured, e.g. fish, beargrass, berries, rock, ferns, boughs, transplants.

- Who are the groups that harvest NTCs, which items are they collecting, and why?

- Can projects be designed to enhance production of non-timber commodities (NTCs)?
- What are the production functions (how much can be harvested at what rate without adverse impacts to the resource) for NTCs?
- What is the intrinsic and monetary value of NTCs and the collecting process, and how can they be measured?
- How is the value of NTCs accounted for in management activities?

Potential Indicators: Quality and quantity of NTC production; survey responses; economic analysis.

2. Timber production can be consistent with ecological principles.

- Are areas designated for timber production appropriate to the underlying landscape?
- What intensities of timber production are consistent with desired ecological conditions for different landscape types?
- Can ecological principles be integrated into economically viable projects?
- Is there more than one silvicultural treatment that can be used to achieve a specific desired ecological condition?
- How do different silvicultural treatments affect commodity production over time?
- What management activities are consistent with the general publics' ecologic, aesthetic, economic, recreational and other values?

Potential Indicators: Modeling of long-term timber production; water quality; sediment regime; habitat diversity; public surveys, economic analysis.

3. Extraction of commodities has an effect on local and regional economies.

- What effect does the extraction of timber commodities have on local and regional economies over time?
- What is the contribution of NTCs to the local economy?
- What is the role of the AMA in meeting the needs of the local timber industry?
- Where does the processing of timber and non-timber commodities take place?
- How can silivicultural techniques and non-timber commodity management be coordinated to optimize economic outputs?

Potential Indicators: Economic analyses.

4. Roads have an effect on the ecological integrity and the economics of management activities.

    - What road building and maintenance technologies are consistent with desired ecological conditions?
    - Where and when should the presence of roads be limited?
    - What economically feasible alternatives to roading provide access and transport of commodities?

5. Management activities can mimic natural disturbances.

    - What effects do management activities have on the occurrence and intensity of natural disturbances, e.g., fire?
    - To what extent can management activities substitute for natural disturbances?
    - Is fire an effective tool for non-timber commodities management? Where?

Topic: High Quality Recreation

Goal: Provide a broad range of recreational opportunities that meet user needs and expectations, while maintaining ecological integrity.

Assumptions:

1. A broad range of recreational opportunities is necessary to satisfy user expectations.

    - What range of recreational opportunities is the public seeking on the Cispus AMA?
    - Are there incompatible recreational uses that make it it necessary to provide separate locations for different activities?
    - Which different activities can be grouped at the same site without conflict?
    - To what extent can or should the AMA provide recreational facilities at different levels of development (primitive versus highly developed)?
    - How do perceptions of crowding differ among the users of the Cispus AMA, and how do these perceptions affect use patterns on the AMA?

Potential Indicators: User surveys; comment cards.

2. Facilities (trails, campsites, restrooms etc.) can be designed to increase user satisfaction.

- Which facilities on the AMA are used most frequently and why?
- Do facility standards, in terms of maintenance and upkeep, affect public use and satisfaction?
- Can user conflicts be minimized through facility design?
- How can facilities be re-designed to meet changing user needs, e.g., roads to trails.

Potential Indicators: User surveys; comment cards.

3. Public information and education reduces misuse of forest resources and conflicts between user groups.

- What interpretive materials are most effective in communicating with the public?
- Do interpretive materials cause changes in behavior of users toward forest resources and forest facilities?
- Do interpretive materials that clearly convey that various user groups are being accommodated cause changes in the acceptance of different user groups by each other?

Potential Indicators: Tracking of public comments.

4. The public would be willing to pay expanded user fees to utilize recreational facilities.

- Is self-supporting recreation operation and maintenance possible and justifiable?
- How much of the expense of maintaining facilities should be borne by the direct users?
- How much is the public willing to pay for activities and opportunities on the Cispus AMA?

5. Roads directly influence the type and quantity of recreational use in an area.

- Are road designs, maintenance levels, and densities appropriate in terms of providing a range of activities and protecting ecological values?
- Are road conditions promoting the appropriate recreational uses of the areas they serve?
- When and where can unmaintained and user-maintained roads be kept open and meet ecological and legal needs of the Forest?

Potential Indicators: Comparative analysis of road density with designated land uses; user comments.

Current Research and Monitoring Projects
Cispus AMA (1997)

Project Title: Lodgeberry Huckleberry Enhancement

Objectives: To respond to concerns from Indian Nations and local area residents regarding the decrease of huckleberry production. This project hopes to increase the number and productivity of huckleberry plants by a variety of over-story removal methods implemented under the Walupt-Cispus timber sale.

Why this research is important: Increasing numbers of people harvesting huckleberry, coupled with an incomplete understanding of how ecosystems function have led to loss of habitat for many important food sources that form a foundation for the cultural heritage of many native people. This partnership-based project will hopefully lead to effective, sustainable management plans based on understanding of cultural, socioeconomic, and biological factors.

Products: Data on huckleberry response
Information to determine which site factors limit growth

Summary of Outcomes: Information to help sustain traditional values, practices and lifestyles which include the harvest of huckleberries. The study is in conjunction with a research project led by Judith Vergun, Oregon State University. Formal monitoring in established research sites will be conducted by OSU. Informal monitoring will be conducted at scheduled intervals by specialists in botany and silviculture from the Randle Ranger District. This may also offer an opportunity to test the feasibility of low value sales (possibly with a mill study), promote stewardship sales for special forest products in the local community, and open areas for firewood cutting.

Cooperators/Involvement: The project is an outcome of a monitoring and research meeting held at the Randle Ranger District in 1995. Our cooperators include: Oregon State University, Olympia and Portland PNW, Yakama Indian Nation, Warm Springs Indian Nation. Others actively involved in this project include: local citizens, Mt. Hood Nat'l Forest, Washington State University, University of Washington, Regional Office staff.

Project Title: Mountain Goat Habitat Utilization

Objectives: Identify high use areas, habitat conditions and trends of Cispus area mountain goat populations.

Why this research is important: The Cispus AMA has a viable and apparently increasing population of mountain goats. This species is of interest for its high consumptive and non-consumptive values, as well as being an indicator of the health of high-elevation, steep terrain. The species is a focus of local interest. During the development of the Cispus AMA Strategies, the public listed the mountain goat as a Featured Species (Cispus AMA Strategy #12). However, no extensive surveys have been done of habitat conditions.

Products:
- GIS generated maps of known and potential habitat
- Helicopter surveys
- Design of data forms
  - habitat conditions
  - goat utilization of various plant species
  - presence or absence of goat sign
  - meadow encroachment
  - Potential habitat improvement
- Field transect

Summary of Outcomes: Identify both high- and low-elevation goat habitat and utilization. Develop a management plan for mountain goat habitat which would incorporate:

- timber harvest recommendations
- habitat improvement
- use of prescribed fire
- public involvement and education
- potential for permitted hunting
- potential for economic (tourist) development

Cooperators/Involvement:

- PNW Portland
- Washington Department of Fish and Wildlife
- US Fish and Wildlife Department
- local citizens and volunteers

Project Title: Cispus AMA Monitoring Database

Objectives: Develop a user-friendly, interactive ArcView 2 interface to allow access of extensive tabular information in Oracle that is associated with spatial data in ARC/INFO coverages.

Why this research is important: The NW Forest Plan requires each AMA to develop effectiveness and validation monitoring plans which are to be tracked over time. At present we do not have a coordinated monitoring database. Databases now range over a variety of platforms, structure, and ownerships. The application will be designed so that on-the-ground specialists are able to effectively utilize the entire information system for research and monitoring projects.

Products: Contract to produce:

- Construction of tabular Oracle database
- Oracle forms for data entry and viewing
- Oracle report design (tied to specific and/or overall projects)
- Program to produce ArcView map layouts
- Link between ArcView and Oracle
- Design of graphical user interface for ArcView
- Design of Task Reminder System
- Develop compatible forms for collection of field data

Summary of Outcomes: From an ArcView workstation, a user could enter a project site location or number by keyboard or select with mouse. The resulting ArcView output (a zoom to the project site with associated roads, streams, stands, coordinates, etc.) Will be displayed on the screen. The user could either view or update the associated Oracle database information, or request maps and reports. Because Oracle is a corporate database, project reporting could be automated and accessed and consolidated throughout the NFS system, including sharing with research, universities or other agencies.

Cooperators/Involvement: PNW Portland, Regional Office staff, BLM

Project Title: User Impacts on Meadow Vegetation

Objectives: Study the impacts to subalpine meadow vegetation made by recreation use, especially trail-riders and packers.

Why this research is important: One of the four objectives from the NW Forest Plan for the Cispus AMA is "high-quality recreation". Recreation opportunities in the Cispus area cover a broad spectrum of experiences, including hiking, horse-back riding, hunting, and associated dispersed camping. There is concern about dispersed campsite use of our many subalpine meadows and whether such use by packers and riders adversely impacts the fragile meadow ecosystem. This 2-year study was designed to determine if campers have changed the distribution, diversity and health of the subalpine meadow plants.

Products: Masters thesis including:
established transect in Midway Meadows
two years of plant survey data
analysis and determination of user impacts on vegetation

Summary of Outcomes: The transect established by this study will continue to be monitored and evaluated, potentially as a class project of White Pass or Morton High Schools. Information collected at Midway Meadows can be then extrapolated to similar, heavily used susbalpine meadows, and be used to determine future management policies on dispersed and managed campsites.

Cooperators/Involvement: The Evergreen State College
Pacific Lutheran University

Project Title: Beargrass (*Xerophyllum tenax*) Production Function

Objectives: The objectives are twofold: (1) to develop a predictive model for estimating harvestable quantities of beargrass based on overstory and understory and understory characteristics; and (2) to set up permanent plots and baseline data for long-term monitoring of the effects of repeated harvest on beargrass productivity and populations.

Why this research is important: Beargrass has traditionally been, and continues to be harvested by native peoples for use in basket making. Its popularity and collection has been promoted by the floral industry, and large-scale harvest by contractors has dramatically increased. There is concern over the impacts of commercial harvest on beargrass populations and productivity. This study will extend previous work done by the Northwest Native Plant Society by setting up long-term plots in areas more similar to sites preferred by harvesters (using overstory characteristics).

Products: Permanent plots located and transect(s) established.

Summary of Outcomes: Twenty-four sample plots will be located. Within each forest zone, plots will be grouped to represent a range of canopy coverages (15-30%, 35-65%, 70-100%). Slope, aspect, elevation, stand age, soils, and fire history will be recorded. Locations will be tagged with capped rebar and flagging, and the location coordinates determined by GPS, and recorded in the District GIS system.

Cooperators/Involvement: Washington State University
PNW Portland
PNW Olympia
Yakama Indian Nation

Project Title: White Pass Community Self-Assessment

Objectives: Obtain information about the social and economic history, conditions and perspectives of the residents within the White Pass School District, Washington State.

Why this research is important: The White Pass School District is the only organized administrative agency within the unincorporated communities that are geographically local to the Cispus AMA. When the AMA was established in 1994, a group of citizens and representative from service agencies formed an ad hoc committee to:

define a historical context for the community
link young people back to the community
validate perceptions of what the community is and means to residents
promote the area to new residents and business
strengthen current economic opportunities
identify training and academic opportunities in schools
strengthen links between community, school, and the Forest Service
identify opportunities to circulate money within the valley

This is the third year for this group. Projects and priorities are self-generated. The Cispus AMA was a catalyst in the initiation stage. The Forest Service role currently is one of service and equal participation. There has been a noticeable, and positive change in the perceptions of the community toward the Forest Service in the last two years, much of it stemming from our involvement and viability with this group.

Products: (1) Three related notebooks containing an assessment of current and historical events assembled by the White Pass Discover Team, a summer employment opportunity for White Pass students. Information was compiled using a combination of oral interviews and literature search. Notebooks build on the previous summer's assessment, focusing on "unanswered questions". (2) A community assessment using a questionnaire developed as a graduate project (Appendix D). Statistics and analysis will be presented in a masters thesis.

Summary of outcomes: The four goals were recognized by the self-assessment committee:

1. To develop an information infrastructure that is pertinent and accessible
2. To maintain a socially and economically viable community
3. To strengthen links between community, schools, and government agencies
4. To learn about and appreciate the history of the area

The group found funding for the third phase of assessment employing and training high school students, helped formulate and fund a statistically valid assessment and questionnaire for the White Pass area, and spearheaded a county-wide telecommunications group that attracted a local server for Internet to the White Pass area. We are on the net!

Cooperators/Involvement:

Washington State Employment Security/Job Training Partnership Act
White Pass School District
Lewis County Commissioners
Providence Hospital
PNW Portland
PNW Seattle
University of Washington
Washington State University
White Pass Community Services Coalition
Lewis County Continuum of Care
East Lewis County PRIDE
Washington State Human Response Network
Lewis County Health Department

Project Title: Cispus Environmental Study Program

Objectives: Provide a structure and class curriculum by which students can participate in monitoring activities on in the Cispus AMA.

Why this research is important: When the Cispus AMA was established, physical science and mathematics teachers in the local schools saw an opportunity to enrich students' learning experience to understand adaptive management and the role of consistent, long-term, and accurate monitoring methods in adaptive change. With the AMA scientist and District resource specialists, teachers have developed a strategy to:

1. Provide valid and repeatable monitoring data for the Cispus AMA
2. Provide "real science" experiences for students
3. Provide an opportunity for environmental education and training of local area students
4. Strengthen the link between school (community) and the Forest Service

During the school year, teachers in the White Pass School District develop classwork in conjunction with research and monitoring projects in the Cispus AMA. Students in mathematics, physical and biological sciences are included in both classroom training and field work. Our focus has been on stream and slope restoration. Work includes: stream surveys and mapping, geomorphology, photo points and data entry. A summer program for students throughout Lewis County was also developed in conjunction with the AMA to introduce students to applied science. The summer program focuses on at-risk and minority students as well as general student recruitment. The summer program is funded through the Educational Talent Search from Centralia College.

Summary of Outcomes:

Curriculum guide drafted by Wolftree Incorporated, in conjunction with White Pass School District and the Gifford Pinchot National Forest. This guide is being modified for classroom work by the teachers and Randle District specialists.

Monitoring data on:

Cascade Frog Population, Cispus Peak area
Selected stream cross-sections and longitudinal profiles
Photo points established for restoration project monitoring

Cooperators/Involvement:

White Pass School District
PNW Portland
Centralia College

Project Title: Landscape Testing of Biological and Forest Management Sciences

Objectives: Incorporate the Cispus Landscape Analysis and Design (LAD) into the Landscape Management System (LMS). Test consequences of proposed management scenarios on biological science.

Why this research is important: Presently, the greatest challenge of forest science and management is to integrate the biological and management sciences in a systematic way and over long time spans. A forest naturally goes through growth cycles; sparked by a natural disturbance such as wildfires, an area may be a clearing, a stand of saplings, a mature stand with a developed understory, and eventually a stand of old-growth forest. This process takes place over many decades and, without human intervention, occurs at varying times in many different parts of a forest, resulting in a diversity of habitats and forest resources.

Active forest management means finding a way to integrate the needs of the local communities and economy with the needs of a diverse and balanced natural landscape. The selection of a landscape design for the AMA offers an opportunity to research this integration. Critical areas to be researched include:

- suitability of forest stand structures for different plant and animal species
- landscape patterns - location and amount of edge, interior and riparian forests, rates of change and behavior
- susceptibility of forests to disturbance agents such as insects, wind, fire, floods based on stand structures and landscape patterns
- uses of various stand structures and landscape patterns by various animal and plant species

Products: Integration of stand level vegetative data into the LMS program to model changes in time over the Cispus AMA.

Summary of Outcomes: Product will be a method to hypothesize a process, including measurable expectations, to explain expected behavior. This information can be used during collaboration with the public and other agencies, and as a monitoring tool to evaluate expected outcomes and the effectiveness of management activities.

Cooperators/Involvement:

University of Washington
PNW Portland

Project Title: Habitat Monitoring of Edible Forest Mushrooms

Objectives: Conduct trials of new sampling methods for monitoring the location, annual production and forest habitat of edible ectomycorrhizal mushroom colonies (matsutakes, chanterelles and others).

Why this research is important: Most edible mushroom monitoring efforts have concentrated on developing means of estimating mushroom productivity on particular sites or in experimental study treatments. To develop models that will predict the effects of forest management activities on future mushroom productivity, research will need to develop methods for sampling habitats, including effective and efficient field procedures.

Products: In conjunction with the 20/35 Timber Sale, permanent plots will be located and transect(s) established. Baseline data will be collected and entered into an Oracle database, and stored both at PNW Corvallis and the GIS system at the Randle Ranger District. The work in 1996 tested sampling methods. Results will be applied to the 1997 phase.

Summary of Outcomes: Sampling procedures for monitoring location, habitat and productivity of mushroom colonies. The baseline data collected will also be used for long-term monitoring by the Randle Ranger District on the effects of timber management (thinning) on the impacts and recovery of mushroom population and productivity.

Cooperators/Involvement:

PNW Corvallis
PNW Portland
Applegate AMA
Oregon State University
Monarch Model Forest, Mexico

Appendix I
AMA Steering Committee Objectives

February 1996

Goal: *Development and testing of innovative approaches at the stand, landscape and watershed level to integration of timber production with the maintenance of late-successional forests, healthy riparian zones, and high quality recreational values (ROD p. D-13, 1994)*

Objectives:

1. Monitor changing needs, values and interests of the local community and other forest users, and identify formal and informal communication networks and leaders within the communities.

2. Develop relationships with local, county, state, and other federal agencies, local community members, Indian Nations, interest groups and research communities to collaboratively develop and implement a management strategy based on biophysical and social assessments.

3. Design, implement, and adapt as needed, a landscape analysis that depicts management direction and reflects a shared vision for the Cispus area.

4. Maintain and/or restore ecosystem health including, but not limited to, fish and wildlife habitat needs, a mix of seral vegetative states based on long-term landscape objectives, and maintenance of water quality standards.

5. Identify project level activities that implement the AMA strategy of *developing innovative forestry management practices that integrate ecological and economic values in a sustainable manner.*

6. Ensure high quality recreational opportunities.

7. Develop ongoing educational opportunities in ecosystem management for external and internal audiences.

8. Develop and implement research and monitoring programs for innovative projects and areas of ecological concern, including use of citizen monitoring.

Action Items

Social Assessment:

- Work with local community and forest user groups to implement public goals and objectives, facilitate information sharing, and explore grant and funding opportunities for natural resource based community projects.

Develop Relationships:

- Expand and maintain working relationships with other agencies (state, federal and county), Native American Nations, universities, colleges and local school districts to share information, propose agreements and/or partnerships and research opportunities.
- Share information with and promote involvement by interest groups, local communities and other forest users to maintain and further interest in the Cispus AMA.
- Newsletters, formal and informal presentations, public meetings, letters, informal networking, field trips, workshops
- Maintain and expand communication with other Adaptive Management Areas and with forests in the Model Forest Network.
- Apply the collaborative learning process to all internal and external relationships.

Landscape Design:

- Design a landscape analysis that depicts a shared future vision.
- Implement desired management direction.
- Monitor to track development of future vision for landscape with regard to management direction and to validate assumptions used in the design.
- Utilize adaptive management process to achieve desired design.
- Ensure interagency and public participation in planning, implementation and monitoring.

Ecosystem Health:

- Assess the area of the AMA not addressed by the Pilot Watershed Analysis.
- Expand analysis as appropriate to consider additional available information, changing conditions and potential effects associated with long-term management issues.
- Implement innovative projects addressed in watershed analysis that restore or maintain ecosystem health.
- Evaluate future projects in ensure that fish and wildlife needs are met, a mix of seral vegetative states are maintained or developed that meet objectives of the landscape design, and water quality standards are maintained.

Project Implementation:

- Develop projects that integrate ecological and economic values.
    - Create and Maintain a variety of forest structural conditions
    - Integrate habitat needs with timber management and production
    - Integrate water quality needs with timber management and production
    - Restore structural and biological complexity
    - Develop and test a variety of logging and transportation systems
    - Design and test management effects at a landscape level
    - Restore and maintain forest health using controlled fire and silvicultural approaches

Recreation:

- Involve the public in identification of desired recreational opportunities.
- Ensure quality recreational opportunities when planning future management direction for the area.

Education:

- Work with Columbia Learning Center to develop educational programs for external and internal audiences, and to maintain relationships with PNW.
- Work with local schools and Cispus Learning Center to develop on-going educational field experiments, data collection and monitoring projects.
- Establish reciprocal technology transfer between the Cispus AMA and:
  - PNW and university researchers
  - Local colleges and schools
  - Local community
  - Interested public and forest users

Monitoring:

- Develop long-term monitoring programs for areas or parameters of ecological concern.
- Conduct effectiveness and validation monitoring of innovative (and other) forest management projects.
- Monitor the progress of the desired management direction outlined in the landscape analysis.
- Ensure public and interagency participation in monitoring programs.
- Periodically update all interested parties of monitoring results.