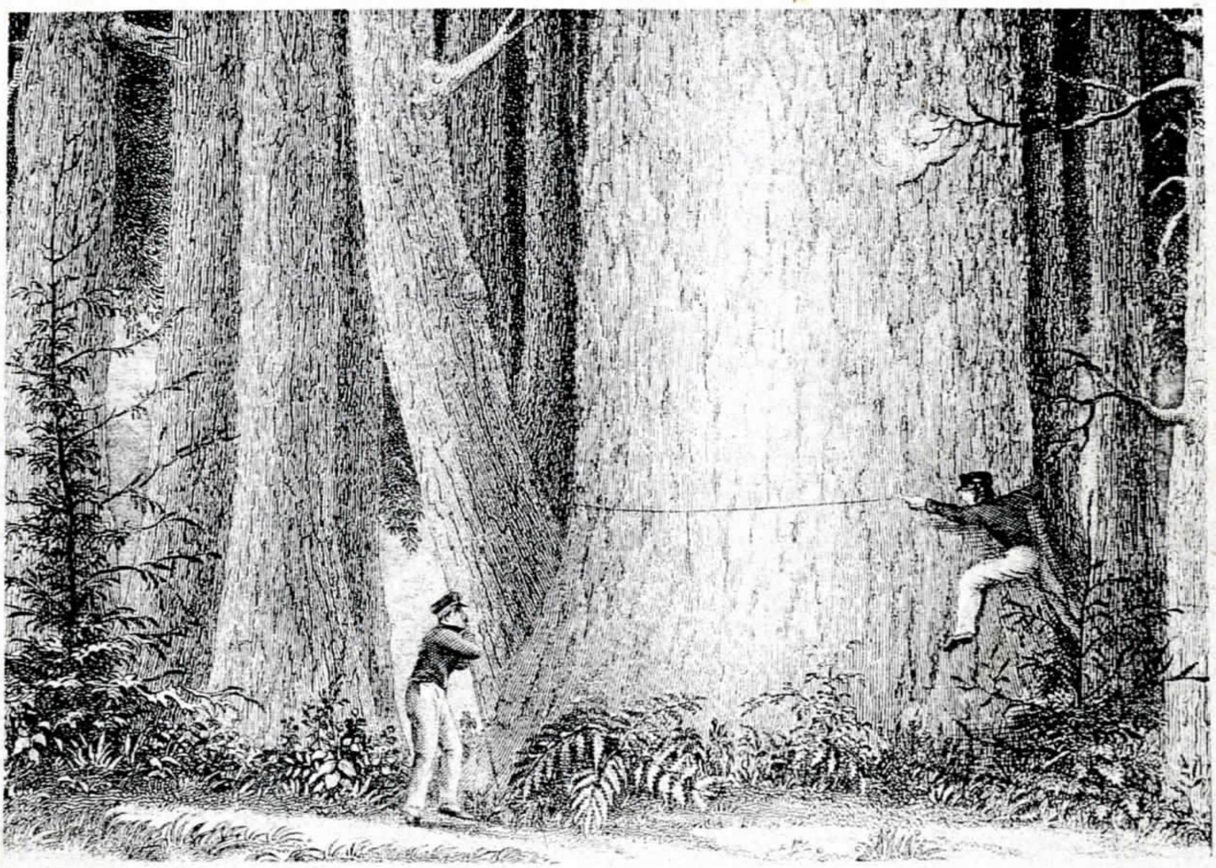
FOREST HISTORY AND FEMAT ASSUMPTIONS:
A Critical Review of President Clinton's 1994 Northwest Forest Plan



By Bob Zybach
Corvallis, Oregon

Originally prepared For:
American Forest and Paper Association and
The Northwest Forest Resource Council
October 26, 1993 (Rev. March 20, 1993)

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COVER: American military explorers, under the direction of Lieutenant Charles Wilkes in 1841, scientifically measure and record a giant tree near the present-day location of Astoria, Oregon. Probably the first logging of Douglas-fir *in the range of the northern spotted owl within the present boundaries of the United States* was the 1810 clearing of a fur trading post at Astoria. Alexander Ross' descriptions of that clearing; of cutting "gigantic trees of almost incredible size, many of them measuring fifty feet in girth, and so close together . . . it sometimes required two days, or more, to fell one tree" (Ross 1810, quoted in 1986: 89-91) were corroborated in 1825 by David Douglas, who found a barkless, three-foot high stump behind the fort that was 48 feet in circumference. According to Douglas, the tree had been removed "to give place to a more useful vegetable, namely potatoes" (Meany 1935: 53).

ACKNOWLEDGEMENTS: The following people provided excellent criticism and discussion opportunities for me during the construction of this paper: Patricia Benner, John Beuter, Thomas Bonnicksen, Debbie Deagen, Bruce Fraser, Wayne Giesy, Jan Henderson, K. Norman Johnson, Kent Kelly, Dennis Martinez, Harold Sandstrom, Benjamin Stout, Terri Trosper, and George Weber. Their help has been substantial and I have appreciated (and usually incorporated) their suggestions, corrections, and ideas. Final decisions, opinions, and typos remain my own.

EDITORIAL NOTE: I have used **bold-faced type** throughout this report to add emphasis to individual words and phrases, including those used in quotations. Where emphasis is already indicated within the body of a quotation, I have used *italicized type*. Quotation marks (" ") are used to identify important words and phrases quoted from the DSEIS (including FEMAT) or that appear in the glossary of this review. These practices are not otherwise noted in the text.

March 29, 1993 Revision: Due to time constraints, several minor errors and omissions (including misspellings, typos, two reversed graphics, and a few incomplete references) existed in the submitted (October 26) draft of this review. This revised draft is intended to correct some of these errors and to clarify the review's basic points with slight revisions and additions to the submitted text. Pagination, quotations, illustrations, and summary conclusions remain virtually identical to the earlier submission. *It is important to note that this manuscript is not a scientific document. It is a critical review of a proposed resource management plan from a forest history perspective. As such, many of the conclusions stated in the text are not necessarily based upon logically presented evidence so much as they are based upon practical experience and a general understanding of local history and ecology. The additional purposes of this report are stated in the introduction.*

BZ/940329 Rev.

Executive Summary

President Clinton's 1994 Plan for Northwest Forests was selected from 10 alternatives presented in the Draft Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (DSEIS). This review is based upon a number of concerns relating to the development and description of the ten alternatives, as analyzed from a forest history perspective. Analysis of the DSEIS largely centered upon:

———historical inadequacies in Appendix A of the DSEIS: Forest Ecosystem Management: An Ecological, Economic, and Social Assessment (FEMAT);
———faulty information;
———lack of meaningful interdisciplinary review.

This combination of omission, error, and secrecy led to predictive use of a number of fundamentally flawed assumptions. The limited variety of management alternatives presented to President Clinton in FEMAT are a direct result of these shortcomings. Because many of the planning goals (e.g.; "old-growth" preservation, native wildlife diversity, direct control of the extinction process) are founded upon faulty historical assumptions, it is highly unlikely that they can be attained as described.

Baseline information for the history and relative current status of old growth in the Douglas-fir (Spotted Owl) Region is inadequately and inaccurately presented in FEMAT. A result of using poor information about Douglas-fir fire and logging history is that many of FEMAT's primary predictive assumptions for "naturally functioning" ecosystems, native wildlife populations, the significance, structure and extent of American Indian cultural landscapes, and the cumulative effects of human (historical) ecology are wrong and misleading. The problem is compounded by public perceptions that FEMAT is based upon the "best technical and scientific information currently available," and that "good science" has developed a comprehensive list of options for an "ecosystem approach" to the management of federal (and other) forestlands in the Douglas-fir Region.

Specific FEMAT predictive assumptions that contain questionable assertions were identified by using a system of criteria based upon credible historical evidence. Four of these assumptions are described and analyzed, based upon their importance in developing plan alternatives:

1. *At the time of European settlement,* the Douglas-fir Region was a blanket of trees, 60 to 70 percent of which existed in stands 200 years or greater in age.

2. *Before the time of European settlement,* American Indians in the Douglas-fir Region lived in a "naturally functioning" environment that can be described in terms of regional "fire cycles" and forest plant succession.

3. *Since the time of European settlement,* logging in the Douglas-fir Region has destroyed or degraded many of the natural and cultural values associated with "native" "old-growth" forests; effects that have been exacerbated by standard "clearcut" harvest methods and industrial reforestation practices.

4. *Current* laws, ownerships, and values in the Douglas-fir Region are likely to remain constant for the *next* 100 years; "early seral stage" patterns of vegetation have remained constant (or increased in extent) during the *past* 100 years.

Alternative assumptions, based upon cited and demonstrated evidence, were developed for each of these four identified FEMAT assumptions; a number of complementary alternative management strategies—legally, economically, and ecologically sound, but not considered by FEMAT—are also described:

1. The "Blanket of Old-Growth" Myth. Based upon historical evidence and standard definitions, it can be shown that the landscape of the Douglas-fir Region at the time of settlement was primarily comprised of shifting patterns of even-aged stands of conifers bounded by prairies and savannahs. Islands of conifers, groves of oak, meadows, ponds, balds, brakes, and berry patches further defined the environment, much of which was virtually free of underbrush, ladder fuels, coarse woody debris, snags, and other characteristics common to many post-1910 Pacific Northwest forests. At any given time during the past 1000 years, perhaps five to 38 percent of the region was covered with patches and stands of trees in excess of 200 years of age; the percentage varied significantly from time to time and from watershed to watershed, depending upon human settlement patterns, topography, fuel history, and local climatic conditions. To structure and manage for these environments over the long term must involve the periodic use of fire, the need for additional historical research, and the purposeful creation of wildlife island habitats within the landscape.

2. Cultural Landscapes and Succession Theory. Human families have lived in the Douglas-fir Region for at least 11,000 years. The use of fire by these families for heating, cooking, hunting, recreation, vegetation management, and other purposes produced an environment dominated by fire-dependent and fire-tolerant plant species, such as bunchgrasses, white oak, Douglas-fir, and brackenfern. Identifiable patterns of these types of plants existed across most of the landscape at the time of European settlement. Relatively accurate physical reconstructions of historical vegetation patterns requires the presence of people, the periodic use of fire, and the reintroduction of extirpated carnivores. The continued "preservation" of many existing stands and patches of old-growth trees requires the periodic use of ground fires or other methods to control ladder fuel development and the accumulation of fuels on adjacent lands. Catastrophic nonhuman disturbance patterns can be modeled into current resource management strategies, based upon established records of location, resiliency and repopulation. Using the historical record, native wildlife habitat management must be based upon a combination of scheduled periodic disturbances and planned responses to anticipated catastrophic events.

3. Logging History and Resource "Destruction." Commercial logging in the Douglas-fir Region began in the late 1700s and accelerated rapidly after 1848, following the discovery of gold in California. At various times logging has been principally directed toward the construction of homes and communities; the expansion and maintenance of railroads; the mining, tannin, and fuelwood industries; and the manufacturing of paper products. Clearcut logging, broadcast burning, and tree planting methods developed over the past 100 years can be effectively used to mimic prehistoric patterns of forest fires, landslides, volcanic eruptions, and windstorms. Wildlife populations that have adapted to these patterns over past centuries and millenia can also be encouraged by the systematic transformation of currently fragmented, diseased, or otherwise degraded stands into proven historical patterns of reforestation and revegetation. Based upon current evidence, it is unlikely that the judicious continuation of these interrelated management strategies of clearcutting, broadcast burning, and tree planting will result in accelerated rates of extinction; in fact, it sems more likely that their continued use can effectively maintain current populations of most forest wildlife species and assist in planned reintroductions of extirpated species—both important facets of President Clinton's commitment to "reconstructing past environments."

4. Cultural and Biological Forest Dynamics. The forests of the Douglas-fir Region are the expressions of thousands of years of changing human values, catastrophic events, and the cumulative actions of resident families and native animals. Change is, has been, and always will be, constant. The efficient management of change requires an educated and involved public.

As laws, values, land ownership, vegetation patterns, and human populations change, a flexible management strategy—driven by information regarding the magnitude and importance of such changes—must be developed. A combination of *proven* adaptive methods, new information, changing alternatives, evolving options and local consensus can be used to implement effective and enlightened resource management strategies over time.

Currently perceived problems regarding the possible extinction of certain animals; the degradation of critical forest environments; and the reduction of anadromous fish populations in the Pacific Northwest do not seem to be directly related to historical methods of logging and reforestation, or to descriptions, locations, or claimed extents of "old-growth" forests. Rather, these problems are more closely related to increases in human populations; waste in the manufacture, distribution, and use of forest products; and constantly changing evaluations of natural resources and their uses. Expressions of these over-riding problems include recent large-scale urban, transportation, and agricultural developments; the damming of rivers and streams; overflowing landfills; superfluous mailings and packagings; and the "preservation" of select environmental conditions. By comparison, the cumulative effects of logging and reforestation on the environment are limited. There is no apparent urgency (from an ecological or historical perspective) to adopt any sudden or radical change in the way we manage our forests—and there is abundant evidence that many of our current practices are scientifically sound and biologically sustainable.

From a strictly historical perspective, the true nature of current problems in Pacific Northwest forests may have been best summarized by Hugh M. Raup:

> I think **the largest single need in American forest biology is the study of man's relation to forest land**. **Our foresters need to** understand much more than most of them do about purely human motives and aspirations with respect to the land. They ought to **become genuinely knowledgable and respectful of people's economic, social, and aesthetic institutions.**
> (Stout, 1981:93)

By ignoring the role of people in the environment, President Clinton's Plan for Northwest Forests will prove to be insufficient.. Current issues regarding regional forest management are serious and need to be examined closely, but there is little documentation that supports either the assumptions or the direction of this current effort.

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FOREST HISTORY AND FEMAT ASSUMPTIONS:
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President Clinton's 1994 Northwest Forest Plan
By

Bob Zybach[1]

(Earlier version submitted October 28, 1993)

This is a critical review of the Draft Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (DSEIS). I will specifically "address the adequacy of the statement" as it relates to "the merits of the alternatives discussed" in Appendix A of the DSEIS: Forest Ecosystem Management: An Ecological, Economic, and Social Assessment (FEMAT). I believe that this review contains new and corrected information that challenges basic historical assumptions of the 10 FEMAT alternatives presented to President Clinton.

Introduction

Baseline information for the history and current status (relative to past patterns and populations) of "old growth" in the Douglas-fir ("Spotted Owl") Region is inadequately and inaccurately presented in FEMAT. A result of using poor information about Douglas-fir fire and logging history is that many of FEMAT's primary predictive assumptions for "naturally functioning" ecosystems (DSEIS: 3&4-42); native wildlife populations; the significance, structure and extent of American Indian cultural landscapes; and cumulative effects of human (historical) ecology are wrong and misleading. The problem is compounded by public perceptions that FEMAT is based upon the "best technical and scientific information currently available" (FEMAT 1993: ii), and that "good science" has developed a comprehensive list of options for an "ecosystem approach" (FEMAT 1993: ii) to the management of federal (and other) forestlands in the Douglas-fir Region.

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[1]Bob Zybach is past Cultural Resources Management Forester for OSU Research Forests. He is currently completing his thesis, Human Influences on Forest Cover Patterns: Soap Creek Valley, Oregon, for a Master's of Arts degree in Interdisciplinary Studies at Oregon State University. Between 1969 and 1986 he owned and operated a family reforestation and tree farm busineess that completed over 80,000 acres of reforestation projects in western Oregon and Washington and employed an average of 25 to 30 full-time local residents.

My concerns with the DSEIS document are largely centered upon the historical inadequacies of Appendix A (FEMAT). A combination of faulty information and a lack of meaningful interdisciplinary review led to the predictive use (regarding regional resource degradation and the decline of select species) of a number of fundamentally flawed assumptions. The limited variety of management alternatives in FEMAT are a direct result of this process. Because many of the planning goals (e.g.; old-growth preservation, native wildlife diversity, direct control of the extinction process) are founded upon faulty historical assumptions, it is highly unlikely that they can be attained as described.

It will be demonstrated throughout this report that a wide range of legal and reasonable management alternatives were not considered during the FEMAT process. It will also be inferred that the 10 alternatives given to President Clinton were basically variations on a single three-part Northwest forest management theme: the best way to manage old-growth is to preserve it in refuges; the best way to protect native wildlife diversity is to preserve old-growth; the best way to delay or stop the extinction process is to delay or stop logging old-growth.

Although lack of accurate data has severely limited the description and variety of FEMAT alternatives, it was argued that this did not pose a serious problem during the actual process of selecting the best one:

> **While . . . missing information would** frequently **add precision** to estimates or better specify a relationship, the basic data and central relationships are sufficiently well established in the respective sciences that the new information is very unlikely to reverse or nullify understood relationships. Though **new information** would be welcome, it **is not essential to a reasoned choice among the alternatives as they are constituted.**
> (DSEIS: 3&4-2)

The problem with bad information, though, was during *construction* of the alternatives, not with the selection process. Accurate information is critically needed to develop a greater variety of more reasonable alternatives. Until that can be done, the selection—and/or attempted implementation—of any of the 10 FEMAT alternatives is premature and management success seems highly unlikely.

REVIEW METHODOLOGY

The plan's predictive assumptions are never clearly stated in the text, but must be inferred by careful reading of the DSEIS and FEMAT. The following criteria were used to isolate specific planning assumptions for further review:

The assumption must—

1) be fundamental to the predictive processes used to develop the 10 FEMAT management options;

2) withstand standard scientific review using known and available information; and,

3) be specifically associated with the human impacts, history, and population dynamics of Douglas-fir forests over the past 1000 years.

Using these criteria, I identified the four assumptions that are examined in this review. Steps used to further analyze each assumption include:

——— Brief analysis of potential significance of the assumption.

——— Location of specific quotes within the two documents that best illustrate the assumption.

——— Location of quotes or passages from reputable scientific or historical sources that provide a clearly different perspective or opposing conclusions.

——— Identification and citation of credible and available sources of information that challenge the assumption.

FEMAT HISTORICAL ASSUMPTIONS

These assumptions form the basis for many of the current ecosystem assessments and "long-term" species viability projections made during the FEMAT process:

1. **The "Blanket of Old-Growth" Myth.** *At the time of European settlement the Douglas-fir Region was a blanket of trees, 40 to 60 percent of which existed in stands 200 years or greater in age.*

2. **Cultural Landscapes and Succession Theory.** *Before the time of European settlement, American Indians in the Douglas-fir Region lived in a "naturally functioning" environment that can be described in terms of regional "fire cycles" and forest plant succession.*

3. **Logging History and Resource "Destruction."** *Since the time of European settlement, logging in the Douglas-fir Region has destroyed or degraded many of the natural and cultural values associated with "native" "old-growth" forests; effects that have been exacerbated by standard "clearcut" harvest methods and industrial reforestation practices.*

4. **Cultural and Biological Forest Dynamics.** *Current laws, ownerships, and values in the Douglas-fir Region are likely to remain constant for the next 100 years; "early seral stage" patterns of vegetation have remained constant (or increased in extent) during the past 100 years.*

SOURCES OF INFORMATION

The scientific and historical information used to identify and analyze these assumptions is from a wide variety of sources and disciplines. A key criterion for selection of this material is that it is publicly available and can be readily obtained with reasonable effort.

Methodologies used to locate Northwest forest history information, standardized formats in which such information is commonly found, and specific examples of identification, location and potential forest management uses of historical information are listed in an earlier report commissioned by the Coastal Oregon Productivity Enhancement (COPE) program (Zybach, 1992). The geographical focus of the COPE report is two tributaries of the Alsea River in Lincoln County, Oregon, but the research methodologies and the general locations, types, sources, and uses of local forest history information were intended to be of regional value. The following historical periods and corresponding types and sources of information are summarized (or derived) from the report:

I. *Prehistoric Information (10,800 B.C. to 1774 A.D.).* This period is bounded by the termination of Bretz Flood events during the last Ice Age and by Spanish and British explorations of the Pacific Northwest between 1774 and 1778. These visits resulted in the first publicly available written descriptions and maps of the peoples, places, and forests of "New Albion." Other sources of information, however, can also be used to develop sophisticated insights into the specific and regional locations of prehistoric people, animals, tree species and plant specimens through time. The scientific need for prehistoric information is illustrated by the following statement:

> The average of centurial-low (average of the lows that occur in 100-year periods) coverage by late-successional forest is defined as setting the lower bound of the "typical" range. **There is no data from which to estimate the average low for the preceding 10 centuries.** Consequently, **this value was estimated based on the subjective opinions of the ecosystem experts.** The Forest Ecosystem Management Assessment Team hypothesized that **the average of low amounts might be about 40 percent** coverage by late-successional forests, with lower values expected for individual provinces.
> (DSEIS: 3&4-34)

Abundant data exists. Sources of information for prehistoric times include pollen fossils, archaeological records, ethnographies, tree rings, and analyses of relict plant populations (including old-growth trees). Techniques for analyzing information from these sources have been used and scientifically verified for over 50 years. Good sources of regional data include Boyd (1986), Burke (1979), Graumlich (1987), Gray (1990), Hansen (1947), Hermann (1985), Heusser (1960), Shinn (1977), Starker (1939), and Teensma (1988). Of specific value is a report made in response to a 1989 request from Oregon Congressman Bob Smith to Forest Service Chief Dale Robertson, Trends In Amount Of Old-Growth Forest For The Last 1000 Years In Western Oregon And Washington (Henderson, 1990).

> **Our knowledge** of the [Olympic Peninsula] fire history **increases greatly about 1000 years ago.** Prior to that time we can only speculate about fires, based on evidence such as charcoal preserved in bogs and our knowledge of different tree species. **For the period of the past 1000 years we can study living trees** (Douglas-fir and western redcedar both live to over 1000 years) **and refer to historical records to construct a much more detailed picture** of the fire history.
> (Henderson, et al. 1989: 12)

Henderson's analysis of fire history records for the Mt. Baker-Snoqualamie and Olympic National Forests reveals a 1000-year trend in the amount of old-growth that "appears to be relatively stable over a long period of time" (1990:2). His estimate for the year 2000 is a 40% cover of old-growth for both forests, for example; a number that exceeds the *average* of his projections for the same areas during the centuries between 1300 and 1800 A.D. His estimates of old-growth cover for three western Washington and five western Oregon National Forests over the past century show *increases* in post-settlement old-growth that peak in the 1950s, during which time increased logging levels, fire, and wind resulted in sharp decreases in old-growth inventories (Henderson 1990:5). This information indicates two important points:

1) old-growth has significantly increased in quantity for some areas *following* settlement; and,
2) something happened around 1750 that precipitated a significant amount of reforestation and/or afforestation in the spotted owl region.

Franklin and Hemstrom (1981: 212-229) reported finding several widely-separated stands of Douglas-fir with an age of about 500 years. They speculated that widespread "major fires" likely occurred throughout the region 500 years ago, or about 1500 A.D. Henderson (1993: personal communication) reports an extensive age class dating to probable fires in southwest Washington between 1668 and 1701. Zybach (1988) provides evidence of a series of catastrophic fires in Oregon Coast Range forests between 1770 and 1933. Maps of these stands and fires would provide a good starting point for further "estimating the average centurial low" of regional "late-successional" Douglas-fir forestlands for the 15th through 20th centuries. Information gleaned from other referenced sources would add significant additional "data from which to estimate" past conditions. More refined tree ring studies, pollen profile analyses, and interpretations of archaeological resources will add certainty to predictions of prehistoric conditions and populations.

II. *Early Historical Information (1778 to 1859).* Information from this period is particularly important because it includes the "white settlement" and "prelogging" time periods specifically used to model the 10 preservation alternatives presented to President Clinton. These are the "native forests" in their "naturally functioning ecosystem" conditions that were evaluated for each alternative on the basis of "an expected likelihood of achieving long-term past conditions" (FEMAT: S-8).

Information from this time precedes living memory and most photographic records. In addition to sources already listed, qualitative descriptions of Northwest peoples, trees, and animals for this period have been recorded by a number of reliable journalists and correspondents, including Robert Haswell in 1788; Lewis and Clark, 1805-06; Alexander Henry, 1812-13; David Douglas, 1825-26; and the Wilkes Expedition in 1841. State and local histories round out written accounts of the region and provide specific references to other resources.

From a forestry and wildlife habitat perspective, the most important source of information from this period may be contained in the maps and notes of the General Land Office surveys that began in 1851. These surveys divided the Pacific Northwest into square townships of 36 square miles each. Trees were systematically identified by species, measured for diameter, and mapped at half-mile intervals along six-mile-long transects. Understory species, human developments, crops, and general landscape features were also routinely described in accordance with specific instructions, (Minnick n.d.: 221-311). In addition to qualitative data, quantitative interpretations of the surveys can be derived by a number of methods. A standard reference for original land survey analyses is Bourdo [1956]. These surveys have been used for a number of years to research forest conditions in early historical times. Examples of this work in the Douglas-fir Region include Benner (1991), Habeck (1961), Johanneson et al. (1971), Teensma et al. (1990), and Thilenius (1964).

III. *Recent History (1860 to 1945).* This time period includes the critical "turn-of-the-century" change from natural forest seeding to early conifer plantations. Stands established subsequent to settlement—due to the suppression of Indian burning, the introduction of plows and thousands of grazing animals, the virtual elimination of large carvnivores, and the fencing of open lands—have all been modified by human actions. These are the current stock of "middle" and "late- successional" stands being groomed to become the next generation of old-growth.

Information from this time is readily available, but generally neglected or avoided; FEMAT uses virtually no information from this period, for example. Living memory (Zybach, 1992), early aerial photographs (Bennet and Stanbury 1937), scientific research (US Geological Survey 1900), and cruise, construction, sales, and tax records from regional railroad logging operations (Sandstrom, personal communication 1993) can all be used to record changes in wildlife habitat patterns and timber volume densities for these times.

The memories of our older foresters, loggers, wildlife managers, farmers, scientists, and other observers are the most fragile and threatened source of information for this period (see Meany 1935: *i*, regarding the relative importance of "men [who] still live who have **participated** in the period"). They are also our most *valuable* source of information. These are the people that can locate maps, sites, photographs, reports, and other knowledgable individuals capable of describing past forest conditions. An active program of systematic oral history gathering—such as existed during the Works Projects Administration of the 1930s—is critically needed if we are to efficiently engage in the "maintenance and/or restoration of habitat conditions" (FEMAT: iv). Such a program could also provide a number of important rural jobs for displaced timber workers.

IV. *Modern History (1946 to 1993).* Finally, it is the period following World War II that logging (especially clearcut logging) began liquidating huge stands of large trees and turning them into houses financed by "G.I. Loans." Information from this period is everywhere. Videos, computers, satellites, and other modern technologies have all had a hand in recording the changes in Douglas-fir forests over the past 50 years.

It is important to realize that trees less than 300-350 years old that were logged after 1946 were only "second growth" at the time of settlement. Their subsequent development into commercial old-growth timber may well have been a function of settlement, rather than by any other "naturally" occurring event. An inventory of stump rings of trees cut during the past 50 years should be used to further refine and analyze the cumulative impacts of logging and fire suppression upon our native forests—including the amount of old-growth decline that can be attributed to modern logging practices. Such an inventory could be easily and cheaply performed by unemployed rural families or local schoolchildren.

The memories, knowledge and skills of forest workers from this period are needed for both research purposes and for plan implementation projects. The reconstruction of past environments will require many of the same techniques that have been used in logging and reforestation activities for the past 50 years. The revegetation of early historic wildlife habitats—including savannahs, prairies, meadows, and young stands of trees—should produce large amounts of revenue from the sales of trees that have afforested and reforested these environments since the time of settlement. From an historical perspective, workers will not have to be retrained or relocated so much as they will have to be redirected.

1. The "Blanket of Old-Growth" Myth. *At the time of settlement the Douglas-fir Region was a blanket of trees, 40 to 60 percent of which existed in stands 200 years or greater in age.*

One of the most common and most important assumptions driving the list of FEMAT alternatives is the idea that an ancient, vast, contiguous forest of diverse tree and animal species existed along the western edge of the Oregon Country (originally the land between California and Alaska that drained into the Pacific Ocean) at the time of settlement by white people. Charles Meslow, who also co-authored the Interagency Scientific Committee's Conservation Strategy For The Northern Spotted Owl, is quoted in at least three portions of FEMAT regarding the extent of "old-growth" forests at the "time of [European] settlement." The quote seems to best summarize the FEMAT team's position, both by it's consistent use as a source of reference and by the basic focus of the planning alternatives:

> At **the time of settlement** . . . the Northwest was **blanketed with forests**. Perhaps **60 to 70 percent of that forest was old growth**. . . over **200 years of age**. Those extensive stands of old forests are **mostly gone now**. Essentially all old forest has been cut on the private lands. . . on National Forest or BLM lands, old growth constitutes from . . . 10 percent to perhaps 50 percent of the current area. . . of the old forest has been dramatically reduced—what remains has been highly fragmented . . . Even on public lands, **cutting has created so many holes in the blanket** of the forest, that the fabric holding the segments together has been severed. We routinely find **that the old growth forest exists mostly as islands**. (FEMAT: II-63; VII-2; Appendix VII-A: 79)

There is no historical or prehistorical evidence that validates these claims. It is highly unlikely that such an environment has ever existed since people first settled in this region, at least 11,000 years ago. Prior to that time—for a period of nearly 2,000,000 years—much of the region was covered by great sheets of ice, or subject to periodic catastrophic flooding (Allen and Burns 1986: 79-81). Abundant pollen samples from grasses, white oak, and Douglas-fir that represent virtually all forest evolution since the last ice age (about 12,000 years of time) indicate the presence of frequent and periodic fires (Hansen 1947 and Heusser 1960). These fires produced a landscape that was highly varied in structure and age. Mapped patterns of age classes for the Oregon Coast Range (Teensma et al. 1992) demonstrate a catastrophic fire history that extends back to 1650 (200 year age class in 1850), at least. These patterns are apparent in **Fig. I,** which shows forest vegetation types for Oregon in 1914 (Zybach 1993c: 6-9). The same patterns are shown in greater detail as the backgrounds to **Fig. II** and **Fig. IX**. The key to these patterns is described in the text for **Fig. IX**.

Following establishment of the 10 alternatives, the DSEIS modified the FEMAT numbers dramatically by subtly changing the land base description and by adding "mature" second growth trees to Meslow's 60 to 70 percent equation with the arbitrary assumptions that "average regional natural fire rotation was about 250 years" and that "late successional" trees could be as young as 80 years old :

> **Assuming that** the average regional natural fire rotation was about 250 years for severe fires (those removing 70 percent or more of the basal area), **then 60 to 70 percent of the forest area** of the region was **typically dominated by late-successional** and old-growth forests, depending on the age which "mature" forest conditions develop (assume a range of **80 to 100 years**). (DSEIS: 3&4-32)

The addition of "mature" 80-year-old forests to the statistical mix significantly alters the assumptions used by Meslow and others to develop the FEMAT alternatives. There is clearly a difference in aesthetics and wildlife habitat conditions between landscapes that are "blanketed" with 60 to 70 percent 200-year-old (and older) trees and landscapes in which "the forest area" is 60 to 70 percent 80-year-old (and older) trees. The ambiguity of these differing descriptions is ignored in the DSEIS text.

An additional problem with this alteration is that it is based upon a belief in "fire cycles." The methodology used to arrive at these numbers assumes that "catastrophic fires are located randomly," among other assumptions (Booth 1991:25). Because of: topographical variances; changing climate patterns; the consistancy of human settlement (and land use) patterns over the past 10,000 years; the seasonal and geographical predictability of lightning fire occurrences;— and other factors, as well—there is little room for randomness in the spatial or temporal location of catastrophic fires, making this a measure of dubious value:

> The magnitude, character, and organization of these historical changes lead to the concept of a *fuel cyle*. And from this concept comes another, the *fire cycle*. As their names imply, for these concepts historical changes are considered to be regular and at least roughly periodic. In fact, they are neither. In general, only where humans intervene with fire and fuel management practices is there an approximate cycle or an apparent periodcicity. . . The fuel cycle and fire cycle concepts are convenient ways to characterize the fact that fuels and fires have histories, but erroneous designations of how those histories evolve and interrelate. (Pyne 1984: 103-106)

Because the DSEIS description of the age and extent of forests in the Douglas-fir Region is based upon an assumption of little proven value, and because it is significantly different than the biological description ("blanket" vs. "area"; "old-growth" vs. "late successional") used during the FEMAT process, it should be necessary to thoroughly review the value and accuracy of these assertions before selecting the size and location of additional forest reserves.

A basic point of this review is that it is unnecessary to resort to controversial methods, arbitrary assumptions, or ambiguous assertions in the reconstruction of historical vegetation patterns—the historical record is already sufficiently clear and available for far more accurate descriptions than those used by the Clinton scientific team.

Fig. I. 1914 Oregon State Forester's Map w/John McWade, November 25, 1987. (Zybach, 1988: Appendix B:1)

THE TIME OF SETTLEMENT

Although it is referenced repeatedly in FEMAT, the "time of settlement" is never stated. Related words—such as prehistoric, presettlement, and prelogging—are also used in FEMAT and the DSEIS without clarification. It is important that specfic points in time be discussed when dealing with 100-year plans and 200-year-old trees. The time of settlement (by whites) for Astoria was either 1805 or 1810; for Vancouver, 1825; for Champoeg, 1828; for Oregon City, 1843. The Great Migration over the Oregon Trail took place in 1843; Oregon was separated from Britain and California from Mexico in 1846; California became a state and Oregon became a territory in 1849. For the Douglas-fir Region, time of settlement can reasonably be argued to be almost anytime between 1805 and 1859.

For practical purposes, the early 1840s in general and 1840 in particular are reasonable choices as regional markers. Living trees 200 years old when the first pioneers arrived over the Oregon Trail, are now 350 years old. Fifty-year-old second growth is now 200 years old. By contrast (and to add context) the 1830s were a time when many native families and communities were destroyed by diseases; the 1850s saw established Northwest logging, milling, agricultural, and political industries respond to the needs of booming mining towns in California and to growing urban populations in the Willamette Valley.

Meslow's use of a 200-year age class for defining "old-growth" stands of Douglas-fir is often accepted in scientific and public circles—and is the definition that I will use through the remainder of this review—but it doesn't always match the definitions given in the FEMAT Glossary. Descriptions of "classic old growth" (IX-5), "old-growth conifer stand,""old-growth forest," "old-growth stand" (IX-24), and the five "seral stages" (IX-31) add a variety of physical characteristics to basic age class definitions, but these added structural components seem more often associated with specific conifer species that have been topographically isolated over time than with stand age. For that reason, there seems little need to add most of these details to regional-scale discussions of managing older trees.

Examples of "structurally-defined" old-growth (big trees, multilayered canopy, coarse woody debris, snags, etc.) populations are usually associated with remote, broken terrains and limited human contact. Specific examples include the Siletz Gorge (Lincoln and Polk Counties, Oregon), Vaughn Creek (Coos County, Oregon), the H.J. Andrews Experimental Forest (Lane County, Oregon), the western Olympic Mountains (Clallam and Jefferson Counties, Washington), and the northern Cascades (Washington State). Areas more frequently occupied—or topographically more "in the line of fire" of periodic windstorms or human burning practices—have significantly less snags and coarse woody debris at 200 years of age than their more isolated counterparts.

Current defintions of "old-growth"—including detailed descriptions of the structure and extent of snags, coarse woody debris, and multi-layered canopies—simply do not fit most of the Douglas-fir Region during the past several centuries. Much of the land was open savannah and prairie, many of the older forests had little underbrush and few snags, and much of the landscape was covered with trees younger than 200 years—and many of these trees were younger than 20 years.

Finally, it is important to provide a precise year (at least) to the time with which we compare historical changes, whether those changes are expressed in terms of tree age, species extinction, aesthetics, or population numbers. Catastrophic events, such as forest fires, windstorms, volcanic eruptions, floods, and insect outbreaks, have the proven ability of removing vast tracts of older trees in a matter of moments, hours, or months. Measuring such things as percentages of older trees or reductions in habitat must consider the times of specific events in order to be credible or valid.

THE ANCIENT FOREST

Although Meslow does not refer to the old-growth as "ancient forest," it is a term that is employed consistently throughout the document, often in reference to old-growth; for instance, page II-2 of FEMAT states that "**where many large old trees remain** in the overstory, **these stands are** usually referred to as **'old growth'** or **'ancient forests'**." This definition does not make the FEMAT Glossary, however, for either term.

No information is provided as to who "usually" uses these terms, or when (or how) this definition came to be, but there is a critical need to understand what is meant. This need is exemplified by MacColl's observation (FEMAT Appendix VII-A: 79) that "a century of **indiscriminate logging has eliminated all but 13 percent of the ancient forest** in western Oregon and Washington," and by Sher's claim:

> I have for six years now represented national organizations whose . . . **millions of members** around the country **are all terribly concerned about the future** of this region **and the ancient forests.**
> (FEMAT Appendix VII-A: 75)

For the purposes of this review, "old-growth" and "ancient forests" will both be defined as stands of trees older than 200 years (which can more precisely be defined as "older than 180 to 220 years of age").

THE BLANKET OF TREES

The assertion that western Washington, western Oregon, and northwestern California were cloaked in a "blanket" of trees at the "time of settlement"—no matter what age for the trees is given or implied—is clearly false. Even recent efforts to modify this assertion by key people in the FEMAT process are easy to disprove:

> **In the early part of this century** [1900], **most of the forested area west of the crest of the Cascade Range was covered by old-growth forests** consisting of Douglas-fir, western hemlock . . . and several other large, long-lived conifer species. **Most of these forests were probably more than 300 years old and many exceeded 750 years.**
>
> (Spies and Franklin 1988).

This statement is refuted by virtually all scientific and historical information available for the period of 1840 (settlement) to 1930 (early century). Pioneers settled in the Rogue, Umpqua, and Willamette Valleys precisely because of the lack of forests and the abundance of grass. Rivers and creeks draining the eastern slopes of the Coast Range and the western slopes of the Cascades into these valleys passed through miles of prairies, savannahs, ponds, swamps, burns, and young forests at that time. Pioneer landowners almost invariably picked the open ground first. A good summary of the settlement landscape is provided by Munger, a nationally recognized forest scientist whose career spanned "the early part of this century":

> Instead of finding an uninterrupted forest carrying 100,000 feet or more per acre reaching from the Cascades to the Pacific, the first settlers seventy-five years ago [1840] found in the valleys great areas of "prairie" land covered with grass, brakes or brush which were burned and kept treeless by the Indians, and mountain sides upon which forest fires had destroyed the mature forest and which were then covered by a "second growth" of Douglas fir saplings or poles. (Munger, 1916: 92)

The proof of Munger's statements is demonstrated by the illustrations on the following pages **(Figures II-VII)**, which show detailed late-1800 vegetation patterns for a significant cross section of landscapes within the current range of the spotted owl.

These color maps were first published in 1900 as part of Volume V of the 21st Annual Report of the US Geological Survey (USGS). They depict surveyed forest and settlement patterns for various mapped quadrangles containing federal timber reserves at the turn of the century. These maps are accompanied by detailed species composition and timber volume tables, on-site photographs, and qualitative descriptions of stand histories (USGS 1900:209-498) that further disprove the assertion that a blanket of trees covered the landscape during some early historical time.

These maps are only examples of the types of information routinely ignored or dismissed during the FEMAT process. These illustrations are included primarily because of their scale and the clarity with which they depict the forest mosaic for a significant "prelogging" portion of the Spotted Owl Region during the late 1800s:

Fig. II. *Western Oregon Index to Figures III to VIII (Scale 1:2,000,000).* The base map for this index is a computerized Geographic Information System (GIS) generated map of 1914 vegetation patterns for Oregon, from 121 degrees longitude west to the Pacific Ocean. The base map was digitized in August, 1993 by Rich Crucchiola of the Oregon State GIS Service Center from the map photographed in **Fig. I.** The color key to these patterns is located with **Fig. IX.** The numbered red rectangles correspond to the following five quadrangle maps (**Figures III-VII**). A comparison of the quadrangle maps with the index will provide a general idea of forest changes between 1900 and 1915, as well as give some specific insights as to how the various maps were originally classified and typed. This map also shows the 36-square mile townships included in the original General Land Office surveys that began in 1851. The outlined township in rectangle No. 1 corresponds to the township in **Fig. VIII.**

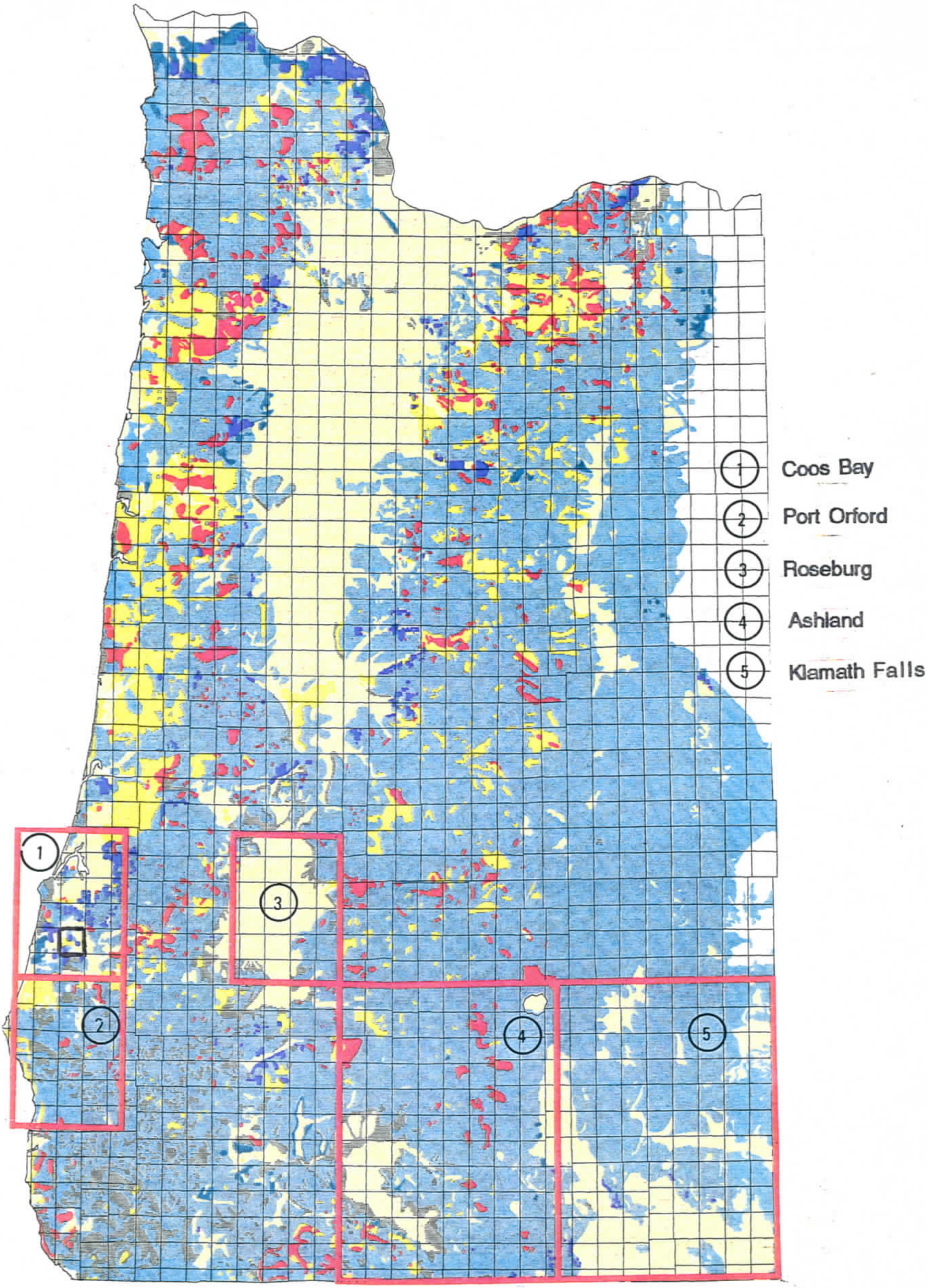


Fig. II. Index to 1900 USGS Oregon Timber Volume Quadrangle Maps. (Cruchiola and Zybach 1993). 1:2,000,000

Fig. III. 1895-96 Land Use and Timber Volume Patterns, Coos Bay.
(US Geological Survey 1900: Atlas Plate CXXVII). 1:250,000

Fig. III. *1895-96 Land Use and Timber Volume Patterns, Coos Bay, Oregon (Scale 1:250,000; original map scale is 1:125,000)*. This map depicts a portion of the Oregon **Coast Range** that was heavily logged between 1851 and 1890, and heavily burned in 1868. It also serves as an index to **Fig. VIII** in this series; depicted by the dark line around Township 28 South, Range 13 West of the Willamette Meridian (T. 28 S., R. 13 W.). **NOTE:** Numbers have been added to the legends of the quadrangle maps to aid in their analysis. The italicized description next to the number is quoted from the original map legend. The additional interpretation that follows the description is my own. This format will be used for all of the figures in this series, from III to VII.

1 *Cultivable land.* This is mostly former prairie land.

2 *Barren.* Coastal beaches and rock formations.

3 *Merchantable timber, 10,000 to 25,000 B.M. per acre.* This is mostly young trees, perhaps 20-80 years old.

4 *Merchantable timber, 25,000 to 50,000 B.M. per acre.* These are older trees, perhaps 40-100 years old.

5 *Merchantable timber, 50,000 B.M. and over per acre.* These stands are probably over 80 years old and contain any extensive stands of old-growth in the area. They include about 10% of the total area.

6 *Logged areas restocking.* These stands are less than 50 years old. For the most part they probably contain naturally seeded trees of a species mix that is very similar to the native stand that had been harvested.

7 *Burned areas restocking.* These stands are less than 30 years old. For the most part they probably contain naturally seeded trees of a species mix that is very similar to the native stand that had been burned.

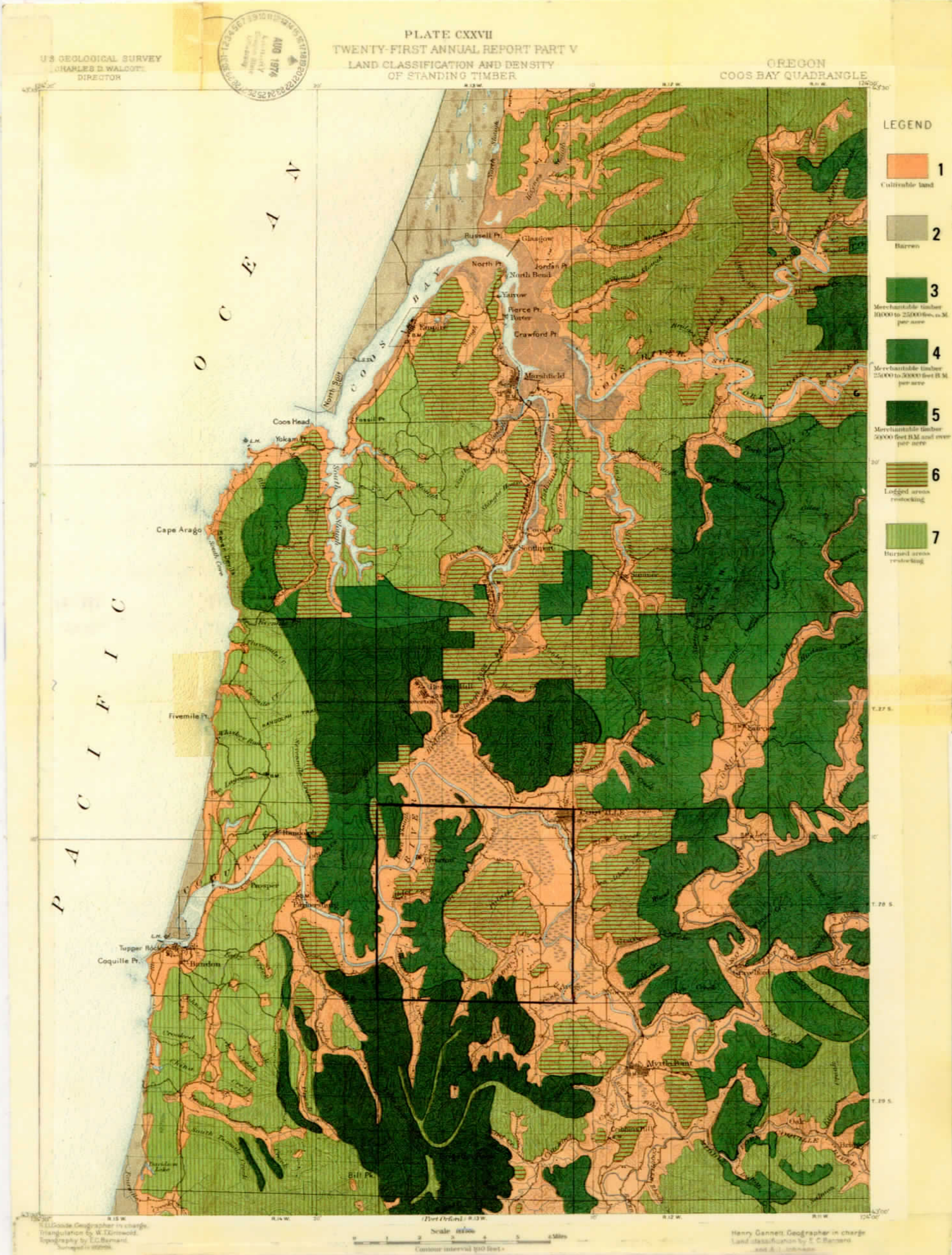


Fig. III. 1895-96 Land Use and Timber Volume Patterns, Coos Bay.
(US Geological Survey 1900: Atlas Plate CXXVII). 1:250,000

Fig. IV. *1897-98 Land Use and Timber Volume Patterns, Port Orford, Oregon (Scale 1:250,000; original map scale is1:125,000).* This map depicts a portion of the **Klamath/Siskiyous** that was heavily burned between 1868 and 1898.

1 *Cultivated land.* This is mostly former prairie land.

2 *Grazing land.* This is also mostly former prairie land.

3 *Burned areas restocking.* These stands are less than 30 years old. For the most part they probably contain naturally seeded trees of a species mix that is very similar to the native stand that had been burned.

4 *Merchantable timber, 10,000 to 25,000 B.M. per acre.* This is mostly young trees, perhaps 20-40 years old.

5 *Merchantable timber, 25,000 to 50,000 B.M. per acre.* These are older trees, perhaps 40-80 years old. They include about 40% of the total area.

6 *Merchantable timber, 50,000 B.M. and over per acre.* These stands are probably over 80 years old and contain any extensive stands of old-growth in the area. They include about 1% of the total area.

7 *Barren land.* Coastal beaches and rock formations.

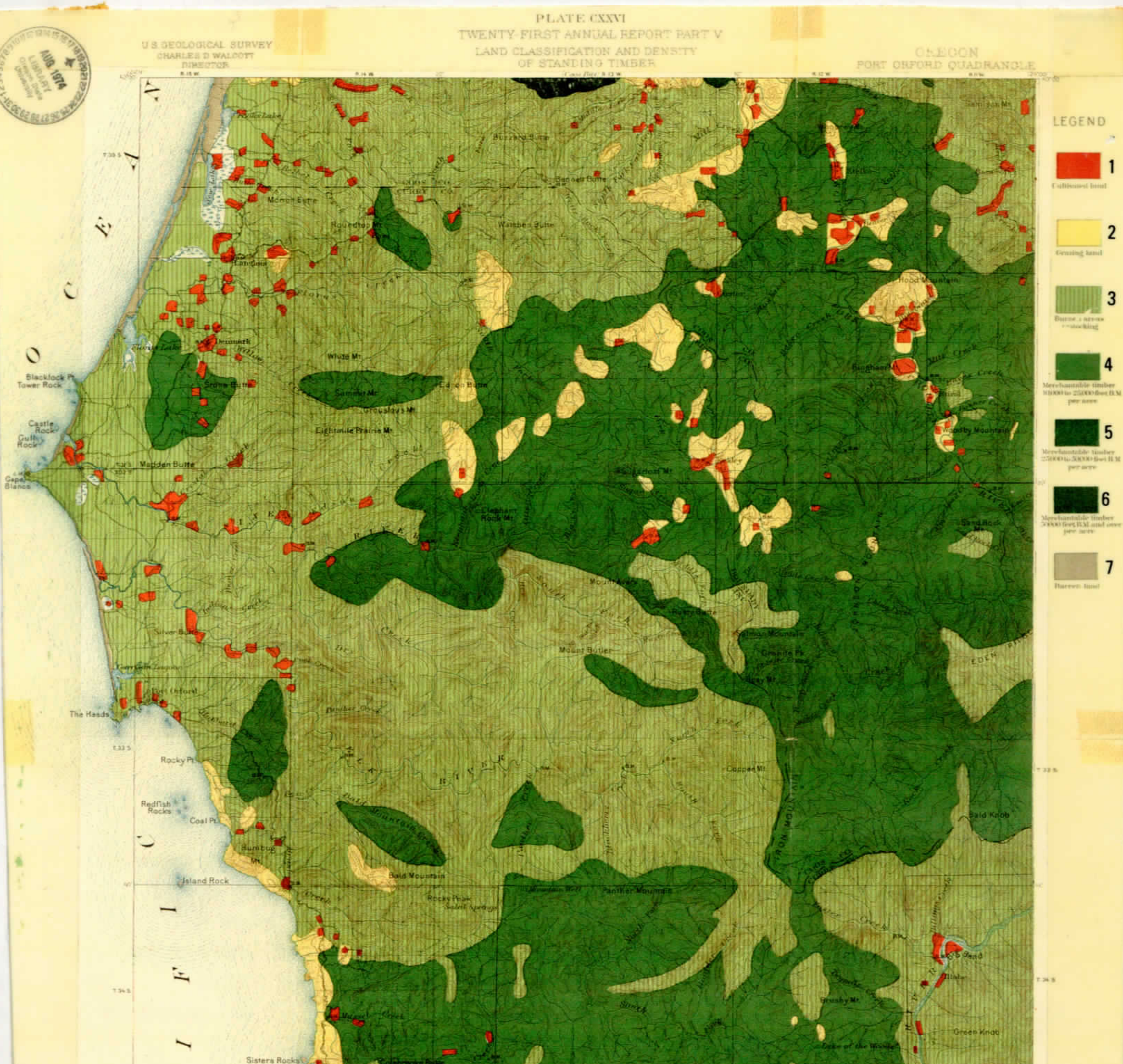


Fig. IV. 1897-98 Land Use and Timber Volume Patterns, Port Orford.
(US Geological Survey 1900: Atlas Plate CXXVI). 1:250,000

Fig. V. *1894-95 Land Use and Timber Volume Patterns, Roseburg, Oregon (Scale 1:250,000; original map scale is 1:125,000).* This map depicts a portion of the **Interior Valley** complex that extends northward from the Sacramento Valley of northern California to the Puget Lowlands of southwestern Washington. E.C. Barnard described this quadrangle in 1895:

> Little of this quadrangle has been cleared, either for settlement or by lumbering operations. The cleared land consists entirely of land which was originally prairie. Lumbering has been carried on upon a small scale and mainly, if not entirely, to supply local needs.
>
> The merchantable timber standing upon this area is estimated at 1,766 million B.M., nearly all of which is red fir [Douglas-fir]. The average stand of timber upon the timbered area is about 10,000 B.M. per acre.
> (USGS 1900:577)

1 *Cultivated land.* This is mostly former prairie land.

2 *Grazing land.* This is probably a mix of oak savannah and former prairie land.

3 *Woodland (not mechantable).* This is probably a mix of oak savannah, madrone, and scattered mixed conifer stands.

4 *Merchantable timberland.* Averages 10,000 to 20,000 board feet per acre. This totals about 30% of the area, a fraction of which includes virtually all of the coniferous old-growth in the quadrangle.

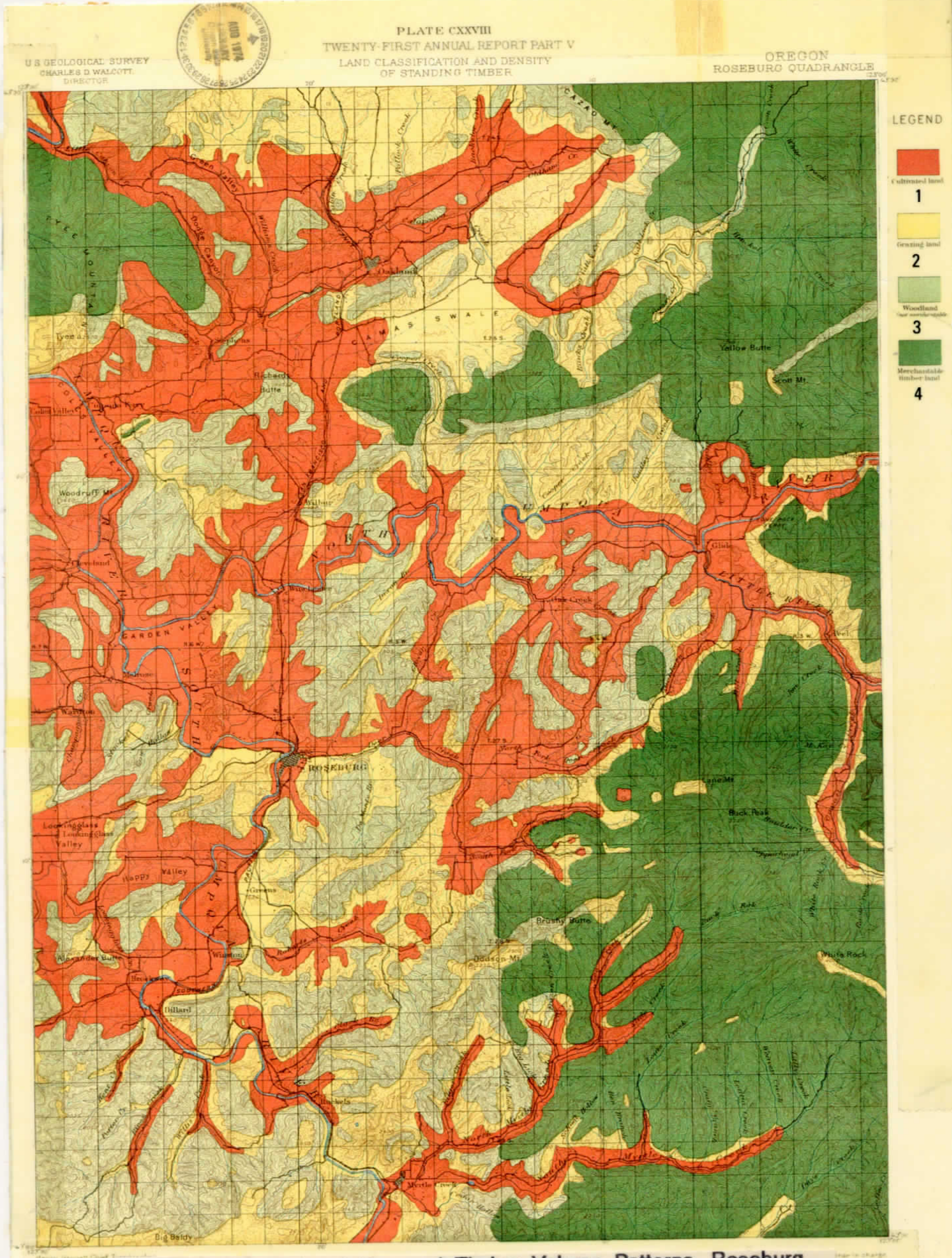


Fig. V. 1894-95 Land Use and Timber Volume Patterns, Roseburg (US Geological Survey 1900: Atlas Plate CXXVIII). 1:250,000

Fig. VI. *1886-87 Land Use and Timber Volume Patterns, Ashland, Oregon (Scale 1:500,000; original map scale is 1:250,000).* This map depicts an area of the **West Cascades** that intersects the Klamath and Siskiyou Mountains and the eastern Cascades. This quadrangle includes the Ashland Reserve, which was created to preserve the water quality and volume of Ashland Creek, which was the primary water supply for Ashland at the turn of the century.

1 *Merchantable timber less than 2000 feet B.M. per acre.* These areas probably contain very young stands of Douglas-fir and ponderosa pine, or older stands of lodgepole pine or mountain hemlock.

2 *Merchantable timber 2000 to 5000 feet B.M. per acre.* These stands buffer the smaller commercial stands and are probably a little older, a little thicker, or are growing on slightly better sites.

3 *Merchantable timber 5000 to 10,000 feet B.M. per acre.* This is probably mostly young trees, perhaps 20-40 years old.

4 *Merchantable timber 10,000 to 25,000 feet B.M. per acre.* These are older trees, perhaps 40-80 years old.

5 *Merchantable timber 25,000 to 50,000 feet B.M. per acre.* These stands are probably over 80 years old and may contain some extensive stands of old-growth. They include about 10% of the total area.

6 *Merchantable timber 50,000 feet B.M. and over per acre.* These are almost certainly old-growth, totaling about 1% or 2% of the total area.

7 *Deforested areas and areas covered with brush-growth through natural causes.*

8 *Deforested areas and areas covered with brush-growth as the result of forest fires.*

> Areas classed as "badly burned" consist of tracts on which the forest has been burned from 75 per cent and upward by fires whose origin lie within the time of the white man's occupancy of the region. (Leiberg 1900:474)

9 *Areas of bare rocks or pumice fields.*

10 *Areas non-forested as marshes, meadows, and agricultural lands.* These are probably areas of heavy prehistoric use, reflecting periodic fires and access to water and riparian vegetation.

Fig. VI. 1886-87 Land Use and Timber Volume Patterns, Ashland (US Geological Survey 1900: Atlas Plate LXXI). 1:500,000

Fig. VII. *1885-87 Land Use and Timber Volume Patterns, Klamath Falls (Linkville), Oregon (Scale 1:500,000; original map scale is 1:250,000).* This area depicts a portion of the **East Cascades** that lies within the range of the spotted owl.

1 *Areas non-forested as marshes, meadows and agricultural lands.* Likely locations of heavy prehistoric use and occupation.

2 *Merchantable timber less than 2000 feet B.M. per acre.* These areas probably contain very young (or very scattered) stands of ponderosa pine, or older stands of lodgepole pine or mountain hemlock.

3 *Merchantable timber 2000 to 5000 feet B.M. per acre.* These stands buffer the smaller commercial stands and are probably a little older, a little thicker, or are growing on slightly better sites.

4 *Merchantable timber 5000 to 10,000 feet B.M. per acre.* This is probably mostly young trees, perhaps 40-80 years old. Other possibilities include scattered older trees, mostly ponderosa or sugar pine, or slower growing species, such as noble fir or (in this region) Douglas-fir.

5 *Merchantable timber 10,000 to 25,000 feet B.M. per acre.* These are older trees, perhaps 80 to 160 years old, or scattered stands of old-growth ponderosa or sugar pine, totaling about 10% of the total area.

6 *Areas carrying chiefly brush growth.*

The information provided from these maps indicate that, at the time of settlement, significant portions of the spotted owl region contained relatively small amounts of old-growth forest; perhaps as little as five to 10 per cent of the total landscapes shown contained tree age classes that exceeded 200 years in 1900. Although a number of other parts of the region carried greater volumes and older trees, Leiberg's summary of age classifications for much of the pre-1900 southern Oregon area are reasonably specific:

> **The age of lumber utilized in sawmill consumption varies from 100 to 350 years. Most of the yellow [ponderosa] pine falls below 175 years; the higher limit is reached chiefly in the sugar pine.** Most of the sugar pine in the region is of great and mature age. Comparatively little **red fir [Douglas-fir]** is sawn. It **varies in age from 100 to 500 years**, and some of the very large individuals seen were doubtless even older. The **noble fir** and white fir of mill-timber size **varies in age from 100 to 350 years**, most of it falling below 180 years. The **alpine hemlock** of mill size **runs from 80 to 250 years**, 120 to 140 years representing the age of the bulk of the standard growth. The **white fir**, with sufficient clear trunk development to come within the limit of those estimates, **varies in age from 75 to 120 years.** (Leiberg 1900: 274)

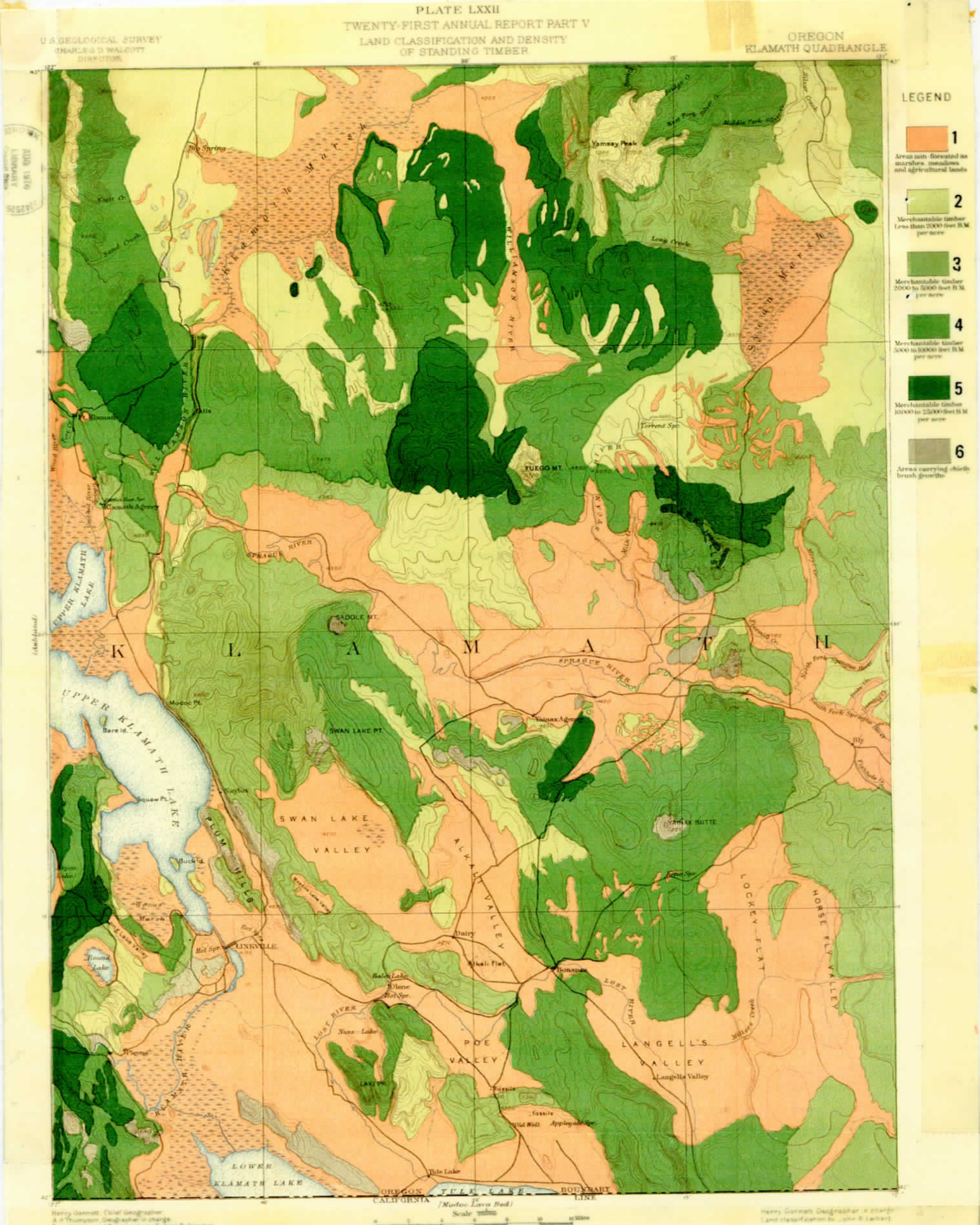


Fig. VII. 1885-87 Land Use and Timber Volume Patterns, Klamath Falls (US Geological Survey 1900: Atlas Plate LXXII). 1:500,000

A brief interpretation of Lieberg's numbers reveals a somewhat species-specific record of prehistoric fires:

1300 to 1550	Douglas-fir
1550 to 1650	Douglas-fir, sugar pine, noble fir
1650 to 1750	Douglas-fir, sugar pine, noble fir, mountain hemlock, ponderosa pine
1750 to 1825	Douglas-fir, sugar pine, noble fir, mountain hemlock ponderosa pine, white fir

As further evidenced by the maps of these forests, the southwestern Oregon landscape was highly variegated a century ago. Definitions of historical native wildlife habitat and estimates of indigenous wildlife populations during the 1800s need to consider the vast amounts of prairie and savannah that were quickly converted to farms, pastures, and urban developments between 1840 and 1890. While Leiberg's age class and timber volume summaries are limited to southern Oregon, other contemporary age class estimates for the region support his numbers:

> **Many of the virgin forests** of western Oregon and Washington **are composed of trees upward of six feet in diameter and 250 feet high**, with occasional trees thirteen feet in diameter and over 300 feet high. **The best stands are exceedingly dense, carrying twenty-five to fifty trees per acre over four feet in diameter** and yielding over considerable areas two hundred thousand board feet per acre. **Most of the so-called virgin stands are not over 350 or 400 years old, and trees over six hundred years old are quite uncommon.**
> (Munger, 1916: 92)

Based upon my own research, I would estimate that the "blanket" (extent) of Douglas-fir trees is at least 10% to 20% larger now than it was 150 years ago, with most of the increase due to the incremental afforestation of interior valley margins and forest brakes, balds, prairies, savannahs, and meadows.

Whether "60 to 70 percent" of the presettlement landscape was forest over 200 years of age, or not, is another question. Based upon information that is currently available, I would estimate a number much closer to 16% than to 60%. The percentage would vary significantly depending upon the boundaries of the surveyed area and the month and year for which the survey was constructed, i.e; the months before and after the Tillamook Fire of 1933, the Columbus Day Storm of 1962, and the eruption of Mt. St. Helens in 1980 would all show measureable differences in the percentage of land area that contained enough 200 year old trees to be classified as "old-growth."

Finally, there is the alarm that the blanket's "fabric" is being "severed" to such a degree that: "We routinely find that the old growth forest exists mostly as islands"; Meslow seems to suggest that animals formerly inhabiting a huge, contiguous forest have been isolated into tiny fragments of their former range. Compare his description of 1990s Douglas-fir old-growth islands to this 1845 description of "green islands" by Polk County pioneer, James Neall:

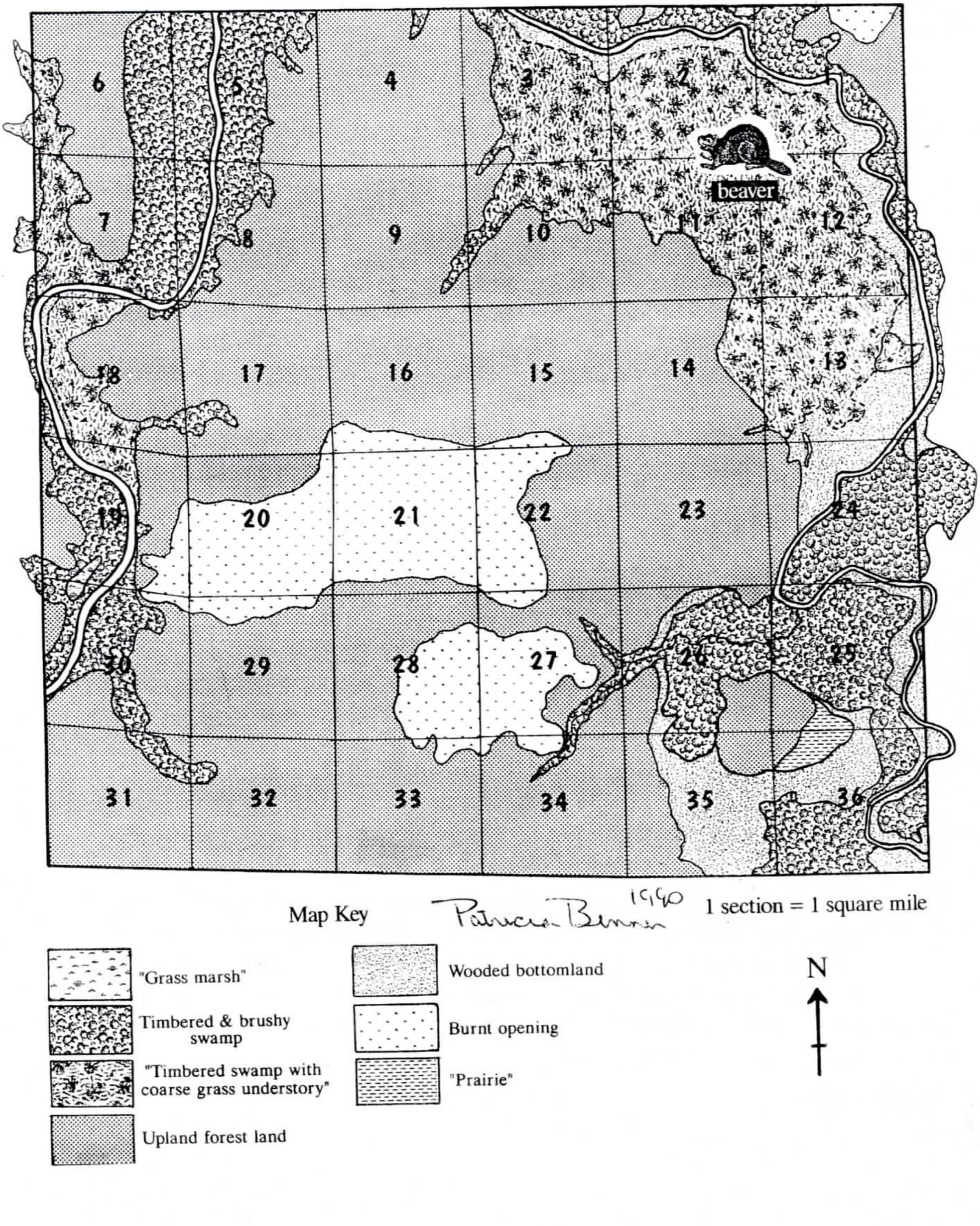
> The **leading features of the Willamette Valley and the Tualatin plains were peculiar and strange** to me as compared with any other country I had seen. **Among the striking peculiarities was the entire absence of anything like brush or undergrowth in the forests of fir timber** that had sprung up in the midst of the large plains, **looking at a distance like green islands** here and there dotting the vast expanse of vision. The plains covered with rich grasses & wild flowers looking like our vast cultivated fields, and where **the rolling foothills** approached the level valley these spurs **would be sprinkled with low spreading oak trees**, frequently **with a seeming regularity** that would seem unlike nature's doing, and at a distance **like orchards of old apple trees.**
> (Neall, 1977: 44)

The "peculiarities" noted by Neall applied to more than just the Tualatin and Willamette River basins; they also describe many other east slope Coast Range drainages and significant portions of the watersheds that drain the western slopes of the Cascades. An example of the types of agents that create "islands" in the landscape is provided by Benner **(Fig. VIII)**. Her map of 1857-1871 vegetation patterns for a township along the Coquille River in Coos County, Oregon shows a number of isolated vegetation types that have been bounded by fire, beavers, water, and topography. This pattern is indexed and updated in **Fig. II.** Of particular interest is the notion that Neall's islands of brush-free fir (and Benner's islands of other vegetation types) must have provided "desired" or "necessary" environment for native plants and animals:

> In larger burns, islands of timber along streams and in protected canyons often escape destruction. These supply seed to restock interior portions of the burn. Thus natural restocking following a single burn is the rule unless the fire be very large or severe. Each subsequent fire, however, greatly decreases the opportunity for natural reforestation. The interior islands of living trees, which escaped the first fire, are likely to be killed by the second, the existing seedlings are killed, and conditions made much less favorable for the establishment of seedlings from any seed that may reach the area. . . The effect of repeated fires on logged areas is similar to that in uncut forests.
> (Kummel, Rindt and Munger 1944:2)

Fig. VIII. 1857-1871 Coquille Vegetation Types: T. 28 S., R. 13 W. (Benner 1991: Fig. 3.2.2.3, pg. 3.2-22).

Coquille River Bottomlands & Surrounding Uplands
Reconstructed using the 1857-1871 Original Land Survey Notes
Township 28 South Range 13 West



Based upon the historical record and perceived biological need, it is clear that numerous "islands" of conifer should be created, managed, and accounted for. Perhaps a number of the islands identified by Meslow are relicts of processes other than logging and should be maintained and managed for wildlife habitat purposes. In any instance, such islands should reasonably be placed about the landscape in a pattern similar to that encountered in the 1840s if the planned objective is to create wildlife habitat conditions similar to those that existed at the time of settlement.

If we are not to manage for islands, then the "fabric" we are dealing with should be perceived as a "swiss cheese"-type of covering rather than any form of "tight-weave." This is the pattern that the native flying, swimming, and migrating animals have adapted to over the past several thousand years, and it is the type of pattern that must be considered within the range of management options, whether local or regional.

2. Cultural Landscapes and Succession Theory. *Before the time of settlement American Indians in the Douglas-fir Region lived in a "naturally functioning" environment that can be described in terms of regional "fire cycles" and forest plant succession.*

This is a two part assumption: 1) Vegetation in the Douglas-fir Region develops through a "series of [five] relatively transitory planned [sic?; plant?] communities that develop during **ecological succession from bare ground to the climax stage**" (FEMAT: IX-31); and 2) American Indians subsisted in ecosystems dominated by **"seral stage five"** (old-growth or "climax)") conifers. The question becomes: Upon what areas—if any—of regional watersheds were vegetation patterns changed or maintained through the practices of prehistoric and early historical families (i.e.; What areas of the region were incapable of attaining climax vegetation status because of periodic human actions)?

Of the lands that had not attained climax conditions by the time of settlement, how many were affected—and in what manner—by American Indian land management practices? While fully recognizing that indigenous people "were **active managers of the land; they used fire** and otherwise managed it **to create and maintain specific landscapes**" (VII-83), FEMAT also contends that a forested "blanket" of predominantly old-growth trees greeted "the first non-Indian immigrants [that] began to settle and farm" the Pacific Northwest (II-2). Either the influence of native burning was slight and highly localized, or else the amount of old-growth is significantly exaggerated; the historical record strongly suggests the latter option.

It is critically important that this apparent contradiction be resolved *before* developing additional alternatives. The given reason for completing a "necessarily limited" analysis of FEMAT alternatives was the existence of some form of "constraint on direct consultation" with affected Indians tribes:

> In addition to these treaty-based rights, *there are various cultural uses associated with natural resource products.* **Cultural uses are traditional activities that**, while not affirmed specifically in legal treaties, **are essential to** spiritual activities, **cultural identity and continuity, and need to be addressed** in decisionmaking.
>
> **For both legal and moral reasons**, the impacts of management options on **Naive American uses and values are a key policy matter. There are constraints on direct consultation with the tribes in this exercise. As a result, our analysis of effects is** necessarily **limited**, and it is difficult to determine all the ways that tribes might be affected by federal forest policy and practices. (FEMAT, VII-84, 85).

Whatever the actual reasons might have been for discounting American Indian influences upon Northwest ecosystems, it is vitally important to consider the effects these processes have had in providing habitat for native wildlife. Until the recorded effects of human actions upon the biological environment are fully considered, we will be incapable of mimicking, restoring, *or* maintaining past conditions—whether we are attempting to manage for wildlife, for timber, or for any other purpose requiring a knowledge of presettlement forests.

"**Cultural uses,**" as defined in FEMAT, must include those "traditional activities" associated with the *use of fire* to **"create and maintain specific landscapes";** therefore, there are "both legal and moral reasons" for considering the use of cultural fire processes on federal timberlands.

A widespread contemporary American Indian perspective points out that there are also aesthetic, historical, biological and ecological reasons to reconstruct prehistoric landscapes. These comments are from a talk by Dennis Martinez, a Pima Indian working with the Ten Tribes Intertribal Wilderness Council of southern Oregon and northern California. Compare the *process* described by Martinez with the *landscape* described earlier by Neall:

> **In the old days there were vast areas where the Indian women burned in the morning in late summer and early fall. These areas were like gardens**—kind of like the Garden of Eden that was described by the early pioneer people who came from Europe to that land.
>
> . . . **the landscape that people saw** when they came from Europe was a landscape that **was literally an expression of the culture of Indian people.** When we talk about restoring the culture of the ten tribes I work with, we're talking about restoring the land as part of restoring the culture. **There is absolutely no separation between the way the landscape looked in pre-contact times**, the species composition and the structure of that forest, or that prairie, **and the cultural needs and expressions of the Indian people.** The land is an expression of the culture, as much as the arts and crafts and ceremonies.
>
> . . . **We need to bring back all the plants that were used** for food and for baskets and for medicine. And **we need to involve the children in the process.**
> (Martinez, 1993a: 51)

Martinez's claims about the managed landscapes of earlier cultures is supported by the historical record. For example, as the Wilkes' Expedition was arriving at the California border on September 28, 1841, the party's leader noted:

> On the way, they met **an old squaw, with a large firebrand** in her hand, with which she **had just set the grass and bushes on fire**; when surprised, she stood motionless, and appeared to be heedless of any thing that was passing around her . . . **there were no other Indians in sight.** (Wilkes, 1845: V).

In another, more recent, article, Martinez presents a prevailing American Indian attitude regarding the "legal reasons" that might have influenced FEMAT's "constraints on direct consultation with the tribes in this exercise":

> **What would the forests of** southwestern Oregon and northwestern California **(the Klamath Mountains) have looked like if no timber harvesting had ever taken place?** We need only look at places where old-growth has been undisturbed. We could assume that these few remaining old-growth stands are "natural," except that **two significant historical factors are missing: indigenous people and periodic low-intensity fires. Both have been legally excluded from the forest.**
> (Martinez, 1993b: 26)

Early historical Indian burning practices created and maintained vast tracts of important "wildlife habitat" that are not being considered under current "ecosystem approaches" to forestland management; these practices also created and maintained conditions in forested stands in which dangerous ladder and deadwood fuels were kept under much better control than currently occurs with most modern management systems.

The cultural role of burning in prehistoric landscapes and among native peoples must be considered for a number of ecological, biological, legal, and moral reasons before any plan alternatives are adopted for managing regional forests. Without an understanding of prehistoric human burning objectives and strategies it is impossible to reconstruct past conditions throughout most of the Douglas-fir Region.

EARLY HISTORICAL VEGETATION PATTERNS

As quoted in other parts of this review, FEMAT generally assumes that the prehistoric Douglas-fir Region can be described in terms of "blankets," older age classes, and a 250 year "fire cycle." This simplistic approach to regional vegetation patterns and fire histories finds a logical expression in the 50-11-40 rule; an homogenized landscape that can be easily "modeled" on a computer. Such patterns have probably never existed and probably never will. Nature (including people) is far too complex and dynamic to be so easily manipulated; native forest plant assemblages are far more varied and resilient than the dry, statistically-driven patterns being proposed and supposed by FEMAT.

Fig. IX illustrates seven basic areas of fire-dependent and fire-tolerant native plant assemblages that can be used to describe early historical vegetation patterns in western Oregon. These areas have been generalized and expanded from a similar, earlier division of the Oregon Coast Range into six basic types of native plant associations (Zybach 1988:25-30):

1) *coastal fogbelt*	(Sitka spruce/western hemlock/lodgepole pine);
2) *western slope*	(Douglas-fir/red alder/bigleaf maple);
3) *eastern slope*	(Douglas-fir/white oak/poisonoak);
4) *savannah*	(white oak/bunchgrass/camass);
5) *gallery*	(ponderosa pine/black cottonwood/willow);
6) *relict groves*	(ponderosa pine/myrtlewood/noble fir).

The use of these general vegetation types in describing historical Coast Range catastrophic fire events resulted in a number of interesting findings: there appeared to be very strong geographical correlationships between: 1) vegetation (fuel/habitat) patterns; 2) catastrophic fire patterns; 3) prescribed fire patterns; 4) prehistoric human settlement patterns; 5) modern human settlement patterns; 6) historical wildlife populations; 7) current land ownership patterns; 8) political (county) boundaries; 9) river basin boundaries; and 10) rainfall patterns. This is not intended to suggest a comprehensive listing of all physical, biological, and cultural relationships within the Coast Range, but rather the combination of these ten interrelated patterns and boundaries strongly support the individual integrity of the assigned subdivisions. It is expected that further analysis of the proposed boundaries shown on **Fig. IX** would result in similar findings.

The **Fig. IX** legend describes specific *types* of vegetation (based upon the 1914 map fig XI

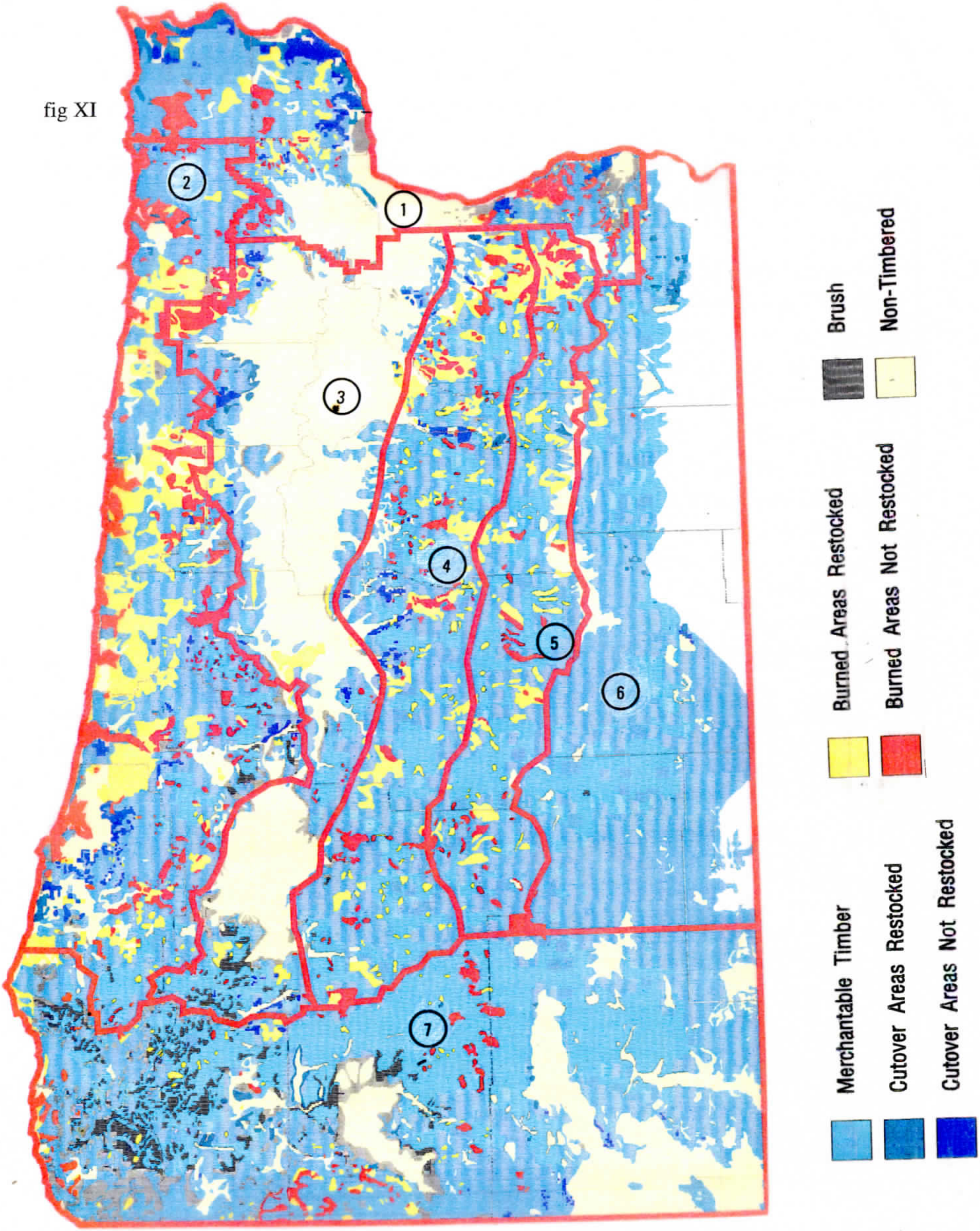


Fig. IX. 1914 Oregon State Forester's Map w/Fire History Patterns (Zybach and Crucchiola 1993)

shown in **Fig. I**), and the numbered polygons represent specific geographical *areas* of common plant and animal species, fire histories, and topography. A description and interpretation of the legend provides a good background for discussion of the vegetation/fuel/habitat patterns within the separate geographical boundaries:

Merchantable Timber. This classification includes *all age classes* of Douglas-fir, hardwoods, and other conifers that contained commercial trees. The extent of merchantable timber is somewhat exaggerated by the standards used to define forest products in 1914. Many of the forests in the high Cascades and east of the Deschutes River are composed of stands of mountain hemlock and lodgepole pine. Their volumes have been generalized over a large area to include isolated stands and groves of ponderosa pine and Douglas-fir. Many of these stands would not be considered merchantable by today's standards, at least partially because of rapid shifts away from firewood, tannin, fencepost, and mine timber use during the early 1900s:

> It is well to remember that in 1907 the country produced and used 45,000,000,000 board-ft. of lumber, that **in 1925** this fell to 35,000,000,000, and that **per capita consumption fell from more than 500 to 300 board-ft.** Further, **it is significant that all soft woods exist in great abundance** and at low prices. (Donovan 1928:470)

Cutover Areas Restocked. These areas, a relatively small part of the total landscape, were mostly seeded with local species and were described as strongly representing the types and numbers of trees that were in the original stand.

Cutover Areas Not Restocked. These areas were likely covered with brush or low-value deciduous trees at the time of this inventory.

Burned Areas Restocked. Regeneration of these burned areas usually resulted in a stocking level and variety that closely resembled the previous stand:

> The forests of the north Pacific coast offer an exception to the law, otherwise general, for this continent at least, that a change of forest crops follows a forest fire. **The fir forests** of western Washington territory and Oregon **when destroyed by fire are quickly replaced by a vigorous growth of the same species**, and the fires which have consumed great bodies of the California redwood have not prevented the reproduction of these species by sees and shoots. (Sargent 1880:492)

Burned Areas Not Restocked.

> In some cases, however, and especially in the largest burns, the work of reforestation has made little progress, owing probably to the difficulty of reseeding large burned areas. Since **over many square miles all the trees were killed**, the seeds of a new crop have had to come from outside the region, and hence the seeding process has been slow. **Areas are reported which were burned twenty-five to fifty years ago in which there is no vegtation larger than brush or ferns**, trees of any species not yet having obtained a foothold. (Gannett 1902:12)

Brush. From the appearance of the map, it appears likely that many of these areas are south-facing slopes in the Klamath/Siskiyou Mountains and the perimeters of the Rogue River and Umpqua Valley savannahs. These areas may be relict Indian balds and meadows, or the result of miner's clearing fires between the 1850s and the 1920s.

Non-Timbered. This designation was used to describe urban and agricultural developments, large lakes, interior valley savannahs, deserts, prairies, and marshes.

Using the Coast Range model described in the preceeding pages, western Oregon was divided into the seven areas shown on **Fig. IX.** The basic plant associations and fire histories for each area were primary determinants of the region's vegetation patterns at the time of settlement. The purpose for creating these areas (other than demonstration), is to create better categories for considering native vegetation managment strategies. Current assessments and measurements (e.g.; the 50-11-40 Rule; 250 year fire cycles; the presence of coarse, woody debris) cannot be used to describe most of these areas, either generally or specifically. The conformance of vegetation types, fire histories, drainage and property ownership patterns to the mapped boundaries demonstrates the validity of these divisions. A brief overview of fire history and forest vegetation at the time of settlement, and current ownership for each area follows:

1. Columbian. This area is formed by the rivers that flow northward into the Columbia River between its mouth and the Dalles. The Willamette River is included only to the falls at Oregon City. The early historical families that lived along this landscape were dependent upon fish species (salmon, lamprey, sturgeon, smelt) for a large portion of their subsistance and did comparatively little broadcast burning. The result was a towering forest of Douglas-fir, cedar, and hemlock along most of the terrain. Portions of the landscape subject to flooding were dominated by hardwoods such as cottonwood, alder, and bigleaf maple. A few prairies lined the shorelines but, for the most part, evidence of Indian burning was generally slight within this area. These were the trees described and measured by Lewis and Clark (1805-1806), David Douglas (1825-1826), and the Wilkes Expedition (1841). They were also some of the first trees extensively logged in Oregon, due to their size and the convenience of water transport. Current ownership is largely corporate timber owners.

2. **Coastal.** This area is made of the drainages south of the Columbia that flow directly into the Pacific Ocean from the Oregon Coast Range. The Umpqua River is bounded near Elkton, and the southern boundary is the middle fork of the Coquille River. Even-aged, nearly pure stands of Douglas-fir characterize the western slope of the Coast Range, a region of some of the largest and hottest forest fires in history. This history is due to massive fuel build-ups that include some of the biggest, fastest growing conifers ever measured, a rolling topography, seasonal east winds, and systematic arrangements of human fires that occurred on a daily basis for centuries along the eastern slopes of the range.

Available accounts of the indigenous human populations that lived along the coast begin with a daily journal kept in 1788 by Robert Haswell, an officer aboard Robert Gray's fur trading sloop, *Washington.* Traveling northward from California in nearly constant view of the shoreline, Haswell noted that "this Countrey must be thickly inhabited by the many fiers we saw in the night and collums of smoak we would see in the day time," and "a delightful countrey thickly inhabited and Cloathed with woods and verdure with maney charming streems of water gushing from the vallies." By the time the crew had reached the Salmon River along the central Oregon Coast, Haswell noted that Indians had "both Iron and stone knives" and that "two or three of our visitors were much pitted with the small pox"; both certain signs of local European contact and influence.

The coastal fogbelt is primarily populated with Sitka spruce, western hemlock, and lodgepole pine, while uplands are dominated by Douglas-fir and red alder. Native peoples kept the areas around the estuaries clear of trees by periodic burnings. The Elliot and Tillamook State Forests, BLM O&C Lands, and the Siuslaw National Forest are included in this area, most of the remainder of which is industrial and family tree farms.

3. **Interior Valleys.** The Sacramento Valley of northwestern California, Rogue, Umpqua, and Willamette Valleys of western Oregon and the Puget Lowlands of western Washington were occupied by prehistoric peoples that traditionally burned millions of acres of land annually. The result was a nearly contiguous series of great prairies and oak savannahs that extended almost the entire

length of the Cascade Mountains in the western United States. When the early pioneers headed westward (1835-1848), it was free land in these grassy valleys that they were seeking.

The earliest accounts of prairie burning west of the Cascades dates from 1826, the year botanist David Douglas traveled with a beaver hunting expedition from Fort Vancouver to the Umpqua Valley; the entire geographical north-south range of Kalapuyan speaking families. By 1832, most of the Indians Douglas had encountered on this journey had been killed by infectious diseases. Hudson's Bay Company journals from 1825-1834 (most notably those of Alexander R. McLeod, Peter S. Ogden, and John Work) contain a substantial amount of detailed information that complements and corroborates Douglas' accounts of Kalapuyan burning practices and results.

By 1841 only a few Kalapuyans still lived in western Oregon, but they were stilling burning and maintaining most of the prairies, wetlands, and oak savannah that had provided their families and their ancestors with berries, seeds, nuts, bulbs, weaving fibers, fuel, construction materials, and animals. Local wildlife populations, including grizzly bears, white-tailed deer, elk, and timber wolves, were dependent upon Kalapuyan burning practices for providing much of their habitat. Ownership is concentrated in agriculture, urban development, and private second growth tree farms, with BLM O&C Lands along the western boundary..

4. **West Cascades.** This is the area most often associated with "spotted owl habitat" or "classic old-growth" conditions: big, old trees; snags; coarse, woody debris; little human evidence; multi-layered canopies; etc. Patches of trees of between the interior valleys to the west and higher elevations to the east sometimes reach 1000 years of age. Much of the FEMAT information regarding old-growth trees was developed in this area, particularly within the boundaries of the H.J. Andrews Experimental Forest: "a virgin forest of old-growth Douglas fir and allied species typical of the northern Oregon Cascade Range" (Munger c.1955:232). Ownership is dominated by the federal government in the form of National Forests. The area to the southeast of Portland, on the western slopes of Mount Hood, has experienced hundreds of thousands of acres of forest fires over the past 130 years; most are thought to be caused by humans.

5. **High Cascades.** Almost entirely owned by the federal government in the forms of National Forests, Wilderness and Crater Lake National Park, these areas contain meadows, huckleberry patches, and stands of even-aged pine, Douglas-fir, mountain hemlock, and true fir that indicate a cultural fire history. Because of seasonal snows, cold temperatures, and shallow soils, tree growth in this area is slow.

6. East Cascades. Modern researchers have used tree rings to help overcome the lack of early written records for the Cascades. Tree rings from old-growth pine on the eastern slope of these mountains show that fire was used by people frequently, burning through some large forests at 5 to 10 year intervals. As a result, early settlers often found a grassy, brush free environment with huge, wide spaced trees in which they could ride their horses and graze livestock. Stands of even-aged lodgepole pine owe their existence to both lightning fires and human fires. Ownership is industrial tree farm, private ranch, and National Forest.

7. Klamath/Siskiyous. This area is characterized by frequent light underburnings, grassy valleys, and a wide variety of mixed plants. Douglas-fir dominates along the Pacific Coast, including components of coastal redwood, Port Orford white cedar, and ponderosa pine. Ponderosa pine dominates to the east, with components of Douglas-fir, sugar pine, red fir, and lodgepole pine. Jeffrey pine, madrone, black oak, and incense cedar are scattered through out the area. There is an extensive history of cultural fire throughout this area:

> Fires have widely ravaged the region examined. There is not a single forested township either on the west side or on the east side of the [Cascade] range in which the timber is not more or less fire marked. Without much doubt the present agricultural areas, once grass covered and carrying scattered stands of oak, were burned over quite as extensively as the timbered tracts; at least there are few oaks that do not show fire marks. The only tracts that have escaped are the swampy sedge- and tule-covered areas bordering the Klamath lakes and marsh, and such spots at the higher elevations where bare lava or pumice fields made the spread of fire impossible.
>
> Of the forest area examined, comprising in round numbers 3,000,000 acres, a total of 2,975,000 acres, or 99.992 per cent, are fire marked. The remaining 25,000 acres which have escaped are divided mostly in the small tracts between the swampy bottoms of the upper Rogue River forks and isolated tracts along the higher summits of the Cascades main range (Pls. LXXVII, *B*, and LXXIX). (Leiburg 1900: 276-277)

This area is bounded by Crater Lake and the middle fork of the Coquille to the north, Klamath Lakes to the east, the Pacific Ocean to the west, and California to the south. Ownership is in the form of National Forests, private and industrial tree farms, and private ranches. Given the great amount of cultural burning recorded by Leiburg, it would be interesting to see what percentage of this landscape can now be described as "classic old-growth," using the FEMAT definition for that condition.

SUCCESSION THEORY AND THE HISTORICAL RECORD

The historical maps and descriptions of early Northwest forests consistantly depict a landscape influenced and controlled by people. Prairies, savannahs, brakes, balds, huckleberry patches, meadows, and even-aged stands of Douglas-fir, ponderosa pine, and lodgepole pine are all dependent upon the periodic burning practices of people. This historical record of human activity and a variegated landscape dominated by a different types and ages of plants runs counter to FEMAT descriptions of orderly transitions of plants, aging their way toward an old-growth set of conditions..

To understand the importance of this assumption it is necessary to understand the succession theory model used by FEMAT. According to the theory; following a disturbance, plant "communities" progress through a series of predictable stages until a culminating "climax," or "highly stable" equilibrium is attained. Five such basic "seral stages" are defined as leading to a climax condition in the Douglas-fir Region (FEMAT IX-5):

1. *Early.* From disturbance to crown closure; about 5 to 20 years.
2. *Mid.* From crown closure to merchantibility; about 5 to 80 years.
3. *Late.* From merchantibility to peak annual growth; about 25 to 125 years.
4. *Mature.* From peak annual growth to climax; about 60 to 180 years.
5. *Climax.* Old-growth; beginning about 180 to 220 years.

Although I have slightly altered age class ranges for the various "seral stages" in order to more accurately reflect the biological and economical constraints given in FEMAT, this list is evidence that it is possible to define Douglas-fir "succession" in terms of stand age, rate of growth, and current market conditions ("merchantability"); i.e., *according to FEMAT, changes in plant community populations through time are not as important as stand age and market value in defining "seral stages" within the current range of the spotted owl.* This is an important distinction in a region characterized by the preponderance of stands of trees that can be easily defined by age and dollar value.

There are two problems with the use of this theory in developing alternatives: 1) the existence of Douglas-fir and other tree species at the very first stages of forest establishment do not fit "classic" plant succession models; and, 2) periodic fires set by people kept great areas of the landscape from "functioning naturally" toward an old-growth condition.

The theoretical dilemna is described in a recent collegiate text book on wildlife and forest managment:

> **This model of succession**, as expounded by its creator Frederic Clements (1916) and various disciples such as Eugene Odum (1969), **has been sharply criticized by many writers** (reviewed by McIntosh 1980). **They are particularly opposed to Clements' likening a community to a** supraorganism, a **creature that is hurt by a disturbance and heals itself through succession**. They are adherents to Darwin's ideas of natural selection and see competition among individuals, rather than cooperation among the components of a larger entity, as the driving force behind succession. **In their alternative model, all the species that will participate in succession become established soon after a disturbance . . .** (Hunter, Jr. 1990:22).

Although it is the latter definition that seems to be used by FEMAT, there appears to be little reason to adopt this conceit (other than to echo the "late-successional" tag given to 80-year-old second growth). Standard age classifications, in use for over a century, work exceedingly well when describing stands of trees in the Douglas-fir Region. The second problem with using successional theory—the overwhelming evidence of prehistoric human resource management practices and effects— to describe wildlife habitat in the region is discussed by Martinez:

> We're talking about an historical structure, habitat quality, and species composition and distribution *created by indigenous people.* They accomplished this by keeping the forest in a state of "arrested seral succession" through the use of controlled burning. That is to say, constant intervention by people produced a kind of precarious balance or ecological stability that acknowledged change as a fundamental feature of nature, and worked with and directed natural processes, especially fire. . . .
>
> These fires enabled all stages of plant species succession to be present in one watershed or landscape.
>
> **The fire mosaic was the principal reason for the tremendous numbers of wildlife when Europeans first settled North America. Indian burning was universal. . .**
>
> Prairie soils, enriched by billions of decomposing grass roots over thousands of years and protected from tree invasion by fire, grew the wheat and corn that fed America and a good part of the rest of the world. These soils also fed the European livestock that sustained the invaders. To deny this considerable contribution to the economic welfare of European peoples in North America is also to deny Indian people their place in the history of this continent. (Martinez, 1993: 27-28)

The general historical pattern of forest and wildlife habitat evolution in the Dopuglas-fir Region for the past 10,000 years has been one of disturbance, resilient repopulation, migration, introduction, and extinction—rather than one of disturbance, succession, and climax. Assumptions that extensive indisturbed forests covered the mountains and valleys of western Oregon at the time of European settlement (i.e.; the successional theory prediction) cannot be validated; therefore, some alternative hypothesis may be more useful for modeling proposed management options.

One valide alternative to succession theory—an alternative that *does* predict the known past—are Raup's theories regarding disturbance and resilient repopulation. In discussions of his thoughts, Raup thoroughly dismantles most current theories regarding the likelihood and formation of climax vegetation (Stout 1981: 1-29). The idealogical consequences of accepting Raup's thinking are summarized by Stout:

> **If the natural order is to move all vegetation to the climax, then man's role is one of minimizing disturbance. If the natural order is less ordered** and the progression to climax is not ordained, **then man's role can be one of** manipulating: i.e., **disturbing the vegetation so that the vegetation better serves the needs of man.** (Stout 1981: :xi).

The practical difficulty in getting succession theory to accomodate the effects of long-term human activities ("periodic disturbances") is illustrated by the following quote:

> **100 years is not long enough** for the cutover landscapes to return to late-successional conditions that approximate prelogging conditions. **Many late successional attributes require 200 to 500 years to develop.** In addition, many large scale disturbance processes such as **severe wildfire will probably not occur under any of the alternatives,** at least **not to the extent that they would in an environment that was not influenced by humans.** (DSEIS: 3&4-42).

People have cooked daily and burned seasonally throughout the Northwest for generations: why do we possibly want to eliminate them from the environment at this time? A number of other important questions also come to mind:

What "late successional attributes" take 200 "postlogging" years to develop?

How could anyone know what those attributes might be (logging has only been a major influence on Northwest forest biology for about 140 years)?

Why is an environment devoid of people considered desirable?

What do actual land and resource managers think about the practical reality of implementing non-human environments near urban areas and rural communities?

Where did the "severe wildfire" probability assessment come from?

In sum, succession theory tends toward anti-human management practices. Clinton's jobs would involve policing more than planting; attempts to artificiallly eliminate change from the environment ("steady state"), rather than opportunities to improve conditions—whether for people, wildlife, or whatever objectives society may set. Disturbance modeling accomodates change and allows people to provide thoughtful and well-intended assistance to natural processes and disturbances.

3. Logging History and Resource "Destruction." *Logging in the Douglas-fir Region destroys and degrades the natural and cultural environment, effects that are exacerbated when clearcutting methods are used.*

FEMAT quotes both President Clinton and Vice-President Gore regarding the impacts of logging old-growth in the Douglas-fir Region and the associated loss of resources that it causes:

> How can we preserve **our precious old growth forests** which are part of our national heritage and **when once destroyed can never be replaced**? . . . We need to protect the long-term health of our forests, of our wildlife, and our waterways. **They are . . . a gift from God. . . If we destroy our old growth forest we will lose jobs and salmon fishing and tourism and eventually in the timber industry as well. We'll destroy recreational opportunities and hunting and fishing for all and eventually make our communities less attractive.**
> Clinton (Appendix VII-A: 74)

> . . . **our old growth forests**, a part of national heritage which if **once destroyed will be gone forever** for every generation that follows . . . **If we destroy the old growth forests we lose jobs and threaten entire communities. Jobs in tourism and fishing, recreational activities like hunting and hiking and fishing, water supplies we count on** to be clean and safe.
> Gore (Appendix VII-A: 75)

In addition to summarizing a key FEMAT predictive assumption, these quotes are interesting for the values they imply: old-growth is "precious"; logged forests are permanently "destroyed"; fishing, hunting, hiking, and water are also "destroyed" (or at least degraded) in logged environments; jobs and communities are "threatenend" and made "less attractive" following harvest. The nearly identical phrasing of these quotes is curious: Whose information are these views based upon and why have they been so completely accepted? There is little evidence that these processes of destruction and degradation were enacted following logging of the southern and eastern forests known to Clinton and Gore, and there are no citable historical or scientific sources for these remarkably similar viewpoints.

EARLY DOUGLAS-FIR LOGGING HISTORY

As evidenced by the Clinton and Gore quotes, current sentiment about Douglas-fir logging often centers upon its "destructive" qualities. This runs counter to historical perspectives that the "Pacific Northwest logger leads the world as a practical and resourceful engineer" (W.B. Greeley, quoted in Brandstrom 1933: 2). Some of the difference in perspectives can be traced to a general current ignorance about the history and importance of logging in modern times; according to the FEMAT perspective:

> **Cutting of forests in the Pacific Northwest began** in the 1800's **when the first non-Indian immigrants began to settle and farm** in the interior valleys of western Oregon. Initially, **the extensive forests** that covered much of the landscape were viewed as an impediment to progress and **were systematically cleared and burned to make way for agriculture**. (FEMAT, II-2)

Given the great body of scientific, historical, business, and industrial information available, it is unnecessary to ignore factual logging history. This ignorance is the likely root cause that separates FEMAT descriptiuons of logging practices and effects from the existing record. A standard accepted beginning point for commercial logging of *coastal* Douglas-fir is 1788, when British Captain John Meares arrived at Nootka, Vancouver Island, B.C., built a fort, built a ship (the North West America) and set sail for China with a cargo of furs:

> We also took on board **a considerable quantity of fine spars, for the Chinese market, where they are very much wanted** and of course proportionately dear. Indeed the woods of this part of America are capable of supplying with these valuable materials all the navies of Europe. (Meares 1788: quoted in Carey 1971: 61)

Probably the first logging of Douglas-fir *in the range of the northern spotted owl within the present boundaries of the United States* was the 1810 clearing of a fur trading post at Astoria. Alexander Ross' descriptions of cutting "gigantic trees of almost incredible size, many of them measuring fifty feet in girth, and so close together . . . it sometimes required two days, or more, to fell one tree" (Ross 1810, quoted in 1986: 89-91) were corroborated in 1825 by David Douglas, who found a barkless, three-foot high stump behind the fort that was 48 feet in circumference. According to Douglas, the tree had been removed "to give place to a more useful vegetable, namely potatoes" (Meany 1935: 53).

The first commercial sawmill in the Douglas-fir Region was built in 1827 by the Hudsons Bay Company, near Fort Vancouver. This was the first sawmill in operation on the Pacific Coast, and also the first west of the Mississippi River (Brandstrom 1933: 7). By 1835 the mill had increased its output to nearly one million board feet per year; from a crew of 8 men (mostly Hawaiian laborers) in 1829, full-time employment had increased to "twenty-eight men and twelve yoke of oxen" by 1836 (Meany 1935: 61). The first commercial mill operated by an American was Ewing Young's 1838-1840 operation at the present site of Newberg, Oregon. By 1844 at least two sawmills were operating at Oregon City, powered by the falls of the Willamette. The California Gold Rush of 1848 resulted in an immediate need for more construction materials and was footed by the money to pay for them:

> **By the spring of 1849**, a large inflow of gold had created a circulating medium which gave life to commerce; markets had been established which promised a certain and profitable outlet for all that farmers and lumbermen could produce; **flour mills and sawmills fluorished**, whenever they could obtain hands to operate them. (Carey 1971:478)

Contrary to FEMAT assertions, logging began at least one or two generations *before* the "first non-Indian immigrants began to settle . . . the interior valleys of western Oregon." For purposes of this review, the term "prelogging" will be taken to mean "before 1810"; in addition to requiring a major land clearing project, the establishment of Astoria ultimately resulted in the permanent settlement of the Willamette Valley by retired beaver hunters, beginning around 1828. As with the thousands of American pioneers who followed them, these people farmed the native prairies and savannahs in order to *avoid* "systematically" clearing and burning forestlands for agricultural purposes:

> **The North America that European peoples invaded and settled was not a "virgin" land undisturbed by people**. There was no "pristine wilderness" here. Prairie and forest was to a large extent the creation of indigenous peoples. The main justification by Europeans for genocide—that land was not being used to its productive potential by its Native inhabitants—is false. **Vast meadows and smaller forest openings which had been maintained for millennia by Indian burning became farms and towns without the need to fell a single tree.**
> (Martinez, 1993: 27)

Martinez' claims are verified time and again by historical evidence. George Riddle (namesake of Riddle, Oregon), for example, described his family's 1851 Donaltion Land Claim in the Umpqua River basin:

> **At that time Cow Creek valley looked like a great wheat field**. The Indians, according to their custom, had burned the grass during the summer, and early rains had caused a luxuriant crop of grass on which our imigrant cattle were fat by Christmas time. . .Fortuneately [sic] in our case the land was ready for the plow. There was no grubbing to do. **In all the low valleys of the Umpqua there was very little undergrowth, the annual fires set by the Indians preventing young growth of timber . . .**
> (Riddle 1920:37-38).

Without a clear idea as to *why* logging is performed, *where* it has taken place, and *when* it has occurred, it is impossible to understand or measure its effects, much less estimate its future impacts. By completely ignoring the beneficial aspects of selective harvesting and by seriously misrepresenting the role of logging in Northwest history and culture, FEMAT presented President Clinton with alternatives that were heavily biased against the influences of logging activities on Douglas-fir ecosystems, and particularly biased toward ecosystems containing big trees during the past 50 years.

CLEARCUTTING AND RESOURCE "DESTRUCTION"

More than logging, a *type* of logging—clearcutting—is being held responsible for the "destruction" of old-growth forests in the Northwest. A political cartoon from the early 1900s **(Fig. X)** demonstrates the earliest national concerns with regional clearcutting: Pinchot's loudly proclaimed predictions of an eminent "timber famine." Although the fear turned out to be unfounded (both per capita timber consumption and total national timber consumption decreased dramatically between 1907 and 1925), it was politically useful in expanding the land base of federal timberlands and in transferring control of most of these forests from the US Department of the Interior to Pinchot's fledgling Forest Service in the US Department of Agriculture.

FEMAT defines "clearcut harvest" as "**a timber harvest method** in which all trees are removed in a single entry from a designated area, with the exception of wildlife trees or snags, **to create an even-aged stand**" (IX-5). The apparent *current* fear of creating even-aged stands of young trees is that they represent an alien environment to our wildlife populations:

> **In the early part of this century, most of the forested area west of the crest of the Cascade Range was covered by old-growth forests** consisting of Douglas-fir, western hemlock . . . and several other large, long-lived conifer species. **Most of these forests were probably more than 300 years old and many exceeded 750 years.** (Spies and Franklin 1988).

An entirely different perception is provided by another renowned forest scientist, one who actually lived in the Douglas-fir Region in the early part of this century:

> The paths of **the great forest fires of the last century or two are plainly marked by even-aged stands, consisting to the extent of at least 90 per cent of Douglas fir** (if within the preferred habitat of this tree), regardless of the proportion of Douglas fir in the original fire-killed stand. (Munger 1940).

Munger is referring to an obvious and measurable fire history that extends back to 1840 (the general beginning of American settlement) and to 1740, well before the period of first significant contacts between Europeans and Pacific Coast Indians. The forests Munger describes covered a significant portion of the Douglas-fir Region, including almost all of the area currently designated as Marbled Murrelet habitat within the United States.

The closest modern approximation to Munger's description of prehistoric patterns of fire and reforestation has been large-scale industrial clearcuts followed by broadcast burning and planting with (at least 90%) Douglas-fir seedlings. These practices produce an almost immediate increase in foliage and protein at the earth's surface, providing important sunlight, habitat and food for many mammals (including people), birds, fish, wildflowers, butterflies, and other native flora and fauna. They can also be used to closely approximate the processes by which most old-growth stands were first created.

Clearcutting, broadcast burning, and tree planting are important tools for mimicing natural processes and reconstructing past (historical) environments. No FEMAT alternatives were presented that utilized these tools in order to rejuvenate diseased or fragmented stands of trees. Judiscious use of clearcutting can result in increased timber harvests, increased human safety and job security, improved habitat for many native plant and animal species, and can be an excellent method—both ecologically and economically—of helping to restoring "health" to many degraded environments.

Fig. X. Nationally printed in 1908; titled "Uncle Sam As He Is Likely To Appear Twenty Years Hence" (Puter 1908: 488).

LOGGING RATES AND EXTINCTION RATES

In an early draft of this review seven FEMAT predictive assumptions were first identified, including the assumption that: *There is a direct and measurable relationship between the volume of timber harvested from federal lands and the ability of certain vertebrates to exist through time.*

Basically, this statement says that spotted owls and other "old-growth associated species" (FEMAT, IX-24) will experience population changes—including extirpations and extinctions—in response to continued regional levels of "overcutting" (not defined). This assertion assumes that some such relationship has been established at some point in time. There is no historical evidence that any such relationship exists, although there is a great amount of posturing that such relationships are obvious:

> The scientists, the economists, and our own eyes tell us that **if we continue to log out the last of the big trees**, that **the extinction of species, the extinction of ecosystems, and the extinction of economies** that are dependent upon the sustainable use of those forests **will result.**
> (Kerr, FEMAT, Appendix VII-A: 81)

The old-growth environments in which we find certain species today are substantially different than the old-growth enviroments of 150 years ago: Large carnivores have been extirpated and replaced by introduced species of plants and animals; Thousands of people living in camps and villages, setting fires, walking on trails, and shooting arrows have been replaced with millions of people living in cities, cutting trees, planting trees, driving cars on highways, and shooting guns. Many species have become introduced and many others extirpated during this process. These four questions, at least, are important to consider before additional plans are made or implemented:

1. How many species in the Pacific Northwest have *gone extinct* in the past 150 years?

2. How many extinctions *caused by logging*?

3. How many *caused by the rate of logging?*

4. How many caused by the rate of logging *on lands currently owned by the federal government?*

In order to be fair, a similar set of historical questions should be asked regarding the effect of fire suppression during the past century on regional extinction patterns; These are important questions for measuring resiliency, growth, changed dynamics, etc. Instead, in the absence of facts detailing one of the most critical relationships being examined by FEMAT, a series of closed door and secret votes among pre-selected participants was taken:

> **The rating process was a subjective evaluation of the sufficiency of the amount and distribution of late-successional and old-growth habitat** on federal lands under each option **to support the species or group of species over the next 100 years. For most species, the information** necessary to precisely quantify the response to changes in the quality and pattern of their environment **simply does not exist.**
> (FEMAT: II-29)

For most species, due to the great amount of variables inherent in the species extinction (and species creation) processes, the information necessary to precisely quantify most responses to change *will never exist.* This is not a good justification for refusing to examine available information in a scientific manner before making reasonable decisions. From an historical perspective regarding the extinction process, there is sufficient time to adopt a less hurried change to proven methods of forest management. By the same standard, there is also plenty of time to have informed interdisciplinary reviews of proposed changes and the development of a public consensus to support most changes—whether these processes take 5 years or 50 years.

It is important to note that this perspective applies solely to forest management history in the Douglas-fir Region and does not consider such other factors as damming rivers to produce electricity, sportfishing, human population growth, urban landscaping, transportation network development, resource waste, resource distribution patterns, and plowing.

As with other portions of FEMAT, concepts of forest history are virtually limited to the past 10 or 20 years when it comes to discussions of public concerns regarding resource depletion and reforestation. When the viewpoint is extended beyond the range of the careers of the FEMAT scientists, the historical record becomes highly subjective and condescending:

> When I arrived in Oregon 40 years ago it never dawned on me that our natural resources were limited. . . The realization that such resources are limited and all related within the ecosystem has caused much of the frustration and anxiety we currently face. . . **Concern about overcutting was slow to develop**. In 1927, Oregon's leading banker, John C. Answorth [sic?], warned, "Something surely must be done before long to prevent the wholesale slaughtering of our timber." If you listen, **reforestation became acceptable only in the past 30 to 40 years. Until that time**, and even in more recent years, **settlement became the accepted way to salvage logged-off lands.** It has only been since the mid 1970's that a concerted effort has been mounted to save the old growth.
> (MacColl, FEMAT, Appendix VII-A: 77)

Compare MacColl's remarks regarding "slow to develop" "concern about overcutting" with a Bureau of Census report that was published over 110 years ago:

> **The railroads of the country**, using in the construction and maintenance of their permanent ways vast quantitites of timber, **inflict far greater injury upon the forests than is represented by the consumption of material.** Railway ties, except in California, are almost invariably cut from vigorous young trees from 10 to 12 inches in diameter; that is, from trees which twenty or thirty years ago escaped destruction by fire or browsing animals, and which, if allowed to grow, would at the end of fifty or one hundred years longer afford immense quantities of valuable timber. The railroads of the United States, old and new, consume every year not far from 60,000,000 ties; the quantity of lumber from 60,000,000 ties is comparatively not very great, and would hardly be missed from our forests; but **the destruction of 30,000,000 vigorous, healthy young trees . . . is a serious drain upon the forest wealth of the country and should cause grave apprehensions for the future**, especially in view of the fact that **in every part of the country there are now growing fewer seedling trees of species valuable for railway ties than when the trees now cut for this purpose first started**. (Sargent 1880:493)

This lengthy quote demonstrates that a very large amount of *second growth logging* was taking place *before 1900* to service the expansion and maintenance of the railroad industry. In addition, *concern was immediate* regarding the need to regenerate these young stands (the "destruction" of young forests "should cause grave apprehensions for the future"). The magnitude of Sargent's concerns can be realized by the following quote:

> The number of miles of U.S. railroads increased from less than 10,000 miles to more than 350,000 miles between 1850 and 1910. **By the late 1800s, railroads accounted for 20 to 25 percent of the country's total consumption of timber . . .** By far the most significant railroad use of wood was for crossties. Each mile of track required over 2,500 ties. **Crossties were not treated with preservatives until after 1900**, so because of their rapid deterioration in contact with the ground, they had to be replaced every 5 to 7 years. Given the miles of track in 1910, that would be equivalent to replacing the ties on over 50,000 miles of track annually. **Just replacing railroad ties on a sustained basis required between 15 and 20 million acres of forest land in 1900.** (MacCleery 1992:19)

MacColl's patronizing "if you listen" remarks about reforestation are also in direct conflict with the historical record. One need only *read* to discover that concern about regional reforestation has existed for at least a century in the Pacific Northwest. Following Sargent's 1880 "grave apprehensions" about "growing fewer seedling trees" in "every part of the country," a selection of quotations from a variety of sources indicates ample concern about the future of our forests and that relation to reforestation:

> **Reforestation is** indispensable as insurance. Let us see to it that the untillable hills shall ever bear these matchless forests, emerald settings for our snowpeaks. On their future depends, **in great degree, the future of the Northwest.** (Williams 1912:139)

Although local Douglas-fir and cottonwood planting projects began in the 1850s on some landownerships, probably the first large-scale commercial planting of forest trees in the Douglas-fir Region was started in 1901 by the Willamette Pulp and Paper Company; the project involved the planting of several hundred acres of riparian lands with black cottonwood seedlings. The US Forest Service began artificial seeding projects in 1908 and established the first federal conifer nursery in 1910; tree planting operations began the same year in the Hebo district of the Siuslaw National Forest. In the 1920s at least four nurseries were established by private timber companies, resulting in the planting of several thousand acres of industrial lands over that time (Kummel, Rindt, and Munger 1944:7).

Research regarding reforestation also began shortly after the turn of the century, with the establishment of the Forest Service District Forester's office in 1908. The one-man Section of Silvics was operated by Thornton T. Munger, who in 1909 hired Leo Isaacs to begin researching artificial reforestation potentials of native Pacific Coast tree species. The Wind River Experiment Station was established near Carson, Washington in 1913 "due largely to the concept that the most pressing problems requiring research was in connection with nursery practice and artificial reforestation" (Munger c.1955:226-229). By the 1940s reforestation had become firmly established throughout the Douglas-fir timber industry:

> Within the past decade there has been a decided change in the attitude of the Pacific Northwest timberland owners toward the handling of their forest lands . . . a few of the larger companies began to take stock of their assets and to look toward planting some of their nonreforesting lands. . . As interest grew and the magnitude of the problem became apparent, industry pooled its efforts to establish an "Industry Nursery" at Nisqually, Washington. This nursery, with a capacity of eight or ten million trees, grows seedlings on consignment for the operators in the Douglas fir region of Washington and Oregon.
> (Gordon D. Marckworth, quoted in Isaac 1949: Foreward)

The 40-year history of regional reforestation practices did not go unnoticed by the general public of Oregon, who, *over 45 years ago,* voted to spend millions of their own dollars on the largest tree planting project in history:

> The celebration of this fiftieth anniversary of the worst forest fire in modern history also recognizes the thirty-fifth anniversary of the November 2, 1948 decision by the voters of Oregon to pay for the reforestation of over 250,000 acres of prime timberland that came into state hands as a direct result of the 1933, 1939 and 1945 Tillamook fires. The vote on Article XI E, "Constitutional Amendment Authorizing Indebtedness for State Reforestation," was extremely close. Less than 2,000 votes of the total 420,000 cast decided the issue. (Zybach 1983:13)

In sum, there has been a consistant concern in the Pacific Northwest about the potential adverse effects of "overcutting" for *over 100 years*, and concerted public and private efforts to reforest logged and burned lands for *at least 85 years.* The fact that a recent immigrant to Oregon began paying attention to these details within the past few decades *should not form the basis for either FEMAT's or President Clinton's understanding of historical Northwest Foresat management practices.*

4. Cultural and Biological Forest Dynamics. *Current laws, ownerships, and values in the Douglas-fir Region are likely to remain constant for the forseeable future; past "early seral stage" patterns of vegetation have remained constant (or increased in extent) through time.*

FEMAT predictions are based upon laws, boundaries, and objectives that are assumed to be static for the entire prediction process. By the same token, there is every indication that certain plant communities are thought to be sufficiently represented to cause little concern to the FEMAT scientists. These typically dynamic elements of our cultural and biological environments are (for Northwest Forest planning purposes) considered to be unchanging aspects of forest managment. Certainly, the rapidity with which our natural resource management laws have changed over the past 10 to 25 years regarding endangered species, sustained yield, NEPA, etc., should indicate the that likelihood that our current laws will remain unchanged throughout the next 100 year time frame of the forest plan is little to almost none. For FEMAT purposes, required compliance with existing laws was specifically interpreted to mean (FEMAT:II-4 to II-5):

1) spotted owls and marbled murrelets would be **"well distributed across their current range";**
2) maintenance and **restoration of inland anadromous fish habitat;**
3) a **"connected or interactive old-growth forest ecosystem"** would be **"created".**

Legal interpretations of existing laws, lands outside Forest Service and BLM boundaries, early seral stage plant and animal assemblages, and human families were some of the missing elements in the FEMAT process—This despite the fact that Clinton had instructed:

> "First, we must **never forget the human and economic dimensions of these problems";**
> "Second, we need to **protect the long-term health of our forests."**
> "Third, our efforts must be **scientifically sound, ecologically credible, and legally responsible."**

Somehow, the President's basic instructions were ultimately interpreted to mean a "**defacto policy of biodiversity protection.**" At least the English language was being treated as a dynamic entity:

> . . we forget that the first paragraph in the Endangered Species Act says, "**It's not the species that's listed. It's the ecosystem on which it depends.**"
>
> If you consider those two things in combination and the case law, it appears, to me at least, that **we have a de facto policy of biodiversity protection, particularly for national forest lands. It becomes an overriding objective. . .**
>
> So as we move on to the rest of our lives, let's understand we can't go back now. We have to go on, and **there should be no looking back now except to learn from the past, because in the past there's blame enough for all of us**. But, by golly, in the future there's credit for all of us too, and let's get on with it. (Thomas et al. 1993: 12)

The forests of the Douglas-fir Region are the expressions of thousands of years of changing human values, catastrophic events, and the cumulative actions of resident families and native animals. Change is, has been, and always will be, constant. The effective management of change requires an educated and involved public: as laws, values, land ownership, vegetation patterns, and human populations change, a flexible management strategy—driven by information regarding the magnitude and importance of such changes—must be developed. A combination of proven methods, new information, changing alternatives, new options and local consensus can be used to implement evolving and enlightened resource management strategies over time:

> **A variety of fish, wildlife, plant and invertebrate species within the range of the northern spotted owl use early-successional forests as primary habitat** for breeding and/or feeding . . . Alternatives that provide for the greatest amount of habitat in the youngest successional stages would generally result in the best outcomes for early-successional associated species. In general, **those alternatives that provide for the higher levels of timber harvest will produce greater amounts of this habitat.** (DSEIS: 3&4-102)

Although the DSEIS specifically addresses the relation between "primary habitat" for certain species that benefit by "higher levels of timber harvest," for practical purposes, FEMAT planning assumptions followed the Regional Ecological Assessment Project (REAP) guidelines:

> **This analysis compared** landscape structure for two (approximate) time periods—**1890 (to represent landscapes in a "natural" condition)** and 1990 (to represent the current condition). 1890 was chosen as the year of comparison because . . . 2) for the area used in this analysis, **it is prior to extensive** landscape pattern

> alteration by **logging and disruption of natural fire regimes by settlers (although the Siuslaw National Forest by this time DID experience some fires set by European settlers). Fires started by native Americans are considered to be "natural" phenomena** in this analysis. . .
>
> The following **assumptions** were made in creating the landscape structure maps:
>
> . . . **Natural nonforest patches (meadows,** rock outcroppings, **etc.) have been stable over the last 100 years**; none have been created or lost.
> (Diaz, Kertis and Peter 1993:3-4)

By clearly stating their assumptions, *and then applying those assumptions to their analysis,* the REAP team was able to identify several interesting and important environmental changes in their study areas. Although their selection of years (1890) or treatment of native Americans might be suspect, these are considerations that can always be altered at some other time. At least the REAP analytical process has been clearly identified and used; claims impossible to make for the FEMAT process.

REGIONAL NONHUMAN DISTURBANCE HISTORY

Nonhuman disturbances—such as floods, windstorms, insect outbreaks, beaver ponding, ocean changes, and climate changes—have affected the locations and numbers of Douglas-fir Region wildlife populations through time. Current assemblages of viable western Oregon plants and animals have adapted to local and regional patterns of physical and biological change over time. In addition to not considering the effects of most human actions upon the region's forests (logging is an exception), FEMAT barely considers other forces of nature:

> **The simulation** [of forest development] **was based upon simple assumptions** about growth from one forest cover size class into another **and did not include disturbance.** It did not take into acount that many dense young plantations within the Reserves would probably take longer to develop late-successional conditions, or perhaps not ever develop them. **A disturbance correction was applied** to the growth output by assuming that 12.5 percent of the reserved areas would be subject to severe disturbance over 50 years. **This translates to a 400-year natural disturbance rotation**. The simulation **assumed that a partial fire suppression would occur,** driving the natural disturbance rotation longer than the presettlement regional average of about 250 years. **Under these assumptions**, about 80 percent of the Reserves on average would eventually be covered by forests older than 80 years. (FEMAT:IV-55)

Nonhuman disturbance patterns are eposodic in nature, however, and cannot be demonstrated to provide anything near the regularity required for a useable "average." For instance, what bearing has the ***average*** time (or intensity, or extent) of eruptions for Mt. St. Helens had upon the age, size, or structure of forests currently existing on the mountain's slopes? The answer is none. For eposodic events, an "average" of anything is of very limited value for describing influences upon dynamic, living populations. Each event has its own consequences, depending upon severity, existing conditions, time of day, etc. To draw conclusions regarding forest age, extent, and structure from such a limited measure does not make good sense or good science. This point is summarized by Pyne:

> Yet from particles to complexes, **fuels** also show a history; they **change over time**. The magnitude, character, and organization of these historical changes lead to the concept of a *fuel cycle*. And from this concept comes another, the *fire cycle*. As their names imply, **for these concepts historical changes are considered to be regular and at least roughly periodic**. In fact, they are neither. **In general, only where humans**

intervene with fire and fuel management practices is there an approximate cycle or an apparent periodicity. (Pyne 1984:103)

In addition to not considering the recent Northwest disturbance history of volcanic eruptions (1982 Mt. St. Helens), windstorms (1962 Columbus Day Storm), regional flooods (1948 Columbian), FEMAT fails to consider "partial fire suppression" as a disturbance, even though the results of this element are shown to have had a profound effect upon forest age, structure, and extent, and even though massive quantities of fuels would build up under this particular FEMAT scenario greatly alters future fire behavior within Reserve boundaries.

Many nonhuman disturbances play a primary role in the shaping and bounding of forested areas. During the past 15,000 years or so, however, some types of recurring regional nonhuman disturbances seem to have had little direct effect upon the wildlife populations of the Douglas-fir Region. Major disturbances that have occurred in that time (such as glaciers, volcanic eruptions, changing sea levels, and changing climate, as examples) are well known and have been relatively well documented. Other nonhuman disturbances, such as insect outbreaks, tree diseases, landslides, and frost heaving, have also obviously occurred—and undoubtably had profound cumulative effects—but have left so little apparent evidence that they are difficult to measure and consider. Nonhuman disturbances for which there is substantial measureable evidence in regional forests include those resulting from flood, fire, wind, snow, and drought.

Floods. Between 15,000 and 12,800 years ago, the Willamette Valley filled between 50 and 100 times with water, mud, huge rocks, and ice that had coursed down the Columbia River from an area of origin in present-day western Montana (Allen, et al., 1986). These floods returned periodically for the given 2200 year period, creating an ephemeral "Lake Allison" between Oregon City and Eugene with each major event. The soil deposits from these floods form the basis for the flattened topography of much of the Willamette Valley, including much of the land below 400 feet elevation. Smaller floods during historical times (including those of 1861, 1890, 1943, 1948, and 1964) have also affected the vegetation of the valley, but to a far lesser degree. Floods since 1846 have been largely confined to lower elevations and have generally lasted for only a matter of hours or days. Soil deposits, erosion, and wildlife mortality associated with these lesser events could only be a fraction of that associated with the catastrophic floods of the last ice age.

Fire. Virtually all of the historic "Great Fires" and historical prairie fires of any magnitude in the Douglas-fir Region can be traced to sources of known—or greatly suspected—human ignition. Although lightning strikes do occasionally start major fires in the region, the thousands of fires used daily by humans have provided a more consistant and widespread source of ignition over the past few centuries; and likely over the past 10,000 years as well. Detailed contemporary written records of landscape changing fires in the region date back at least 165 years, to the accounts of David Douglas and Alexander McLeod in 1826. Histories written in the rings of living and dead trees extend the record hundreds of additional years, to at least 1647 in the Willamette Valley (Starker, 1939: 48) and nearly 1000 years in western Washington (Henderson et al 1989:12) and in the western Oregon Cascades (Teensma 1987:32). Meticulous pollen counts and subtle archaeological analyses paint a more general picture, but add another 10,000 years to the history of changing landscape patterns in western Oregon forests. During all of this time (from the last ice age to the present) there has been patterns of periodic fires in the Douglas-fir Region that have favored the establishment and maintenance of wet and dry grassland prairies, brakes, balds, oak savannahs, and even-aged stands of Douglas-fir and hemlock. The link between cultural fire and Pacific Northwest forest ages, structures, and extents seems obvious, but remains to be proven. Today, field burning, broadcast burning, and other prescribed agricultural and forest management fires—coupled with occasional wildfires—approximate many of the vegetation patterns of the past. It seems unlikely that the "periodic fires" required to maintain such fire-climax vegetation types as bunchgrass, brackenfern, Oregon oak, and Douglas-fir could have consistantly affected the region in an "average" manner if the only source of ignition was lightning.

Wind. The Columbus Day Storm of 1962 traveled due north from California to southern Washington, including the Willamette Valley in its path. Over 11 billion feet of commercial timber were estimated to have been blown down during the course of this event. Another major windstorm event, the 1921 "Big Blowdown" or "21 Blow" extended from the Columbia River north to Vancouver, leveled an estimated 6.7 to 8.0 billion board feet of timber in western Washington (Henderson et al. 1989:20). Other major windstorms in the region occurred in 1780-1788, 1880, 1895, 1923, 1955, 1961, 1979, and 1981. For FEMAT to ignore events of this frequency and magnitude in deference to "fire cycles" and "50-11-40 Rules" seems odd. At the least, the presence of billions of board feet of fuels that follow many of these events will greatly strain the "simple assumptions" regarding "partial fire suppression" that FEMAT uses to model regional 250-year and 400-year "fire cycles."

Snow. The snows of 1861, 1881-82 and 1936-37 were all noted for the vast amounts of livestock they killed on the ranges of the Willamette Valley. Until those times, much of the prairie lands that had been cleared and maintained by Indian fires had subsequently been kept clear of tree growth by grazing cattle, horses, sheep, and goats. There is some evidence that reductions in grazing associated with the livestock mortality of those years resulted in the spreading of Douglas-fir to many former hillside pasturages.

Drought. The seasonal droughts of the Pacific Northwest have been noted as one of the primary factors favoring conifer forests over hardwood forests in the region. Many deciduous trees simply cannot survive long, dry summers without periodic irrigation. In addition, Graumlich (1987) analyzed tree rings to arrive at a 300-year precipitation pattern that identified specific years (1717, 1721, 1739, 1839, 1899, 1929, and 1973) and at least one decade per century (1790s, 1840s, 1860s, 1920s, and 1930s) of prolonged regional drought. These latter patterns have been correlated to major forest fire events in the Coast Range, including the western Willamette Valley (Zybach, 1992: 9).

This sampling of nonhuman disturbances within the region of the current range of the northern spotted owl display: 1) the profound cumulative total effects that these events have had on regional wildlife habitat patterns through time; and, 2) the glaring inadequacies of FEMAT in ignoring or trying to "simplify" the "average" individual impacts of these occurances upon each of the 10 FEMAT alternatives.

Probably the greatest agent of change over human history has been the cultural use of fire. The earliest historical records of the Northwest describe an environment defined by fire-dependent species (bunchgrass, white oak, Douglas-fir, brackenfern, etc.) that require periodic burning of the landscape. These burnings vary from the annual firings of prairies, brakes, meadows, and savannahs that characterize much of the interior valley landscapes, to catastrophic events that—for a given area—may be separated by one or more centuries per occurrence.

An example of the latter category is provided by the Tillamook Fire of 1933, which burned over 220,000 acres in a single August day, creating a mushroom cloud 40 miles wide that extended eight miles into the atmosphere (Zybach 1983:13-17). The Tillamook fire, as with other historical (1843-1933) "Great Fires" of the Oregon Coast Range, is thought to have a human caused origin (Zybach, 1988: 18-27). This pattern of fires (and probably of human ignition as well) has an ancient history:

> Pollen analysis of . . . west central Oregon shows that postglacial forest succession differed from that in the Puget Sound region. This may have been due to the existence of forests in the Coast Range of Oregon during the latter part of the Pleistocene, and the occurrence of many periodic holocaustic fires during postglacial times. (Hansen 1941).

The realization that "holocaustic fires" along the coast of Oregon have been occurring "periodically" since the arrival of people should not be suprising: With hundreds or thousands of people systematically spread across the landscape that are hunting, cooking, heating, harvesting, clearing, and playing with fire on a daily basis, the wildfire requirement of "source of ignition" is provided constantly over a wide variety of locations and under a wide variety of circumstances. Other basic requirements for a wildfire include fuel (the world's largest conifer forests); climate (seasonal dry east winds); and topography—the Willapa hills of southwest Washington and many of the coastal Oregon river basins feature rolling hills and open valleys that have allowed a nearly total killing of surface vegetation during the "reburning" cycles that characteristically follow "stand replacement" fire events.

One of the few predictive assumptions identified in the DSEIS is that the spotted owl region can be roughly generalized and described by using a single statistical measuring tool, the "fire cycle":

> **Assuming that** the average regional natural fire rotation was about 250 years for severe fires (those removing 70 percent or more of the basal area), **then 60 to 70 percent of the forest area** of the region was **typically dominated by late-successional** and old-growth forests, depending on the age which "mature" forest conditions develop (assume a range of **80 to 100 years**). DSEIS: 3&4-32

As Pyne states, however, fire cycle regularity and averages can only be applied with some effectiveness to measure and predict controlled *human activities*. Teensma's 1987 fire history of the central western Cascades, for example, included a tree ring study that spanned 800 years. His conclusions (1987: 115-117) were that the fire cycle for his study area (a remote area of the Cascades that includes a portion of the H.J. Andrews Experimental Forest) was only 78 years before settlement (1772-1830); 87 years after settlement (1851-1909); and, *beginning with fire suppression activities in 1910*, has "dramatically" increased to its current rotation of 587 years!

Although it has already been argued that the common concept of a "fire cycle" is an artificial construct with little practical application (Pyne 1984:103-106), the underlying point Teensma makes is that "presumably, aboriginal burning is ecologically important in some parts of the study area, e.g., huckleberry fields and high elevation meadows" (1987:116). As demonstrated by his findings, the frequent burnings of specific areas also has a profound effect upon adjacent forestlands.

The historically unprecedented reduction in wildfire frequency chronicled by Teensma is accompanied by equally remarkable increases in logging, agriculture, species introductions, urban and transportation developments, and local human populations. In addition to the patterns of catastrophic nonhuman disturbances in the Douglas-fir Region, there is also the history of pervasive and significant human disturbances that has existed for at least 11,000 years. Combinations of these changes have defined the lands and forests that we see today.

Periodic human disturbances and episodic nonhuman disturbances have contributed to regional introductions of numerous species (Doughty 1974), including bullfrogs, bachelor buttons, orchard grass, opposums, tobacco, rainbow trout, and—possibly—white oak; the recent localized extirpations of numerous plants and animals, including white-tailed deer, grizzly bears, camass, lampreys (Downey et al. 1993) and bunchgrasses (**Fig. XI** is a picture of a hunting expedition in Soap Creek Valley, Benton County, Oregon, at the turn of the century: many of the animals shown in the photograph are now extinct or rare in the valley);

Fig. XI. 1900 Wildlife Inventory, Paul M. Dunn Forest (Sondenaa 1992: 3) the extinction of a number of ice age megagauna, including elephants, camels, giant sloths, giant beavers, and (**Fig. XII** is a picture of an elephant tooth discovered on the Glender Brothers farm in Soap Creek Valley in 1919. It is about 11,000 years old and may be associated with Paleoindian hunters of that time); and the constant alteration of wildlife habitat patterns for entire ecosystems.

An example of these processes is provided by photographs of lands indexed in **Fig. XIII.** The settlement of Douglas-fir forests in the 1800s by European and American settlers was hastened by fires. **Fig. XIV** shows the homestead of two brothers from England that was established in the Oregon Coast Range following the Yaquina Fire of 1868. Notice the absence of stumps—indicating periodic seasonal burning by former residents or visitors to the area—and the great number of snags on the hillsides. **Fig. XV** is a photograph of the same general area, taken a few miles to the west, in 1920. Notice the size and distribution of the stumps. The introduction of grazing animals has kept ladder fuels from developing and aided in the maintenance of stumps and snags that may have formerly been factors in a series of reburns. Finally, **Fig. XVI** shows the same area today. The elimination of many grazing animals following widespread automobile use after 1915 has created a regional expansion in Douglas-fir reforestation, such as evidence by this series of photographs. This pattern of fire, grazing, afforestation and reforestation is typical of much of the spotted owl region in historical times.

Grass prairies, meadows, and brakes (brackenfern prairies) created and maintained by human fires, surrounded most early historic Indian settlements and also provided habitat for a wide variety of wild plants and animals. The introduction of domesticated grazing (cattle and horses) and rooting animals (hogs) in the mid-1800s provided an immediate use for the roots, bulbs, grasses, and berries in the Indian clearings. Burned areas that went ungrazed, unmowed, or unplowed were gradually forested by the seeding of adjacent trees and shrubs. An example of this process is provided by Warren Vaughn, an early pioneer writing about conditions in the Tillamook Bay area in 1856:

> At that time there was not a bush or tree to be seen on all those hills, for the Indians kept it burned over every spring, but when the whites came, they stopped the fires for it destroyed the grass and then the young spruces sprang up and grew as we now see them. (Vaughn c.1890: 64)

Evidence that the process of afforestation of Indian prairies is continuing to this time is provided by a series of aerial photographs taken of an area in the Paul M. Dunn Forest. **Figs. XVII-XIX** show a 50-year reductionsin a prairie complex located in Section 23, Tsp. 10 S., fig XII

Fig. XII. Prehistoric Elephant Tooth, Paul M. Dunn Forest (Glender Brothers c.1919)

Rng. 5 W. in Benton County, Oregon taken between 1936 and 1986. These photos are corroborated by a comparison of oblique photos of the same complex taken in 1914 **(Fig. XX)** and in 1989 **(Fig. XXI)**. These views are looking northeasterly, along the valley made by Soap Creek, a tributary to the Willamete River. Land on the north side of the valley is contained in the Paul M. Dunn Forest; land on the south of the valley is included in the Mary McDonald Forest. These lands are currently owned by Oregon State University and are included in the lands managed OSU Research Forests.

Probably as good a summary as ever written concerning the primary reason for the failure of FEMAT scientists in developing the DSEIS was given a number of years ago by Harvard botanist and forester, Hugh Raup:

> I think **the largest single need in American forest biology is the study of man's relation to forest land**. **Our foresters need to** understand much more than most of them do about purely human motives and aspirations with respect to the land. They ought to **become genuinely knowledgable and respectful of people's economic, social, and aesthetic institutions.**
> (Hugh Raup, quoted in Stout, 1981:93)

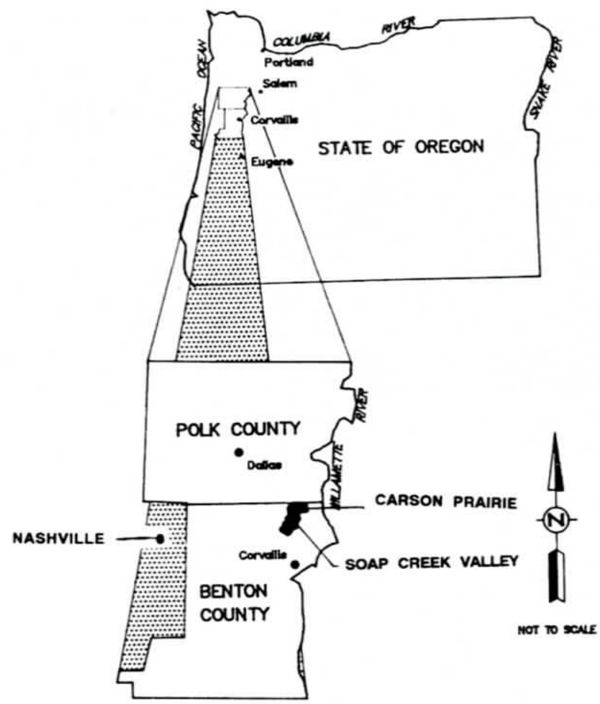
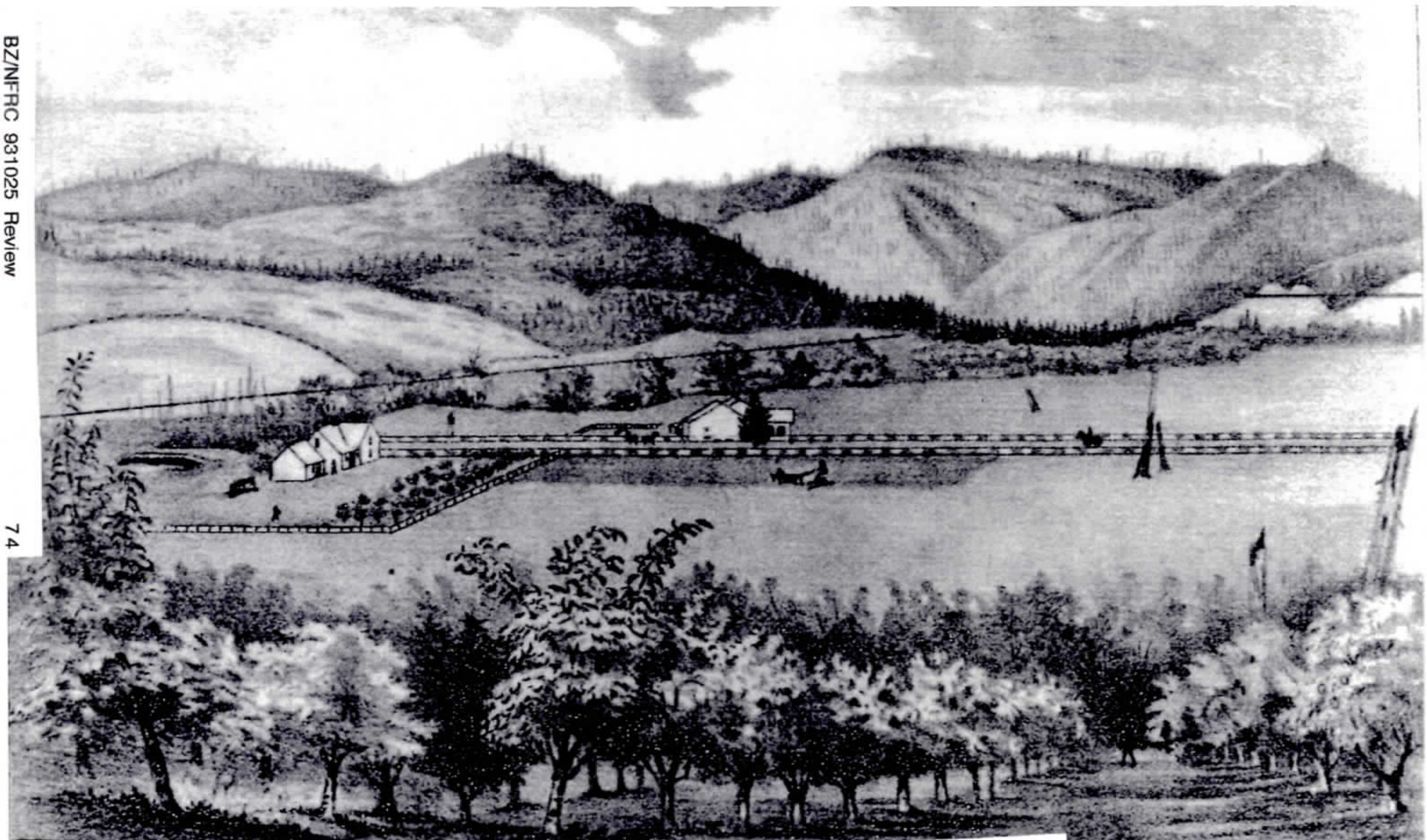


Fig. XIII. 1993 Western Oregon Location Map (Zybach 1993a: 4)



A. G. Walling, Lith. Portland, Or.

Fig. XIV. 1885 Nashville: T. 10 S. R. 8 W. East View (Fagan 1885: 148)

FARM AND RESIDENCE OF ERNEST AND CLAUDE WARREN,

Nashville, [illegible] County, Oregon.

Fig. XV. **1920 Nashville: T. 10 S., R. 8 W., Sec. 30 NW 1/4**
West View (Lister c.1920)

Sec. 33 **Fig. XVI.** **1992 Nashville: T. 10 S., R. 8 W., Sec. 30 NW 1/4**
West View (Nystrom 1992)

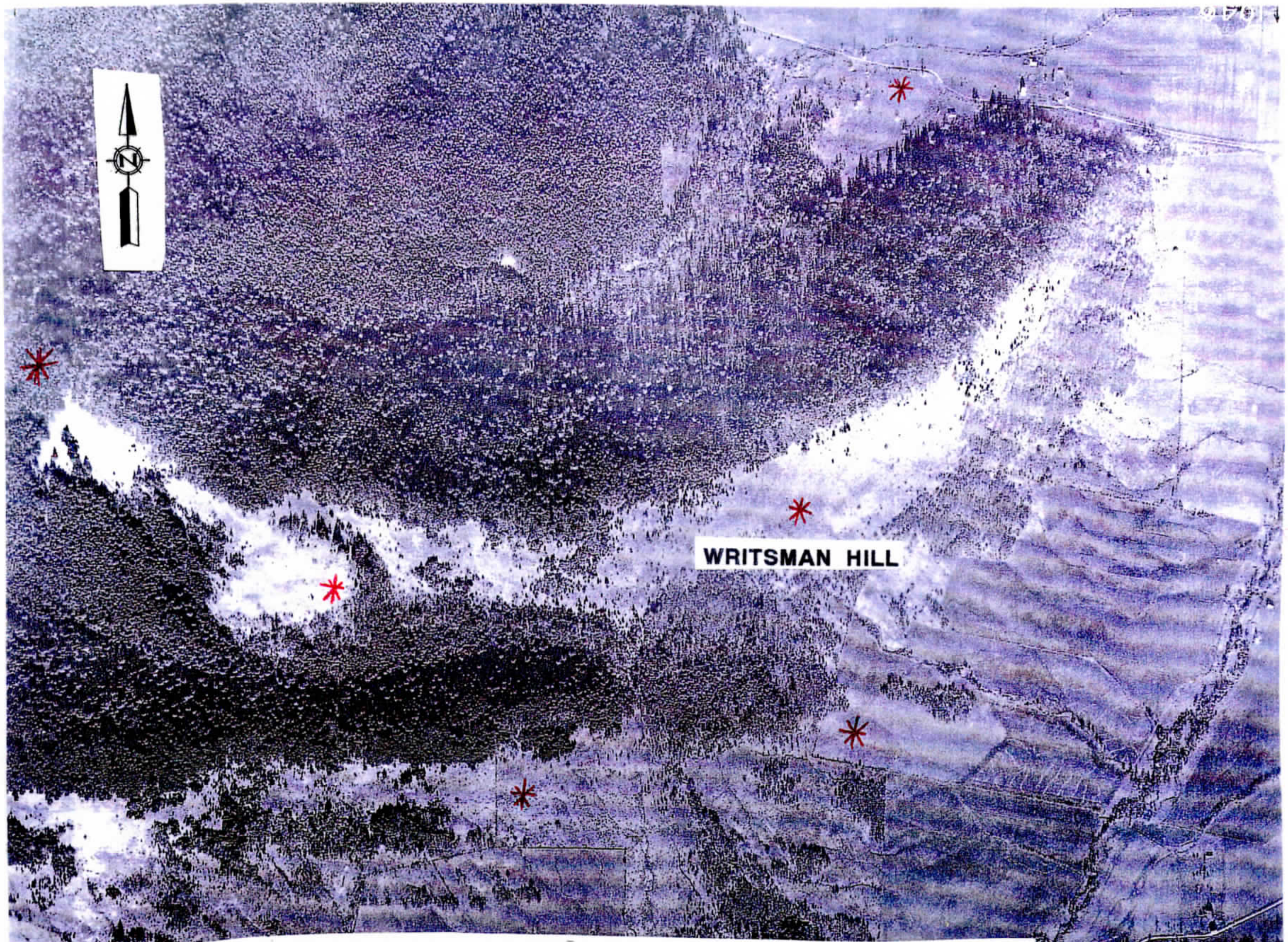


Fig. XVII. 1936 Carson Prairie Relicts (Zybach et al. 1990: 41)

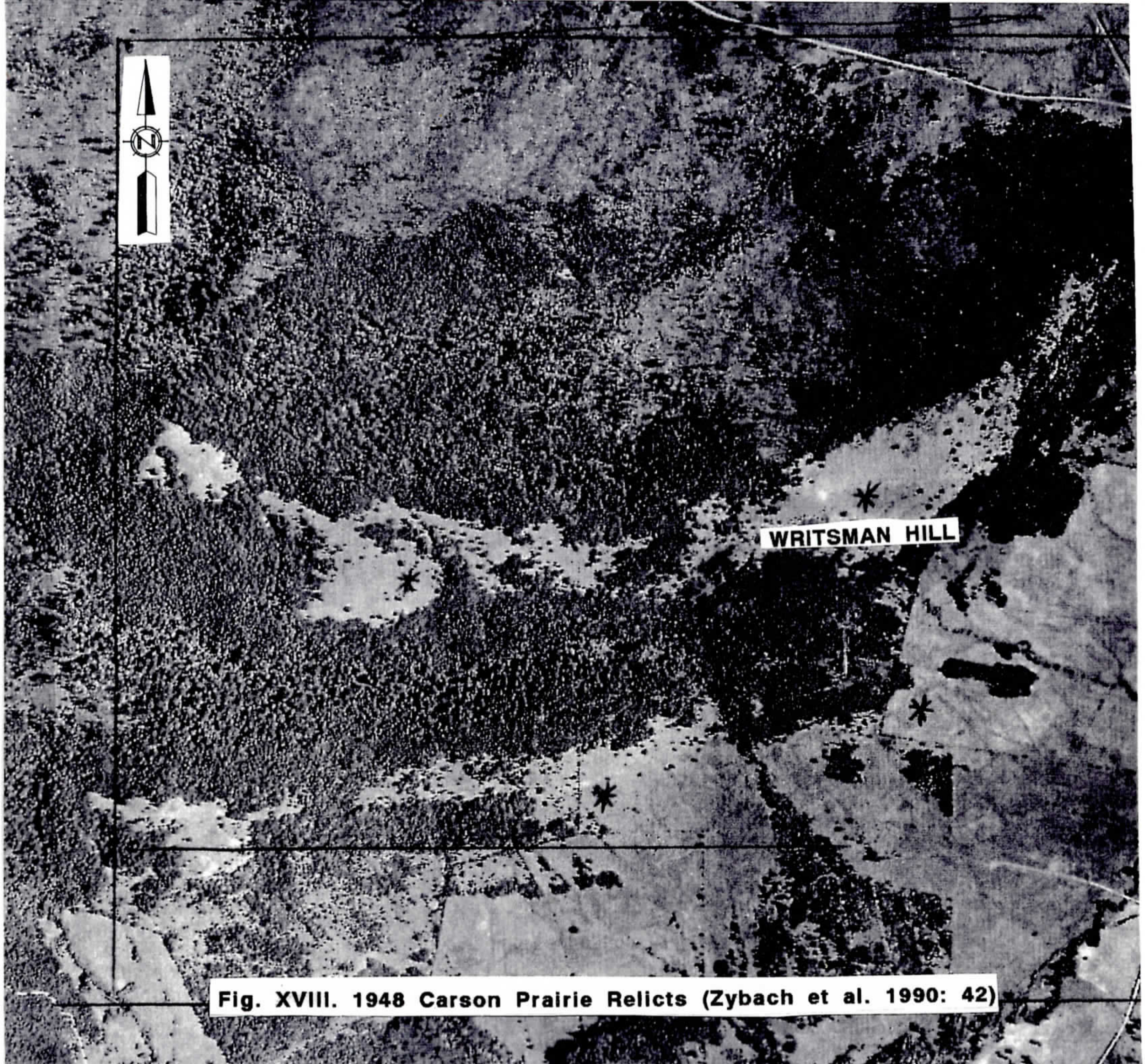


Fig. XVIII. 1948 Carson Prairie Relicts (Zybach et al. 1990: 42)

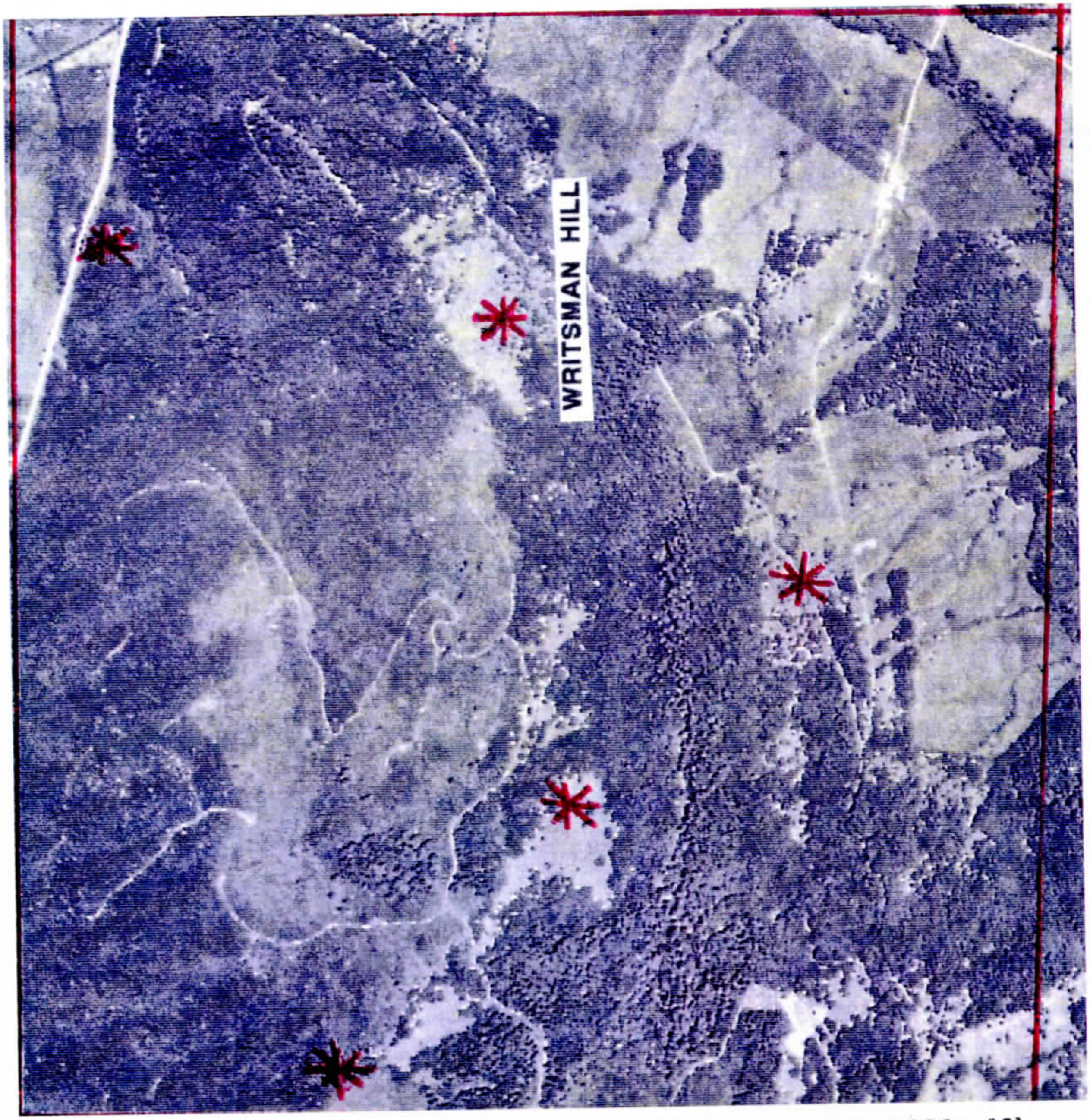


Fig. XIX. 1986 Carson Prairie Relicts (Zybach et al. 1990: 43)

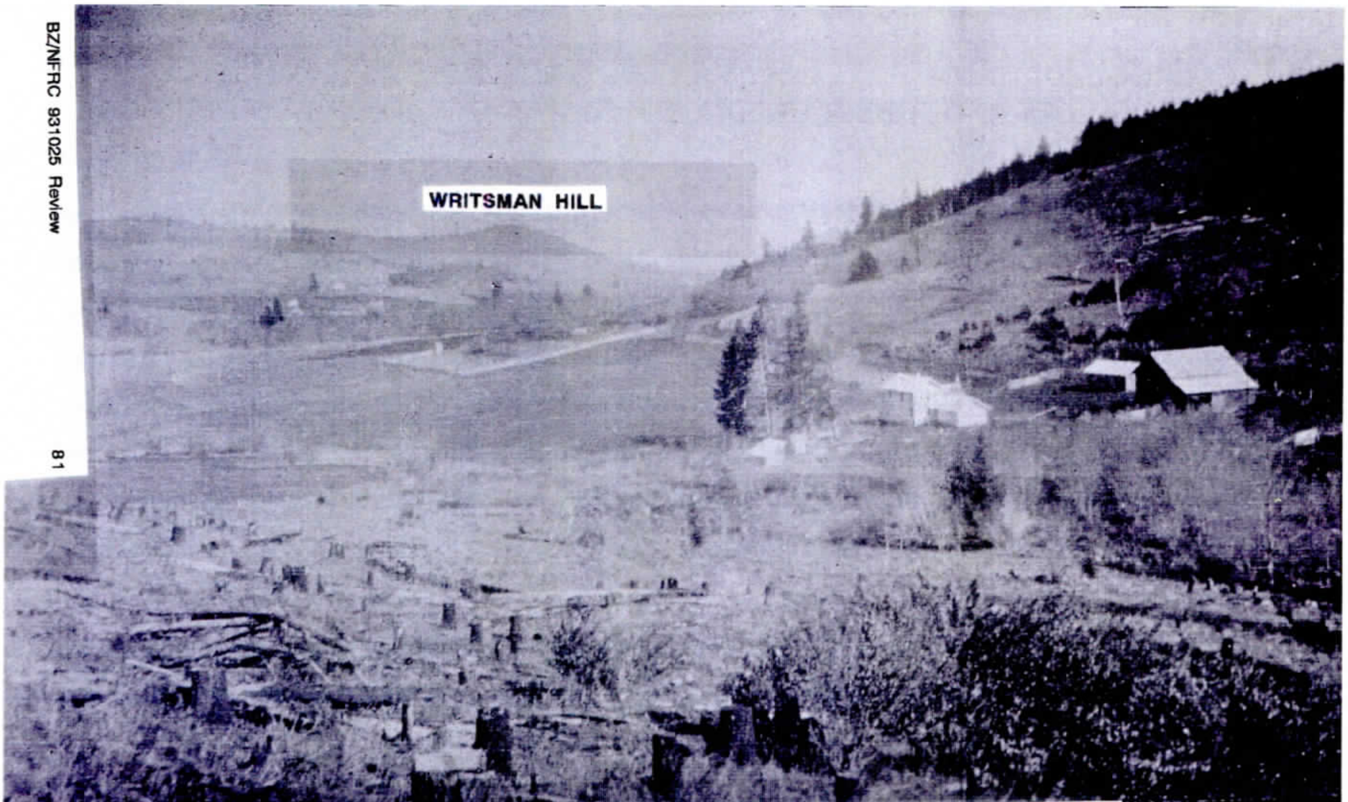


Fig. XX. 1914 Oblique View of Carson Prairie Complex (Cook 1914)

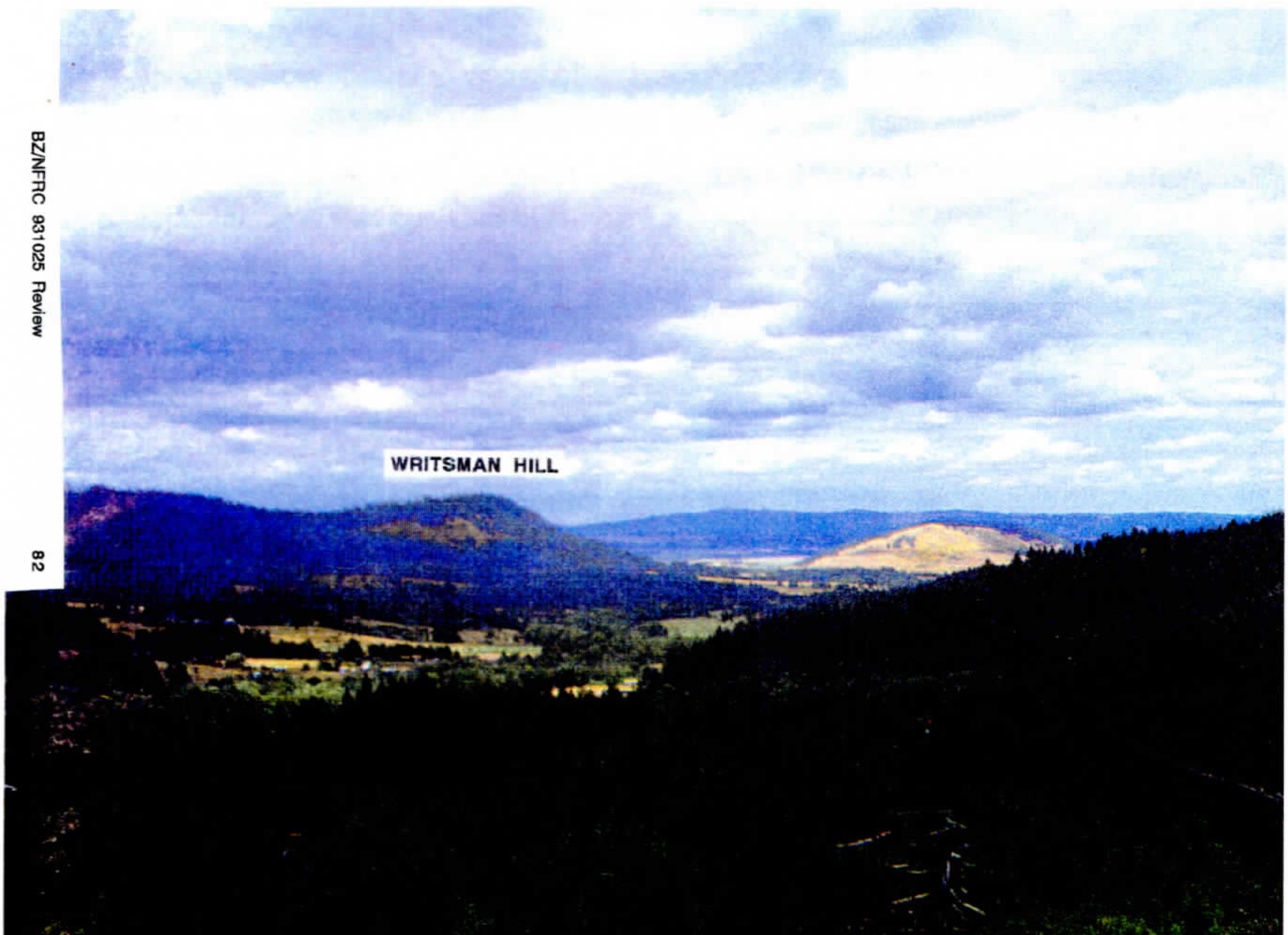


Fig. XXI. 1989 Oblique View of Carson Prairie Relicts (Zybach 1989)

CULTURAL VALUES AND FOREST PRODUCTS

Forests in the Douglas-fir Region have been significantly affected by human activities (including hunting, fishing, and the use and suppression of fire) for thousands of years. Many of the actions that directly impact the size, shape, and populations of these forests are formulated and implemented at the individual family level; with a general objective of creating or using products that satisfy both the family's basic survival needs *and* existing sets of cultural values defined by inclusive local, regional, and national communities. For at least the past 10,000 years, wild plant and animal populations within and adjacent to Northwest forests have had to adapt to value-driven human activities, migrate to other areas, or die out.

In order to better understand the dynamic relationship between human activities and forest cover patterns (wildlife habitat) in general, it is helpful to define some terms and develop a few basic concepts. Central to this discussion is the idea that individual actions result from:

a) biological and social "needs" to survive and persist as a species; and,
b) culturally-defined "values" created to enhance or maintain a "way of life" for people, their families, and their local communities.

Abraham Maslow, in developing his five-level "hierarchy of needs," argued that the lower "material" levels of human needs had to be met before the upper "self-actualizing" levels could begin to influence behavior (Barbour, 1980: 62-63). Although it can be debated whether this process is as mechanical as Maslow describes, it seems reasonable that some combination of his five levels of identified "needs" are, indeed, critical to the short-term survival of individual humans, and thus to the long-term survival of the species. A summary of Maslow's hierarchal "levels of human need" are:

1. Basic	(air, food, water, sleep)
2. Security	(physical safety, steady job, home security)
3. Social	(sense of belonging, love, affection)
4. Esteem	(self esteem, independence, status)
5. Self Realization	(fulfillment of potential, joy)

A useful definition of *value,* as opposed to *need,* is also provided by Barbour (1980:60), as an object or state of affairs that is viewed with:

1) a favorable attitude;
2) a beneficial aspect;
3) a disposition to act toward its realization.

As such, it can be seen that nearly all of Maslow's "levels of need" can also be defined as "values." An important distinction (in fact, the primary difference I see between people and the remainder of the animal kingdom) is that specific values are routinely attached to things and situations that are not apparently critical for our survival or continued existence. In his study of U.S. society, for example, Rokeach (Barbour 1980: 61) had his subjects rank such personal values as world peace, freedom, salvation, beauty and an "exciting life." It is difficult to imagine other members of the animal kingdom being capable of grasping these concepts, much less being willing or able to act toward their realization.

A "disposition to act or promote" that is central to these definitions of human need and value is also critical to a "cause and effect" understanding of the relationship between human actions and environmental change. For example, the need to eat or the need for affection might influence a person to try and catch fish for themselves or their family; personal values regarding recreational excitement, natural beauty, or aesthetic judgements of texture and flavor might cause the same person to seek trout rather than carp.

An illustration of the hypothetical interrelationships between human needs, cultural values, family activities, and the biological transformation of affected forests is provided by the systems diagram on the following page **(Fig. XXII).** This diagram attempts to depict how cultural information—i.e., *values* that are peculiar to the human species—and biological *needs* is communicated between spatially-scaled organizations of people. The creation of *forest products* is the mechanism by which this value-based information is transformed into family-scale *activities* that result in *direct physical and biological changes to local forests*; and, ultimately, to the *global environment.*

The importance of understanding these relationships, so far as this review is concerned, is that we must first identify the primary sources of human influence upon Douglas-fir forest environments before we can measure the effects of that influence. And in order to predict what the local forests would be like in the complete absence of human influence (FEMAT's "naturally functioning ecosystem"), we must first consider the cumulative magnitude of the measured effects.

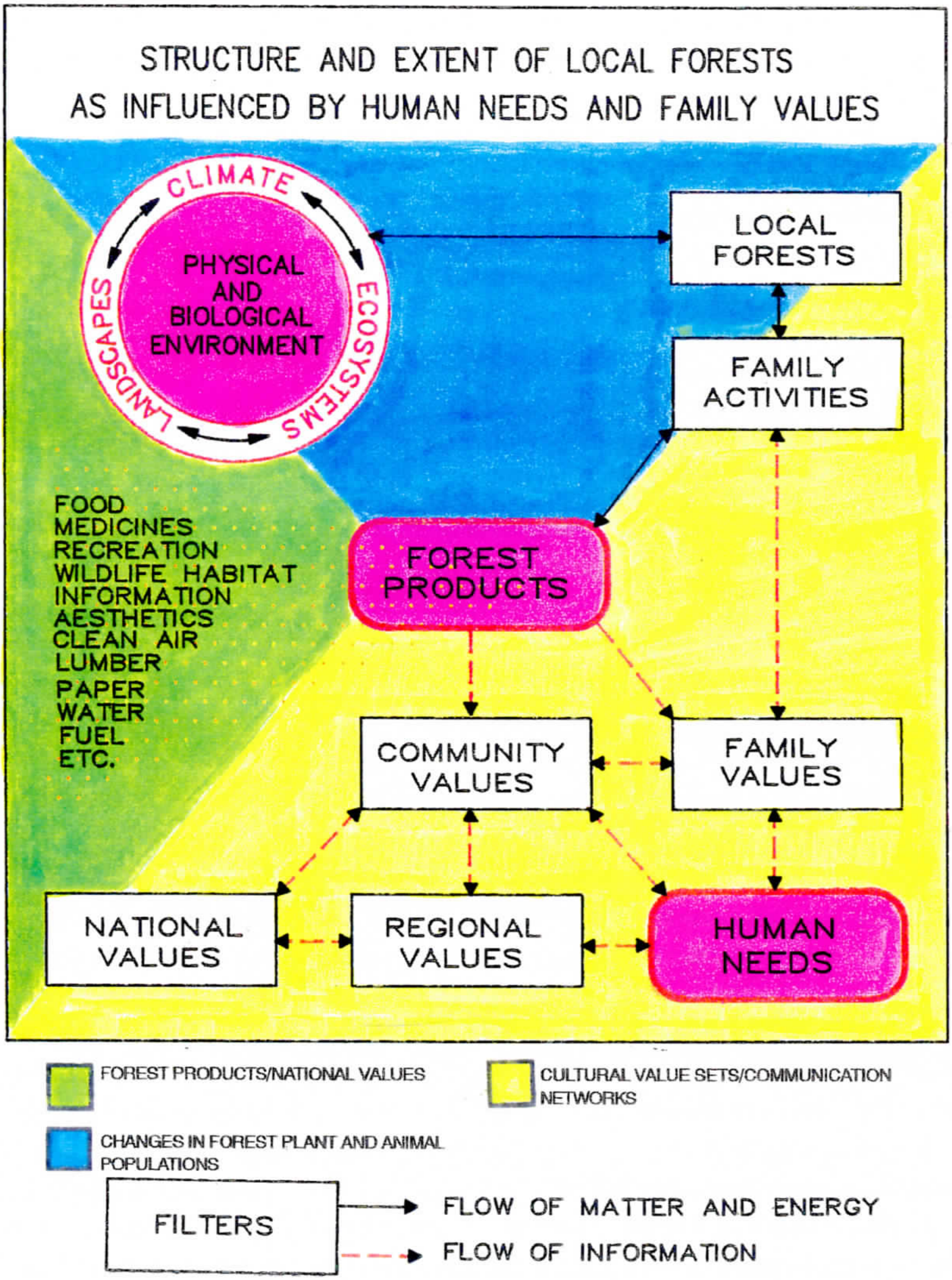


Fig. XXII. Systems Diagram: Family Values and Forest Biology (Zybach 1993a: 14)

To follow the diagram on a step-by-step basis, it is probably easiest to begin in the lower left hand corner, with the box filter titled "National Values." This set of cultural values, to use the United States as an example, might include federal laws and policies regarding the preservation of endangered species, a concern for national defense, and a preference for the democratic process for resolving conflicts. This information is circulated and considered at community (Corvallis) and regional (Pacific Northwest) levels through such communications media and events as television, radio, telephones, newspapers, books, public education, and political rallies. In addition, new values are added to the mix that are appropriate to the differing scales; perhaps local job opportunities at the community scale and desirable landscape scenery at the regional scale would be good examples. As values change through time and circumstance, information that is passed through the communications network can quickly reflect the nature and degree of that change.

The lower right hand corner box contains Maslow's "Human Needs." These are the critical biological and social drivers that have resulted in the survival of the human species over time. "Survival" is perceived as being approached on a "family" level; whether the family is defined as a couple or as an extended family of dozens, the basic characteristic is that of individuals sharing their daily lives and housing, and being mutually dependent upon one another. A family-scaled survival strategy, or "way of life," would depend upon basic needs, local opportunities, and the shared values of the community in which the family lived. This combination of influences would be the primary shapers of an individual family's system of values, which in turn would influence decisions regarding acceptable types and locations of employment, desirable styles of shelter and clothing, methods of obtaining and preparing food, and other activities associated with a family's life style.

Using the diagram, it can be seen that human actions (or, "activities") made in response to changing social values can be measured on a family-by-family basis. In communities that depend upon a forest-based timber economy for employment stability, infrastructure improvements, or definition ("timber town," "mill town," "logging community"), families become directly associated with their primary means of employment; i.e., loggers, mill workers, brush pickers, farmers, etc. In fact, Carroll (1989), building upon Haynor's study of Pacific Northwest logging communities in the early 1940s, reported a remarkable stability in the social organizations and specific job identities associated with individual families within these communities over an 80 year period of time. Given the profound technical and philosophical changes that have taken place in the timber industry during the 1900-1983 study period, this resistance to outside influence is represented as a serious problem related to conflicting social value systems (Carroll 1989.: 103-104).

At the point where cultural and biological information is transformed into action, the diagram's box filters begin to track changes in matter and energy that are ultimately reflected in a changed environment. In forested areas, these changes are measured in terms of impacts to extent (the total area covered by the forest) and structure (the size, age, and species of trees, snags, woody debris, and other physical aspects of a forest's "architecture") brought about by the creation of forest products. The products listed in the diagram can be roughly divided into three basic categories (Karchesy, personal conversations, 1992):

1. Primary (logs, lumber, pulp, fuel)
2. Secondary (food, medicines, clean air, water)
3. Intrinsic (aesthetics, wildlife habitat, information)

Primary forest products are those carrying the greatest amount of economic value. For the most part, these products address several of the needs representing Maslow's second level, including a steady job and home security. Secondary forest products also carry economic values, but to a lesser degree. Interestingly, these less-valued products address the basic needs of Maslow's *first* level, including food, air, and water. These most fundamental of biological needs are common throughout the animal kingdom, but only people attach dollar values to them, as evidenced by water bills and hunting fees.

"Intrinsic products" are those that are general to a forested area, including the way different areas look, the type of habitat it provides to what kinds and amounts of different species, and the scientific information that its existence provides. These are the types of products that are most difficult to value or measure in dollar amounts, mostly because of the difficulty in marketing them. They are also products that best address the higher levels of Maslow's Hierarchy, including sense of belonging (cultural landscape), independence, and spiritual joy. The attachment of intrinsic values to a forested area is a particularly human approach to resource use, one that doesn't appear to be shared with other members of the animal kindom.

Finally, it is the creation of identifiable forest products that transforms cultural values into physical and biological environmental change, both on a forest-by-forest level and on a global scale. The periods of time over which a clearcut is regenerated, a wilderness preserve is established, or huckleberries are picked *and* the size, locations, and efficiency of the human families that take part in these activities, are the two primary factors that must be considered in the measuring of human-influenced impacts upon forested areas.

The concepts and definitions regarding human influence on forested environments over time is almost completely overlooked in FEMAT. Nonhuman disturbance patterns are also disregarded. These are two of the primary drivers of forest history and landscape dynamics over time; their understanding is critical to an understanding of environmental ecology over the past 15,000 years, at least. A result of this missing information in the FEMAT process is that the various alternatives presented to President Clinton are not credible from an ecological standpoint and are too limited from biological, economic, or cultural perspective.

GENERAL CONCLUSIONS

Based upon equal parts of information presented in this review and my own practical experience, I have arrived at the following conclusions:

1. **The "Blanket of Old-Growth" Myth.** At the time of European settlement, the Douglas-fir Region was not a blanket of trees, 40 to 60 percent of which existed in stands 200 years or greater in age. Rather, the landscape of the Douglas-fir Region in the early 1800s was primarily comprised of shifting patterns of even-aged stands of conifers bounded by prairies and savannahs. Islands of conifers, groves of oak, meadows, ponds, balds, brakes, and berry patches further defined the environment, much of which was virtually free of underbrush, ladder fuels, coarse woody debris, snags, and other characteristics common to many post-1910 Pacific Northwest forests. At any given time during the past 1000 years, perhaps five to 38 percent of the region was covered with patches and stands of trees in excess of 200 years of age; the percentage varied significantly from time to time and from watershed to watershed, depending upon human settlement patterns, topography, fuel history, and local climatic conditions.

2. **Cultural Landscapes and Succession Theory.** Before the time of European settlement, American Indians in the Douglas-fir Region did not live in a "naturally functioning" environment that can be described in terms of regional "fire cycles" and forest plant succession. Rather, human families have lived in the Douglas-fir Region for at least 11,000 years. The use of fire by these families for heating, cooking, hunting, recreation, vegetation management, and other purposes produced an environment dominated by fire-dependent and fire-tolerant plant species, such as bunchgrasses, white oak, Douglas-fir, and brackenfern. Identifiable patterns of these types of plants existed across most of the landscape for thousands of years.

3. **Logging History and Resource "Destruction."** Since the time of European settlement logging, in the Douglas-fir Region has not "destroyed" or degraded many (if any) of the natural and cultural values associated with "native" "old-growth" forests. Such effects—where they can be identified—have rarely been exacerbated by standard "clearcut" harvest methods and industrial reforestation practices. Rather, clearcut logging, broadcast burning, and tree planting methods developed over the past 100 years can be effectively used to mimic prehistoric patterns of forest fires, landslides, volcanic eruptions, and windstorms. Wildlife populations that have adapted to these patterns over past centuries and millenia can also be encouraged by the systematic transformation of currently fragmented, diseased, or otherwise degraded stands into proven historical patterns of reforestation and revegetation.

4. Cultural and Biological Forest Dynamics. Current laws, ownerships, and values in the Douglas-fir Region are not likely to remain constant for the next 100 years; "early seral stage" patterns of vegetation have not remained constant (or increased in extent) during the past 100 years. The forests of the Douglas-fir Region are the expressions of thousands of years of changing human values, catastrophic events, and the cumulative actions of resident families and native animals. To effectively manage for the future, consideration must be made for expanding human populations, changing cultural values (and resulting laws), the continued waste of forest products, and occasional catastrophic occurances of such events as forest fires, floods, landslides, windstorms, and climate changes.

In sum, President Clinton was not offered a wide range of alternatives at all, but rather, variations on a single preservation-oriented theme: stop logging—especially clearcut logging—in "old-growth" Douglas-fir forests. An objective consideration of available historical information would have resulted in a wider range of management possibilities.

GLOSSARY

This glossary is included for two primary reasons:

1) to provide a basic and singular definition for key words used in this review;
2) to identify and define key words missing in the FEMAT and DSEIS glossaries.

Words used consistantly throughout the DSEIS and FEMAT—but absent from their glossarie— are marked with an asterisk (*). Definitions consistant with word use in this report—but based upon those used in the FEMAT text or glossary—are referenced by source and page number. Definitions given in FEMAT—but varying significantly with those used here—are marked with a double-asterisk (**). Such instances will also reference the differing definition by source and page.

All definitions apply exclusively to the Douglas-fir Region located within the United States; their application is intended solely for the purposes of this report.

Afforestation— The process of growing trees on land in which there is no prior indication of tree growth.

***American Indians—** Pacific Northwest families that were living here in 1809, and their descendents.

***Ancient Forest—** A stand of trees in the Douglas-fir Region at least 200 (180-220) years of age (FEMAT, II-2).

Classic old growth— A stand of trees in the Douglas-fir Region at least 200 (180-220) years of age with "heavy accumulations of wood, including large logs on the ground" (FEMAT, IX-24)

Climax vegetation— A stand of trees in the Douglas-fir Region at least 200 (180-220) years of age (FEMAT, IX-31).

***Cultural landscape—** A visible landscape that carries identifying features of human use or occupation.

***Cultural values—** Objects or states viewed with a favorable attitude and that carry a beneficial aspect that creates a disposition to act toward their realization.

Cultural resource— Objects, structures, or locations that can be identified with past cultures.

****Cumulative effects—** The total results of incremental human activities and nonhuman disturbances through time.

***Disturbance patterns—** Visible evidence on the landscape of past events.

***Douglas-fir region—** The area of North America including the distribution of Douglas-fir in 1850.

****Ecosystem—** The area of land drained by a single river system.

Ecosystem approach— A strategy to manage ecosystems to provide for all associated organisms (DSEIS: 1-1)

Ecosystem management— Forest management that takes "an ecosystem approach" (DSEIS: 1-2).

50-11-40 rule— A statistical measure developed in 1990 that can be used to regulate and monitor levels and methods of logging on federal lands in the Pacific Northwest. The Rule: for every nine square miles (measured by quarter-townships), logging will not be permitted unless **50** percent of the federal ownership has forest stands with an average diameter at breast height of at least **11** inches and a canopy closure of at least **40** percent (DSEIS:2-16).

Fire Cycle— See text

***Fire History—** In forest lands, the record of fire in the landscape since the time of first human visitations.

***Forest History—** The record of human activities and nonhuman disturbances and the biological, physical, and cultural interrelationships that result from those actions and events.

****Forest land—** Land that grows trees in the absence of human care or disturbances.

***Forest land, commercial—** Land that can profitably grow trees for timber, chip, and fuel products .

Forest matrix— Federal forest land in the Douglas-fir Region not committed to preservation in the FEMAT options.

***History—** 1) the written and graphic records of an area; 2) the entire record of human use and/or settlement of an area.

***Indicator Species—** A former measurement used to rationalize the need to stop logging old-growth in the Douglas-fir Region.

***Logging—** A standard definition of logging is "the business or occupation of felling timber and transporting logs to a mill or market" (Funk & Wagnalls Standard College Dictionary, 1963). This definition separates prehistoric practices of harvesting logs for use as firewood, lodgepoles, planks, canoes, or totem poles from historical concepts of business, occupation, and market.

Matrix— See "Forest matrix."

***Native Americans—** The indigenous peoples of the Pacific Northwest that were living here before 1810, and their descendents.

***Native Vegetation—** The plant life that existed here before 1774.

***Native Wildlife—** The regional plants and animals that existed here before 1774.

***Natural Conditions—** Those cultural, biotic and abiotic interrelationships that can be used to describe an area at some point in time.

Natural Functioning— Natural processes that existed before human evolution (DSEIS: 3&4-42).

***Nonhuman Disturbances—** Changes in natural conditions caused by forces that existed prior to human evolution. Changes include localized species introductions, extirpations, and extinctions, altered topography, different seasonal weather patterns, and unusually rapid population expansions of certain plants or animals; Causes include climate changes, insect outbreaks, lightning fires, sea level changes, glaciation, volcanism, etc.; .

***Prehistoric—** Varies by location; generally, before 1774.

***Prelogging—** Varies by location; generally, before 1810.

***Presettlement—** Varies by location; generally, before 1841.

****Second growth—** Merchantible conifers less than 200 (180-220) years of age.

Seral stages— Although FEMAT is predicated on "late-successional" forests, primary definitions used in the text and glossary reveal the following adherence to an age-based (disturbance originated) classification system:

Early—	Native plants predominantly 0-10 years old.
Mid—	Native plants predominantly 10-40 years old.
Late—	Native plants predominantly 40-80 years old.
Mature—	Native plants predominantly 80-200 years old.
Climax—	(See "old-growth").

Snag— A standing dead tree.

***Values—** See "cultural values."

****Wildfire—** An uncontrolled fire after the time of settlement.

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