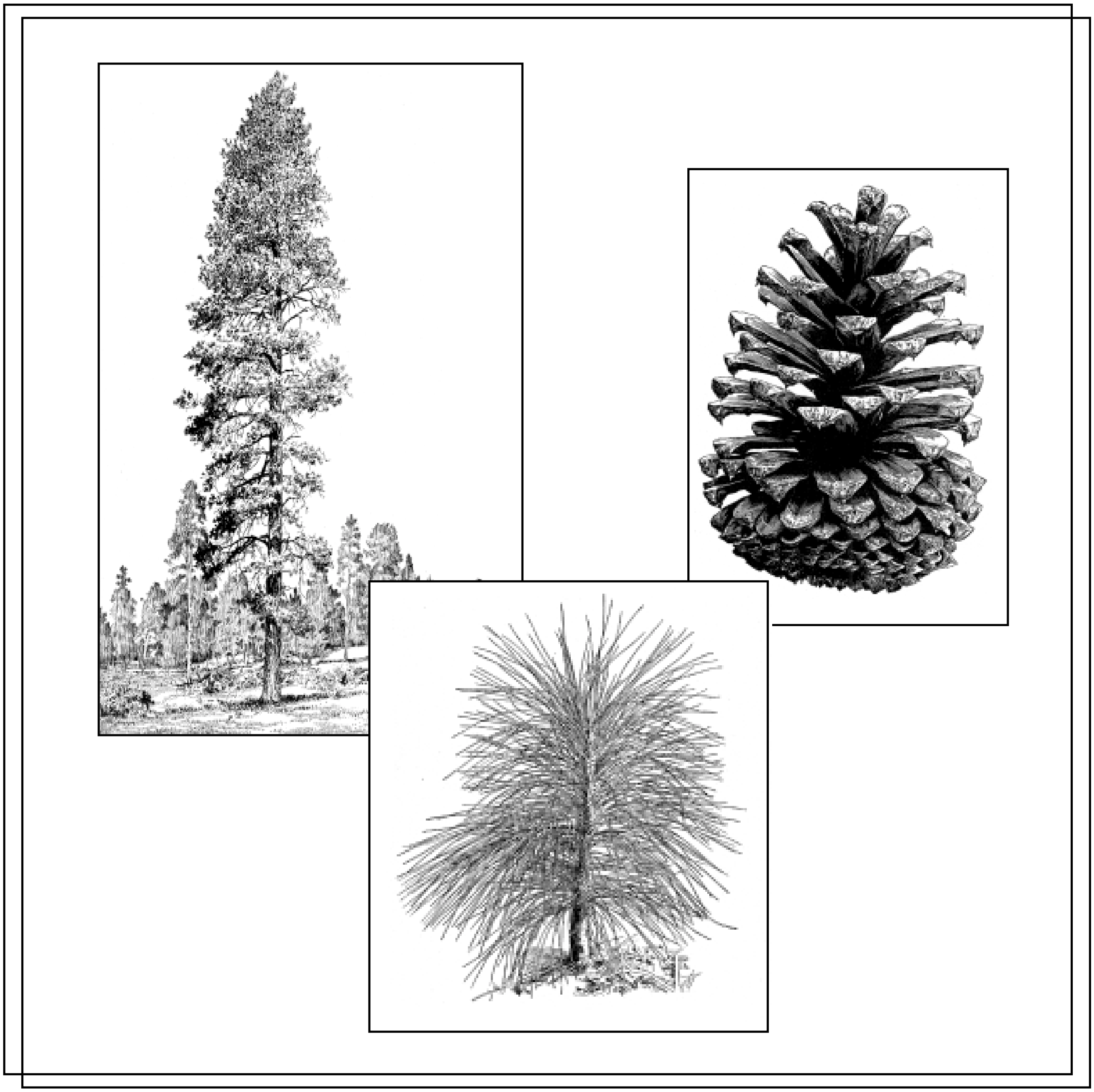
Flathead Indian Reservation Forest Management Plan



An Ecosystem Approach to Tribal Forest Management

Confederated Salish and Kootenai Tribes

May, 2000

FLATHEAD INDIAN RESERVATION
FOREST MANAGEMENT PLAN

2000

Confederated Salish and Kootenai Tribes

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Flathead Indian Reservation Forest Management Plan

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This document was prepared by David Rockwell. Small sections have been adapted from Volume I of the Flathead Reservation Comprehensive Resources Plan.

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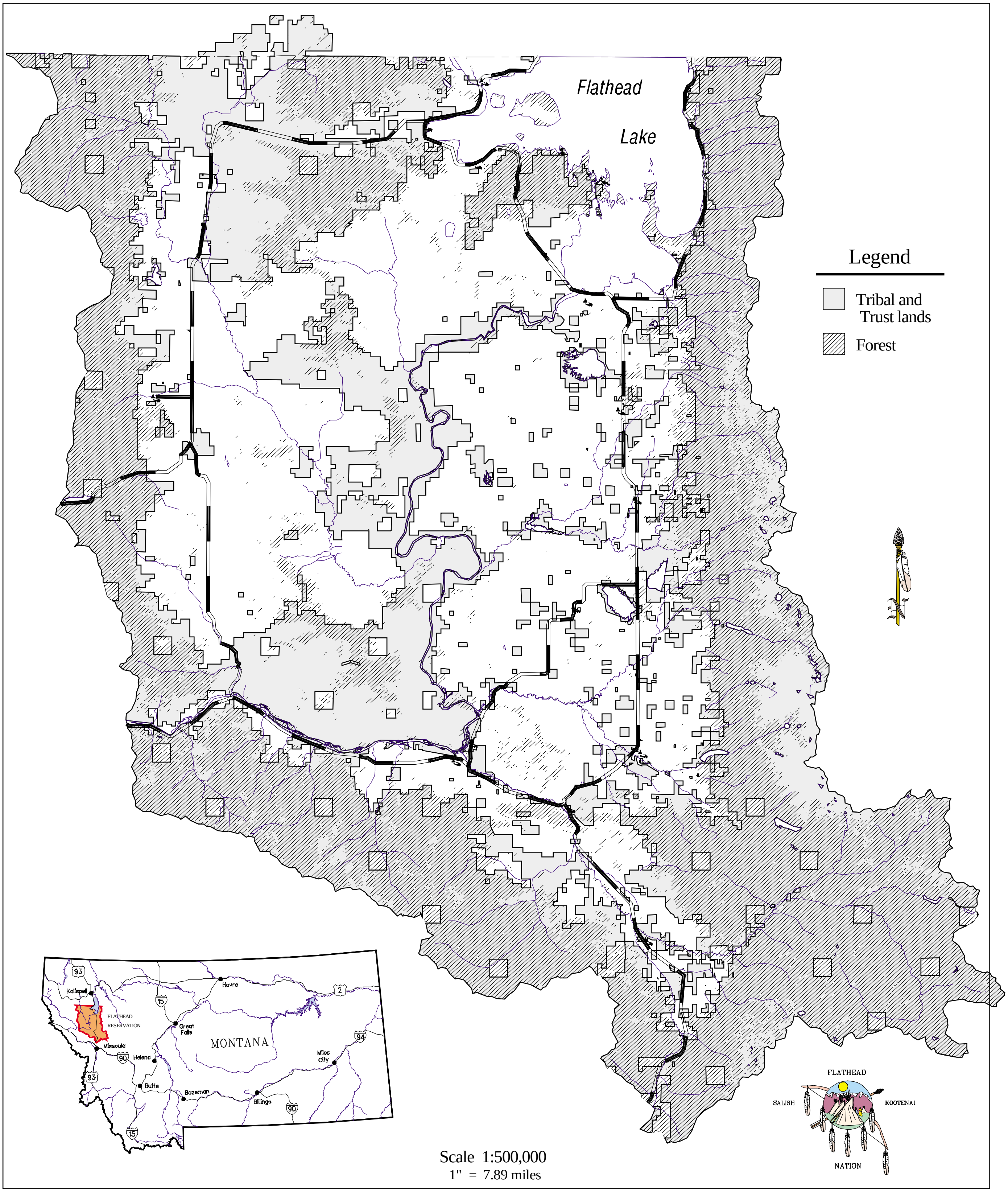

Tribal and trust lands and forested acres on the Flathead Indian Reservation. Forests occur primarily on Tribal and trust land.

Preface

While the purpose of forest management planning — providing long-term direction for the wise use and management of forest resources — has not changed, the methodology and philosophy behind forest planning has. As a consequence, this Forest Management Plan is a major departure from the plans of past decades.

We have, for example, used computer models more extensively than ever before. This does not mean we did not rely on field knowledge. We have simply used that knowledge in several state-of-the-art computer models which enable us to better predict what our forests will look like in the future under various management scenarios. We have also brought in data derived from satellite imagery to help us classify vegetation. And we have done much more spatial or geographic information system (GIS) analysis. These analyses appear as graphs, charts, and maps throughout the document.

But perhaps the greatest distinction between this plan and those of the past is in its overall approach — that of ecosystem management. Ecosystem management uses ecological, cultural, economic, social, and managerial principles to maintain and restore the ecological diversity and integrity of the forest. By definition, it requires an integrated or interdisciplinary approach. This is not necessarily a departure from past planning, but it was a key element in our process and is reflected in the makeup of our forest plan ID team and the document we have produced. Ecosystem management also requires input from the public, in this case the Tribal membership. In addition to half a dozen public meetings and meetings with the Tribal culture committees and the Tribal Council, the forest plan ID team worked over the course of several days with an Ad Hoc group of Tribal members appointed by the Tribal Council. The concerns of the Tribal public and the Ad Hoc group played a major part in shaping our plan. Most important, ecosystem management attempts to understand the interactions of plants and animals and natural processes — fire, insects, disease, flooding, windthrow — as a functioning whole, and this, too, is reflected in our plan.

Throughout the planning process our premise has been: In order to manage for diverse and sustainable forests, we must maintain and restore the processes, structures, and functions under which our forests evolved. We have therefore tried to develop management strategies that will reproduce or mimic those key structures and processes. Our planning process involved four basic steps: (1) developing a model of the kind of forest structure that existed prior to European settlement, (2) analyzing the conditions that exist today, (3) determining the kinds of conditions that are both sustainable and desirable, and (4) developing a strategy to achieve those conditions.

Plan Duration

Unlike the Tribes' previous forest management plans, which were concerned with short-term commodity production, this plan is largely driven by long-term structural goals. Therefore this Plan shall be in effect from 2000 to 2030 with the following stipulations:

1. The Plan will receive on-going monitoring as described in Chapter 5: Environmental Indicators for Monitoring.

2. The Plan will be critically reviewed every ten years by an interdisciplinary team, coincident with the analysis of new CFI data. If this data analysis indicates substantial changes in potential harvest levels, if ongoing monitoring indicates the need to change significant portions of the Plan (for example, the vegetative goals),

or if substantially new resource issues surface, then an interdisciplinary team will be reconvened to recommend analysis methods, amendments to the FEIS and Plan, or the writing of a new FEIS and forest management plan. Other circumstances that might trigger amendments or a rewrite of the plan include a major shift in management philosophy on the part of the Tribal Council, a large change in acreage allocation, or a catastrophic event such as a very large wildfire.

If on-going reviews and the 10 year CFI measurement cycle indicate that harvest levels are reasonably accurate and commensurate with the attainment of vegetation goals, and if it is determined that the forest plan is providing adequate direction for forest management, then it (the forest plan) shall remain in effect until the final review date or expiration date of 2030. Summaries of all reviews and analyses will be appended to both the Forest Plan and the Forest Plan FEIS.

Lands Covered by the Plan

This Forest Plan shall be applicable to all Indian lands on the Flathead Indian Reservation, including allotments. Where possible, allotment sales will be included in and/or coordinated with larger Tribal timber sales within the same vicinity. It is recognized, however, that the broad vegetative goals developed for the forest may not be sensibly applied to most allotted lands because of their small, fragmented nature. Thus, management of allotment lands may incorporate objectives and goals other than those in the management plan. The allottee would be encouraged, however, to use management practices desired by the Tribes, especially with respect to vegetative goals and road closures wherever feasible. Other portions of this Forest Plan, such as compliance with best management practices and application of sound silviculture and sustained yield principles, apply to allotted lands.

A Word About Data

This plan draws upon data from a variety of sources, each the best available at the time. Still, some of the data have limitations which we, as an Interdisciplinary Team, acknowledge. For example, the plan uses 1990 as its base year for all vegetation analysis because more recent data were not available. However, we have attempted, whenever possible, to compensate for these limitations through the use of personal knowledge, professional judgment, and in some instances complimentary data. We have also modified the assumptions and constraints in our models when appropriate. While no one on the forest planning ID team believes we have developed a perfectly comprehensive plan based on flawless data, we do have confidence in the conclusions we've drawn and the management direction put forth.

It is important to keep in mind that this is a reservation forest plan which, by necessity, is broad in scope. It is intended to set a general management direction for relatively large areas of land over extended time periods, and it allows for mid-course corrections. Project level planning, which, by definition, is more specific, will undoubtedly fill in many gaps or areas in which this plan may be weak. In a sense, our situation is analogous to a ship moving across a wide ocean toward a specific destination. If the crew sets out in the right general direction, they can be reasonably assured of success as long as they continually monitor their progress and are willing to make the necessary mid-course corrections.

As another group of forest planners once observed in a US Forest Service publication titled *Sustaining Ecosystems*, "It would be vastly reassuring to us if we had the scientific information and knowhow to ensure the successful management of sustainable ecosystems. In an absolute sense, it is doubtful that we ever will. The dilemma then is whether to proceed with less information than we would like — or not to proceed at all. If we do not proceed [but remain on our present course] we run the risk of dire consequences. Stewardship, utilizing available science in combination with our best professional and ethical judgment where information is missing, is required to meet this challenge. An adaptive management approach is used to incorporate scientific understanding and knowledge as it evolves."

As managers, we have to make judgments on what appears to be most scientifically persuasive and ethically responsible. That is precisely what we have attempted to do in this plan.

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Illustration Credits

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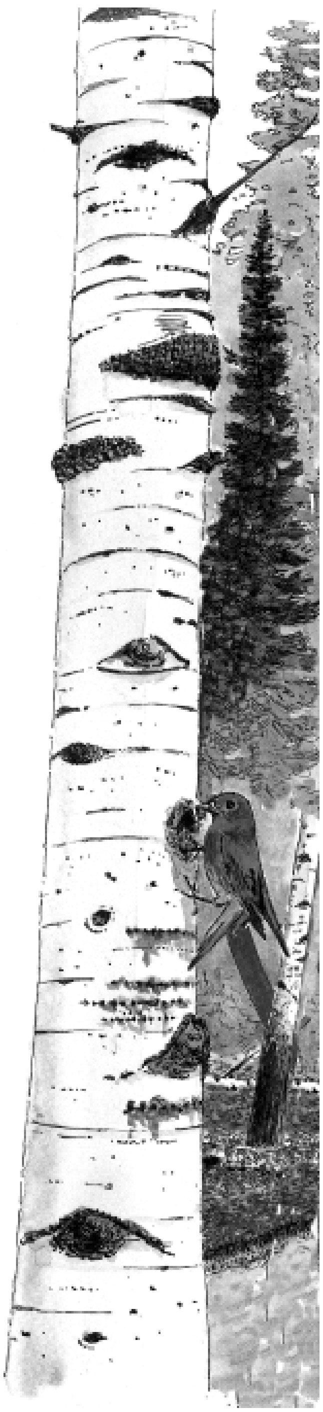
Chapter 1: Introduction



Purpose, Need, and Goal Statement

The Confederated Salish and Kootenai Tribes have prepared this Forest Management Plan in accordance with 25CFR 163 to cover forested acres owned by the Confederated Salish and Kootenai Tribes and allottees (trust lands). The Confederated Salish and Kootenai Tribes and BIA will meet all applicable Federal laws, CFR regulations, and Tribal ordinances when carrying out forest protection, forest improvement, and timber harvesting and planning activities under this plan. All permits and contracts issued will be in compliance with these laws and regulations. The Tribes will carry out all forestry planning, preparation, and monitoring and oversight activities. The Bureau will approve contracts, permits, NEPA documents, and suppression actions.

Compliance with the requirements of the National Environmental Policy Act, the Endangered Species Act, and other Federal laws and Tribal ordinances will be achieved by preparation of appropriate environmental documents (Environmental Assessments, Biological Assessments, etc.) on a project-by-project basis. These will be developed for each action or tiered off of existing documents or categorical exclusions before approval of any forestry management projects.

The FEIS for the Forest Management Plan was completed November of 1999, and the Record of Decision was issued in March of 2000.

The Need for the Plan

The Forest Management Plan is needed to:

1. **Satisfy Tribal goals and objectives.***

2. **Ensure that management activities are compatible with sustainable forest ecosystems.**

3. **Balance Tribal cultural, social, economic and environmental values.**

4. **Establish an adaptive management and monitoring process that incorporates Tribal member values.**

* *Tribal goals and objectives include all applicable goals and objectives in all approved Tribal guidance and planning documents.*

The Goals of the Plan

The goals of the Forest Management Plan are to:

1. **Strengthen Tribal sovereignty and self sufficiency through good forest management.**

2. **Manage forest ecosystems to include natural processes and to balance cultural, spiritual, economic, social and environmental values.**

3. **Adopt a process which accommodates changes in Tribal values and resources.**

4. **Facilitate Tribal member involvement in forest stewardship.**

5. **Provide sustained yield of forest products and maintain or enhance forest health.**

6. **Develop options for managing land use conflicts.**

7. **Provide perpetual economic benefits of labor, profit, and products to local communities.**

8. **Manage forested ecosystems to protect and enhance biological diversity.**

9. **Provide a variety of natural areas that Tribal members can use for solitude, cultural activities, and recreation pursuits.**

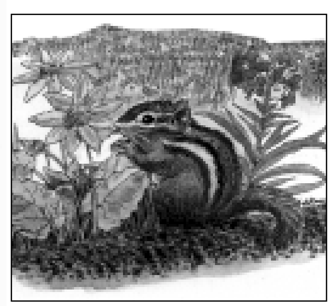
10. **Work cooperatively with adjacent landowners and federal agencies to minimize cumulative impacts.**

11. **Protect human life, property and forest resources through fire suppression and fuels management.**

12. **Comply with Tribal and Federal laws.**

"These Mountains belong to our children, and when our children grow old they will belong to their children. In this way and for this reason, these mountains are sacred."

— Flathead Culture Committee, 1977



A Long History of Forest Management by the Tribes

For thousands of years, the Salish, Kootenai and Pend d'Oreille derived much of their living from forests. Before European settlement, the Tribes found all they needed — foods, medicines, shelter, and beauty — within forests. They considered the forests and the grasslands that border them their home. And apparently they used and managed them in a sustainable way because their cultures coexisted with stable plant and animal communities for millennia.

Indian-lit and Lightning Fires Shaped the Forest

Here in the Northern Rockies, fire, more than any other factor except climate, shaped the structure of our forests. It determined the kinds and ages of trees, how close together they grew, and the number and types of openings that existed. These structural characteristics in turn, determined the kinds of plants and animals that lived here.

The fires were caused both by lightning and people. Prior to European contact, the Tribes used fire to manage the forests where they lived. From the stories of elders, the historical accounts of early Europeans, and the findings of modern scientific research, we know that Indians have been purposefully burning in this area for at least 7,000 years. Fire kept brush down in favorite campsites, opened travel routes through dense timber, enhanced berry production over large areas, increased forage for big game and herds of horses, and forced wildlife to move. It was also used as a tool in warfare. Research conducted by fire ecologists like Steve Barrett has shown that the Indian use of fire was so extensive in some areas that the Salish, Kootenai, and Pend d'Oreille actually doubled the number of fires that would have occurred from lightning alone (part of his research involved interviewing Tribal elders).

The fires lit by Indians

Indian-lit fires fit a different pattern than lightning fires. Tribal people started most of their fires in spring, early summer, and fall, when burning conditions were less hazardous. In addition, most of their burning was done in lower-elevation forests, although many times these low-elevation blazes burned up slope into higher elevations. As a rule, Indian-lit fires were generally of a lower intensity than lightning fires, which burned at all elevations and generally got their start in mid to late summer — the hottest and driest time of the year.

Most of the fires lit by Indian people were low-intensity fires that burned the understory of low-elevation forests.

Lightning and Indian-lit fires created a diversity of habitats, as is apparent in this photo of the mountains east of Arlee taken around 1920. Note the many different patches; each represents a different kind of forest structure that provides unique habitat conditions for wildlife.

Our forests depend on fire and other disturbances

By using fire on a regular basis, the Tribes exerted a tremendous influence over the character of the forest. Not only did they shape the age, spacing, and species of trees, they also had a major influence over the mix of birds and animals that lived here. The plant and animal communities we inherited — the big game, furbearers, predators, birds, rodents, food and medicine plants — are in large part the legacy of thousands of years of regular and purposeful burning by Indian people and frequent, uncontrolled lightning-fires. Fire has played such a large role for such a long time that many of our plant and animal communities now depend on it.

The magnitude of the problem suggests we need to take a lesson from the past and begin looking at our forests in a different way.

Changes Caused by 100 Years of Fire Exclusion

Indians lit fewer fires after the 1880s. Since 1910, the policy has been to exclude fire altogether (except for a very limited amount of prescribed burning). The fire exclusion policy, as well as logging and grazing practices have brought about enormous changes in the forest. Many stands of trees have grown dense and now have more trees per acre than ever before. As a consequence these stands are stressed and more susceptible to severe insect and disease outbreaks. The fire-created quilt-work of communities that existed in pre-European times — a mosaic of many different patches each with its own mix of tree species, ages, and sizes — is becoming more homogeneous, more like a blanket than a quilt. This loss of structural diversity has caused a corresponding loss of habitat diversity for wildlife. In short, the kinds of trees, understory plants, and animals that depend on fire have experienced population declines, while those species that don't depend on fire have increased. Biologists and foresters alike believe these shifts are unsustainable over the long term.

If current forest trends of diminishing structural diversity continue, we stand to see many species of plants and animals decline, which would have profound implications for the Tribes. We also run the risk of experiencing exceptionally large and intense fires and extreme epidemics of insects and diseases — events of a scale never before seen on these lands. The magnitude of the problem suggests we need to take a lesson from the past and begin thinking about and managing our forests in a different way.

A New Approach to Forest Management

We've all heard the saying, "You can't see the forest for the trees." That old cliche goes right to the heart of many of the problems with the way we've thought about and managed forests over the past one hundred years. That is to say, managers have often concentrated on individual parts of the forest at the expense of the ecosystem as a whole. Foresters have focused primarily on individual stands of trees while biologists have focused on particular species of plants and animals. This approach can work for a while, but forests are too complicated — they have too many parts interacting in too many different ways — for humans to understand or manage them piecemeal.

Another problem is that society has often viewed important elements of the forest — fire, predators, insects and diseases — in a negative way. We've attempted, often successfully, to control or remove them from the forest. Again, we have been so caught up in looking at the individual parts of each community that we have neglected the big picture — the consequences of our actions across large areas and over long periods of time. We've missed, until relatively recently, some startling trends and fundamental ecological changes.

Ecosystem management views the entire forest as the context for management as opposed to its individual parts — hence the name ecosystem management. In this sense, managing a forest is somewhat analogous to dissecting a frog. If you only look at the frog once its cut up — at each of its parts neatly lined up — you have no idea what a living, breathing frog is all about, even if you know how each individual part functions.

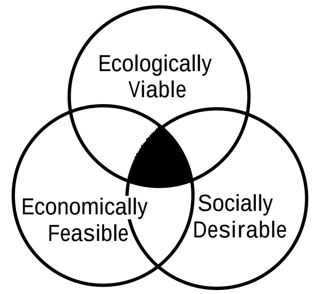
Taking another Look

This negative attitude toward the kinds of natural forces that bring about change has developed in part because we have failed to ask a key question: How did our forested ecosystems evolve? Put another way, what natural processes created our forests? Asking this question is critical because it allows us to see more clearly the conditions our plant and animal communities evolved with. Case in point. If elk and grizzly bears and rufous hummingbirds and dozens of other species evolved with frequent fires and have come to depend on the kinds of forest openings that fire creates, removing fire will, over the long term, eliminate key habitats for these species. The same principle applies for the trees that make up the forest. Removing or altering age-old processes will change how our forests function and ultimately cause serious forest health problems and events of a scale that threaten sustainability. Many ecologists believe our forests are approaching that point today.

To manage for diverse and sustainable forest ecosystems, we need to maintain and restore the natural processes and functions under which our ecosystems evolved. And where it is not possible to restore natural processes, we need to provide conditions within and across landscapes that mimic those processes. For example, selective cutting and clearcuts, when carried out in combination with prescribed burning, can be used to mimic natural fires.

What is Ecosystem Management?

Ecosystem management, the approach taken by this management plan, attempts to address some of the deficiencies of past management. First, it views the entire forest as the context for management rather than the individual parts, and it considers all parts of the landscape to be interrelated. It focuses on the diversity of forest structures and how they function across relatively large areas. Second, it emphasizes the importance of key elements or processes like fire — the natural forces that shaped the forest and created the basic pattern or mosaic our plant and animal communities evolved with. Third, it attempts to develop policies and programs designed to restore or mimic natural processes. The goal is to sustain forests as diverse, productive, and resilient ecosystems.



Our management goals and actions should fall within the zone where the three spheres intersect (the area that is colored black) in the above diagram. Operating within this zone will ensure that management is simultaneously ecologically viable, economically feasible, and socially acceptable. If we are unable to reach this kind of balance, it's likely our desired condition will not be sustainable because of failures in one or more of the spheres. After Zonnveld (1990).

Humans are Considered Part of the System

Ecosystem management does not, however, ignore human needs and uses of the forest. Indeed, it views people — our beliefs, life styles, land uses, culture, and economy — as an integral part of the forest community. It integrates economic and biological concerns so that each builds on and benefits the other. More important, ecosystem management takes the long view by merging what the current generation desires for itself and its children with what our scientific understanding tells us is biologically and physically possible over the long term.

Five Key Questions

We could summarize the ecosystem management approach, the approach we've taken in this plan (figure 1-1), by listing some of the key questions managers need to ask.

Five basic questions fundamental to ecosystem management

1. How did our ecosystems evolve?

What were the pre-European conditions?

2. What is the situation today?

What are the existing conditions?

3. What is sustainable?

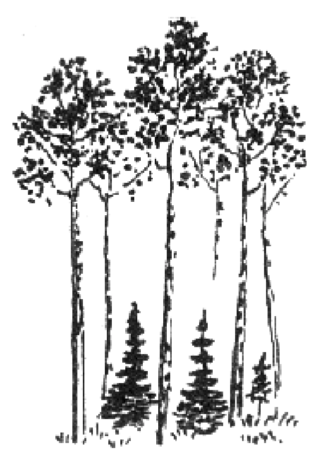
What activities can be perpetuated indefinitely?

4. What conditions do we want in the future?

What is the desired condition?

5. How do we move from where we are today to where we want to be?

Answering these questions will help to change the focus of forest management planning from *output-driven project-oriented planning,* which asked "What do we need to mitigate?" to *outcome-driven ecosystem-focused planning,* which asks "What conditions do we want to create?"



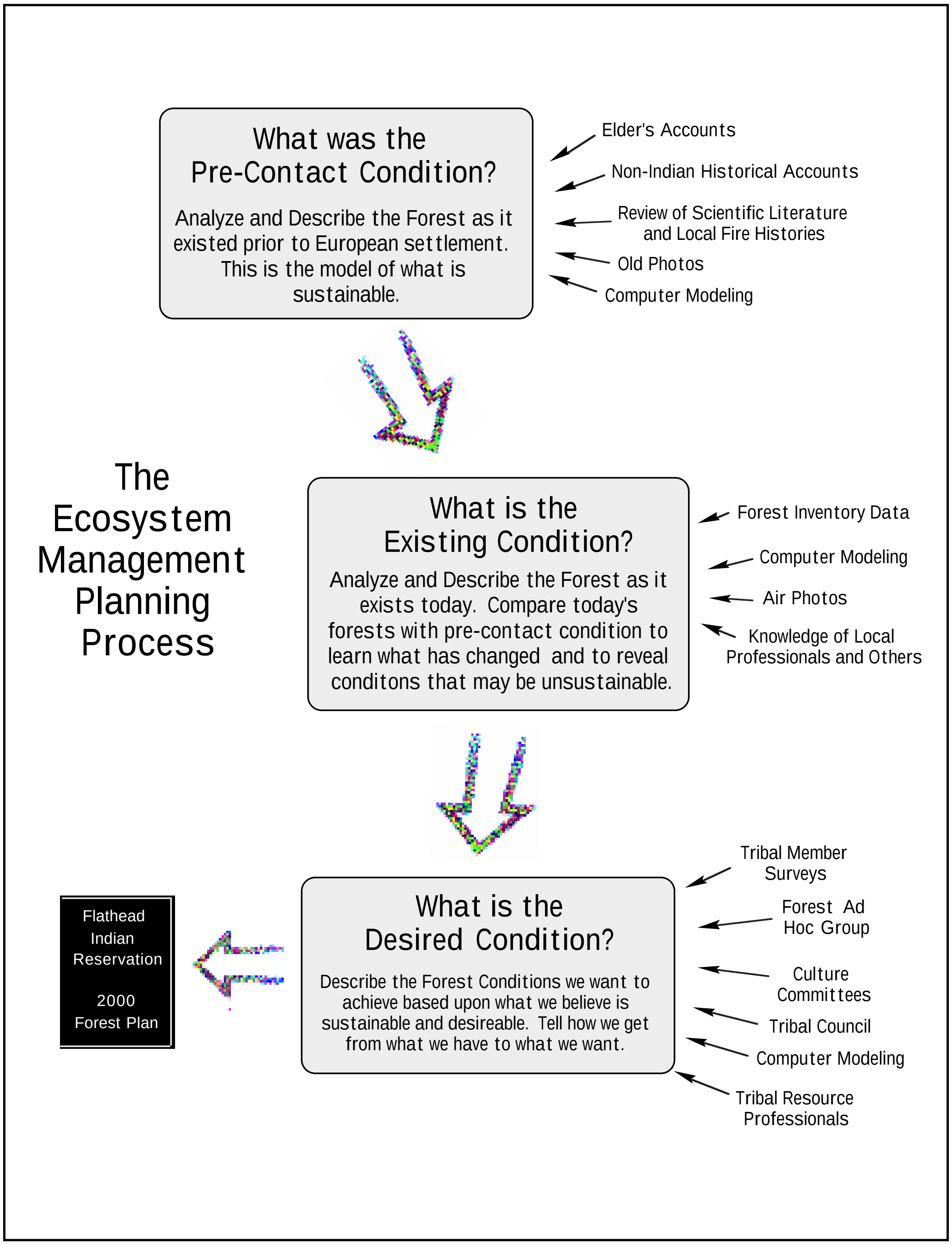
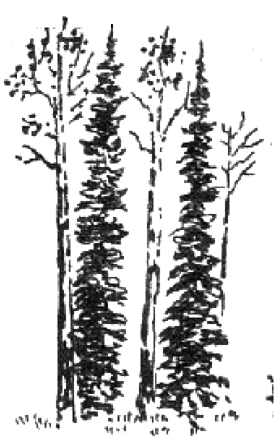


Figure 1-1. Ecosystem management involves three key steps. First, it looks at pre-European conditions to learn how our plant and animal communities evolved. Second, it considers the existing condition — what our forests look like today — to see what changes have occurred and to identify trends. Finally, it describes the desired condition — what we want our forests to look like — and suggests a practical strategy for getting there.



Some Key Terms and Concepts Defined

Although we have tried to keep technical jargon to a minimum in this document, there are a few terms and concepts fundamental to our planning approach that we feel are useful. These are defined below and on the following pages.

General Ecosystem Management Terms

Examining the habitat and biological needs for each individual organism within all communities would be tremendously complex, costly, and impracticable at any sort of extensive scale.

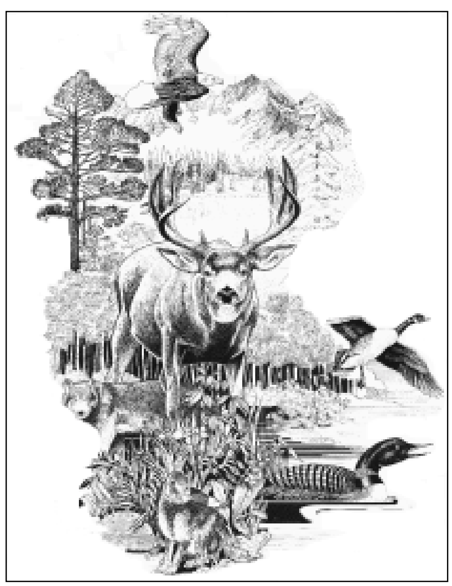
Biological Centered and Ecosystem Centered*

There are different philosophical approaches to forest management**.** As an example, managers can take either a biologically centered or an ecosystem-centered approach. Strategies that focus on individual or groups of species are considered ***biologically centered***, while those that focus on landscape patterns are termed ***ecosystem centered***. Another choice of approach has to do with the level of refinement or detail. Managers can operate using a fine-filter approach or a coarse-filter approach (or some combination of the two). Strategies designed to address the needs of individual, at-risk species are called ***fine filter***, while those that seek to retain entire communities are termed ***coarse filter***.

The biologically centered approach

The traditional approach has been a species-focused or biologically centered approach. Emphasis has been on Federally threatened and endangered species, culturally sensitive species, and game animals. These species have been used as management indicators, and have often been used to represent the habitat needs of large groups of other species.

The use of individual *indicator species* to represent the habitat needs of others is inconsistent with the concept that each plant or animal has individual habitat needs. Today, biologically centered approaches use a combination of coarse-filter and fine-filter methods. Large reserves, such as Tribal conservation areas, provide protection for entire communities (a coarse-filter strategy), while fine-filter strategies protect individual species at risk (such as grizzly bears and bald eagles). The threatened, endangered, and sensitive species programs at the Tribal and Federal levels are generally regarded as appropriate fine-filter conservation efforts.



Managers can either take a biologically centered approach that focuses on individual species, or an ecosystem-centered approach that emphasizes vegetation patterns and structures. The latter approach is based on the premise that if quality habitat is available, wildlife will use it.

Problems with the biologically centered approach

The focus of the biocentric approach has changed over time from a small number of key species, to groups of related species, to entire communities of organisms. This approach has not yet been used for developing strategies for conserving the full range of biological diver-

* *Adapted from* Sustaining Ecosystems: A Conceptual Framework. *Sherry Hazelhurst, Frank Magary, and Kelly S. Hawk, eds. 1992.*

sity, which would involve examining the habitat and biological needs for the full range of organisms within all the communities. Such an endeavor would be tremendously complex, costly, and impracticable at any sort of extensive scale. There are many other problems as well. For example, this approach can ignore potentially important interactions between communities. Assuming communities are stable, predictable entities, it focuses on dominant species that may not represent the needs of others that are less abundant or conspicuous, and it ignores the influence our society has had on disturbance regimes.

A well designed fine-filter approach will serve as an early warning that some aspect of the coarse-filter approach needs adjustment. In practice the two systems can complement each other well.

The ecosystem-centered approach

A different approach to conserving biological diversity is a *coarse-filter, ecosystem-centered* approach. It looks beyond single species. Reserves are no longer the key part of the conservation scheme — the entire landscape assumes that role. The focus is on providing components, structures, and processes that mimic natural ecosystems, thereby providing habitat for a greater range of biological organisms within each ecosystem.

The ecosystem-centered approach is an attractive alternative because it offers a conceptually sound and potentially achievable approach for addressing the full range of biological diversity. It is not necessary to have detailed information about all the organisms and processes in an ecosystem to develop a management scheme based on maintaining the integrity of the ecosystem across the landscape. In other words, it assumes that if the habitat or structure is present in the right proportions, the animals will use it.

Because landscapes are dynamic, the ecosystem approach attempts to mimic the expected variation that would be produced by natural disturbances and, in fact, is a more practicable approach to conserving biological diversity given the complexity and dynamic nature of ecosystems. Its theoretical weakness is that it may not recognize the needs of critical species. Another problem is that scientists and land managers are just beginning to understand the intricacies of how ecosystems function. It is, however, in our view, the most sensible approach to management planning and the principle strategy used in this forest plan.

Taking the best from both

Our current level of understanding and the amount of time required to achieve natural patterns across landscapes compels us to also continue our use of biologically centered, fine-filter approaches. Fine-filter methods will be needed for some time to sustain species already known to be at risk, as well as species that will become at risk in the future.

The two approaches — coarse-filtered ecosystem-centered and fine-filtered biologically centered — can complement one another. Indeed, in our time neither is a defensible conservation strategy in and of itself. The former relies upon the fine-filter approach as a safety net, because incomplete information can lead to false assumptions about ecosystems, and species or processes will suffer as a result. A well-designed fine-filter approach will serve as an early warning that some aspect of the coarse-filter approach needs adjustment.

Grizzly bears require special management. This plan proposes to use an ecosystem-centered, coarse-filter approach to provide ecosystem structures and processes on a broad scale, while using a fine-filter strategy to protect sensitive species like grizzly bears.

Key Terms and Concepts Continued…

General Ecosystem Management Terms

Landscapes

Ecosystem management requires managers to focus on relatively large areas. In this plan, we have divided the Reservation into six ***landscapes*** based on physical features such as topography, soils, geology, climate, watersheds, vegetation types, and administrative designations. The six landscapes are shown in figure 1-2. Each landscape in turn is divided into four major *fire regimes*.

A landscape is defined as an area drained by one or a group of similar streams within which the climate, land-forming processes and natural vegetation patterns are fairly uniform. It is an area that, for a number of reasons, people tend to view as a single unit.

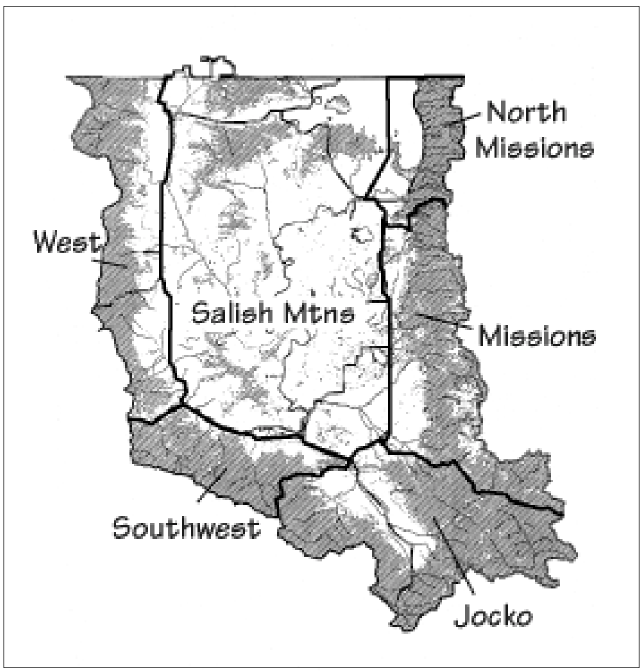
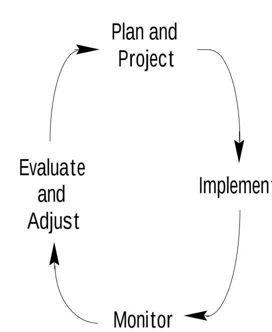


Figure 1-2. The ID Team divided the Reservation into six landscapes.

Adaptive Management

In our planning process, we readily admit that our scientific knowledge and our technical abilities are limited. We do, however, recognize the need to move forward — even if we don't have all the answers. Our approach is to use our best stewardship skills with ***adaptive management***. Adaptive management simply means that we will plan and implement our activities to the best of our abilities, then monitor the results to see if we are meeting our goals. If our strategy proves inadequate, we will make the changes in management that are necessary to better meet our goals.

The Adaptive Management Cycle



Key Terms and Concepts Continued…

General Ecosystem Management Terms

Reference variability is the natural variation exhibited by an element of the forest during pre-European times.

Reference Variability (RV)

Fundamental to ecosystem management is the concept of sustainability. Managers hope to manage for conditions that will allow plant and animal communities to perpetuate themselves. The best model of sustainability comes from the pre-European period when forest ecosystems remained relatively stable over thousands of years. Pre-European conditions are the conditions under which our plant and animal communities evolved. These are the conditions to which they are best adapted.

Westslope cutthroat trout, for instance, are adapted to summer water temperatures of between 43 to 62° F. For thousands of years that was the natural range of variation in water temperature. If, however, through land management activities such as removing shade trees, we raise the summer temperatures to, say, 73° F, the trout would suffer, their growth would slow, and some fish would likely die. If the high temperatures persist, the population itself would be in jeopardy. In other words, it would not be possible to sustain a cutthroat population under this new condition.

In ecosystem management, managers attempt to identify and manage within the natural range of variation for key elements of the forest because these conditions represent the best opportunity for sustainability. This *natural range of variation* is referred to as the ***reference variability*** (**RV**) (figure 1-3).

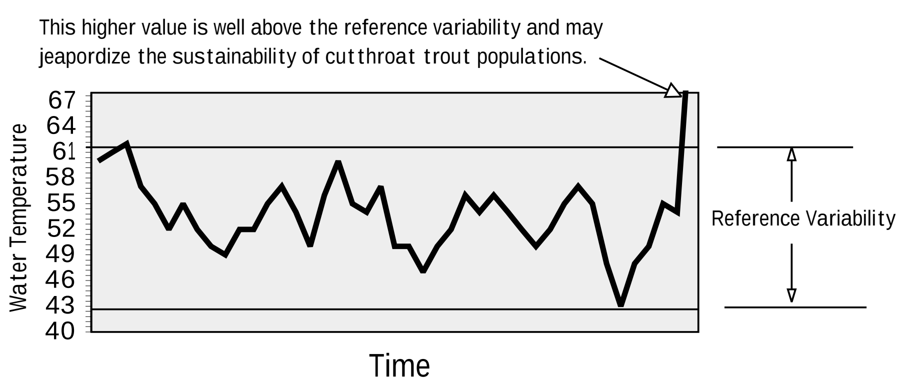


Figure 1-3. This graph shows how the water temperatures of a hypothetical stream may have fluctuated prior to European settlement. A sudden jump to 73°F in modern times would clearly be beyond the reference variability and would probably threaten sustainability of aquatic organisms in the stream.

Recommended Management Variability (RMV)

In general, managers hope to manage for conditions that fall within reference variabilities (RVs). However, managers probably do not want to operate at the extremes of reference variabilities. For example, with cutthroat trout, the reference variability for summer water temperatures is 43 to 62° F. A fisheries manager probably would not want to manage for conditions that would have water temperatures near 62° F. Rather, he or she would probably target a more narrow range within the reference variability, say, an upper temperature of 60° F. The reason is, managing at the margins leaves little room for error, and if the system experiences a major disturbance like a fire, we run a greater risk of being pushed beyond our

Key Terms and Concepts Continued…

General Ecosystem Management Terms

reference variabilities. It is therefore prudent to manage within a more narrow range. We call this more narrow range the ***recommended management variability*** (**RMV**). The concept is illustrated in the graph below (figure 1-4). Again, the basic premise is: ecosystems evolved over extended time periods present the best chance for sustainability; and management designed to maintain or reproduce key components, structures, and processes is the most likely management approach to sustain ecosystem integrity and productivity.

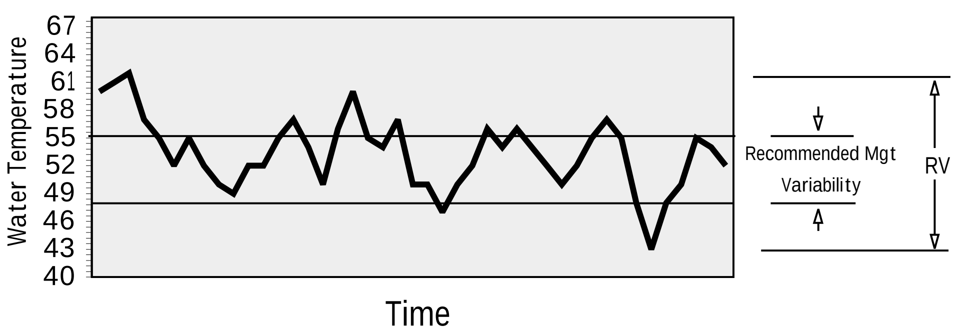
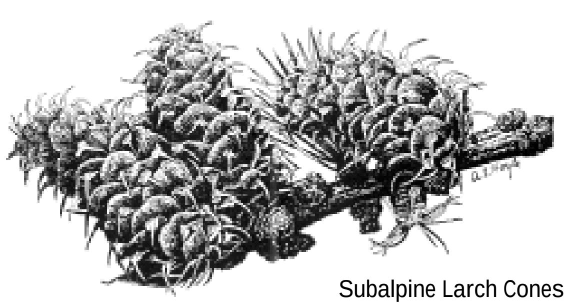


Figure 1-4. Managers will generally choose to operate within a slightly more narrow range than the reference variability to provide them with a buffer in the event of major disturbances like fires. This more narrow zone is referred to as the recommended management variability.

The relation between RMVs and the Desired Condition

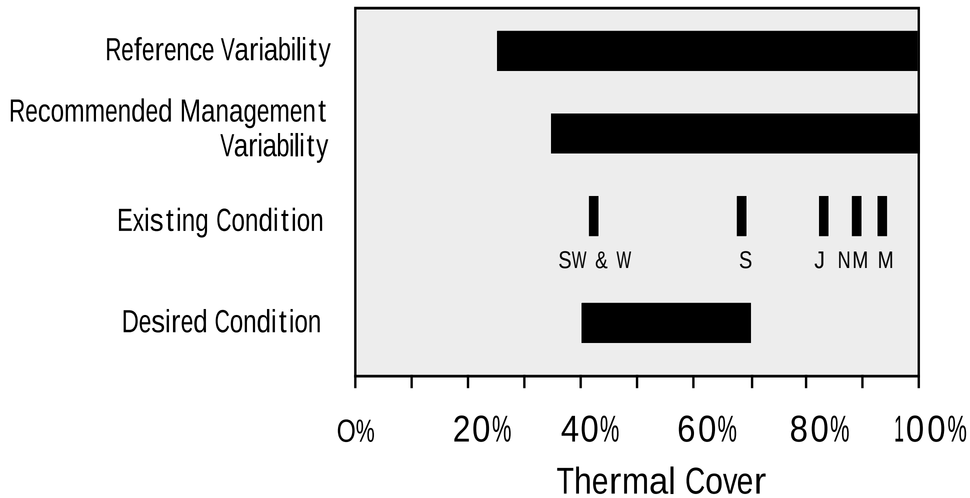
Figure 1-5 shows the hypothetical relationship between the *reference variability*, the *recommended management variability*, the *existing condition* and the ***desired condition*** (DC) for the percent thermal cover for big game. (Thermal cover is timber vegetation that provides protection from temperature extremes in summer and winter.) The chart shows that during pre-European times, thermal cover fluctuated between about 25 and 100 percent Reservation wide. This then is our *reference variability*. Based on this RV, the wildlife biologist is recommending we try to manage for between 35 and 100 percent thermal cover. This is our *recommended management variability*. The *existing condition* is between 43 and 93 percent (each landscape is shown as a separate bar). We estimate that the ***desired condition*** will result in from 40 to 70 percent thermal cover Reservation wide. The desired condition will bring us within the RMV.

Ecosystems evolved over extended time periods present the best chance for sustainability. Management designed to maintain or reproduce the key components, structures, and processes present during pre-European times is the approach most likely to sustain ecosystem integrity and productivity.



Subalpine Larch Cones

Figure 1-5. This chart shows the relationship between RVs, RMVs, the existing condition and the desired condition for thermal cover. Generally, the desired condition will fall within or close to the recommended management variability, although not always.



Obviously, the world has changed in countless ways since pre-European times, and we can't recreate what was here before.

Managing outside the RMVs

In an ideal world, we would attempt to maintain all key elements of the forest within their recommended management variabilities. However, there are often times when, for social, cultural, economic, or even ecological reasons, this approach will not be possible. The world has changed substantially since pre-European times. We now have thousands of miles of forest roads, dams, and utility corridors. We have hundreds of homes within the forest or at its margin. We have threatened and endangered species for which there are specific federal guidelines limiting management options. The public has strong attitudes about prescribed and natural fires, clearcutting, and other forest practices. Also, the Tribes depend on revenue from timber. Hence, in some instances the desired condition may not fall within the recommended management variability. Being outside the recommended management variability for one or more elements does not necessarily mean that the ecosystem is unsustainable. It is, however, a red-flag that indicates a potential risk to sustainability. In these instances, recommended management variabilities are still useful because they inform us of potential problems.

Key Terms and Concepts Continued…

Disturbance and Vegetation Terms

Disturbance

In 1928, Frank Jaquette, an early settler in the Bitterroot Valley reminisced about Salish land management practices in the 1800s and described them as superior to those of the white settlers. Referring to the West Fork of the Bitterroot River in 1887, he said:

> At this time the creek was thoroughly set with a growth of willows and very completely so on the south side. Since it has become part of the white man's domain and fires are less general and frequent, the large alder growth has very generally replaced these willows.
>
> It might be noted here that the Indians were great foresters, as all old-time prospectors will affirm. They left the forests to the tender mercies of nature… [While the Forest] Service spends millions of dollars battling against nature's force, the result is a tendency to a scrubby growth of timber and a fire trap."

"It might be noted here that the Indians were great foresters…"
— Frank Jaquette, Homesteader, 1928

Disturbances create diversity

What the Salish, Kootenai, and Pend d'Oreille took for granted, but few Europeans understood, is that fire is a necessary process of forest renewal. Rather than thinking of ***natural disturbances*** (events like fire, floods, drought, windthrow, storm damage, insects and disease, etc.) as enemies of a healthy forest, they viewed them as integral, even beneficial. They understood that the plants and animals they harvested and hunted depended on a variety of habitats, and that disturbances created that variety. That's why they lit so many fires.

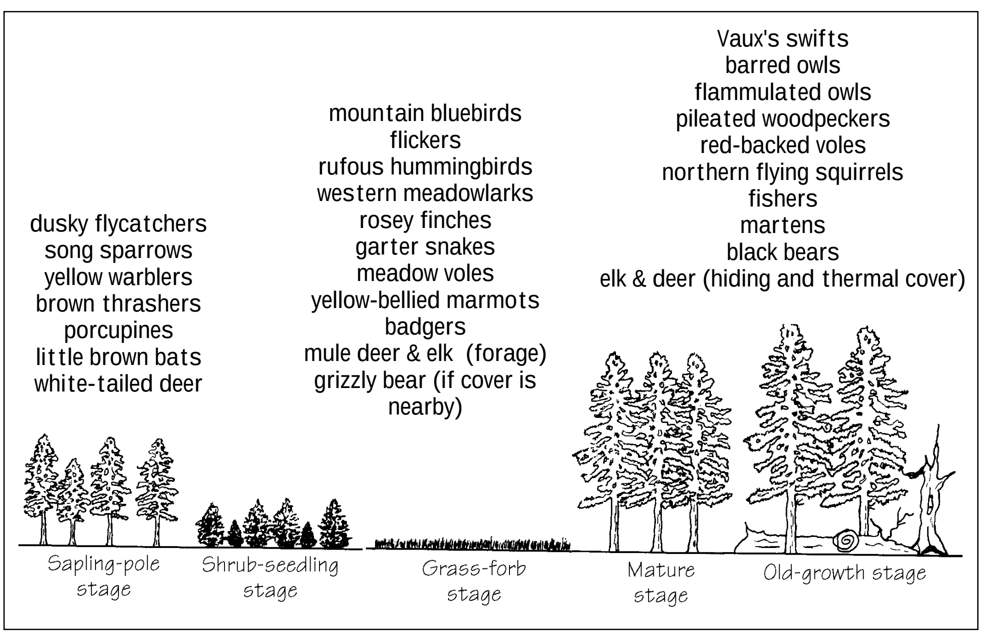
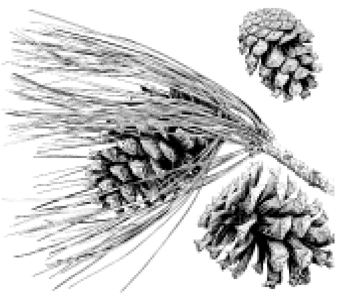


Figure 1-6. Different species require different kinds of habitats. All the vegetation types found within a forest — everything from recently burned areas and meadows to old growth — have specific communities of animals that depend on them. The lists given here are only a sampling of the species that use and depend at least in part on the kind of habitat represented.



Ponderosa Pine

Douglas-fir

Ponderosa pine (top) is more fire resistant and less susceptible to root-rots and mistletoe than Douglas-fir (bottom), but past practices have tended to favor Douglas-fir over ponderosa pine across much of the Reservation. Because our plant and animal communities evolved with fires such as the "stand-replacing fire" shown at right, many species have become dependent on it. Restoring disturbances by utilizing management practices that mimic natural fire can maintain healthier forests.

Deer and elk, for example, need densely timbered areas to hide in and large old trees for protection from winter cold and summer heat, but they also need open areas for foraging. Grizzly bears need variety too, open areas to feed in and timbered areas for cover. Other species rely almost exclusively on a single kind of forest habitat, such as openings or old growth (figure 1-6). The point is, periodic disturbances, especially fire, which is our most common type of natural disturbance, ensure the diversity that wildlife needs.

Natural and human caused

Events which are described as ***disturbances*** generally cause significant change in a forest, usually altering the way the ecosystem functions (a recent burn, for instance, has a different role than an old growth forest). Disturbances can be natural or human caused. ***Human-caused disturbances*** include events like timber harvesting, grazing, the introduction of exotic species, roads, and so on. Their consequences can be similar to those of natural disturbances or they can be of another magnitude, altering ecosystems in ways natural disturbances seldom did.

Fire: our most frequent natural disturbance

Fire can be beneficial as a disturbance. In addition to increasing the variety of habitats for wildlife, in certain fire regimes it tends to favor tree species that are more fire resistant and less vulnerable to insect attack and disease infection.

In addition, fire is an important part of the forest nutrient cycle, especially on drier sites. Without periodic fires, nutrients become less available to plants and soil organisms.

Although fire can be kept out of the forest for long periods, it will eventually return, and when it does, the fuel buildups caused by decades without disturbance usually result in much larger and more catastrophic burns — burns that can consume tens of thousands of acres and do long-term damage to soils and other resources.

Key Terms and Concepts Continued…

Disturbance and Vegetation Terms

Fire Regimes

The term ***fire regime*** refers to the kind of fire behavior that occurred within a portion of a landscape during pre-European times. Although fire exclusion policies have changed the fire behavior and vegetation within these zones, pre-European fire regimes reveal basic information about how our ecosystems functioned before the days of fire suppression. We have identified four major fire regimes: ***nonlethal, mixed, lethal, and timberline.*** General characteristics are summarized in table 1-1 and described in detail in Chapter 2.

The term fire regime refers to the kind of fire behavior that occurs in an area. During pre-European times, fire regimes determined the pattern, structure, and composition of the vegetation.

	Nonlethal Fire Regime (& Encroached Areas)	Mixed Fire Regime	Lethal Fire Regime	Timberline Fire Regime
Habitat	Dry P. Pine, Dry D.Fir	Moist D. Fir, W. Larch, Cool/Dry D.Fir	L. P. Pine, G. Fir, Spruce and Warm S. A. Fir	W. B. Pine and L. P. Pine Cold S. A. Fir
Fuels	Grass and Litter	Grass, Shrubs and Regen.	Regen. and Downfall	Grass, Shrubs and Downfall
Location	Low to Mid-Elevations, Mild Slopes, SE-W Aspects	Low to Mid-Elevations, All Slopes, All Aspects	Mid- to High Elevations, Steep Slopes, All Aspects	High Elevations, All Slopes, All Aspects
Structure	Large Trees, Old Growth, Closed Canopy, Uneven-aged, Seral Stands	Mature Trees, Open/Closed Canopy, Mosaic, Mixed Seral Stands	Mature Trees & Old Growth Closed Canopy, Even-aged, Seral Stands	Mature Trees, Open/Closed Canopy, Mosaic, Climax Stands
Fire Occurrence	Short Interval 5 - 30 years	Variable Interval 30 - 100 years	Long Interval 70 -500 years	Variable Interval 30 - 500 years
Fire Behavior	Low Intensity, Large Size, Short Duration	Variable Intensity, Variable Size, Moder. Duration	High Intensity, Large Size, Long Duration	Variable Intensity, Variable Size, Short Duration
Typical Areas	Dry Fork, Jette, Stevens, Seepay, Little Money	Garceau, Hell Roaring, La Moose	Dog Lake, Boulder, S. Fork Jocko, Revais Creek	Moss Pk, Ninemile Divide, Top of Mission Range

Table 1-1. Descriptions of the major fire regimes of the Flathead Reservation.

Key Terms and Concepts Continued…

If there is one concept that underlies this forest plan, it is that change is a natural part of healthy forest communities.

Disturbance and Vegetation Terms

Succession*

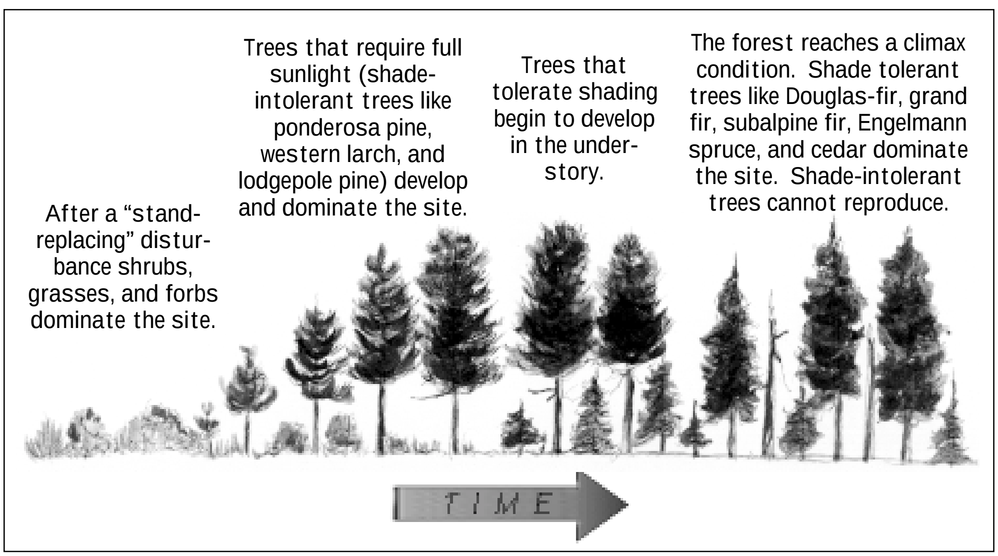
One of the most important ecological concepts underlying this forest plan is that change is a natural part of healthy forest communities. The term ***forest succession*** refers to change, specifically the patterns of change that occur within a forest over time.

The concept of forest succession often clashes with the human desire to maintain stability and control over the environment. We are drawn to trees in part because of their seemingly timeless quality. In a world of seething change, an ancient forest becomes a symbol of permanence and serenity. Besides that, we are sentimental about our forests. We don't like to see trees die. But if we think of forests as stable communities, forest fires and other disturbances do not seem part of a natural process.

The Classical View: A Straight Path

In simplified presentations of forest succession, the forest progresses toward a final or ***climax condition.*** Although details vary, several elements are commonly presented in the sequence of forest succession (figure 1-7). Following a major disturbance, such as a stand-replacement fire, the site enters a relatively short period in which grasses, forbs, and/or brush dominate. This period is typically followed by the dominance of tree species that require lots of sun (called shade-intolerant or early ***seral species*** by foresters). In a final stage, shade tolerant or climax species begin to flourish. Eventually they overtop the seral species and dominate the site, establishing a climax forest community.

Figure 1-7. This is the classic view of forest succession, but there is a problem applying this model to the Reservation: frequent, periodic disturbances have been left out of the picture. The diagram at right depicts a more accurate model.



* *Adapted from* Forest Health and Ecological Integrity in the Northern Rockies *by Edward Monnig and James Byler. 1992.*

The climax condition is often thought of as the goal to which all forests are progressing. It's easy to envision it as the last and best forest, the forest primeval. However, it is not necessarily the natural state of forests in the Northern Rockies nor is it necessarily the best for all wildlife and other forest resources.

A More Realistic Model: Circles within Circles

Before European settlement in the Northern Rockies, many forest types rarely reached climax conditions because of frequent disturbances. More typical patterns of forest development are shown in this second depiction of succession (figure 1-8). Major elements in forest succession were insects, disease, and fire — all made worse by periodic drought. Depending on the site, the interval between disturbances could range from a decade or less to several centuries. However, disturbance was inevitable and played a key role in maintaining the health and diversity of the forest.

Forest succession simply refers to how forests change over time.

Over the last one hundred years, the patterns and types of disturbance have changed. Fire has played a much smaller part in bringing change to our forests, while human disturbances such as logging and grazing have increased. Natural fires cannot be eliminated from forested ecosystems, however. In preventing fires we've allowed fuels to build and created the opportunity for larger, catastrophic fires and insect and disease epidemics.

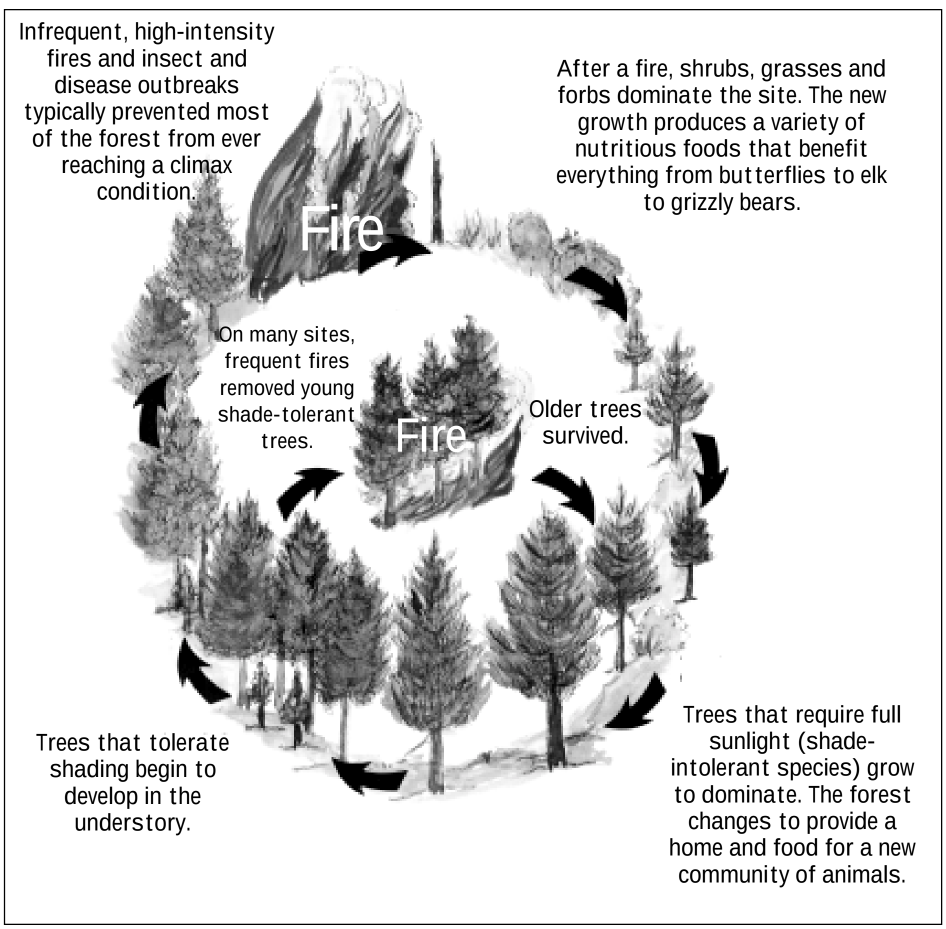


Figure 1-8. This model of forest succession fits the Reservation (and the rest of the Northern Rockies) better than the one shown in figure 1-7. Prior to European settlement, forest succession seldom proceeded to a climax condition but was often interrupted by fire and other disturbances.

Key Terms and Concepts Continued…

Disturbance and Vegetation Terms

Seral Classes

Seral classes are a simplified way of classifying timber vegetation based on its structure and composition.

In this plan, we focus chiefly on the structure and composition of the forest — on the size and age of the trees, on how close they are to each other, on whether a stand is multi or single layered, and on whether species are shade tolerant (climax) or shade intolerant (seral). Keeping track of all these factors on a Reservation scale is complex, so we have simplified things somewhat by developing what we refer to as ***seral classes***. Seral classes are types of timbered vegetation distinguished by their structure and composition. An example might be a stand of old trees that is relatively open and multi-storied with mostly shade tolerant (or climax) species in both the overstory and understory. This particular seral class might look like the one at left, which is a computerized depiction of an actual timbered stand on the Reservation.

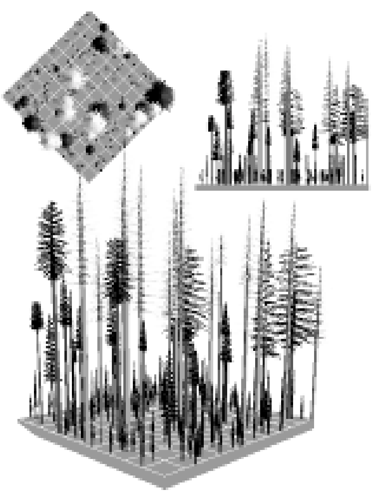
We developed a four digit code to help us keep track of all the various seral classes. We explain that code here, but you won't need to memorize it. Understanding the concept is all that is needed for the reader to follow the plan.

The first number refers to the size of the most dominant tree layer.

The second number describes density or how much shading the ground receives.

3 2 1 3

The third and fourth numbers indicate the species composition of the overstory and understory trees (whether seral or climax) and whether the stand is single or multi-storied.



The above depiction of seral class 5333 was made by taking actual forest inventory data (CFI) for a specific plot on the Reservation and feeding that data into a computer program. The computer then drew this image of the stand. Each individual tree measured in the field is represented.

The seral class code

The seral class code was calculated using two slightly different methods. Seral classes were determined using both imagery data and CFI data. For spacial calculations using imagery data, dominant tree size was a volume estimate that was a function of diameter, height, and numbers of trees. The size designation of a seral class calculated from CFI data was determined by the 5-inch diameter class that had the most basal area. Imagery data measured coverage directly, while CFI data predicted coverage using species, tree diameter, tree height, crown length, crown ratio and tree numbers per acre.

These computational methods will not always predict the same seral class at the stand level, but are similar enough that that any differences will not preclude reasonable project, landscape, or forest level comparisons.

The Code Explained

1. Dominant tree size, based on the predominant size class.

Four size classes were recognized by the modeling process: 1 = trees from 0 to 4.9 inches dbh, 2 = trees from 5.0 to 9.9 inches dbh, 3 = trees from 10.0 to 20.9 inches, and 5 = trees 21 inches and greater. A size class of 4 (10.0 to 13.9 inches dbh) was not used in the original modeling but was instead lumped with size class 3 because of the inability to distinguish it from the satellite imagery. In the future, stand level reconnaissance will gather data using all 5 size classes, equal in class widths, for example, 10 to 14.9”, 15 to 19.9, etc.

2. Density: based on canopy closure (how close together the trees' crowns are to each other)

Modeling used three density classes: 1 = 0 to 39% coverage, 2 = 40 to 69% coverage, and 3 = 70%+ coverage. Operational experience demonstrated that a fourth coverage is necessary. Field collections should use the four class system: 1 = 0 to 14.9% coverage, 2 = 15 to 39.9% coverage, 3 = 40 to 69.9% coverage, and 4 = 70%+ coverage.

3. Species composition and layering: based on the nature of the overstory and understory

Two digits, the first representing the overstory, the second the understory. 0 = no trees in that layer; 1 = at least 75 percent of that layer is in seral species; 2 = seral species comprise between 25 and 75 percent of the layer; 3 = at least 75 percent of the layer is made up of climax species.

A seral cluster is a group of seral classes that are similar in the way they function.

Seral Clusters

Table 1-2 shows the seral classes used in the development of this plan. The table also shows how the ID Team simplified the model by lumping similar functioning seral classes into groups which we call ***seral clusters*** (A through L in the table). This lumping is useful because the seral classes within a cluster generally function in a similar fashion with respect to factors such as fire risk, fire severity, hiding and thermal cover for big game, habitat for birds, insect and disease risks, and so on. The RMVs, Desired Conditions (DCs), and vegetation descriptions of individual landscapes in this plan use these seral clusters or groups of seral clusters. A brief description of each follows (figure 1-9).

	1 0 - 4.9"	2 5 - 8.9"	3 9 - 20.9"	5 >21"
3 > 70% canopy closure	D 0/2 2/2 2/3	D 0/2 2/2 2/3	H 3/3	L 3/3
			G 2/2 2/3	K 2/2 2/3
2 40 - 70% canopy closure	C 0/2 2/2	C 0/2 2/2	F 1/1 2/2 2/3	J 2/2 2/3
	B 2/3	B 2/3 0/3	E 3/3	I 3/3
1 0 - 39% canopy closure	A1 0/2 0/3	A1 0/2 0/3	A2 2/0 3/0	A2 2/0

* *Because of imagery limitations, we lumped size groupings 3 and 4 into a single group.*

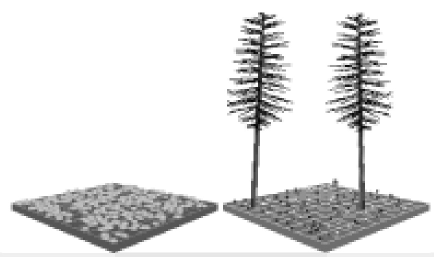
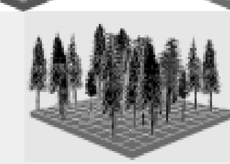
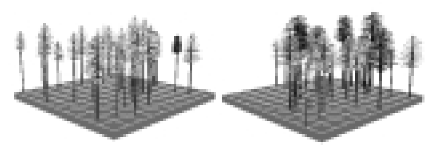
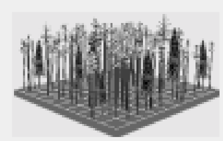
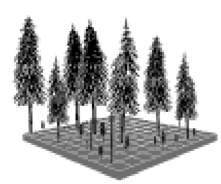
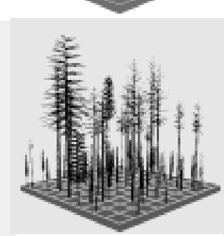
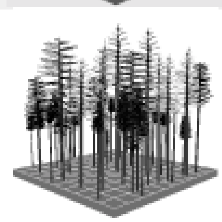
Table 1-2. Seral Classes used in the development of this plan were lumped into Seral Clusters A through L.
X/Y: X represents the species group for the overstory and Y represents the species group for the understory. The break point between overstory and understory is 10 inch dbh.
0 = No species group present
1 = Seral tree species comprise >75% of the stand
2 = Seral tree species comprise 25% to 75% of the stand
3 = Climax trees species comprise > 75% of the stand

Seral Cluster Key

Key Terms and Concepts Continued…

Seral Clusters (cont.)

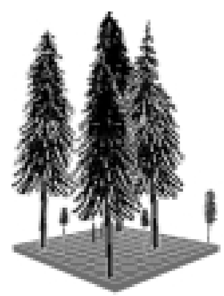
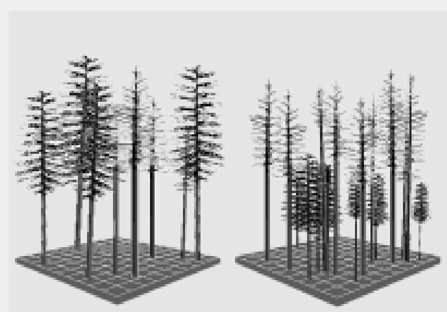
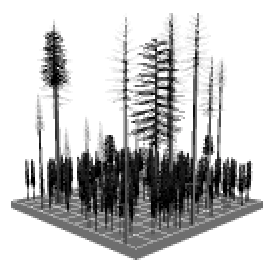
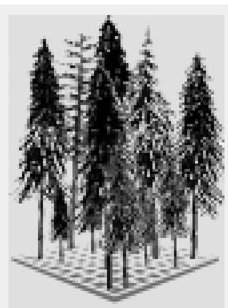
Figure 1-9. Seral cluster descriptions.

Cluster	General Description	Examples
Cluster A	Cluster A1: Young and recenlty disturbed, open canopy, mostly pine and larch. Cluster A2: mature and old, frequently disturbed, open canopy, mostly pine and larch.	
Cluster B	Young, undisturbed since regeneration, moderate canopy, mostly fir.	
Cluster C	Young, frequently disturbed to undisturbed, moderate canopy, mostly pine and larch.	
Cluster D	Young, frequently disturbed to undisturbed, closed canopy, mostly pine and larch.	
Cluster E	Mature, undisturbed, moderate canopy, moslty fir and spruce.	
Cluster F	Mature, undisturbed, moderate canopy, mostly pine and larch. Potential for lodgepole old growth.	
Cluster G	Mature, less frequently disturbed, closed canopy, mostly pine and larch. Potential for lodgepole pine old growth.	

Key Terms and Concepts Continued…

Seral Clusters (cont.)

Figure 1-9. Seral cluster descriptions (cont.).

Cluster	General Description	Examples
Cluster H	Mature, undisturbed, closed canopy, mostly fir and spruce	
Cluster I	Old, undisturbed, moderate canopy, mostly fir and spruce. Potential for old growth	
Cluster J	Old, undisturbed, moderate canopy, mostly pine and larch. Potential for old growth.	
Cluster K	Old, undisturbed, closed canopy, mostly pine and larch. Potential for old growth.	
Cluster L	Old, undisturbed, closed canopy, mostly fir and spruce. Potential for old growth.	

Key Terms and Concepts Continued…

Disturbance and Vegetation Terms

Key Parameters

In our model, we use *seral clusters* to describe the structure and composition of the forest. We then built maps showing how these seral clusters were distributed across the Reservation as of 1990 (using satellite and forest inventory data). We also estimated how much of each seral cluster probably existed during pre-European times. The interdisciplinary team then evaluated how each seral cluster functioned for a series of ***key parameters,*** which are listed below.

Key parameters are indices of how a particular kind of forest structure, or seral cluster, functions. By analyzing seral clusters in terms of their key parameters we can estimate how a given landscape functions (in the past, present, or future), because we know or we can predict the seral cluster distribution found within that landscape.

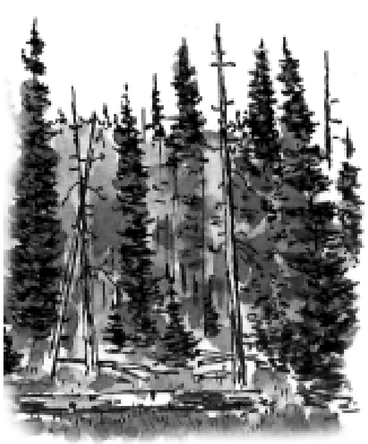
Key Parameters

Vegetation and Disturbance
Defoliator Risk
Root Disease Risk
Bark Beetle Risk
Mistletoe Risk
Fire Severity
Fire Risk
Prescribed Underburn Potential

Wildlife and Diversity
Hiding Cover
Thermal Cover
Big Game Forage
Interior Forest Bird Diversity
Early Seral Bird Diversity

Products
Timber Stocking
Post and Pole Stocking
Christmas Tree Stocking
Firewood Stocking
Berry Production
Livestock Forage

Human Health
Smoke Emissions



Key Terms and Concepts Continued…

As an example of how this system works, take the key parameter *fire risk*. Our ID team rated seral clusters E, G, H, I, and L as having a high fire risk, which means they have a high potential for ignition, and once a fire starts, the fuels are sufficient to sustain it. The fire will likely spread and be of high intensity — the kind of blaze that is extremely costly and difficult to put out. Clusters B, D, F, J, and K were rated as having a moderate fire risk, and clusters A and C were rated low.

We did this exercise for each key parameter, and because we knew the seral cluster distribution for each of the six landscapes, we were able to estimate how each functioned (in terms of hiding cover, thermal cover, fire risk, insect and disease risk, timber production, and so on) (figure 1-10). We were also able to estimate how each of the landscapes probably functioned during pre-European times (which helped us set our reference variabilities or RVs), and to develop sustainable seral cluster distributions for landscapes in the future (which became our desired conditions). These analyses are presented in Chapter 3.

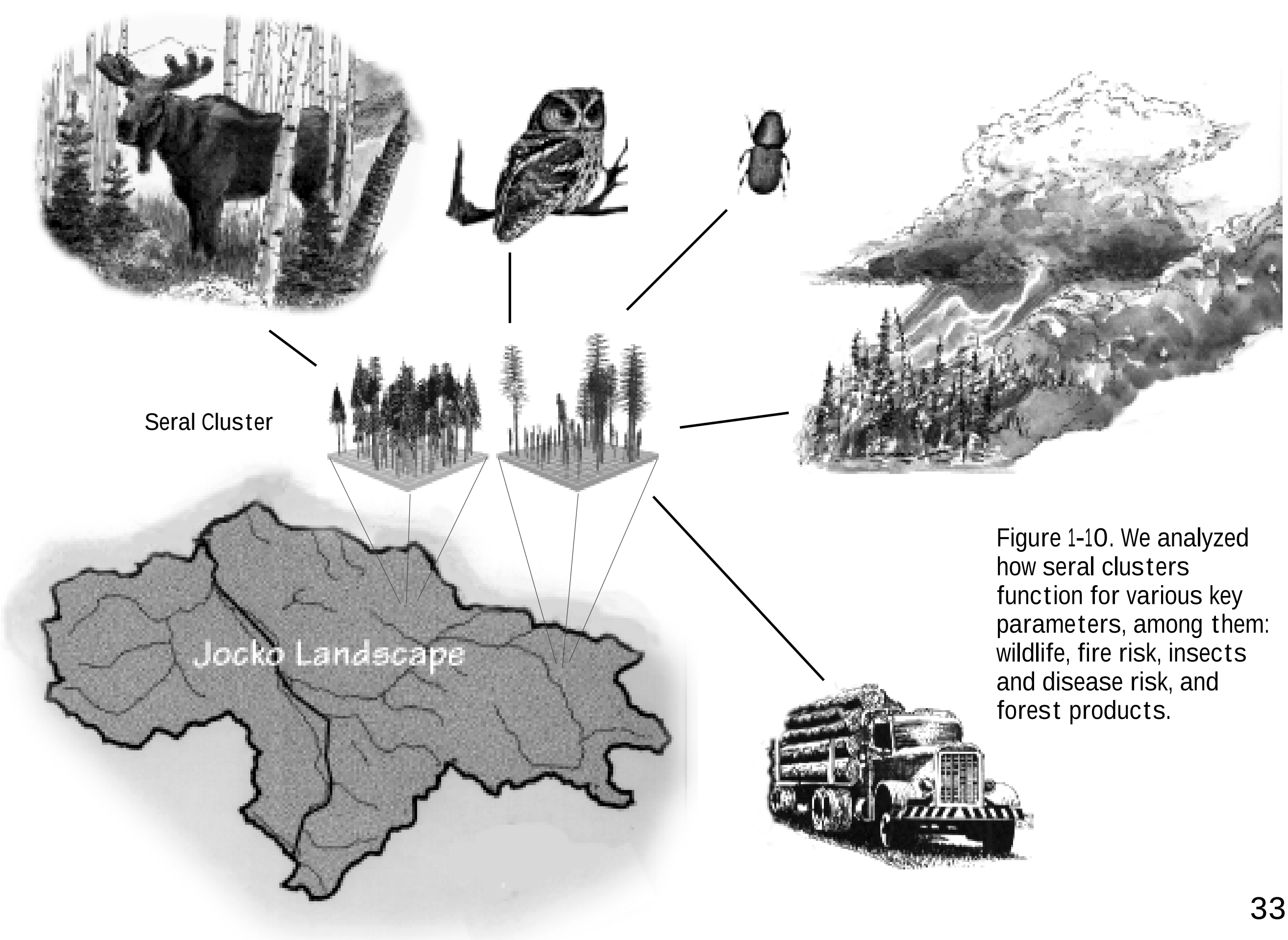


Figure 1-10. We analyzed how seral clusters function for various key parameters, among them: wildlife, fire risk, insects and disease risk, and forest products.

Major Forest Trends: A Photographic Overview

"If a Salish or Kootenai person who lived here two hundred years ago came back today and walked through his or her old forest haunts, they'd have trouble recognizing them. Our forests have changed that much."
— Steve Barrett, Fire Ecologist, 1995

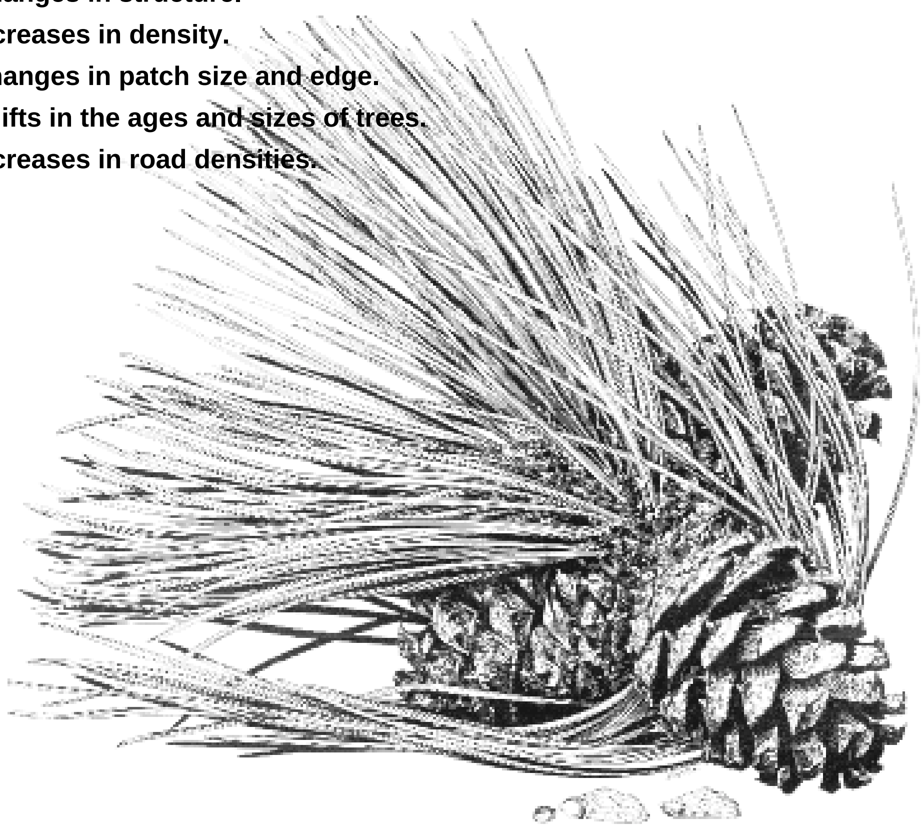
Looking at the Past to See Current and Future Trends

Much of the work of the interdisciplinary forest planning team involved conceptual and computer modeling to estimate what the forests on the Reservation looked like prior to European settlement (what we are calling pre-European conditions). We then compared those conditions with the situation that exists today. This section provides a photographic overview of some of the major changes that analysis revealed. Most of the shifts are a consequence of fire exclusion, although commercial forestry and grazing have been responsible for some major shifts, too. The trends depicted in the photos represent Reservation-wide changes that continue today.

Many of the shifts have been detrimental from the standpoint of ecosystem stability. The actions contained in this plan are designed to counter some of the more negative trends. The major changes (in no particular order) are summarized below.

Major ecological shifts occurring in Reservation forests

1. **Forest expansion onto grasslands.**
2. **Loss of plant and animal diversity.**
3. **Shifts in tree species composition.**
4. **Changes in structure.**
5. **Increases in density.**
6. **Changes in patch size and edge.**
7. **Shifts in the ages and sizes of trees.**
8. **Increases in road densities.**



Ponderosa pine needles and cones. This plan addresses a number of changes that are occurring in forests from Hot Springs to St. Ignatius. Among them the shift from seral species, like ponderosa pine, to climax species like Douglas-fir. The shifts pose a threat to the health and stability of both plant and animal communities.

Trend Number 1: Forest expansion onto grasslands.

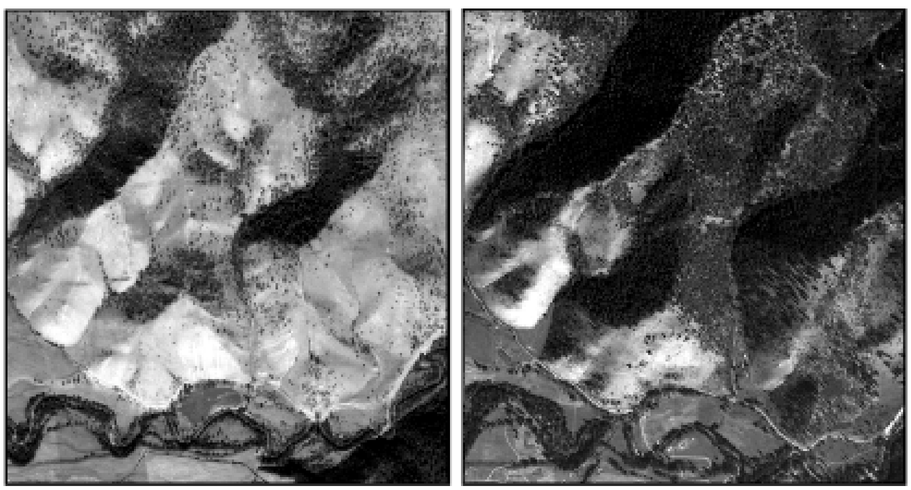


Figure 1-11. The two aerial photos of the dry hills at the mouth of the Jocko Canyon show how dramatic the expansion has been in some areas. The far left photo was taken in 1938, the other in 1990.

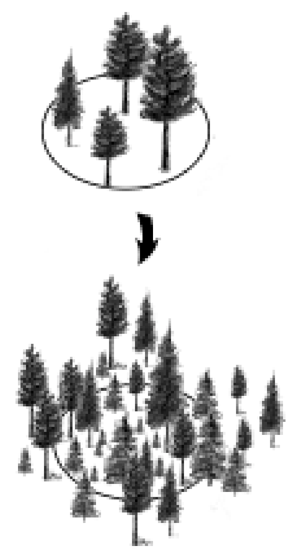


Figure 1-12. The diagram above shows the general pattern occurring at lower elevations at the forest edge: because of fire exclusion, trees are expanding outward onto areas that were historically non-forested.

Grasslands at the forest edge are shrinking.

In pre-European times, fires kept grasslands free of most trees and shrubs. However, without fire, trees are able to gain a foothold. The process, shown in figures 1-11 and 1-12, continues today; young trees can be seen sprouting well below the forest edge on many dry hills. The net result has been an overall increase in total forest acres and a corresponding decrease in interior and exterior grassland. The trees in this "new forest" zone are often densely stocked and subject to extreme drought stress. They are often weak and susceptible to insect and disease attacks as well as stand-replacing fires. At the same time, the productivity of many seral herbs, shrubs, and aspen stands has declined due to the absence of fire and forest densification.

By excluding fires, we have suffered a loss of the meadow and forest-edge habitats that were traditionally key summer calving and wintering areas for big game (figure 1-13). These open pockets were also home to a variety of songbirds, upland gamebirds, small mammals, specialized insects, and unique plant communities — organisms that require undeveloped open habitats within or at the forest edge. In some areas we have re-created these openings with clearcuts.

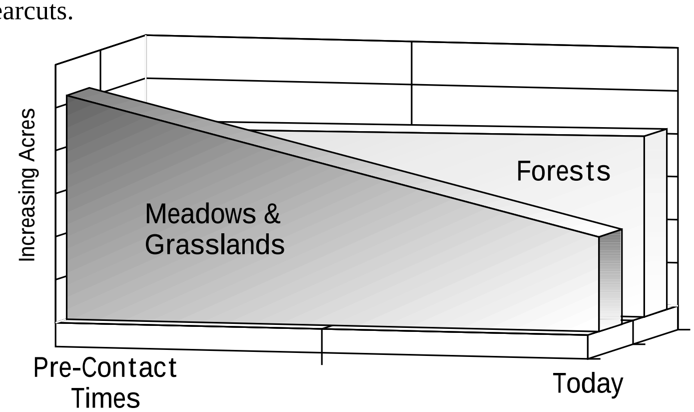


Figure 1-13. The overall trend Reservation-wide is summarized in the graph at left.

Trend Number 2: Loss of diversity.

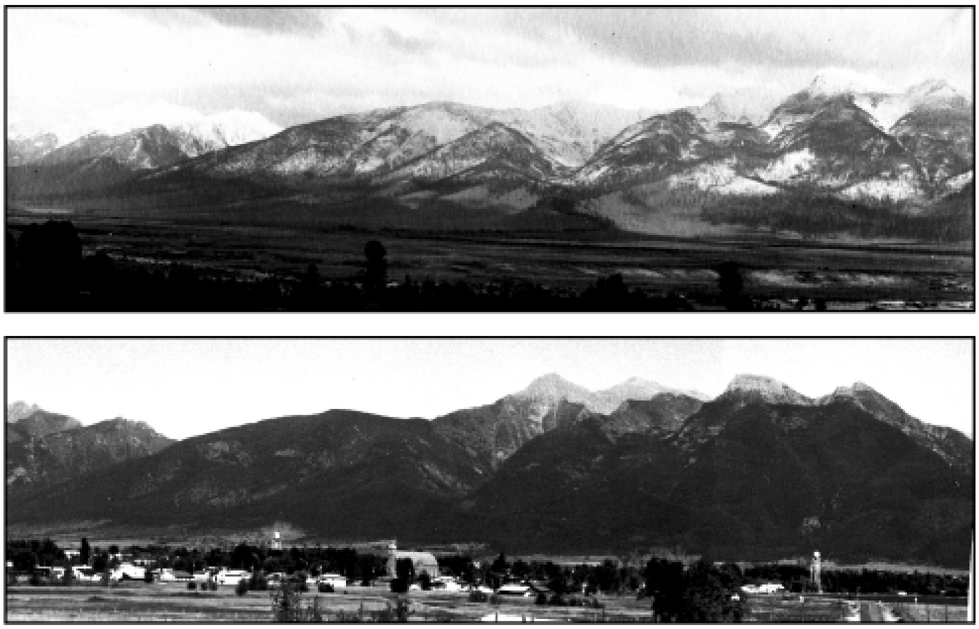


Figure 1-14. These photos are of the Mission range; St. Ignatius is in the foreground. The top photo was probably taken in the 1920s, while the lower photo was taken in 1995.

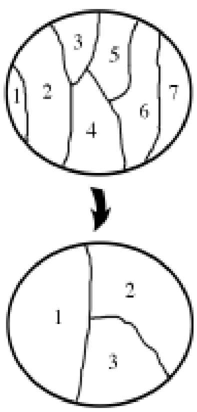


Figure 1-15. The diagram above summarizes a Reservation-wide trend toward a loss of diversity. Each number represents a different patch (forest structural type).

The trend across the Reservation is toward reduced diversity.

Because of fire exclusion policies and past forest practices, forest communities are becoming uniform blankets of similarly aged trees (figures 1-14 and 1-15). Gone is the quilt-work of pre-European times, a mosaic that contained a tremendous diversity of forest habitats. We have traded that richness for a more impoverished forest dominated by just a few kinds of structures. Losing habitats means losing plant and animal species, many with cultural significance.

Without changes in management, this trend will continue; our forest will become even more habitat impoverished. Figure 1-16 shows two photos with lines marking individual patches to show the trend more clearly.

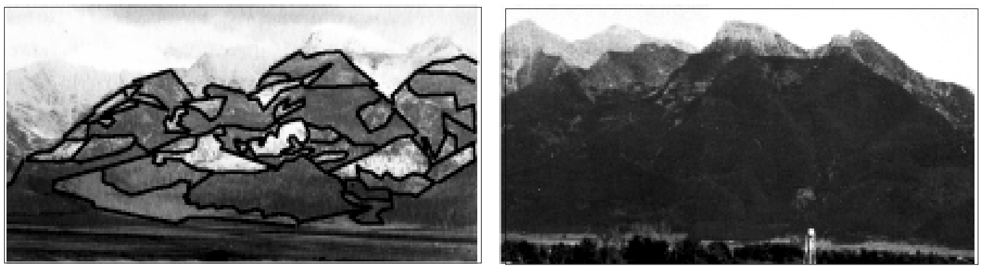


Figure 1-16. On these photos, different patches have been delineated in a general way with lines, illustrating how over the last 50 years diversity has been reduced.

Trend Numbers 3 and 4: Shifts in species composition and stand structure.

Figure 1-17. These photos, while not taken on the Reservation (both are from Lick Creek in the Bitterroot) illustrate a clear Reservation trend. Douglas-fir is overtaking ponderosa pine. The left photo was taken in 1909, the other in the same location in 1979.

Seral species are loosing ground to climax species.

Over the last 50 to 100 years, climax species like Douglas-fir which tolerate shade have increased at the expense of seral species like ponderosa pine which require lots of sun. Without fire, Douglas-fir is able to gain a foothold beneath the pines, eventually out competing and overtaking them. During pre-European times, periodic fires interrupted this process by killing the climax species while they were young. Open stands of giant pines like the one shown in the photo at upper left were maintained by frequent ground fires (figure 1-17).

The same dynamic — climax species overtaking seral species — continues to happen throughout the Reservation, although the trend is most apparent at lower elevations, in the Nonlethal Fire Regime, where ponderosa pine stands are giving way to Douglas-fir. The trend concerns foresters because Douglas-fir is much more susceptible to a variety of insect pests and diseases than ponderosa pine. In 1945, Douglas-fir made up only 26 percent of the forest, while ponderosa pine occupied 59 percent. In 1981, Douglas-fir had increased to cover 42 percent of our forests, meanwhile, ponderosa pine had dropped to 22 percent (figure 1-19).

Stands that were historically parklike are also becoming more crowded and multilayered (figure 1-18). Again, low intensity ground fires were the mechanism which kept stands in the nonlethal zone open and parklike.

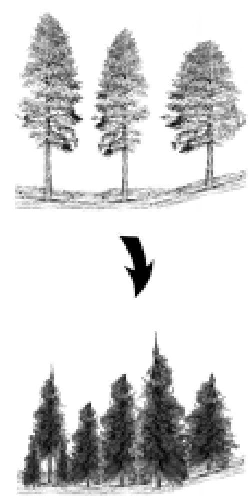


Figure 1-18 above illustrates a Reservation-wide trend — the shift from seral to climax species and a more multilayered forest.

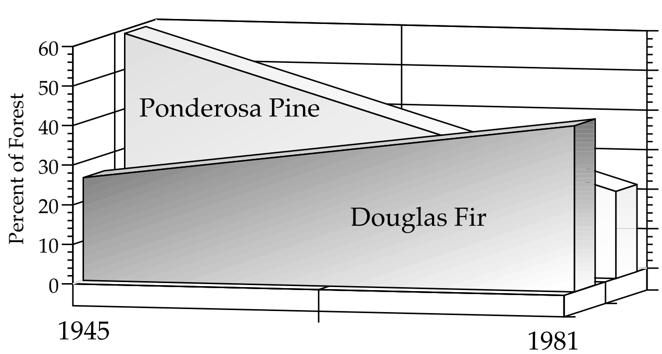


Figure 1-19 at left shows how Douglas-fir has increased at the expense of pine on the Reservation. According to Tribal silviculturists, the trend has become even more pronounced since 1981.

Trend Number 5: Increases in density.

Figure 1-20. These photos were taken on one of the Reservation's high ridges. The left photo, taken in the 1920s, shows a stand maintained in an open condition by fire. The other photo shows the same ridge in 1994.

Stand density refers to how crowded a stand is.

Without disturbance like fire or logging, stand density has increased substantially over what it was during pre-European times (figures 1-20 through 1-23). The availability of moisture, nutrients, and light limit the number of trees that can grow on each site, so as trees become more crowded, stresses increase due to competition. As stresses increase, trees become more susceptible to attack by insects and disease. Those agents kill trees. The result is a build up of fuels giving rise to larger more destructive fires.

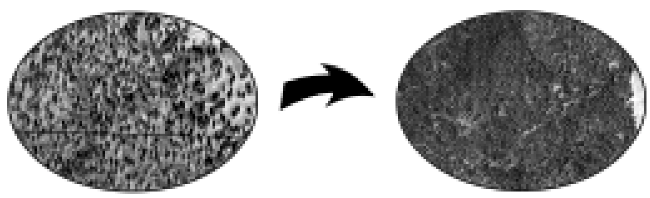
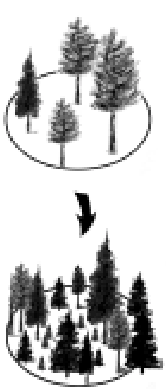
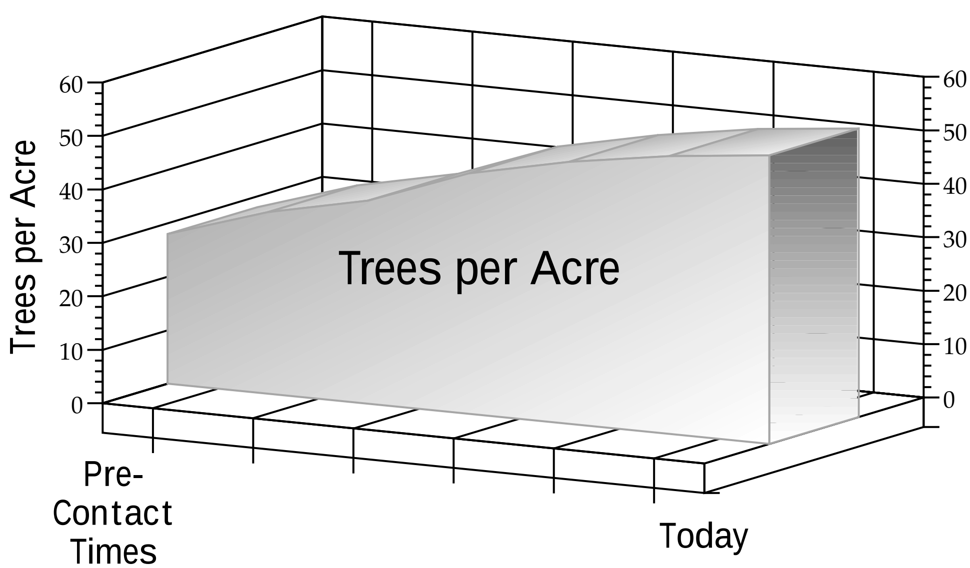


Figure 1-21. The pattern of increasing density across the Reservation is demonstrated in these two aerial photos (center) from the Hot Springs area. They show the same piece of ground, first in 1935, then again in 1990.

Figures 1-22 and 1-23. The diagram below and the graph at right show the trend toward increasing stand density, a consequence of fire exclusion policies.





Trend Number 6: Changes in patch size and edge.

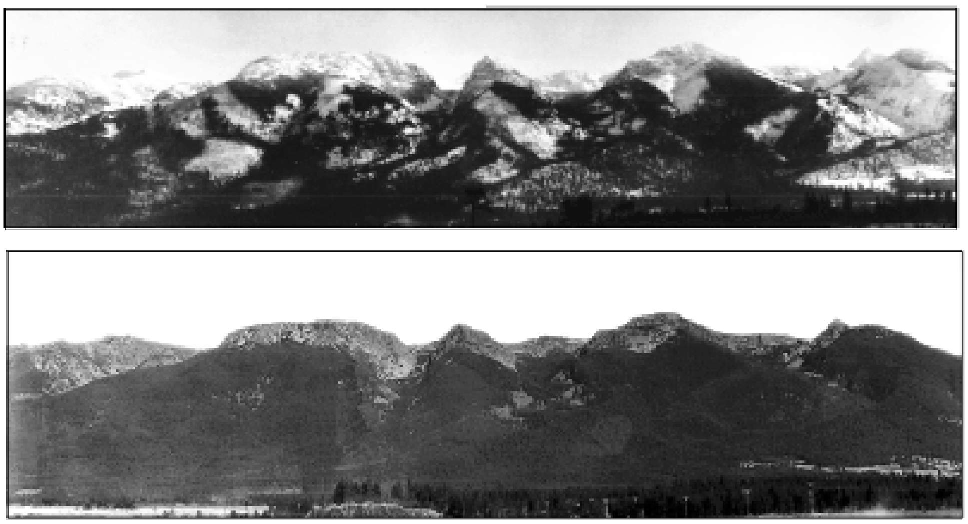


Figure 1-24. These photos of the Mission Range east of Pablo show the change in patch size and amount of edge. The top photo, taken in the 1920s, shows the numerous patches of all sizes created by stand-replacement fires (only one or two of the patches at the very base of the range is from logging). The other photo, taken in 1995, shows how the patchiness has all but disappeared.

Fires created a mosaic dominated by small patches.

A ***patch*** is an area of vegetation that is relatively homogeneous and that differs from the vegetation that surrounds it. The boundary between two patches is referred to as an ***edge***. Fire exclusion policies have caused an increase in the average patch size and a decrease in the amount of edge, particularly in the mid-elevation Mixed Fire Regime. Now, much of the forest is covered by a relatively uniform blanket of trees similar in age and size (figures 1-24 through 1-26). The size of patches and the amount of edge is vitally important for wildlife.

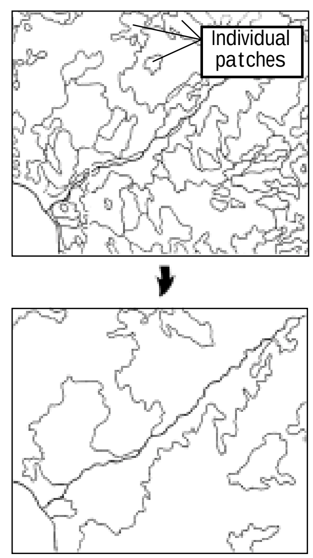


Figure 1-25. The diagram above (modified from Barrett et al. 1991) shows a hypothetical increase in patch size and decrease in edge for an area.

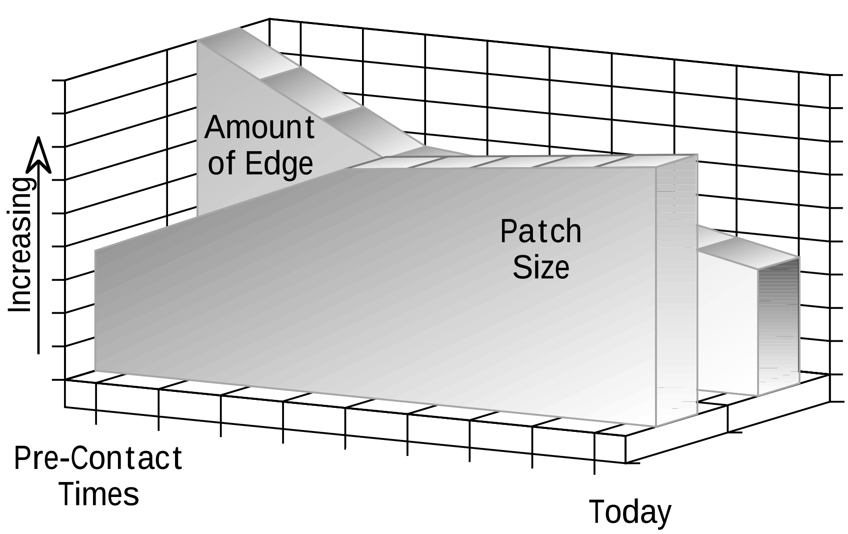


Figure 1-26. The graph at left shows the same trends, both of which are the result of fire exclusion policies.

Trend Number 7: Shifts in the ages and sizes of trees — the trend at low elevations.

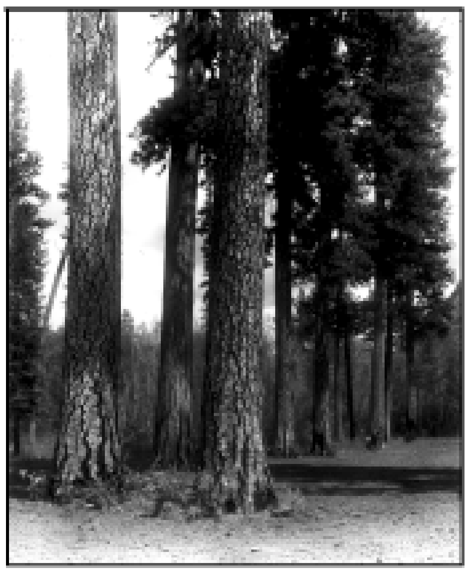


Figure 1-27. The big pines in the photo on the left (taken somewhere on the Reservation) once dominated our low-elevation forests. Some of these big trees were logged and the frequent low-intensity fires that had maintained them were excluded from the forest. The combination has resulted in a shift toward younger trees.

The average age of trees has changed.

But there have been two kinds of changes, one at low elevations and another at middle to high elevations. During pre-European times, lower elevation forests were shaped principally by frequent, low-intensity fires, which left a forest of ancient pines like those shown in the photo on the left (figure 1-27). Now because most of those large pines have been logged off and fire has been removed from the ecosystem, these stands have, in many areas, been replaced by younger pine and Douglas-fir trees (figure 1-28).

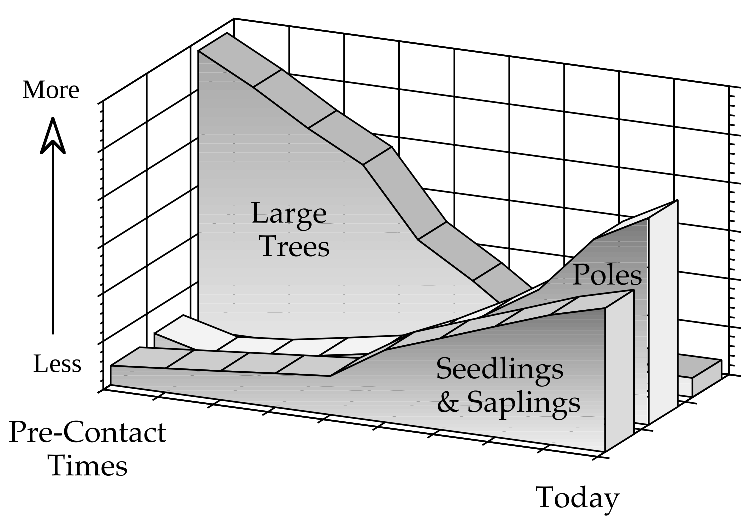


Figure 1-28. This graph shows the general relation between the different age classes of trees over time at low elevations. Large trees have declined while younger trees have increased.

Trend Number 7: Shifts in the ages and sizes of trees — the trend at middle to high elevations.

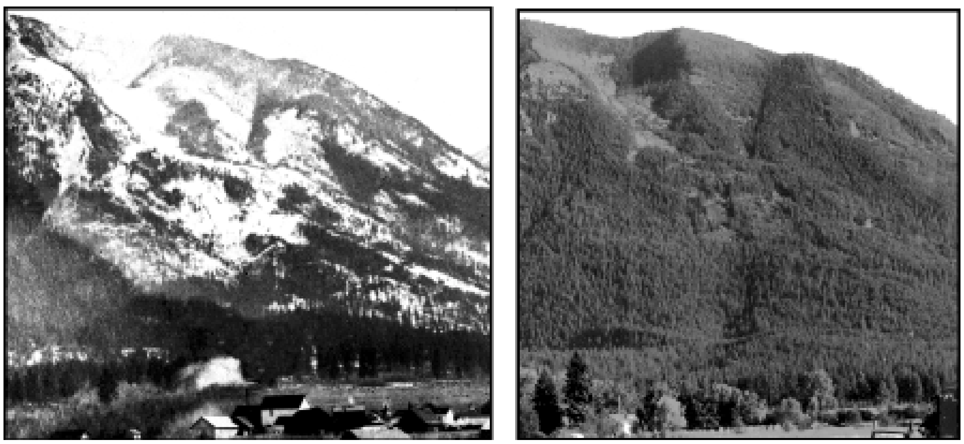


Figure 1-29. The mountains above the old Jocko Agency in the southern part of the Reservation show a clear trend. On these mid- to high-elevation slopes, fires created a patchwork during pre-European times. As a consequence, there were more young trees, seedlings, and saplings in this zone than there are today.

Another trend is evident at mid to high elevations.

Here, stand replacing fires were the rule before European settlement. These fires created more large openings, as the photo to the left shows (figure 1-29). Today, these higher slopes are covered by a blanket of similarly aged, older trees. The mosaic of old and young stands present in pre-European times are generally absent. Although logging has created new openings that are now filled with young trees, the general trend is still toward larger trees in this zone (figure 1-30).

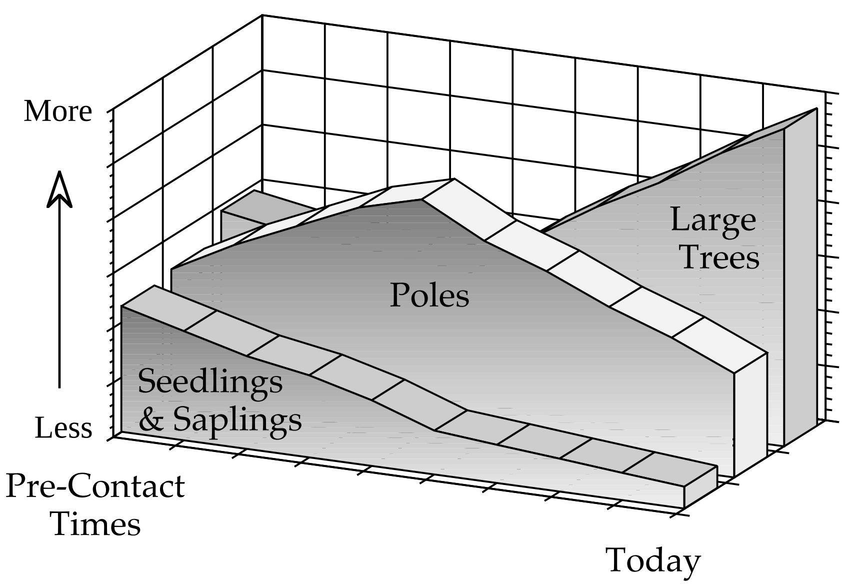


Figure 1-30. This graph shows the general relation between the different age classes of trees over time at mid to high elevations where the land was historically dominated by stand-replacing fires. Large trees have increased in this zone.

Trend Number 8: Roads and other human developments have increased.

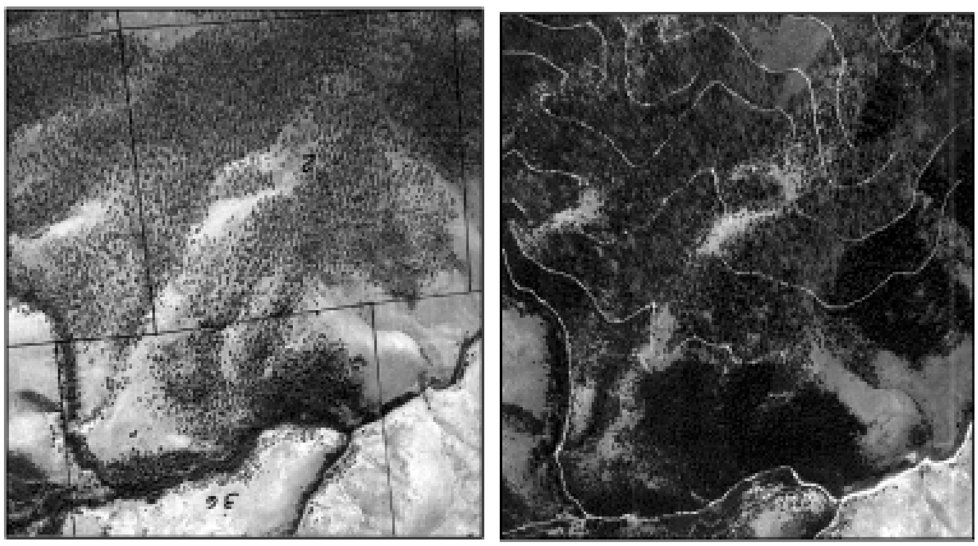


Figure 1-31. This area northeast of Niarada shows a pattern evident throughout the Reservation: roads have increased dramatically. Few of these roads end up being closed, which has serious consequences for wildlife.

Figure 1-32. Roads generally have more negative impacts on fish and wildlife than the logging itself, which can, in fact, benefit many species.

Road density, or the miles of roads per square mile have increased dramatically.

When done properly, removing trees from a site through logging can enhance values for wildlife and other resources. Roads, however, are another story. Roads increase access for humans, thereby reducing security for big game and other animals. Roads also increase runoff and sediment entering streams, which harms fish. Over the past century, road densities in non-wilderness forested acres on the Reservation have gone from zero to an average of about 6 miles of road per square mile of land (figures 1-31 through 1-33). For comparisons, the unforested valley bottom with all its towns and farms has an average of 2 roads per square mile.

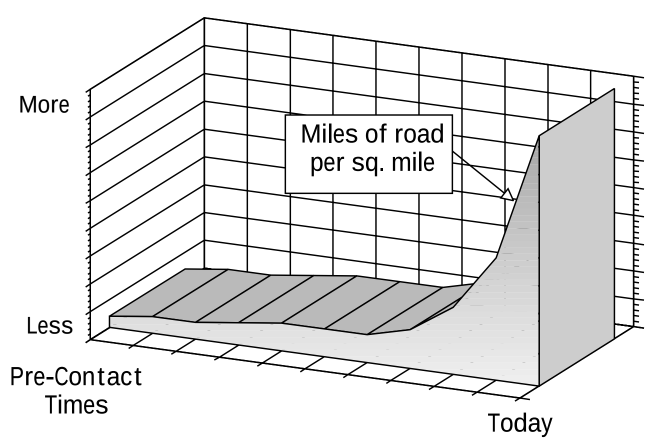


Figure 1-33. This graph shows the general trend in road density over the last century. Of all the developments that occur in the forest, roads have some of the most serious impacts for fish and wildlife.

The Implications and a Strategy

The trends described on the preceding pages are creating conditions quite different from those that our plant and animal communities evolved with. The changes threaten biological diversity, and ultimately, the health and stability of our forests, which in turn has profound implications for Tribal culture. Whitebark pine, for example, a species of cultural and ecological significance, has all but stopped reproducing cones because of fire exclusion policies and an introduced (exotic) disease.

Losing fire as a process has affected the life histories and reproductive success of other plants as well. It has caused reductions in nutrient cycling and unusually high accumulations of biomass. It has reduced tree vigor, increased levels of insects and diseases, and caused reductions in certain kinds of wildlife habitat.

Finally, the shifts described here have made the forest more susceptible to large and intense wildfires and insect and disease epidemics. A fire that may have burned 300 acres during pre-European times may burn 30,000 acres today. That is exactly what happened with the Red Bench Fire in the North Fork of the Flathead in 1988. Large disturbances like the Red Bench fire cause further damage to the ecosystem by adding to the general decline in overall diversity and by jeopardizing water quality, fisheries, wildlife, and soils.

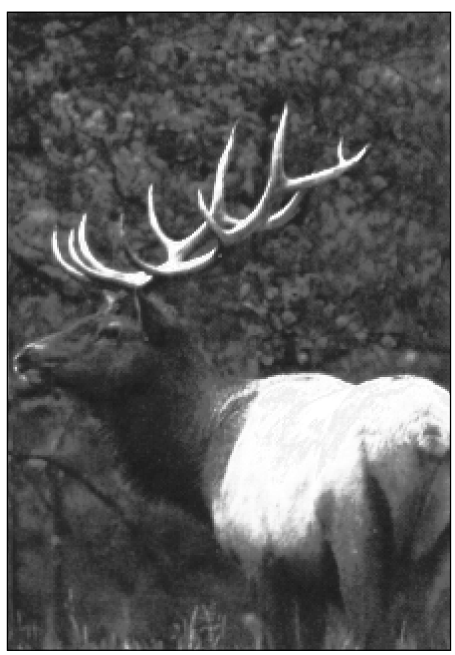
"Forest managers will be continually challenged to make commodity-producing activities more closely represent natural processes."
— Monnig and Byler, Forest Ecologist and Pathologist 1992

A plan for restoration

Without a change in management, extreme disturbance events will become inevitable. And although the forests of the Flathead Reservation are not on the verge of collapse, the trends suggest that, over the long term — say the next 25 to 50 years — our forests could face serious problems, similar in magnitude to what the Forest Service is experiencing in the Blue Mountains of Oregon. There, just like here, fire was excluded for a long period. Forest ecologists have described the problems in the Blue Mountains to be of "catastrophic proportions." There the forest has seen a major deterioration in visual quality, wildlife habitat, water quality, and timber values.

Here on the Flathead Reservation, with the number of people living in or adjacent to the forest and with the current unnaturally high fuel conditions, fire can no longer be expected to play its historic role in ecosystem processes, at least to the extent that it once did. While fire suppression policies may change in some special management zones, wildfires occurring in most areas will have to be managed under existing policies for the foreseeable future.

Still, the ecosystem management actions contained in this plan — a combination of timber harvest, pre-commercial and commercial thinning, and prescribed fire — are designed to restore the forest, not all the way back to its pre-European condition, but to move it in a more ecologically sustainable direction, one that more closely resembles the pre-European. In the



Elk and other big game species should benefit over the long term from the actions contained in this plan because forage and thermal cover will increase while open-road densities will decrease.

words of Edward Monnig and James Byler, "[The] ecosystem approach is complicated by changes in our forests since the early European settlement days and by an inability to fully define pre-European conditions and processes. The changes in our forests over the past century and the current societal demands on our forests make duplication of the pre-European condition a virtual impossibility — even in areas reserved from commodity production. The quest for healthy sustainable forests will require numerous approximations and continual monitoring of effects."

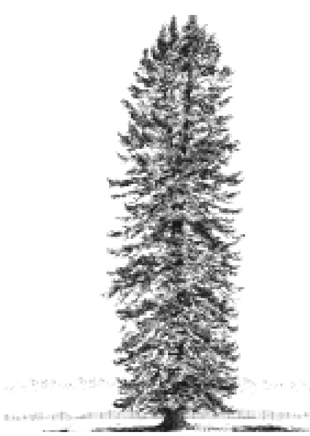
In the end, the best we can do is to strive to maintain and mimic important ecosystem processes in order to arrest some of the more detrimental trends described on the preceding pages. Besides providing the disturbances needed to maintain a healthy forest, the ecosystem management approach will also maintain timber revenues and jobs for Tribal members.

"…properly functioning forests proceed through cycles of succession and disturbance. If we would conserve biological diversity and ecological integrity, we must allow for these cycles. If we are to manage these forests for a variety of values and simultaneously maintain forest ecological integrity, we must represent as closely as possible these cycles with our management activities."
— Monnig and Byler, Forest Ecologist and Pathologist, 1992

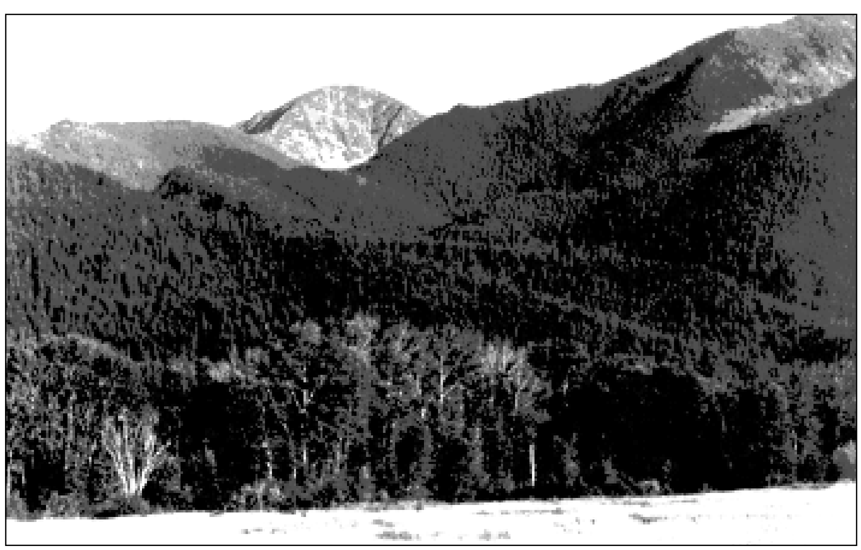
A strategy that's both landscape-based and comprehensive

Ecosystem management challenges foresters, biologists, and the Tribal community at large to take a broader view, to focus on the overall vegetative structure and composition of an entire landscape rather than on the structure of isolated stands or the needs of individual species (except for sensitive or threatened and endangered species). In the past, landscape patterns were essentially unplanned. Management consisted of a collection of individual activities, usually timber sales and fire suppression. These were normally well planned, but the big picture was often neglected — in a sense, we were so busy looking at the trees, we often lost sight of the emerging landscape pattern and how it was affecting other resources or humans on a broader scale. Ecosystem management, however, begins with a landscape-level plan. Individual activities develop from that.

Finally, it should be emphasized that moving toward a pre-European condition also requires managing the forest road system. Restoring some of the pre-European vegetative structures without managing road densities could have disastrous affects on both fish and wildlife. Only by being comprehensive in our approach can ecosystem management succeed. Managers must look at and analyze the effects of all human activities if we are to restore healthy and sustainable forests to the Reservation.



Grand fir



The Ad Hoc Group's View

Public Participation

From the beginning, the Tribal Council considered public participation crucial to the development of a Tribal forest management plan. To that end, they appointed an ***ad hoc group*** of Tribal members to advise the *interdisciplinary or* ID team. (The ID team is the group of resource professionals charged with drafting the plan.) The Ad Hoc Group, the members of which are listed below, represents a cross section of Tribal members interested in forest management issues.

From the beginning, the Tribal Council considered public participation crucial to the development of a Tribal forest management plan.

Forest Management Plan Ad Hoc Group

John Peter Paul
Matt "Buckskin" Michel
Maggie Goode
Doug Jackson
Pat Pierre
Thelma Niemeyer
John Stanislaw
Kendall Dupuis
Mark McDonald
Tom Orr
Rhonda Lankford
LeRoy O'Bennick
Clara Dumontier

The ID Team met with the Ad Hoc Group several times. During the last meeting (which took place over the course of three days), the ID team presented the concept of ecosystem management and asked for direction from the Ad Hoc Group on a number of key management issues. The group's recommendations are summarized below.

Ecosystem Management

- Ecosystem management is a sound approach to forest management and seems appropriate here.

Disturbance and Vegetation

- Fire should be used as a management tool to enhance diversity while protecting human safety and property. Manager-ignited and prescribed natural fires should be used where appropriate.
- Managers should consider varied levels of fire suppression based on the location of the fire, the costs of suppression, and ecological factors.
- Managers should do underburning in the Nonlethal Fire Regime where needed.
- Managers should initiate interagency efforts to protect lives and property in the urban-forest intermix. Fuel management is key in this zone.
- Burn, if possible, in the buffer zone to improve habitat diversity (but protect cultural sites from fire).
- Clearcutting should be used as a management tool to mimic stand-replacing fires and in situations where insect and disease problems make individual tree selection impractical.
- Managers should look for ways to reduce visual impacts from clearcuts by avoiding visually sensitive areas, designing clearcuts in natural shapes, leaving islands and ribbons of trees within clearcuts, and feathering the edges so the cuts look more natural. Rehabilitate existing clearcuts so they look more natural as well.

Open cone of western white pine

Wildlife and Diversity

- Wildlife and wildlife habitat is very important. Their protection should be given a high priority.

- Managers need to do a better job controlling grazing and balancing it with the needs of wildlife.
- Grizzly bears should be protected.

"Our forests are vitally important to who we are as a people. The way we manage them says a lot about this Tribe."
— Ad Hoc Group Member, 1995

Water and Fish

- The protection of water quality should be given the highest priority. Stream channels should also be protected.

Culture

- Manage the forests in as natural way as possible; minimize the mark of humans.
- Use fire to improve berry production where appropriate.
- Lodgepole pine should be for Tribal member use only.

Scenery and Recreation

- Improve winter recreation opportunities.

Transportation

- There are too many roads; road densities should be reduced by approximately 50 percent. When closing roads with gates, enforce the closures.
- Use Best Management Practices at all times when building and maintaining roads. Remove roads completely after harvesting wherever possible.
- Use Timber Stand Improvement dollars to help control weeds along roads.

Grazing

- Some heavily impacted areas should be grazed less (grazing within the forest is acceptable when properly managed).

Homesite Development

- The Tribes should use planning to minimize home building in wildlands and to mitigate impacts where development does occur.
- Balance homesite development against other resource concerns.

Tribal Member Employment Opportunities

- Improve the opportunities for Tribal members to contract larger timber sales.
- Increase the number of Tribal members employed in the woods.
- Increase small business loans to enhance Tribal member business opportunities.
- Keep more timber dollars in the Tribal community.

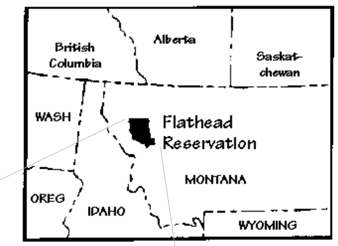
Lodgepole pine limb and cones

In addition to listening to the concerns and desires of the Ad Hoc the Tribes held five scoping meetings around the Reservation and one public hearing in Pablo to gather public input for the Forest Plan EIS. The ID Team also made presentations on the EIS and Forest Plan to the Cultural Committees and Tribal Council and asked for their input throughout the process.

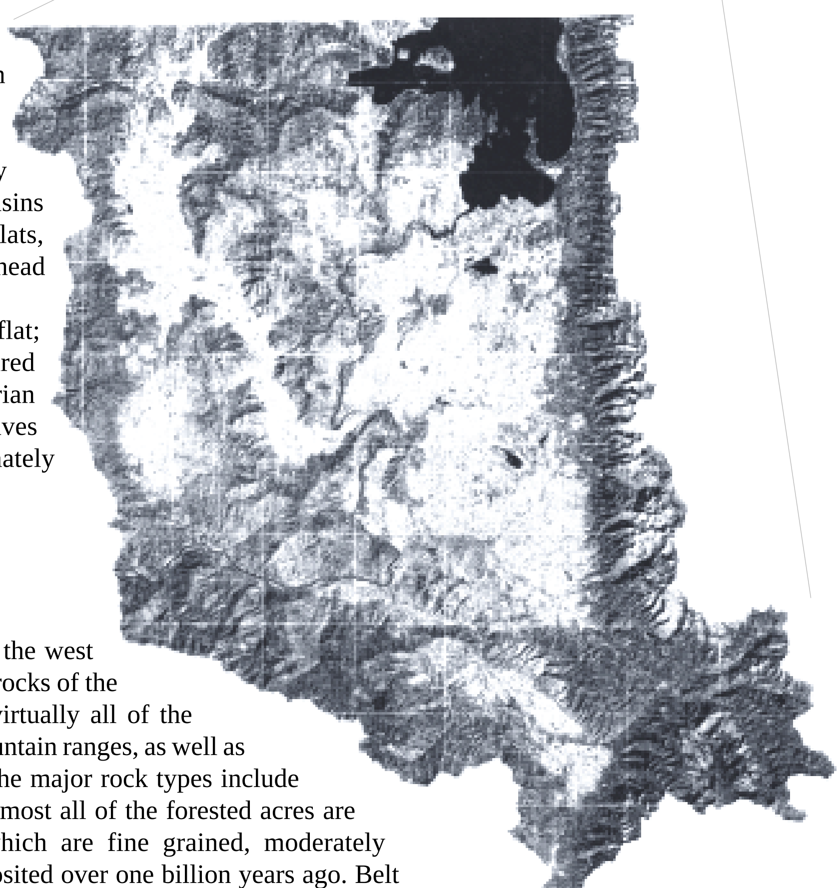
The Setting: The Flathead Indian Reservation

Home of the Flathead Nation

The Flathead Indian Reservation, which makes up the lower quarter of the Flathead River Basin, encompasses 1.3 million acres. About a third of that area, some 459,408 acres, is forested. Most of these timbered acres are on the hills and mountains along the perimeter and central portions of the Reservation and represent the bulk of the Tribal land base. Forest communities range from dry ponderosa pine and Douglas-fir types to subalpine fir and alpine larch.



The top of the Mission Range forms the eastern boundary of the Reservation. Its peaks vary in elevation from six thousand feet at their northern end to ten thousand feet at McDonald Peak in the middle of the range. The Rattlesnake Mountains, another high range, forms the southeast boundary. The Reservation Divide, which reaches eight thousand feet in elevation, defines the southwest boundary. The east edge of the Cabinet Mountains, where elevations reach seven thousand feet, forms the Reservation's western boundary. The northern boundary extends east from these mountains, across Flathead Lake, to the Mission Range. All of these ranges are, for the most part, heavily forested.

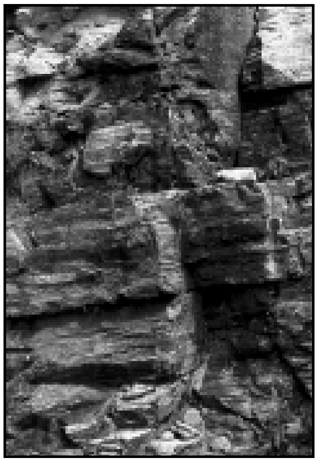


The sparsely timbered, low lying Salish Mountains stretch south from the Reservation's north boundary to the central part of the Reservation. This range separates two north-south valleys: the Mission Valley to the east, and the more arid Little Bitterroot River Valley to the west. Except for riparian zones, these areas are generally untimbered. Other principal valleys and basins include Camas Prairie, Big Draw, Irvine Flats, Sunny Slope, the Jocko Valley, and the Flathead River Valley downstream from Dixon.

These Reservation valleys are generally flat; some have low hills rising to thirty-five hundred feet. All have wetlands and wooded riparian areas. Where the Lower Flathead River leaves the Reservation, the elevation is approximately twenty-four hundred feet.

Geology

The Flathead Indian Reservation lies along the west limb of the Rocky Mountains. Precambrian rocks of the Belt Supergroup form the bedrock under virtually all of the Reservation, and they are exposed in the mountain ranges, as well as in many of the lower hills of the valleys. The major rock types include argillite, siltite, quartzite, and limestone. Almost all of the forested acres are underlain by these Precambrian rocks, which are fine grained, moderately metamorphosed sediments which were deposited over one billion years ago. Belt sediments are highly stable (they have low erosion potential) and they account for the generally high stability of the Reservation's watersheds. Igneous rocks also occur but



Top, an argillite outcropping. Argillite is one of the more common rock types underlying Reservation forests. These rocks were originally laid down as mud in a large lake or inland sea over a billion years ago. Bottom, a soil profile showing volcanic ash overlying a gravelly loam.

only in two areas: south of Hot Springs, and in the northwest corner of the Reservation. The rocks in the latter area are volcanic in origin.

Over the last 100,000 years, Reservation landscapes have been extensively modified by advances and recessions of glaciers. The most recent glacial advance, receded about 10,000 years ago and left unconsolidated surface sediments in many watersheds.

Unconsolidated glacial sediments found in forested watersheds:

1. **Fine grained sediments deposited in Glacial Lake Missoula.**

   These materials are found to an elevation of approximately 4,150 feet across the Reservation

2. **Glacial tills**

   These are clays and silts with interspersed gravels and boulders. They are found along the east and west shore of Flathead Lake and in glaciated valleys

3. **Glacial stream deposits**

   These are sands and gravels deposited by glacial streams, and are widely distributed on the east half of the Reservation.

Soils

Reservation soils formed from residual and colluvial materials eroded from Belt rocks or in materials deposited by glaciers, lakes, streams, and wind. Wind deposits include volcanic ash from Cascade Range volcanoes in Washington and Oregon.

Since the glaciers receded, geologic conditions have been relatively stable. This is suggested by the widespread distribution of 6,700-year-old Mt. Mazama volcanic ash in forested drainages, well developed soil profiles on many glacial features, stable stream channels, and stable slopes in forested watersheds. The volcanic ashes produce soils with very high soil moisture holding capacity, high fertility, low strength, and high erodibility.

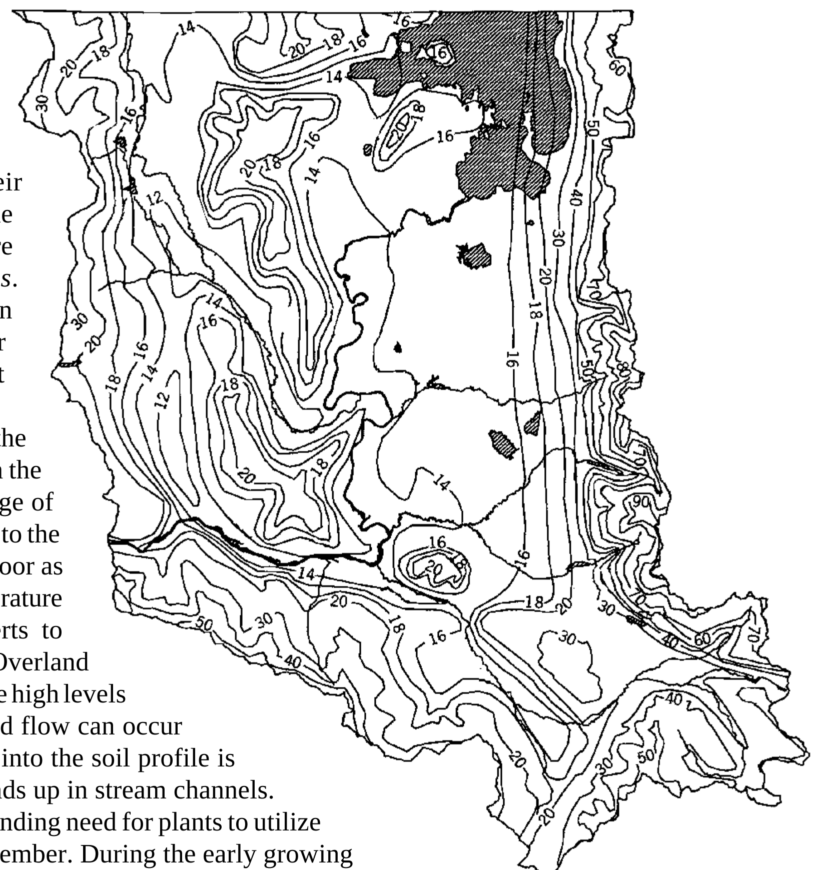
In many areas, soils formed in glacial till and are generally loamy and with moderate to high quantities of boulders, cobbles, and gravels. Mountain and foothill soils are on steep slopes and mostly well drained, with large amounts of broken rock. Rock outcrops are common. In most of the valleys, the soils are deep and gently sloping. Most forest soils on the Reservation are somewhat resistant to erosion by water. Some areas have groundwater levels near the land surface.

Climate

The western half of the Reservation, which lies in the rain shadow of the Cabinet Mountains, receives less precipitation than the east half — Camas Prairie is one of the driest areas in Montana. Mean annual precipitation in the valleys ranges from twelve inches on the west side of the Reservation to twenty inches or more on the east side.

The mountains are wetter, but the amount of moisture they receive differs greatly from east to west. Annual precipitation in the Mission Mountains, the range with the heaviest precipitation, reaches as much as one hundred inches, mostly in the form of snow. Typically the lower mountains receive twenty to thirty inches (figure 1-34).

A moist, maritime influence from the Pacific Ocean dominates the Reservation, especially during winter months when low lying clouds blanket the region. Precipitation falls on a fairly regular basis throughout the year, although May and June are about twice as wet as other months. Forested watersheds receive over half of their precipitation as winter or late spring snows, and the hydrologic budgets in Reservation watersheds are considered *snow-dominated hydrologic regimes*. Rain events, which occur with greatest frequency in the early summer and fall, add to the input of water and modify the timing and magnitude of snowmelt runoff.



Depending upon the density and structure of the forest canopy, precipitation is either intercepted in the forest canopy or lands on the ground. A percentage of the snowfall intercepted by the canopy is lost back to the atmosphere. Precipitation that falls to the forest floor as snow accumulates as winter snowpack. As air temperature increases during early spring, snowpack converts to liquid water, and saturates the forest soil profile. Overland flow is uncommon in forested watersheds due to the high levels of moisture retained in the soil (although overland flow can occur over frozen soils). Precipitation which infiltrates into the soil profile is either taken up and transpired by vegetation or ends up in stream channels.

The vegetative growing cycle, and the corresponding need for plants to utilize soil water, generally runs from May through September. During the early growing season, there is adequate moisture for plants, but as the summer season progresses soil moisture becomes limiting and most available soil moisture is consumed by vegetation. Streamflows decrease as soil moisture levels drop. The permeability and depth of the soil influence how rapidly soil moisture levels decrease. Deeper profiles usually hold higher levels of soil moisture later into the summer season.

The mean annual temperature in the valleys is approximately 45° F. Winter temperatures are fairly moderate, averaging about 27° F, thanks to the sheltering effect of the Mission Mountains and the Continental Divide. Warm, southern chinook winds occasionally moderate these systems, and cold, arctic air masses can drop temperatures to below -20° F for short periods.

A drier, continental climate dominates the Reservation in July and August. Temperatures during these months fluctuate from the high 70s to 90s in the valleys. The growing season in the valleys lasts approximately one hundred days and runs from May to September.

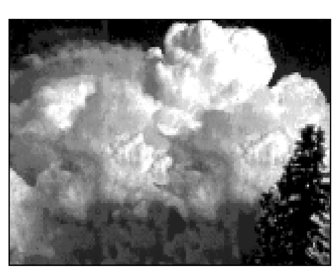


Figure 1-34. The map (above) shows mean annual precipitation in inches. Sheltered portions of the Mission Divide can receive up to 100 inches of precipitation a year. Reservation-wide, about half of the moisture falls as snow. Thunderstorms (left) are not uncommon from mid-July to September. Lightning from these storms starts most of the wildfires on the Reservation.

Vegetation: an Overview

The forests of the Reservation are typical of the northern Rocky Mountain region (figure 1-35). Ponderosa pine, Douglas-fir, western larch, lodgepole pine, grand fir, Engelmann spruce, subalpine fir, whitebark pine, and alpine larch are the most common trees. Common shrubs include snowberry, spiraea and ninebark. Wheatgrasses, fescues, pine grass, and introduced bluegrasses compose most of the grasses. River floodplains support ponderosa pine, Rocky Mountain juniper, Douglas-fir, black cottonwood, aspen, paper birch, willow, alder, dogwood, rose, and snowberry. Willows, alder, aspen, dogwood, cattails, meadow grasses, and sedges dominate wetlands.

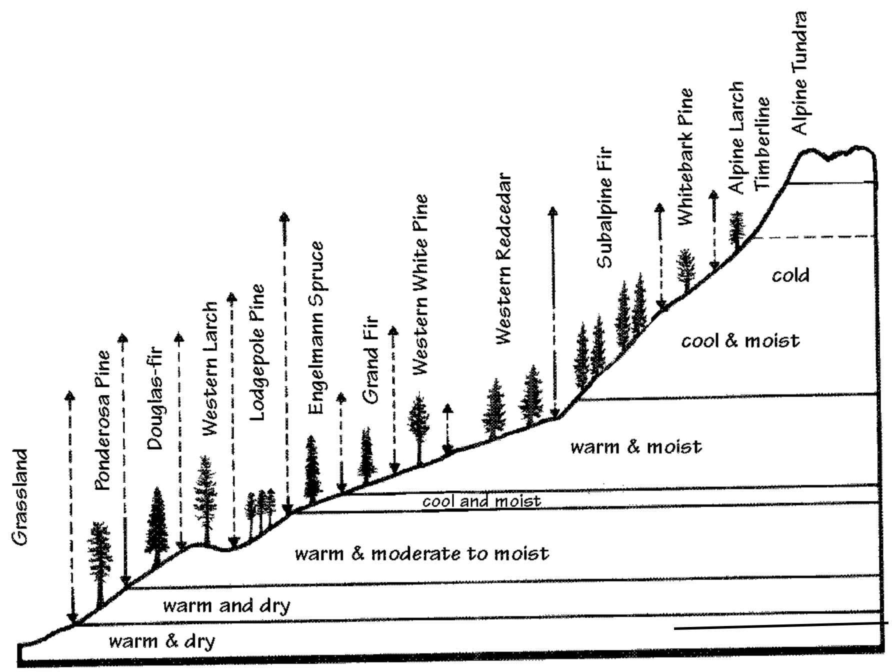


Figure 1-35. A generalized distribution of forest trees on the Reservation (after Pfister et al. 1977). The arrows show the relative elevational range of each species; the solid portion of each arrow indicates where a species is the potential climax and the dashed portion shows where it is seral.

Eighteen plant species on the Flathead Reservation have been identified as Plant Species of Special Concern by the Montana Natural Heritage Program. A few of them have been surveyed on Tribal lands and continue to be monitored. Others have not been seen in recent years, and there is a high probability that some of these have been extirpated.

Two plants are being considered for listing under the Endangered Species Act by the US Fish and Wildlife Service. They are the Spalding's campion (also known as Spalding's catchfly) and the clustered lady's-slipper, although neither occur in forests. The U.S. Fish and Wildlife Service has proposed listing Spalding's campion as threatened pursuant to the Endangered Species Act. The species is currently known from a total of 52 populations, nine of which are in western Montana. It is threatened by a variety of factors including habitat destruction and fragmentation from agricultural and urban development, grazing and trampling by domestic livestock and native herbivores, herbicide treatment, and competition from nonnative plant species. A wetland plant, water howellia, is listed as threatened by the U.S. Fish and Wildlife Service pursuant to the Endangered Species Act. It grows in glacial potholes and former river oxbows that flood in spring but usually dry out by late summer.

The Tribes

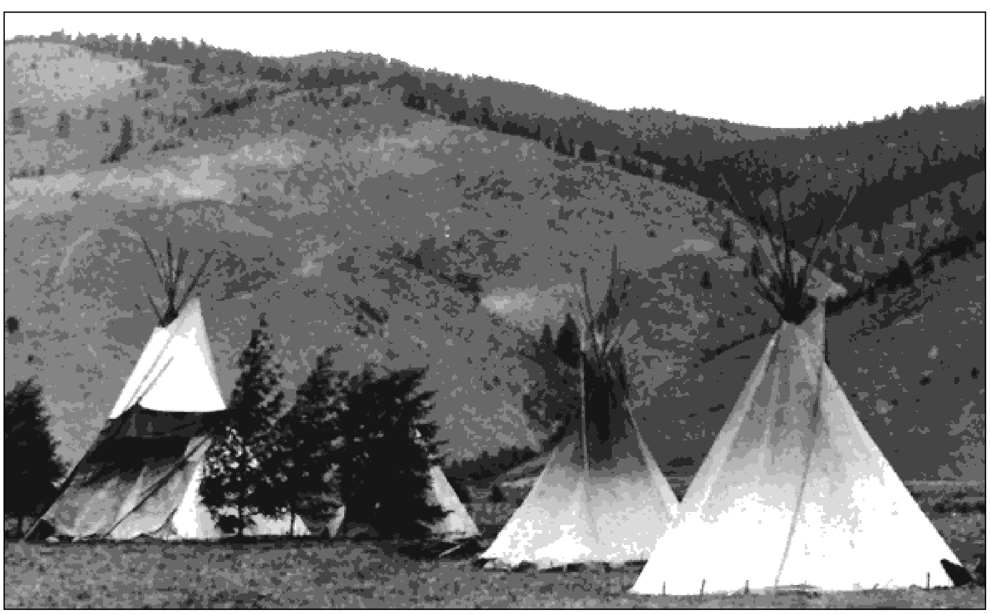
Elders of the Salish, Pend d'Oreille, and Kootenai people tell of the time when Coyote and other animal-people who prepared the world for the human beings, who were yet to come. Coyote destroyed the *Naɬisqélixʷ* — the Ones Who Ate Human Beings. As the signs of his deeds, he left behind countless landmarks, a sacred landscape that tribal people have related through traditional stories for millennia. The stories emphasize the interdependence of all living organisms and remind us that animals came first to this earth and are the cradle of our existence. The stories continue to inform our relations with the land, the plants, and the animals.

Although each of the tribes on the Reservation is culturally unique and has its own belief system, they are similar in at least two respects: each possesses a thorough knowledge of the natural environment and each has a profound respect for all of creation. Both traits enabled the Tribes to live sustainably within the forest and valleys for thousands of years.

The profound age of tribal inhabitance of the region is suggested by the numerous Tribal legends that closely parallel geological descriptions of the end of the last ice age: the draining of glacial Lake Missoula, the retreat of the glaciers, the establishment of a more temperate seasonal regime. The millennia of habitation, experience, and observation resulted in an intimate connection between people and place and a depth of understanding that is often difficult for non-Indians to appreciate.

The Salish, Pend d'Oreille, and Kootenai practiced a cyclical way of life based on the harvest and seasonal abundance of a tremendous variety of fish, game, and plants (for both food and medicinal uses, as well as material culture). This way of life was suffused with a spiritual tradition in which the people, both as individuals and collectively, respected and sought help from the animals, plants, and other elements of the natural environment. In many aspects of their mode of subsistence, our ancestors sought to conserve resources for future generations. They never wasted anything, but took only took what they needed and only harvested and hunted at the appropriate times. Their efforts were rewarded. Today's generations of Tribal members enjoy clean water and clean air and animals like wolves, grizzly bears, wolverine, lynx, cougars, and eagles — species absent from much of the rest of North America.

The Salish, Pend d'Oreille, and Kootenai harvested a tremendous variety of plants for both food and medicinal uses, as well as their material culture.



The Tribes regularly lit fires to alter both the structure and composition of the forest to improve hunting and camping and other aspects of their lives.

Hunters sought many different forest animals, but deer and elk were mainstays. The meat was then dried, as shown here, while hides were prepared for robes and buckskins.

These Tribal ways of life continue to this day. Indeed, Tribal people are today a physical manifestation of the hopes, prayers, and dreams of Tribal ancestors and elders. This is true because of the place of honor Tribal elders hold in Salish, Pend d'Oreille, and Kootenai culture and because of the knowledge that traditionally passes between the generations of the Tribes on an individual and community level. In other words, there is continuity between the beliefs and actions of the past and those of today. That continuity is reflected in the values and goals contained in this forest plan, a plan that emphasizes restoration of the forest over the economic returns it could provide. For the Salish, Pend d'Oreille, and Kootenai people, it is a matter of trading short-term economic gain for long-term cultural survival. They believe the beauty and sacredness of pure water and an uncluttered view of mountain peaks can not be measured by monetary or legal standards and is a cultural value in and of itself. It is these traditional values—in essence, viewing the land in a spiritual way—that distinguish this plan from other forest plans.

Because of this spiritual relationship, many of the ways in which the Salish, Pend d'Oreille, and Kootenai traditionally use the forest are not discussed in this plan. It is not culturally appropriate to casually or publicly discuss specific spiritual traditions and beliefs in a document such as this.

Salish

On the Flathead Reservation, the designation "Salish" refers to Salish-speaking people, including the Bitterroot Salish, the Lower Pend d'Oreille, the Upper Pend d'Oreille[1], Spokane, and Coeur d'Alene Indians who settled on the Reservation. Elders say that these and other tribes were once one Salish-speaking tribe. Thousands of years ago this ancestral tribal group divided into a number of different bands that later became tribes and occupied much of the Northwest, from Montana to the Pacific Coast. The various bands of the Salish and Pend

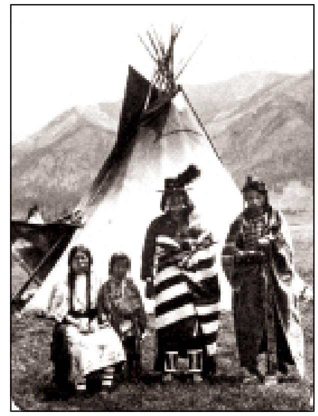
1 The Pend d'Oreille, both Upper and Lower, are also known as the Kalispel.

d'Oreille traditionally occupied a vast territory ranging from Yellowstone and the Three Forks country to the Musselshell and Sun River and throughout the valleys of what is now Western Montana — the Flathead, Clark Fork, Big Hole, and Bitterroot.

The Salish believe that Creation consists not only of humankind, but of everything in the animal world, the mineral world, and the plant world. Even the elements and the forces of nature are part of Creation. Each has a spirit that we must respect and love.

Before the time of the Reservation, the Salish tribes gained subsistence from a tribal system of hunting, fishing, and harvesting that utilized all parts of the forest. The quest for food began in the early spring when the people started harvesting plants from the forest for shelter, tools, food, medicine, and other purposes. They fished year-round in forest streams and lakes. In summer and fall, they hunted and picked berries: first strawberries and serviceberries, later huckleberries, raspberries, chokecherries, and hawthorn berries. They also harvested mushrooms, barks, and roots. They made annual trips to the tops of the mountains to gather pine nuts from whitebark pine stands. In the fall, the men concentrated more on hunting. They hunted many different forest animals, but deer and elk were mainstays. Meanwhile, the women dried the meat and prepared hides for robes and buckskins. They spent the winter months trapping and fishing. Women repaired clothing and sewed new garments from deer and elk skins. They decorated their work with porcupine quills colored with natural dyes.

The forest provided not only food, but also material for lodges, tools, clothing, and games. The Salish made lodge frames from lodgepole pine and coverings from elk and buffalo hides. They fashioned tools such as needles, mauls, and grinding stones from wood, bone, and rock.



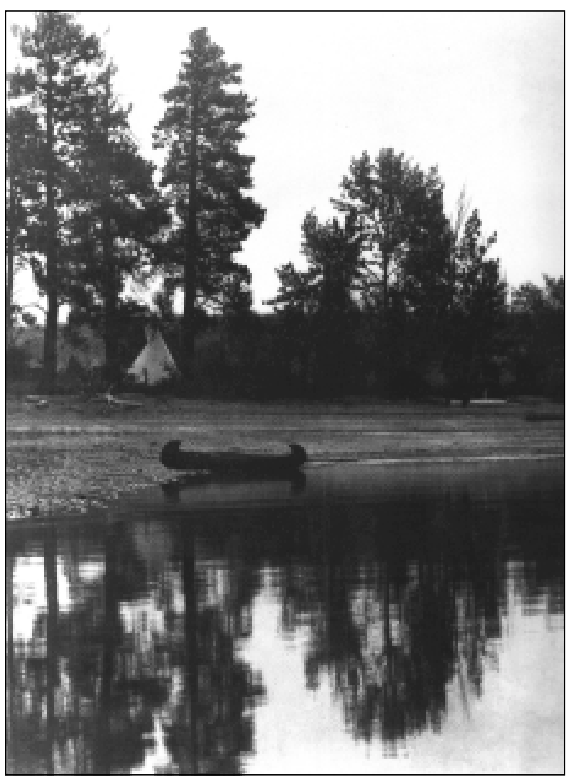
Salish bands lived in valleys throughout the Reservation and made extensive use of woodlands and forests. They also lit fires regularly to alter both the structure and composition of the forest to improve hunting and camping and other aspects of their lives.

Kootenai

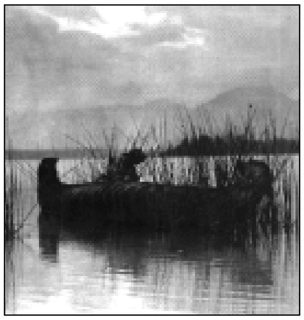
Before contact with non-Indians, the Kootenai Nation numbered over ten thousand and inhabited what is now eastern British Columbia, the southern half of Alberta, northern Idaho, eastern Washington and Montana. The Kootenai band that now lives in the Dayton area called itself the “Fish Trap People,” a name that comes from their practice of setting traps in the creeks during large fish runs.

The Kootenai moved seasonally over a large territory. The seasonal round started in the early spring when they travelled to their fishing grounds to catch bull trout and cutthroat trout, salmon, sturgeon, and whitefish. They also set traps and weirs in streams.

In early May, as the fishing season came to a close, the root harvest began. From mid to late summer the Kootenai harvested serviceberries, chokecherries, huckleberries, and other fruits. When



Ponderosa pine woodlands and parklands near streams and lakes in the valley bottoms often served as important camping areas for the Kootenai.



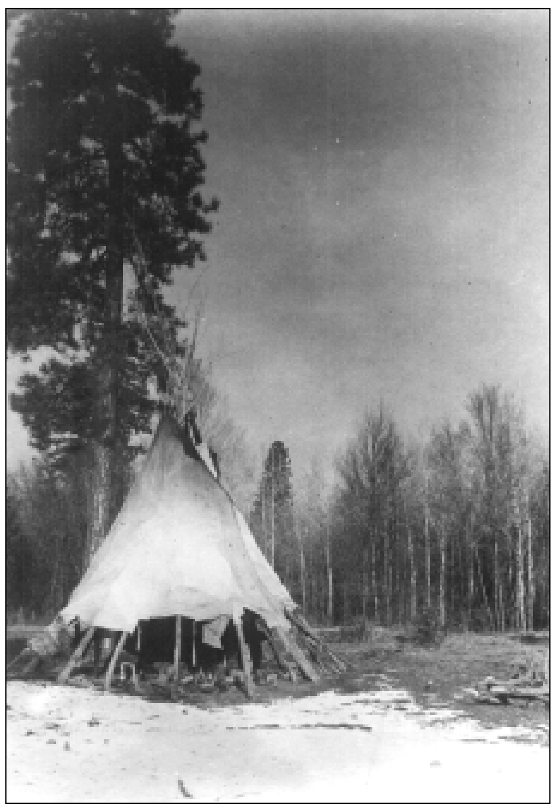
The Kootenai band that lived in the Dayton area lived in woodlands and forests. They managed forest vegetation with fire as did the Salish.

fall approached they organized communal deer drives, caching surplus meat for winter. Deer were the most accessible and abundant of the game animals, and deer meat was one of the most essential foods, but the Kootenai also hunted elk, moose, caribou, buffalo, mountain sheep, bear, and birds such as grouse, geese, and ducks.

The Kootenai lived in skin and mat-covered tepees (the latter woven from tulle and dogbane) and used canoes to transport family and gear, and to fish.

In the words of Naida Lefthand: “It is important that we, as Tribes, preserve the lands of our Reservation and monitor the activities on all of our aboriginal territories.

“The land, Mother Earth, is what provides the food for Indian people. The pure water and air of these lands support the people and the fish and wildlife. Clean water and air is also important to the growth of plants, the roots and berries of which are used by many of the Indian people. Religiously significant areas must be preserved for present-day religious practices.”



Chapter 2: The Resources – Their Status, Use, and Management

Forest-wide Resource Descriptions

In this section, we describe the use and management of resources on a *forest-wide* scale. We also outline *forest-wide* policies, objectives, and management strategies.

Topics included in this section

1. **Disturbance and Vegetation**
2. **Wildlife and Diversity**
3. **Water and Fisheries**
4. **Culture**
5. **Scenery and Recreation**
6. **Transportation**
7. **Air Quality**
8. **Grazing**
9. **Minerals**

Pygmy Nuthatch
(in feeding position)

Each resource description includes: (a) a narrative of the pre-European condition (when applicable), (b) the existing condition, and (c) objectives and management strategies (figure 2-1).

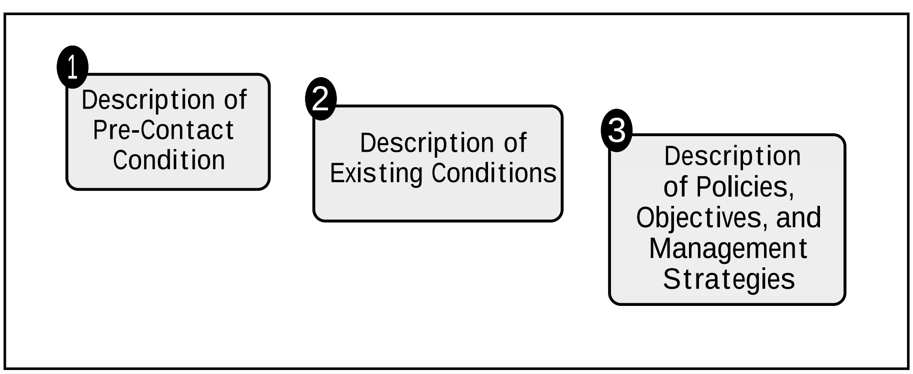
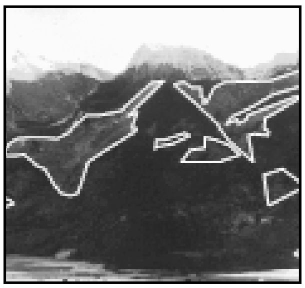


Figure 2-1. Resource descriptions are divided into three parts (except where pre-European descriptions are not applicable, such as with weeds or minerals).

Disturbances and Vegetation

Disturbance: Natural and Human

Events that are described as *disturbances* generally cause significant change in a forest, usually altering the way it functions (a recent burn, for instance, has a different role than an old growth forest). Disturbances need not be a single large event however. Many small disturbances can add up to cause a significant change in a forest. Disturbances can also be natural or human caused. Natural disturbances include events like fire, insects and disease outbreaks, floods, drought, windthrow, and storm damage. Human-caused disturbances include timber harvesting, heavy grazing, the introduction of exotic species such as weeds, and so on. The consequences of human disturbances can be similar to those caused by natural forces or they can be of another magnitude, altering ecosystems in ways natural disturbances seldom did.

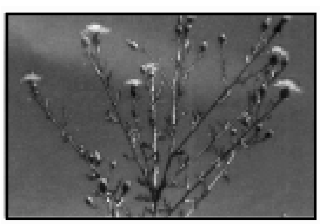


Natural disturbances have always played a major role in shaping the structure and composition of our forests. They were responsible for the overall pattern of vegetation. When this photo of the Missions was taken earlier in this century, the pattern created by natural fires was still evident; openings created by fire are marked.

A good example is weeds. Noxious plants are thoroughly established in many forested areas of the Reservation. Their spread has reduced important wildlife habitat as well as land productivity. Spotted knapweed is the predominant noxious plant, and it occurs on about 85 percent of the weed-infested acres. Other noxious plants that occupy extensive acreages include sulfur cinquifoil, Dalmatian toadflax, leafy spurge, St. Johnswort and whitetop. Smaller, but significant, infestations of thistle, hounds's tongue, yellow toadflax, and Russian and diffuse knapweeds are also present. Purple loosestrife has recently become established and is a serious invader of wetlands.

In the past, the Tribes have adopted a tiered method to address noxious weeds on Tribal lands. They utilize approaches that include species-specific objectives, control objectives based on site or location of infestations, special management areas (such as the Tribal Wilderness and Wilderness Buffer Zone) which require modification of general treatment techniques and policies, and planning units based on watershed or political boundaries. Treatment methods include prevention, manual control, mechanical control, biological controls, and chemical controls.

While dozens of species of exotic plants or weeds have invaded Reservation wildlands, a handful pose serious threats to wildlands, among them spotted knapweed, leafy spurge, and Canada thistle.



Spotted Knapweed

Leafy Spurge

Canada Thistle

Weeds are an enormous disturbance factor today. During pre-European times, however, fire was the most frequent disturbance, second only to climate in the influence it exerted over the mosaic, structure, and composition of our forests. And while the affects of weeds are mostly negative from a biological perspective, fires, which were both natural and human-caused, were usually beneficial. While fire can no longer play the role it once did, silvicultural activities combined with prescribed fire can be designed to mimic natural fires. Timber sales differ from burns in many ways, but logging remains one of the most powerful tools we have to renew forests where large-scale fires are no longer an option. Of course, natural wildfire as a disturbance will always be with us, regardless of how good our suppression efforts are. A brief summary of pre-European Tribal burning practices follows.

Fire Management in Pre-European Times

To learn about Indian burning practices, fire ecologist Steve Barrett interviewed 31 Tribal elders and 27 non-Indian "pioneer" settlers in the late 1970s. Testimony from these individuals and other research Barrett conducted indicated that the Salish, Kootenai, and Pend d'Oreille used fire extensively, especially in low-elevation forests. Fire history studies and early accounts and photos show that these stands were generally open and parklike, presumably from the frequent occurrence of low-intensity fires that burned over large areas and reduced fuels and understory vegetation. Other research conducted in the area suggests this type of Indian burning has gone on for over 7,000 years.

Further evidence of frequent fires comes from the daily journal accounts of Jesuits living in the Mission Valley. The fathers who were here during the latter part of the last century, make frequent mention of fires and remark almost daily in August and September about the extremely smoky conditions in the valley. Theodore Shoemaker who worked for the US Forest Service in the early 1900s wrote that "Prior to 1897, and even later in many sections, fires burned continuously from spring until fall without the slightest attempt being made to extinguish them." While not all of these fires were Indian set, research by Barrett and others suggests that Salish and Kootenai people were responsible for as many as half of them in frequently used valley areas and low-elevation forests. In other words, they doubled the frequency of lightning caused fires (figure 2-2). Indians cited dozens of reasons for setting fires: the main ones identified by Barrett and others include:

"There is no question that enormous areas of the forests and grasslands we inherited were very much cultural landscapes, shaped profoundly by human action… The wildlife communities that characterized these cultural landscapes… were in large measure products of thousands of years of human intervention. And it will take continued human intervention to maintain them."

— Doug MacCleary, Landscape Architect, 1995

The reasons for setting fires

1. **To maintain open stands to facilitate travel and clear routes through dense timber.**

2. **To improve hunting by stimulating the growth of desirable grasses and shrubs, to facilitate stalking, and to drive or surround game.**

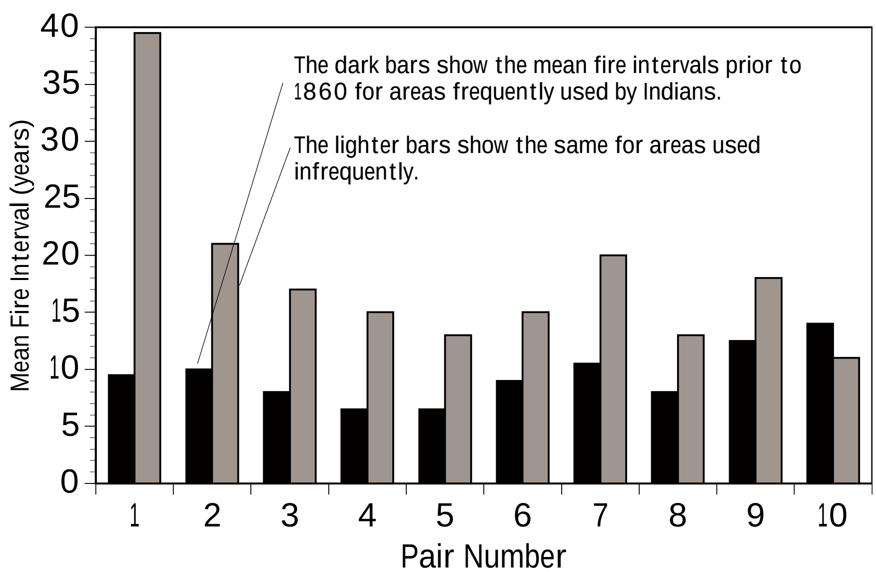


Figure 2-2. Barrett sampled ten pairs of old-growth stands. One member of each was on slopes above a large valley and was thought to be within a major travel and occupation zone. The other was on a similar site but in a remote area not used extensively by Indians for camping or travel. The results, right, show that before 1860 frequently used stands had a mean fire interval (average interval between fires) of 9.1 years; remote sites had an interval of 18.2 years.

3. **To enhance the production of certain foods and medicine plants.**

“This knowledge (about Indian burning) can help us understand why and how our forests have changed.”
— Doug MacCleary, Landscape Architect, 1995

4. **To improve horse grazing (after the 1700).**

5. **To clear campsite areas thereby reducing fire hazard and camouflage for enemies, and cleaning up refuse.**

6. **To communicate by setting large fires.**

7. **To reduce insect pests.**

Traditional Tribal burning continued until local non-Indian authorities put an end to it around the turn of the century.

Frequent, low-intensity fires lit by Indians kept the forest open. The practice explains why so many journal accounts of European settlers talk about people being able to ride horses or drive wagons through the forest — something that would be impossible today in most of those same areas.

The Reservation's Fire Regimes

The term fire regime refers to the kind of fire that typically occurs in an area and the effects that that particular type of burning has on the vegetation. Fire regimes are described by fire frequency (how often fires occur), fire intensity (whether the fires that burn are mostly surface fires that burn ground vegetation or crown fires that burn ground vegetation as well as in the canopy), and the pattern of vegetation that the fires create. We have identified four fire regimes on the Reservation, which are shown in figure 2-3 as they occur on the face of the Mission Range. Fire Regime A is the Nonlethal Fire Regime, Fire Regime B the Mixed Fire Regime, Fire Regime C the Lethal Fire Regime, and Fire Regime D the Timberline Fire Regime.

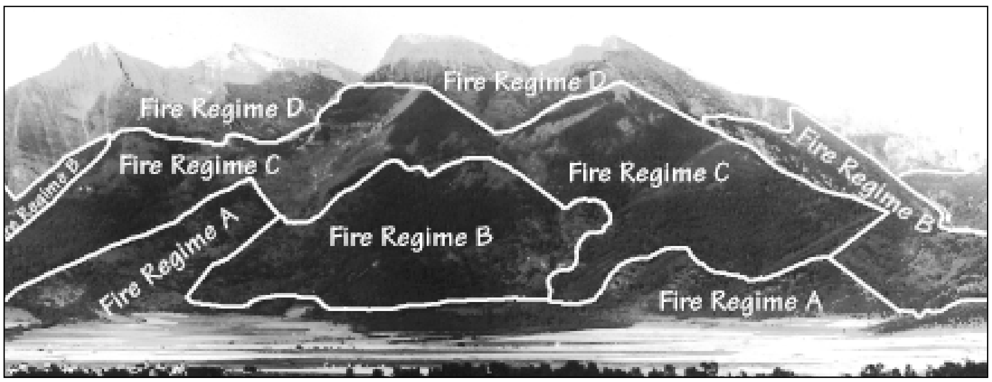


Figure 2-3. The Reservation's four main fire regimes as they occur on the Mission face. They include: Fire Regime A, the Nonlethal FR; Fire Regime B, the Mixed FR; Fire Regime C, the Lethal FR; and Fire Regime D, the Timberline FR.

On the pages that follow we describe the Reservation's four main fire regimes and the vegetation patterns that existed in each during pre-European times. We also describe the vegetative changes that have taken place in each regime over the last 50 to 100 years. These descriptions of past and present conditions are followed by the forest-wide policies and objectives for fire management. Detailed fire regime maps for each landscape are presented in Chapter 3. Table 2-1 shows the acres within each fire regime (with encroached acres separated out from the rest of the Nonlethal Fire Regime) by availability class.

Fire Regime	Available Acres	Restricted Acres	Unavailable Acres	Total
Nonlethal Fire Regime	35,583	3,625	5,505	44,713
Encroached Timber	13,772	725	2,790	17,287
Encroached Woodland/Sod	16,017	818	1,715	18,550
Encroached Woodland/Parks	3,889	329	101	4,319
Non-lethal Fire Regime with Encroached Acres	70,034	5,497	10,111	89,961
Mixed Fire Regime	77,185	15,637	29,849	122,671
Lethal Fire Regime	86,034	33,413	79,264	198,711
Timberline Fire Regime	3,535	2,463	47,161	53,159
Total	236,013	57,011	166,384	512,567

Table 2-1. The acres within each fire regime by availability class.

The Nonlethal Fire Regime

“Travelers often rode horseback or pulled wagons for miles through these areas without having to cut trails.”

— Steve Arno, Forest Ecologist, 1994

Summary

The Nonlethal Fire Regime occurs at low to mid elevations on mild slopes and dry southeast to west aspects. The fires that occurred within this regime generally did not kill mature trees. They were brief, low intensity fires that burned mostly grass and litter on the forest floor. They occurred frequently, sweeping through stands every five to thirty years (figure 2-4), and many were started by Indian people. They created a forest of large, old, mostly ponderosa pine trees — many individual trees were from 200 to 600 years old. These stands were open and parklike with few shrubs, understory trees, or downed logs. In most, the duff layer rarely exceeded three inches.

Stands tended to be uneven-aged although the pattern was dominated by small clumps of even-aged trees. Stands were also intermixed with fire-maintained grasslands and ponderosa pine woodlands. Occasionally bark beetles killed patches of trees and allowed a new age class to develop. Examples of the Nonleathal Fire Regime can be seen in Dry Fork, Jette, Stevens, Seepay, and along the base of the Mission Range (figure 2-5).

Changes since 1900

Fires have been all but completely excluded within this fire regime. Stands have become overgrown with dense Douglas-fir and ponderosa pine understories (commonly 200 to 2,000 small trees per acre beneath old-growth stands and between 2,000-10,000 trees per acre where pine overstories have been removed). Duff mounds of 6 - 24 inches are not uncommon. When duff piles like these burn, they girdle and kill even big trees. Because of the ladder fuels (fuels that reach from the forest floor into the canopy), fires in this zone now burn as partial stand-replacement or stand-replacement fires.

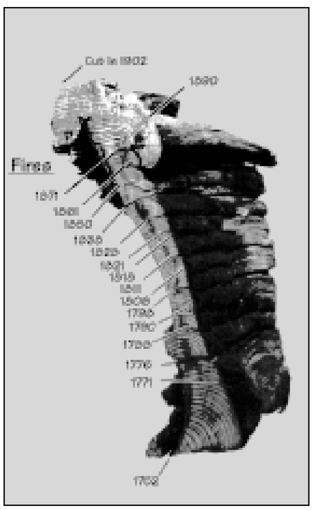


Figure 2-4 (above). A cross-section from a ponderosa pine stump reveals old fire scars that show an average fire frequency of one fire every 8.5 years.

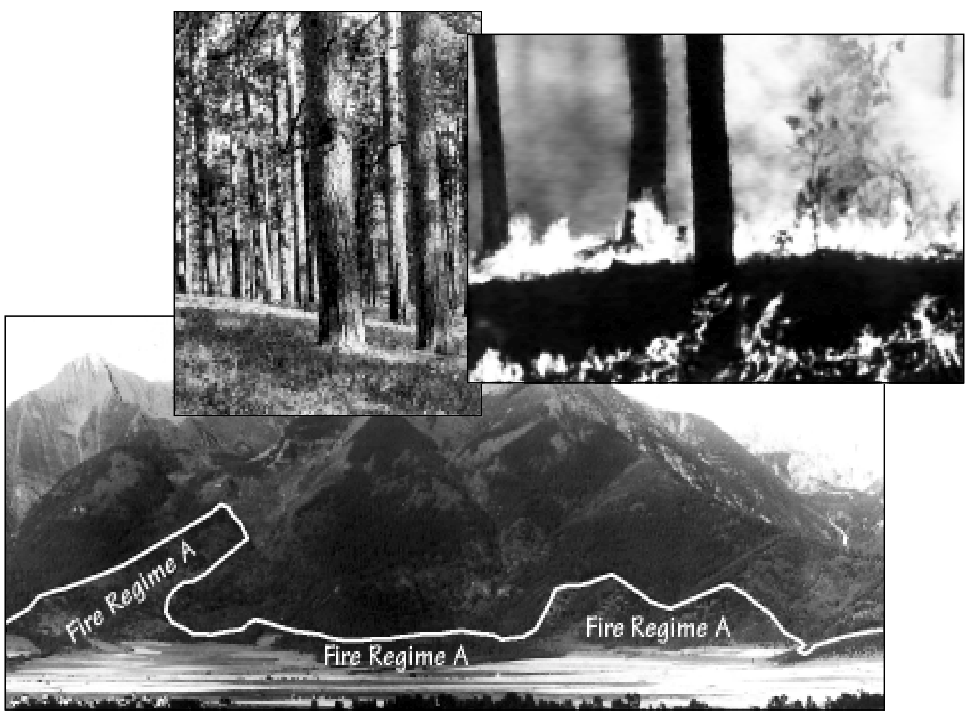


Figure 2-5 (right). The large photo shows where the Nonlethal Fire Regime (Fire Regime A) occurred within the Missions. The far right inset shows typical nonlethal fire behavior. The left inset shows the kind of stand structure that frequent, low-intensity fires created.

A Closer Look at the Nonlethal Regime

The Vegetation

This regime is characterized by low-elevation seral and climax ponderosa pine and dry Douglas-fir types. Sites are typically on hot and dry, south to west-facing slopes or cool and dry upland ridges at low elevations.

Prior to 1900, low-intensity surface fires occurred frequently, returning at intervals of from 5 to 30 years in most areas. The majority of overstory trees survived the fires, while many of the understory seedling and sapling-sized trees were killed. Consequently, these sites were generally maintained in a late seral, parklike condition where large trees dominated (figure 2-6). Shrubs, understory trees, and downed logs were sparse, as testified to by dozens of historical photos and narrative accounts. Undergrowth was composed primarily of fire-dependent grasses and forbs which resprouted quickly after each burn. The most fire-resistant species — ponderosa pine and western larch — were favored. Pine regeneration occurred whenever overstory trees died, thereby creating small openings. Trees were often distributed in small even-aged clumps. Old pines and scattered Douglas-fir often had scars from numerous fires dating back to the early 1600s. In addition to these parklike stands, woodland structures made up a significant portion of the Nonlethal Fire Regime, and they still do. Woodlands are characterized by widely scattered large ponderosa pine trees on very harsh sites. Bunchgrass and seral shrubs make up the understory.

Figure 2-6. These sites were generally maintained in a parklike condition where large trees dominated.

The Fires

Recurrent lightning and native-set fires were usually nonlethal ground fires (underburns) with moderate to high spread rates (figure 2-7). They burned throughout the summer and early fall over a long season of favorable burning weather. They may have been quite large, especially where dry forests and adjacent grasslands were extensive. However, in rugged mountainous topography, these fires were confined to smaller areas, mostly dry sites on south-facing slopes.

Stand replacement fires in this regime were rare, at intervals of several hundred years, but did occur under extreme fire weather conditions and when longer than normal fire-return intervals allowed litter and understory fuels to build.

Figure 2-7. In rugged mountainous topography, nonlethal fires were confined to small areas, mostly dry sites on south-facing slopes.

The Changes

Important changes have occurred in these forests since 1900 due to the interruption of frequent burning. Reduced fire occurrence began in the late 1800s as a result of the relocation of Indians; fuel removal by heavy grazing of livestock; the disruption of fuel continuity on the landscape due to logging, cultivation and development; and the adoption of a full fire suppression policy. Successful suppression of surface fires in open, fire-maintained stands over the last several decades has increased the potential for catastrophic fires.

Many stands have an altered stand structure and composition, and a build up of understory fuels, so much so that it would be difficult — if not impossible — to restore forest health with prescribed fire alone.

The down-dead fuel loading in these cover types usually average 10-15 tons per acre, but tends to increase with stand age as a result of increased needle cast and duff, accumulated downfall from insect and disease damage, blowdown, and natural thinning. Overstory trees have been removed over more than a century of logging, and this has aided the development of thickets of small trees. On sites where ponderosa pine is seral, there has been a shift to shade-tolerant species, like Douglas-fir. These successional changes have resulted in a build up of understory or ladder fuels that now allow wildfires to escalate into stand-replacing crown fires.

Today, prescribed fire is the obvious and most feasible substitute for filling the ecological role of historic fires (figure 2-8). However, many stands now have an altered structure and composition and a buildup of understory fuels that makes it difficult if not impossible to restore forest health with prescribed fire alone.

Figure 2-8. Today, prescribed fire is the obvious and most feasible substitute for filling the ecological role of nonlethal wildfires.

The Mixed Fire Regime

Summary

This fire regime was characterized by a combination of nonlethal and stand-replacing fires. Fire frequency varied from 30 to 100 years, and individual fires could be either large or small in size. Most burned over relatively long periods. Two patterns were typical. In the first, a stand might experience nonlethal fires every 30 to 40 years and a stand-replacing fire every 150 to 400 years. In the second, fires killed fire-susceptible species growing in the overstory (such as subalpine fir), but left fire-resistant trees (like big larch, Douglas-fir, and ponderosa pine).

The Mixed Fire Regime created many small stands dominated by various age structures and was therefore rich in its diversity (figure 2-9). Stands with open overstories of mature Douglas-fir and larch were common, although there were also closed, young stands. The general pattern could be described as a patchy mosaic. The regime occurs on low to mid elevations on all slopes and all aspects. Examples can be found in the Garceau, Hellroaring, LaMoose areas and across the Mission face (figure 2-10).

"Fires in the Mixed Regime create lots of patches, each with a different susceptibility to insects, diseases, and fire. It's a bit like the farmer who grows several different crops. If something goes wrong with one, he's still in business."
— Forest Plan ID Team member, 1995

Changes Since 1900.

Fire exclusion policies have allowed trees to become older and more dense in this regime. There has also been a significant buildup of down woody material and ladder fuels. Recent wildfires have burned as large, stand-replacement fires creating fewer and larger patches.

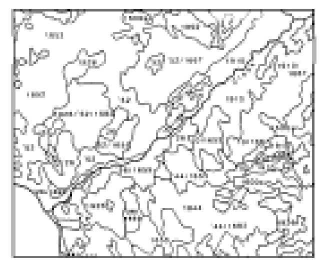


Figure 2-9 (above). The mosaic above is typical of that found in a Mixed Fire Regime. The numbers represent the year(s) an individual stand was established; the data is from the North Fork of the Flathead (Barrett et al. 1991).

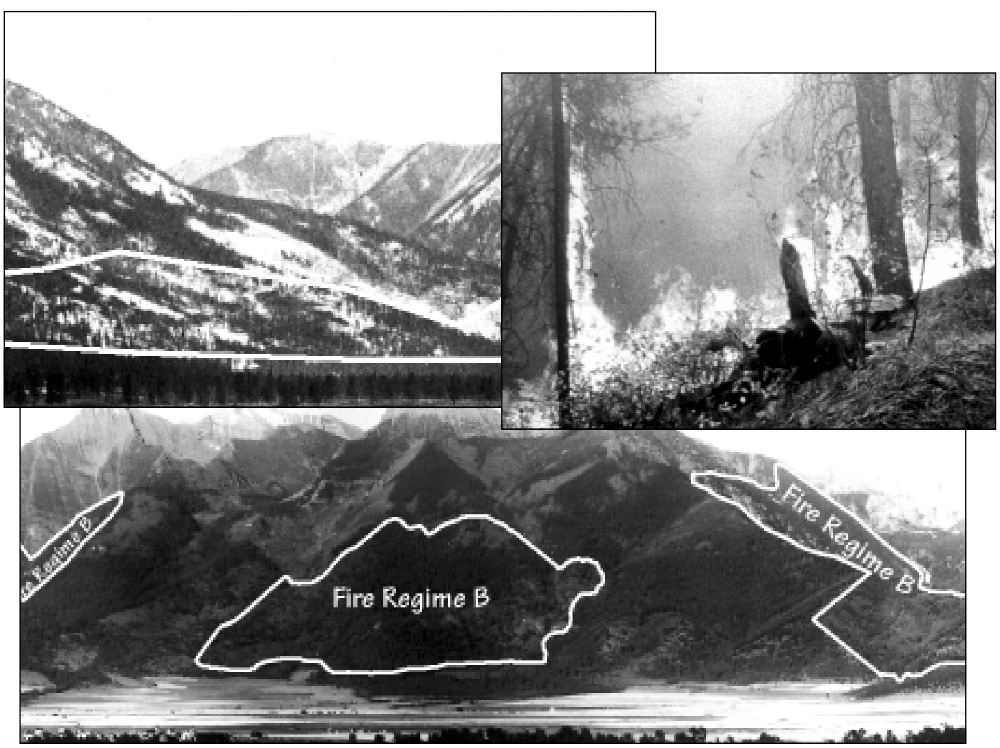


Figure 2-10 (left). The lower photo shows where the Mixed Regime (Fire Regime B) occurred within the Missions landscape. The delineated area within the top left inset shows a typical Mixed Fire Regime mosaic on the Reservation. The right inset shows one kind of fire behavior that occurs within the regime.

Figure 2-11. Stand- and partial stand-replacing fires typically swept through this zone about every 100 to 200 years.

A Closer Look: The Mixed Fire Regime

The Vegetation

This regime is characterized by moist Douglas-fir stands and occurs on most aspects in the 3,000 to 6,500 foot elevation range. Douglas-fir is both the indicated climax species and a vigorous member of seral communities. It is not uncommon for Douglas-fir to dominate all stages of succession on these sites.

Fires maintained a diverse pattern of forest vegetation of varying ages, compositions, and health that was shaped by fuels, topography, and climate. Stand- and partial stand-replacing fires typically swept through this zone about every 100 to 200 years, but lower intensity blazes that created small openings of burned understory vegetation and that killed only a few trees occurred as often as every 20 to 30 years (figure 2-11).

The fires generally killed overstory trees in an irregular pattern as a result of lethal heating at the ground level or fire moving into the crowns of individual trees. The result was a mosaic pattern of various shaped patches of live, mixed-seral forest, and openings occupied by dead trees or even-aged regeneration. Lightning and native-set fires most likely spread over periods of weeks or months in these mixed conifer forests, so burns often covered large areas. Patches were fine grained and had curved edges and a high degree of internal structural diversity (snags, islands of residual trees, etc.).

The uneven burning pattern in the Mixed Fire Regime was probably enhanced by the pattern from previous burns and complex mountain topography.

The Fires

Fire severity in this regime was variable; anywhere from 10 percent to 90 percent of the trees within a stand could have been killed, depending on the type of fire (figure 2-12). Three types of fires were at work: nonlethal underburns like those that dominated the Nonlethal Fire Regime; stand-replacing fires identical to those of the Lethal Fire Regime; and fires that were a hybrid of these two types (figure 2-13). How a fire behaved depended on slope, aspect, fuel conditions, and both short and long-term climatic cycles. Steep, northerly slopes probably showed the greatest tendency toward stand-replacement behavior, while gentle, south-facing slopes tended to have more nonlethal fires. The remaining sites, steep south slopes and gentle north slopes, probably experienced a blend of the two behaviors.

Figure 2-12. As the name suggests, fire behavior in the Mixed Fire Regime is variable and includes both nonlethal and lethal fires.

The Changes

Stands within this fire regime have undergone significant changes in recent decades. As a result of fire exclusion, the trees have become older, and often have a build up of down woody or ladder fuels. Fuel loadings average 10 to 12 tons per acre but can range as high as 75 tons per acre (downed dead fuels tend to accumulate over time in these stands). The most hazardous conditions occur in well-stocked stands with dense, Douglas-fir understories.

Fire's role as a stand-replacement agent becomes more pronounced with fire exclusion, unless corresponding fuel reduction activities occur. Recent wildfires have burned as large stand-replacement fires. Continued fire exclusion will move these communities even further toward a long-interval, Lethal Fire Regime which will decrease vegetation diversity and reduce values for wildlife habitat, watershed protection, and esthetics.

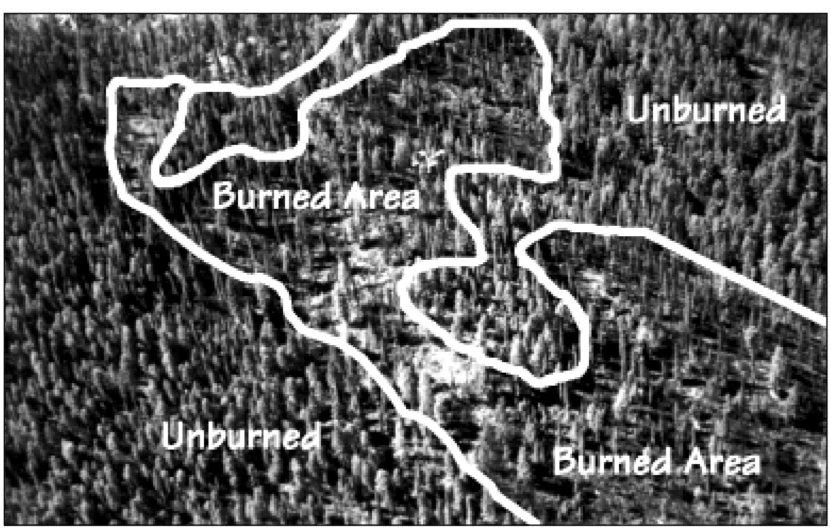


Figure 2-13. A typical pattern produced by a fire in the Mixed Fire Regime. Burned areas can be relatively small with patches of live trees. This mosaic—areas with lots of edge and many small patches is valuable habitat for many wildlife species, especially birds.

The Lethal Fire Regime

Summary

"Although some might argue that wildfires can be suppressed indefinitely with modern fire-fighting technology, a dispassionate view of the fire record in these forests shows that we are only postponing the inevitable… This situation is like holding water behind a leaky dam. We can either draw the water down gradually, or we can wait for the dam to break."
— Monnig and Byler, Forest Ecologists, 1992

Stand-replacing fires killed most if not all the trees where they occurred, although the size and intensity of the fire varied with topography, fuels, and burning conditions. Some fires consumed thousands of acres in a uniform way, others created a complicated mosaic that consisted of stand replacing burning mixed with patches of unburned or lightly burned timber. Stand replacement intervals are generally long — from 70 to 500 years — and probably varied with climatic cycles.

Stands occur on steep, mid- to high-elevation slopes and were composed of grand fir, Douglas-fir, lodgepole pine, western redcedar, subalpine fir, and spruce. They were dense and typically contained substantial amounts of downed woody material and ladder fuels. The size of fires varied. Large fires occurred on more gentle slopes and plateaus while smaller fires burned in rugged mountain terrain where slopes and aspects created a variety of vegetative conditions. Where fires occurred relatively frequently, they created numerous open areas dominated by seral shrub species which provided forage for wildlife. Examples of the Lethal Fire Regime can be seen at Dog Lake, Boulder, the South Fork of the Jocko, and midway up Revais Creek and the Mission face (figure 2-14).

Changes since 1900.

Because of the low frequencies of fire within this regime, this zone has been altered less by fire exclusion policies than other fire regimes. However, our policy of keeping fires at bay has decreased the number of large openings, increased the age of trees, and allowed stands to become denser and more susceptible to insect and disease epidemics and unusually large stand-replacement fires.

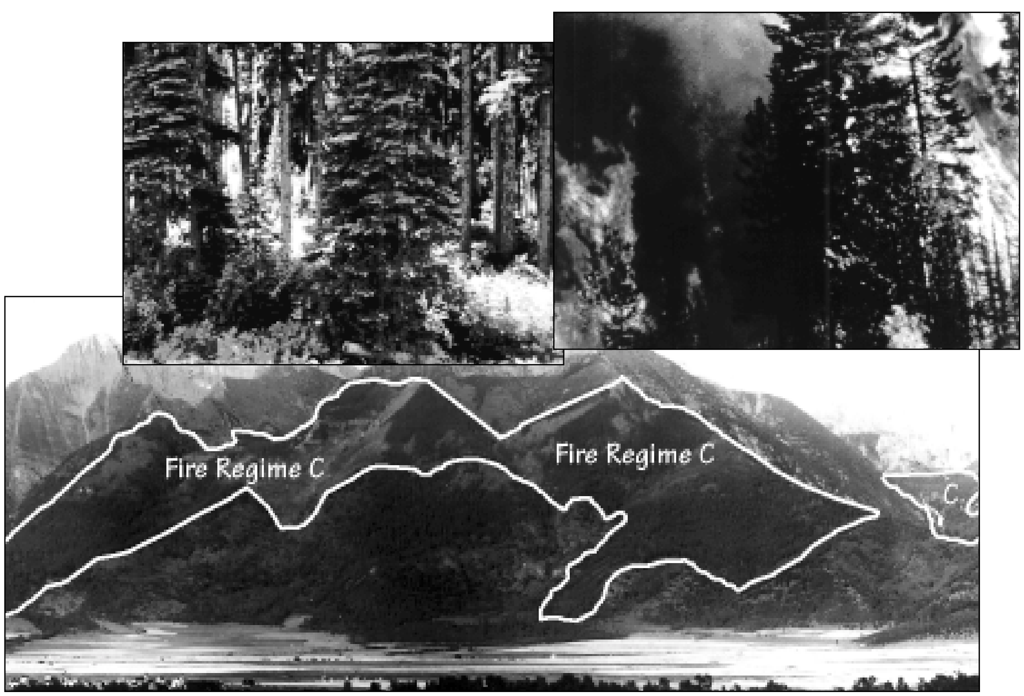


Figure 2-14. The large photo shows where the Lethal Fire Regime (Fire Regime C) occurred within the Missions landscape. The inset (top left) shows the ladder fuels that give rise to the all-consuming fires that characterize this zone. The right inset shows a stand-replacing blaze.

Figure 2-15. Fire return intervals ranged from about 70 years in lower-elevation lodgepole pine forests to 300-500 years in upper-elevation subalpine types.

A Closer Look at the Lethal Fire Regime

The Vegetation

At lower to mid elevations this regime was characterized by grand fir/western redcedar and Douglas-fir/larch types. At upper elevations subalpine fir, spruce, and whitebark pine types dominated.

The warm, moist grand fir and western redcedar habitat types occurred in valley bottoms, riparian areas, benches, and protected exposures (many tree species can occupy these sites, but grand fir and western redcedar are commonly the climax species). Elsewhere at these elevations, western larch, Engelmann spruce, lodgepole pine, and Douglas-fir were a major component of seral stands (figure 2-15). Subalpine fir, lodgepole pine, and whitebark pine occurred at mid to upper elevations, the latter on cold, wetter sites. Undergrowth is characterized by a rich variety of moisture-loving herbs and shrubs.

Though fires killed trees over large areas (from 25 to 500 acres in fir types and from 100 to 10,000 acres in lodgepole stands), relatively small, partially burned or unburned areas were produced by rugged mountainous topography that contained contrasting site types, microclimates, and vegetation. Patches of surviving trees were generally limited to moist, protected areas, or places where fuels were lighter and more discontinuous.

The Fires

Fire return intervals ranged from about 70 years in lower-elevation lodgepole pine forests to more than 400 years in upper-elevation subalpine types. The range is broad because the fires themselves depended on a combination of chance factors such as drought, lightning, and wind. In a stand-replacing fire, over 90 percent of the trees in a stand are generally killed.

Figure 2-16. Fire return intervals ranged from about 70 years in lower-elevation lodgepole pine forests to 400 years in upper-elevation subalpine types.

Fuels, stand structure, species composition, and forest health play a critical role in the behavior of fire in this regime. Predominant climax tree species, extensive ladder fuels, dense canopies, and high levels of downed/dead fuels (from stand age, insect epidemics, root rots, blow-down, or previous fires) is required to allow a fire to sustain itself and spread with torching or to change into a running crown fire.

Fuels are typically greater than 25 tons per acre and result from accumulated deadfall and natural thinning (2-17). Soils and fuels are moist or wet much of the year. The typically high humidity of these moist sites usually mitigates the fire hazard under normal weather conditions.

A combination of deep duff and large amounts of dead, rotten fuel can result in severe surface fires during unusually dry moisture conditions (figure 2-16). Where dense understories exist, fires easily spread to the tree crowns and destroy the stand.

The Changes

Because of the low frequency of fire, this regime probably shows the influence of fire exclusion policies less than the Nonlethal or Mixed Regimes. Nevertheless, fire history studies suggest that fire suppression has allowed large areas to develop into denser stands with higher susceptibility to insect and disease epidemics and even larger stand-replacement fires. At the same time, lodgepole pine and other seral plants are being replaced by thickets of shade-tolerant species.

Figure 2-17. Fuel loadings in this fire regime can be dramatic. Fires that burn through these materials during dry seasons can damage soils. Regeneration suffers as a result.

The Timberline Fire Regime

Summary

This fire regime is similar in nature to the Mixed Fire Regime found at mid to low elevations except that it is found at the highest elevations on the Reservation, in whitebark pine habitat types (the regime also occurs slightly lower in some lodgepole types). It experienced both infrequent nonlethal underburns and rare, large, stand-replacement fires. It generally occurs where terrain is rocky and rugged and where dry south and west-facing slopes are bordered by cool and moist north slopes, so fires generally had a patchy pattern. Fire frequencies varied from 30 to 500 years.

Mountain pine beetle epidemics periodically killed older whitebark pine trees, and those dead trees and ladder fuels from young subalpine fir and Engelmann spruce trees increased the number and size of fires in the regime. Examples can be found on Moss Peak and the upper portions of Agency Creek, the Mission Range, and the Ninemile Divide (figure 2-18).

The loss of whitebark pine is particularly unfortunate here on the Reservation because at one time whitebark pine nuts were used extensively by the Tribes. The nuts were also important to wildlife. They were a primary food for over forty species, including grizzly bears.

How the Timberline Regime has changed since 1900.

Fire exclusion policies have been especially effective in this regime. These policies and white pine blister rust, an introduced disease that kills cone-bearing limbs and young trees, have caused whitebark pine to decline. Engelmann spruce and subalpine fir — both less fire resistant — have replaced it. The loss of whitebark pine is particularly unfortunate because whitebark pine nuts were used extensively by Tribal people and wildlife (figure 2-20).

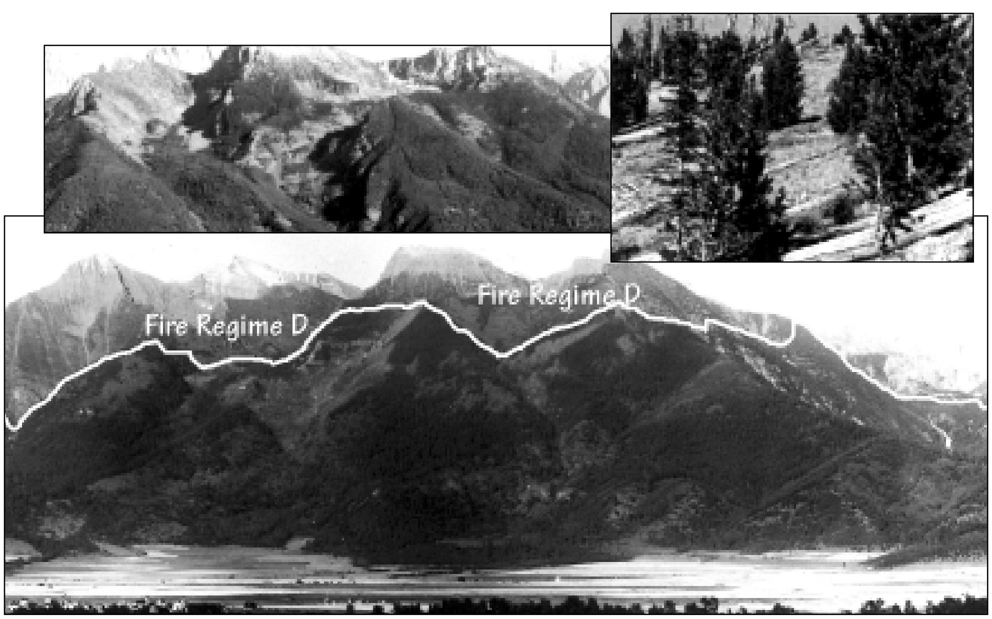


Figure 2-18. The large photo shows where the Timberline Fire Regime (Fire Regime D) occurred within the Missions Landscape. The two insets show, from left to right, the upper elevations of the Mission Range, which is typical whitebark pine habitat, and a whitebark pine tree.

Figure 2-19. A typical whitebark pine stand. Both stand-replacing and nonlethal fires shaped this regime. Fires have largely been removed from this ecosystem.

A Closer Look at the Timberline Regime

The Vegetation

This fire regime consists of high-elevation forests near and at treeline. Subalpine fir or mountain hemlock are the indicated climax in all of the upper subalpine habitat types. Whitebark pine and Engelmann spruce are long-lived seral species. Fire is secondary to climate and soil as an influence on forest development on these sites. Fire, however, has been important in perpetuating an abundance of whitebark pine (2-19).

Rugged terrain, including extensive rock outcrops, avalanche chutes, and cool, moist, north slopes hampered the spread of fires and usually resulted in a variable burn pattern. Fuels created by beetle kills and successional ladder fuels contributed to patchy torching or stand-replacement burning. Underburning in whitebark pine types had a thinning effect that removed much of the competing fir, while more intense fires created open areas favorable to the establishment of whitebark pine.

Figure 2-20. Clark's nutcrackers are one of many species that have suffered as a consequence of fire suppression in this regime. They, like grizzly bears and some 40 other species, fed heavily on whitebark pine nuts when they were available.

The Fires

Fires in this type rarely occur from individual lightning ignitions in the regime itself, but rather get their start from fires at lower elevations that burn upslope. Fire return intervals ranged from 30 to 500 years. Fire behavior ranged from nonlethal underburning to large, patchy, stand-replacing blazes.

These sites are characterized by relatively sparse fine fuels and moderate to heavy loadings of widely scattered, large-diameter fuels. Average downed woody loadings of about 18 to 20 tons per acre are common. The downed and dead woody fuel loadings often take the form of scattered, large-diameter downfall resulting from wind and snow breakage, windthrow, and mortality caused by insects or disease.

The Changes

For a variety of reasons, fire exclusion policies have had a major affect on this regime. On many upper subalpine sites, whitebark pine is being replaced by more shade-tolerant species, which ecologists attribute to fire suppression coupled with mortality caused by mountain pine beetle and white pine blister rust (figure 2-21). Evidence suggests that unless active management is carried out on a landscape scale, whitebark pine, a species of tremendous ecological significance, will continue to decline and will disappear from some areas.

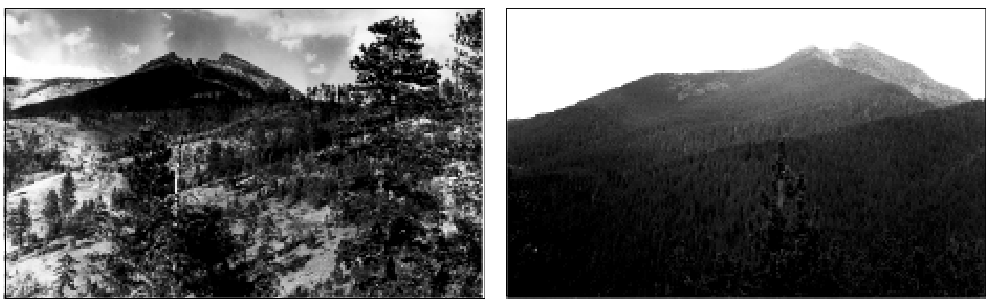


Figure 2-21. These two photos show the same high ridge, the first photo taken in the early part of the century, the second in 1994. Fire exclusion has brought about great changes to this regime.

Fire Suppression Policies in this Century

Around 1910, a national wildfire policy was instituted that required all forest fires to be extinguished as soon as possible. This policy continues with some modification. For instance, under certain conditions, some natural fires are allowed to burn in isolated parts of the forest, such as in the Mission Mountains Tribal Wilderness Area.

But elsewhere, where fires have been promptly extinquished, fuels from dead and dying trees in undisturbed stands have accumulated and are now at the upper end or in excess of what they would be under natural fire conditions.

Limbs and tops from selectively harvested trees, or slash, were historically sawn into small pieces and left to decay on the ground, a process called lopping and scattering. Wildfires which started in these logged areas were aggressively extinguished because of the explosive risks which resulted from unnaturally high fuel loadings.

The role of fire as a management tool has been limited to slash disposal by broadcast burning of clearcuts and seed tree units and understory burns designed to improve wildlife habitat.

1982 Forest Plan — Suppression Policy

The 1982 Forest Management Plan placed most of the Flathead Indian Reservation forested land under a full fire-suppression policy, except for prescribed natural fires managed under the *Mission Mountains Tribal Wilderness Fire Plan*. Fire management, fire suppression, and prescribed fire activities are conducted under the direction of *Flathead Agency Fire, Fuels and Prevention Plans*; *Mission Mountains Tribal Wilderness Fire Plan; Department Manual, 910 DM1; 53 BIAM, Supplement 8; and Prescribed Fire Systems Handbook*.

In 1982, federal policy required an aggressive fire suppression program using the least expenditure of funds, based on state-of-the-art management decisions, and employing suppression methods least damaging to resources and the environment. Current federal policy is more liberal and allows for a range of suppression options as long as a fire management plan

Figure 2-22. The High Elevation-Roadless Fire Management Zone is characterized by climax or late seral timber stands. The potential exists for destructive fires due to the combination of topography, fuels, and high resistance to control.

is in place. Federal policy requires that suppression activities employ a high level of cooperation between Federal, Tribal, State, and local fire suppression organizations.

Tribal fire management staff is responsible for fire planning, training, aviation, fire prevention, fuels management, rehabilitation, wilderness fire management, and initial attack and large fire suppression and logistics.

Figure 2-23. Lightning is the primary cause of wildfires. Between 1980 and 1992 lightning started 82 percent of all fires. Most of lightning strikes occur in July and August.

Fire Occurrence and Cause

Flathead Agency has fire protection responsibility for Tribal and allotted forested lands and fee and state lands under a cooperative agreement.

The agency averaged 36 fires per year between 1985 and 1999. Most fires were held to fewer than 10 acres in size, although fires greater than 200 acres are common, and large fires — 5,000 to 10,000 acres — have occurred in the recent past. Lightning is the primary cause of wildfires and starts an average of 64 percent of all fires (figure 2-23).

Fire Management Zones

The Flathead Agency forested area is presently divided into two fire management zones based on vegetative, resource use, topographic, and fire behavior criteria.

High Elevation-Roadless Fire Management Zone

The high elevation-roadless zone is an area of recreational and cultural uses. These areas have been set aside primarily for those uses. The zone contains wilderness, Tribal primitive, and inaccessible areas that are mostly unroaded. Fire use for resource benefit is allowed within the Mission Mountains Tribal Wilderness. All other areas outside of the wilderness are managed under a full wildland fire suppression policy.

The zone is characterized by steep, high-elevation timber types interspersed with brush-fields, avalanche chutes, and rock. Most timbered stands are in climax or late seral stages (figure 2-22). Common forest types are subalpine fir, lodgepole pine, Englemann spruce, and whitebark pine types under Lethal to Timberline Fire Regimes. The potential exists for destructive fires due to the combination of topography, fuels, and high resistance to control. The area presents very difficult access problems for fire suppression crews.

The fire management objective for this zone is to contain 90 percent of wildfires at 10 acres or less, except for fire use for resource benefit in the Tribal wilderness.

Commercial timberland Fire Management Zone

The lower elevation timberland zone is an area of commercial forest that is mostly roaded, except for portions of the Mission Mountains Buffer Zone, Ninemile Divide, Big Draw, Jocko River, and Flathead River Corridor areas. Forested wildland-residential intermix lands are also found in this zone. The policy is one of full wildland fire suppression.

Common forest types are ponderosa pine, Douglas-fir, and grand fir and most of the zone falls within the Nonlethal, Mixed, and Lethal Fire Regimes.

The fire management objective for this zone is to contain 90 percent of wildfires at 5 acres or less within 1/2 mile of homesites and 90 percent of wildfires at 62 acres or less during periods of critical fire weather. Prescribed fire activities are utilized to meet fuels and wildlife management goals and objectives.

Figure 2-24. Fuels management in Ferry Basin.

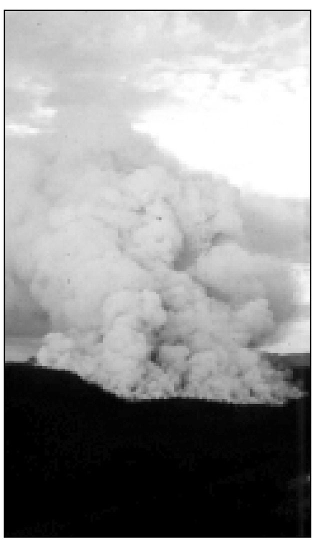


Figure 2-25. Broadcast burning a clearcut. The Tribes conduct broadcast and understory burning, vegetative management, and pile burning to reduce hazards, improve wildlife habitat, prepare sites for replanting, and to control insects and diseases.

Fuels Management

The Flathead Tribal Division of Fire organization supports an active fuels management and prescribed fire program. Prescribed fire and fuels management activities include: prescription writing; fuels and fire effects monitoring; implementation of broadcast, understory, ecosystem maintenance, wildlife habitat enhancement, homesite hazard reduction and dozer pile burning; management of the Fire Use for Resource Benefit program in the Mission Mountains Tribal Wilderness; fuel inventory and wildland-residential intermix data collection and analysis; and fuels evaluations and IDT participation in all timber sale activities (figures 2-24 and 2-25).

The primary goal of the Fuels Management program is to ensure that land management objectives of forest protection and sound silviculture are accomplished. The activities involved in meeting these land management objectives must ensure minimal environmental impacts on all uses.

Prescribed Fire

Prescribed fire is used extensively in a wide variety of vegetation types and in all fire regimes. Broadcast, understory, vegetative management, and pile burning are conducted to meet hazard reduction, wildlife habitat improvement, site preparation, ecosystem maintenance, insect/disease control, and various other treatment objectives. The purpose of prescribed fire is to apply fire treatments that achieve predetermined effects to meet objectives, especially in ecosystems that are partially or totally fire dependent.

Prescribed fire treatment acres have steadily increased since the early 1980s. Approximately 900 total acres were burned under all prescribed treatments in 1981. By 1989 the acreage burned had increased to 2,500 acres. Treatments from 1990 to the present have averaged from 2,500 to 3,000 acres per year. This upward trend in prescribed fire treatments is expected to continue.

All prescribed fire projects are conducted under approved burn plans to ensure that the burn is executed safely, is within prescription parameters designed to meet specified objectives, and is environmentally sound. All projects are routinely monitored to document and evaluate fire behavior and fire effects in order to validate or refine management objectives and to guide decisions on possible alternative treatments.

Fire Use For Resource Benefit

The Mission Mountains Tribal Wilderness is presently managed under a fire-use-for-resource-benefit program. The overall goal of the *Mission Mountains Tribal Wilderness Fire Plan* is to restore fire to its historic role.

The wilderness is characterized by Mixed, Lethal, and Timberline Fire Regimes. Terrain features are sharp and well defined. About 95 percent of fires are lightning caused. Fuels inventory data and historical photos indicate that large stand-replacement wildfires occurred in the wilderness on a regular basis prior to the start of successful fire suppression activities in the 1930s. Additional fire history data are needed for proper management of this area.

Several large wildfires in 1910 and the late 1920s are estimated to have been 5,000 to 30,000 acres in size. Steep topography, heavy downed fuels, and poor forest health conditions indicate that many areas within the wilderness are at high risk of large, catastrophic wildfires.

Steep topography, heavy downed fuels, and poor forest health conditions indicate that many areas within the wilderness are at high risk of large, catastrophic wildfire.

Three fire-use-for-resource-benefit wildland fires have been managed within the wilderness since 1986. The largest was the 1990 St. Marys Peak fire that consumed 12 acres. Fire occurrence within the wilderness only averaged about 3 fires per year between 1981 and 1999, and the average size was less than 3 acres. Under existing conditions, the goal of restoring fire processes to the Tribal wilderness is not being met.

Wildland-Residential Intermix

Intermix lands are Tribal and nontribal lands that have residential homesites or developments within or adjacent to forested areas (for maps and detailed descriptions, see the *Flathead Agency Urban Interface Hazard Analysis*, 1999-2000). These forested areas are generally at lower elevations in the Nonlethal to Mixed Fire Regimes.

Annual fire occurrence within the zone averages seven fires per year. Fire size is usually less than ten acres due to rapid suppression responses from agency and volunteer fire

Figure 2-26. Many homes adjacent to or within forested areas are becoming more susceptible to fire as the risk of wildfires in the Nonlethal Fire Regime increases.

"People who live in the woods or adjacent to a forest can minimize the risk from wildfire by manipulating fuels (both live and dead). The challenge for managers comes in education and in motivating people to take some action to reduce the hazards."
— Tony Harwood, Fire Specialist, 1995

departments. Several outbuildings and developments have been lost to wildfires in the recent past and numerous residences have been threatened in the past few years (figure 2-26).

Most intermix areas (approximately 75%) are at moderate to high risk of catastrophic wildfire due to fire exclusion practices and overall problems that include a lack of defensible space, inadequate transportation systems, a lack of proper homeowner fuels management, and the location of homesites on moderate to steep slopes.

Existing homesites are located in dry, low-elevation forests where fire exclusion over the past several decades has changed the overall vegetation composition and structure. The development of a dense understory has resulted in an increase in vertical ladder fuels which allow ground fires to move to the crowns of larger overstory trees, and increase the risk of severe, stand-replacing wildfires.

Residential development in high fire-risk areas continues to occur in remote, previously uninhabited forested areas and is expected to increase in the future. The risk to life, property, firefighter safety, and economic welfare from fires in these areas is clearly much higher today than ever before. In response to increasing wildland-residential intermix problems, the fire management department utilizes public education, homeowner awareness, hazard analysis, and fuel hazard reduction projects to mitigate risks.

A Summary of the Changes in the Forest

The major changes are summarized below.

Major Changes

1. **Fire exclusion has resulted in increases of down woody and ladder fuels. Stands are more dense and have shifted to late seral or climax species.**

2. **Fire intensity within fire regimes have changed so that more severe and less frequent events will be creating fewer and larger patches on the landscape. The changes resulting from logging and fire exclusion are more pronounced in the Nonlethal and Mixed Fire Regimes than in the Lethal and Timberline Fire Regimes.**

3. **Extensive timber harvest and inflexible fire exclusion policies have altered forest structures and patterns at both the stand and landscape level. Most of the changes are inconsistent with the "pre-European" era.**

What Researchers are Finding

*Forest Ecologists' Views on the Role of Fire Management in Fire-Adapted Ecosystems**

…[The] scenario has been reported in the literature since the 1940s: open ponderosa pine, larch, and Douglas-fir forests at lower elevations burned naturally at rather frequent intervals, on the order of 10 to 25 years, maintaining rather open, fuel-free stands with few fir trees. The larch and pine overstory was harvested extensively, fire was controlled, and the composition of the stands shifted towards an unnaturally dense understory of Douglas-fir and grand fir in the absence of fire. The spruce budworm for the last ten years has been enjoying a steady diet of Douglas-fir and grand fir, which has led to tree mortality, fuel build up, and high-intensity wildfires.

The solution to this problem seems straightforward, but it has some huge barriers. The solution should start with harvesting what fir is possible without causing environmental impacts and retaining larch and ponderosa pine in the overstory for future regeneration purposes. Prescribed fire on a fairly large scale should be coupled with silvicultural methods whenever possible to enhance natural or planted regeneration of larch and pine. Where large quantities of standing dead trees are present, salvage logging should be encouraged to remove unnatural accumulations of fuels and obtain wood products. In areas where large quantities of downed dead woody material cannot be removed mechanically, two or three prescribed fires at high fuel-moisture levels might be needed to restore desired conditions without adverse impacts. This strategy would reduce the amount of fir in the stands over time and substantially reduce the threat of future insect infestations and large-scale wildfires. Over the long term, many of these forests could have silvicultural partial-cutting treatments to favor retention of an open overstory of pine and larch along with periodic underburning.

Managing for healthy forests… will depend on how well we can overcome internal and external barriers to burning on a scale large enough to make a real difference. The question of scale is a critical one… Potential problems are numerous when we contemplate an annual change in prescribed burning: air quality, sedimentation [streams], wildlife cover, visual quality, funding, and risk of fire escapes to name a few.

But if we embark on a major paradigm shift toward ecosystem management, then are we not going to have to make a shift in the way that we value such individual outputs as smoke particulates, sediment load, percentage of wildlife cover, and visual quality objectives? Placing the priority on valuing the health of entire ecosystems will require increased understanding and tolerance on the part of natural resource specialists and managers, as well as on the part of the general public, politicians, and regulatory agencies.

If we are not prepared to make the necessary changes to manage successfully for healthy and sustainable ecosystems, then the consequences of maintaining the status quo will be the aggravated increase of severe forest mortality resulting from insect and disease epidemics and high-intensity wildfires. We have taken drastic steps in attempting to exclude fire from fire-dependent ecosystems in the past. Now bold steps must be taken to effectively manage ecosystems with all processes in place, including prescribed fire and other treatments to the landscape in large enough and correct enough doses to make a difference.

** excerpted from Mutch, R.W. et al. 1993. Forest Health in the Blue Mountains: A Management Strategy for Fire-adapted Ecosystems.*

Forest-wide Objectives for Fire Management

A long-term (one hundred year) goal is to restore key portions of each fire regime to their original structures and compositions. Accomplishing this would help to ensure that our forests are productive and sustainable over the long term.

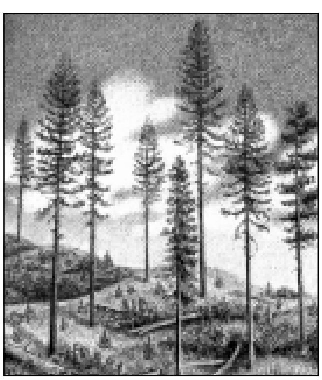
1. **By 2089, restore and maintain portions of all Reservation fire regimes to near pre-European structures, compositions, and arrangements to reverse trends in fuel accumulation, fire risk, severity potential, and smoke emission potential.**

   Restoration and maintenance activities will be implemented through various timber harvest entries, prescribed broadcast burn and underburn treatments, and management of wildland fire for resource benefit.

2. **By 2089, restore fire periodicity to those timber stands in the Nonlethal Fire Regime and the nonlethal portion of the Mixed Fire Regime that have the greatest potential for restoration of pre-European structure and species composition.**

   Priority fuel hazard reduction and ecosystem maintenance prescribed underburns, especially in wildland-residential intermix areas, will be implemented through timber harvest and fuels management treatments and funded through timber stand improvement, add-on, pest management, hazard fuel reduction, and habitat conservation organization funding.

3. **By December, 2002, develop and implement a plan for a comprehensive education program designed to promote a fire-role and fire-use message**



Seed Tree Method

Can Logging Simulate Natural Fires?

Today, the battle against the encroachment of climax species like Douglas-fir is accomplished primarily with chainsaws by taking out mature and immature climax trees. Nature would have used fire and taken out mostly immature climax trees. We are also removing more seral trees now than nature would have because stocking levels are so high. On the east side of the Reservation, we no longer have much of the older seral component — those large, old ponderosa pines that natural fires favored — because, in the past, most were cut when the practice was to high grade stands for the most valuable timber (although some stands still exist in Lozeau, Dry Fork and Bassoo). But cutting, when used with prescribed fire, can come closer to simulating natural fires.

Clearcutting and seed tree methods can simulate stand-replacement fires if they are accompanied by prescribed fire and mechanical treatments designed to achieve site preparation and tree regeneration.

Individual tree selection can simulate light ground fires if accompanied by underburning.

Group selection and small clearcuts can simulate mixed intensity fires such as those that dominate the Mixed Fire Regime if accompanied by appropriate site preparation.

for decision makers and the public. This plan will be incorporated within the agency Fire Prevention Plan.

This program will describe and explain issues such as ecosystem condition, risks, consequences, and costs through media campaigns, public meetings, employee training, etc. The action plan should also define topics, methods, and time frames for media exposure, target audiences, educational materials, and required contact days per year. (This action plan effort should be developed in conjunction with other Tribal and Natural Resources Departments or under an interdisciplinary team approach.)

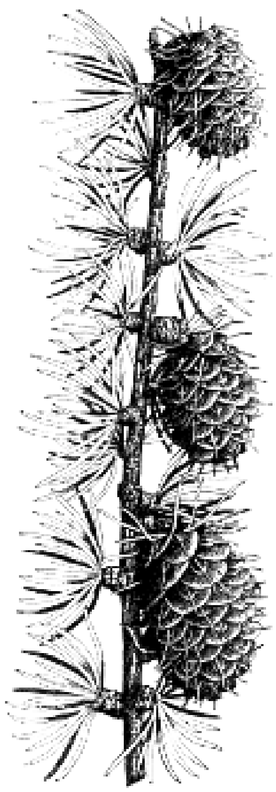
4. **By June 2001, develop a Wildland Fire for Resource Benefit Operations Plan with specific fire-use guidelines to be followed in the Mission Mountains Tribal Wilderness, special use areas (primitive, roadless, Flathead River Corridor) and unique habitats (big game winter range, rangelands, etc.).**

   This objective may depend on activities defined in the agency Fire Management Plan and the possible development of formal management plans for these special use areas.

5. **Update the Fuels Management Plan to incorporate ecosystem management direction by June, 2003.**

   The updated plan will include: fuels management goals and objectives; a general assessment of fire's effects on local ecosystems; fuel treatment strategies, priorities, and implementation schedules; fuel treatment methods and techniques; inventory, modeling, and monitoring procedures for documenting fire effects; funding sources; cultural clearance procedures; and prescribed fire qualifications and certifications.

Managers might consider prescribed underburning soon after [selection harvest]... These underburns could reduce fuel and pathogen hazards with little harm to pole and larger crop trees of ponderosa pine, western larch and Douglas-fir. In addition to enhancing timber production, this approach has potential to stimulate growth of seral shrubs used as big game browse and to result in esthetically appealing open stands.
— Steve Barrett,
Fire Ecologist, 1982



Western Larch

6. Develop and begin implementation of a Tribal Fuelwood Availability Implementation Plan by June 2004.

This plan will define slash disposal methods and procedures that would increase opportunities for firewood collection by Tribal members. It will become an appendix to the Agency Fuels Management Plan.

7. Develop and implement a Reservation Smoke Management Plan by December, 2003.

The plan should include: an emission inventory and an analysis of all forest resource emission activities, historical perspectives, a schedule of future activities and limits, Tribal Air Quality and EPA references, smoke management methods and techniques, emission modeling processes, alternative slash disposal methods and recommendations, etc.

8. Develop and begin implementation of a Reservation-wide Wildland-Residential Intermix Hazard Reduction Implementation Plan by December, 2002.

This implementation plan will include detailed analysis and mapping of levels of risk, vegetation types, transportation systems, bridge weight limits/capacities, fuel regimes, etc. to produce a prioritized schedule for homeowner awareness education, hazard reduction fuel manipulations with timber harvest and prescribed burning, and transportation system mitigation with possible retrofitting of Tribal roads and bridges.

9. Develop and implement a Reservation Fire Management Plan by June, 2000.

This strategic plan will define the Division of Fire's management of wildland fire and prescribed fire and will be supplemented by the agency Preparedness Plan, Prevention Plan, Fuels Management Plan, and other operational plans.

10. Update the Mission Mountains Tribal Wilderness Fire Plan by June, 2001.

The updating of the this plan will depend on the scope and content of the Fire Management Plan and the proposed Wildland Fire for Resource Benefit Operational Plan.

11. Develop an Interagency Fire plan by June, 2005.

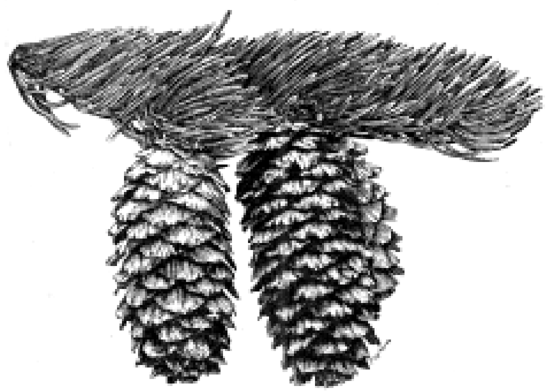
This plan will represent a collaborative, interagency planning effort by the Tribes, Federal, State, and Private entities to address local fire suppression and fire-use issues, particularly in areas of adjacent ownerships where common land-management goals and objectives exist (such as in the Mission Mountain Range, along the Ninemile Divide, on the East Shore of Flathead Lake, and on the Flathead River).

12. Within the wildland-residential intermix convert 5,000 to 6,000 acres of forest stands with a high-to-extreme fire risk rating to a low-to-moderate rating by the year 2020, and a total of more than 10,000 acres by the year 2040.

This objective will be accomplished through a combination of timber harvest, prescribed fire, and fuel hazard reduction treatments.

13. Use mechanical and/or prescribed fire treatments on 2,000 to 3,000 acres of closed canopy wildland-residential intermix per decade to produce suppression-zone fuel breaks to decrease the likelihood of economic losses to catastrophic fire.

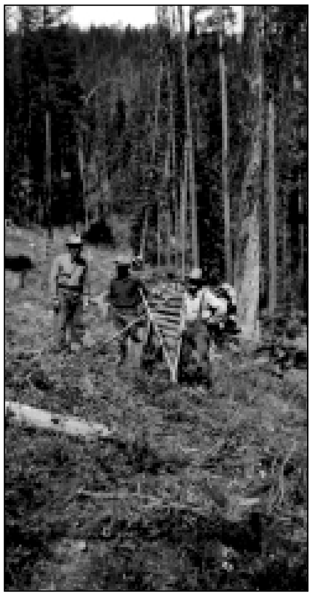
Maintain fuel breaks with a combination of mechanical and periodic prescribed fire treatments where feasible.



Engelmann Spruce

Vegetation Management this Century

By about 1860 much of Indian burning had stopped, and by 1880 commercial logging had started on the Reservation. In the first two decades of cutting, most of the timber went for the construction of the St. Ignatius Mission complex, the Jocko Agency, the Northern Pacific Railway, and Indian farms. In the early 1900s, non-Indian settlement, the timber demands of World War I, and changes in national Indian policy contributed to the onset of large-scale commercial logging operations.[1]



The Basic Philosophy

An underlying philosophy of forest management for much of this century was to apply the basics of forest succession to produce the highest volumes of timber in the shortest time. This was accomplished by managing against stagnated young trees and by harvesting trees over 120 years old. The theory was, the longer an area stayed in the grass and brush stage after being logged, the longer it took for that particular stand to reach prime timber production age. So foresters attempted to speed the process along. Where they logged selectively, they retained overstory trees and they left behind most of the young trees. When they clearcut, the goal was to achieve full stocking within 5 years through natural regeneration, aerial seeding, or planting. Two Tribal greenhouses produced the seedlings for replanting all clearcuts.

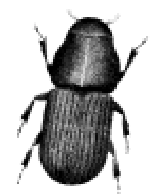
Similarly, forest managers have historically tried to harvest stands of timber before their growth rate slowed significantly or before full-grown trees died from insects, disease, fires, or old-age.

Figures 2-27 a, b, and c. For much of this century, logging and other forest-related commerce has been a major factor in the Tribal economy. It has supplied both jobs and revenue. Most of the membership has benefited either directly or indirectly.

1. *For more details on the history of forestry on the Reservation, see* Timber, Tribes, and Trust: A History of BIA Forest Management on the Flathead Indian Reservation (1855-1975). *Historical Research Associates, Missoula, MT.*

Past Harvest Practices

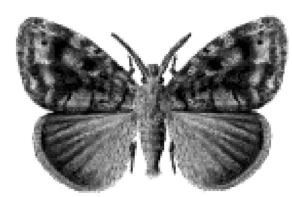
A number of silvicultural regeneration cutting prescriptions were used before 1932 including group selection, individual tree selection, patch, clearcuts, and shelterwood cuts. Early cuttings were heavy; in fact, according to Historical Research Associates, "previous to 1932 every tree that would make a single sawlog was cut for its merchantable content…" Beginning in 1932, all live timber removed under contract was selectively marked for harvest by forest officers based on the crown classes and vigor of individual trees. It was the practice and intention then to selectively harvest and deplete all "virgin timber" over three entry periods over about sixty years (figure 2-27). Harvest specifically targeted old ponderosa pines and other big seral trees. This type of selective harvest stands in stark contrast to modern-day applications of the selection system.



Mountain Pine Beetle

Clearcutting to Fight Insects and Diseases

Selective logging of older trees was the rule until the early 1960s. It was about that time that logging roads were first constructed into high-elevation spruce and fir stands in order to control a major outbreak of the spruce-bark beetle. Because the high probability of excessive blowdown of the timber, which was growing on shallow, moist soils, the selection method of harvest was not practical, and large areas in the South Fork of the Jocko and along the tops of the northern Missions near Yellow Bay, Boulder, and Hellroaring Creeks were clearcut. The goal was to reduce timber losses from beetle kill.



Tussock Moth

Figure 2-28 a and b. Two insects that affect tree species on the Reservation are the mountain pine beetle and the tussock moth.

Nevertheless, selection prescriptions continued to be the silvicultural method of choice over most of the Reservation's forests through the 1960s and 1970s. It had become evident, however, that selective cutting was not controlling the spread of dwarf mistletoe or root rots. Seeds from the dwarf mistletoe plants growing on trees left behind fell on young trees, and the new stands became more heavily infected than the old. Thus, it was common practice in the late 1970s to use clearcutting or seed tree methods in mistletoe-infested stands (figure 2-30). The idea was to return to a selection prescription once the new stands, free of mistletoe, had regenerated.

Another problem foresters faced was an increasing level of tree mortality due to the *Armillaria* root-rot fungus. This disease increased in portions of the forest after selective harvest. *Armillaria* feeds primarily on dead, woody material, but attacks and kills live trees where infection levels are high. The selection harvest methods increased the amount of dead matter in the soil by providing abundant stumps and roots from harvested trees so that infection levels, in many cases, were great enough to permit the fungus to begin to seek out and choke the roots of the live trees in the stand. Silvicultural policy in these areas was to remove all trees

Forest Pests

Parasites
Dwarf mistletoe is the Reservation's most serious timber-management problem. It affects most Douglas-fir stands but also infects western larch and lodgepole pine. Dwarf mistletoe can kill trees, but the greatest damage is from growth loss. Root-rots and needlecast fungi are also problem parasites.

Insects
The mountain pine beetle kills trees in lodgepole and ponderosa pine stands. Spruce-bark beetle can also cause extensive damage. Engraver, western pine and Douglas-fir beetles cause limited mortality. The western spruce budworm, Douglas-fir tussock moth, and pine butterfly defoliate trees and cause productivity losses (figure 2-28).

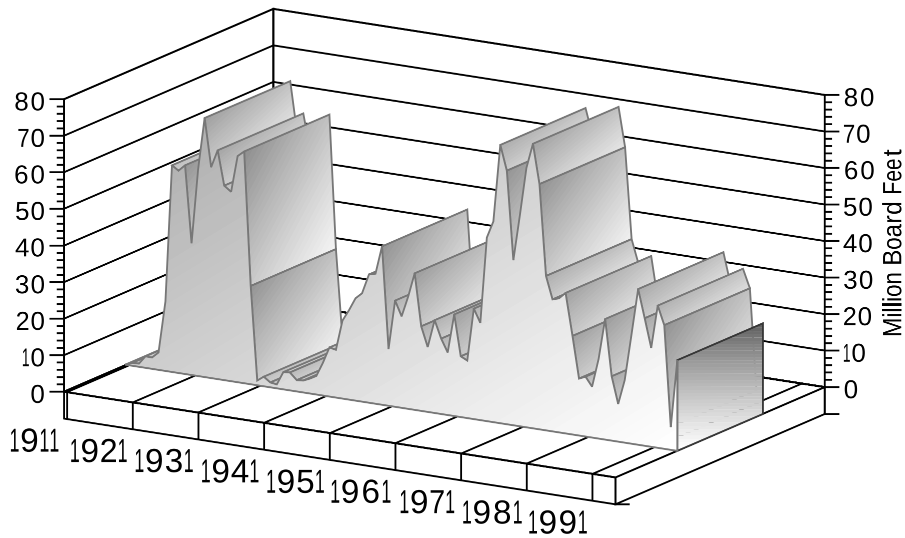


Figure 2-29. The volume of timber harvested over the past several decades has varied considerably. Variations are due primarily to market fluctuations and Tribal Council direction.

except ponderosa pine and western larch, species that are resistant. Foresters then tried to regenerate the site with these resistant species. Recently, *Heterobasidium annosum*, another species of root rot, has been killing live ponderosa pine trees on dry sites at lower elevations.

Harvest Volumes

Industrial timber harvest began in earnest on Reservation forests around the turn of the century and has continued to the present. Average annual harvest of sawlogs has been 29.1 million board feet (MMBF) since 1911 (figure 2-29).

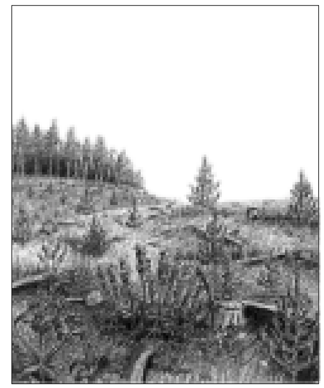
The first Forest Management Plan prepared for the Reservation forest in 1945 estimated an annual harvest of "at least 40 million feet" could be sustained (although this was without consideration for other resources). The annual allowable cut (AAC) of sawlog products has been recalculated four times since then, based on growth and stocking information measured on as many as 489 of the 754 permanent forest installations (CFI). The calculations are illustrated in the table below. Despite a long history of logging on the Reservation, inventories of timber volume continue to increase as growth outpaces harvest.

Table 2-2. In this table, the 1945 actual harvest (AH) is an average annual harvest of all wood products for the years from 1911 to 1945. The 1968 AH is the average from 1945 to 1968; the 1972 AH is the average from 1968 to 1972; 1981 the average from 1972 to 1981; and 1989 the average from 1981 to 1989.

Era	Commercial Acres	Total Forest Stocking (MMBF)	Per Acre Stocking	Calculated AAC (MMBF)	Actual Harvest (MMBF/Yr)	Estim. Growth (BF/AC/Yr)
1945	379,800	1,658	4,367	40	24.5	105.3
1968	411,844	3,546	8,612	76	32.8	184.5
1972	338,215	1,887	5,580	56.4	62.1	167.1
1981	322,065	2,214	6,876	59.1	43.1	183.5
1989	296,425	2,157	7,279	68.6	33.3	230.8

Table 2-2 illustrates an upward trend in annual allowable cuts, except for a disputed calculation in 1968. Foresters attribute this increase to the regular increase in per-acre stocking, or the amount and size of trees on the average acre. Average stocking has increased by 67 percent or from 4,367 board feet per acre (BF/AC) in 1945 to 7,279 BF/AC in 1989.

Since wildfires have been effectively excluded, stocking has increased. The acres disturbed by timber harvests have not equaled the acres disturbed by fire during pre-European times. In other words, actual harvests have been less than what the forest is growing, thus forest stocking has increased.



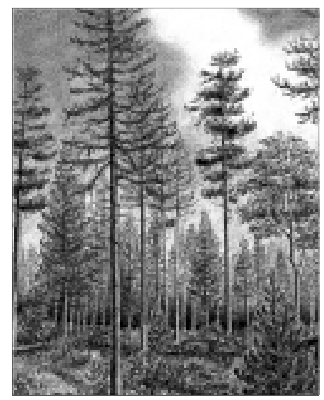


Figure 2-30. Two types of silvicultural systems. At top is a clearcut, which involves the removal of all trees over an area of two acres or more. Below is a selection system in which a continuous uneven-aged forest is maintained or achieved by selecting a limited number of trees of various ages and sizes for harvest.

The Timber Harvest Policy Since 1982

The 1982-1992 Forest Management Plan precedes this document. It was based on the 1980 Continuous Forest Inventory Analysis, which estimated a net allowable cut of 54.1 million board feet of timber per year and required the use of uneven-aged management (selection harvest) wherever possible.

When the Tribal Council approved the plan, they elected to harvest 38.4 million board feet of sawlogs per year. This decision removed temporary even-aged treatment options or clearcuts, except on a case-by-case basis, because of their high visual impact. However, serious forest health issues continued to demand even-aged practices. Over time, the use of temporary even-aged treatments became routine.

The Tribal Council chose to optimize post and pole harvest opportunities for Tribal members by allowing the harvest of 452,000 posts annually. It set aside approximately 15,000 acres of lodgepole for continuous post and pole production.

Forest Trends

Current seral cluster distributions for each landscape are described and mapped in Chapter 3.

The practice of harvesting older seral trees in the Nonlethal Fire Regime earlier in the century, along with the protection of fire-susceptible climax species that would have

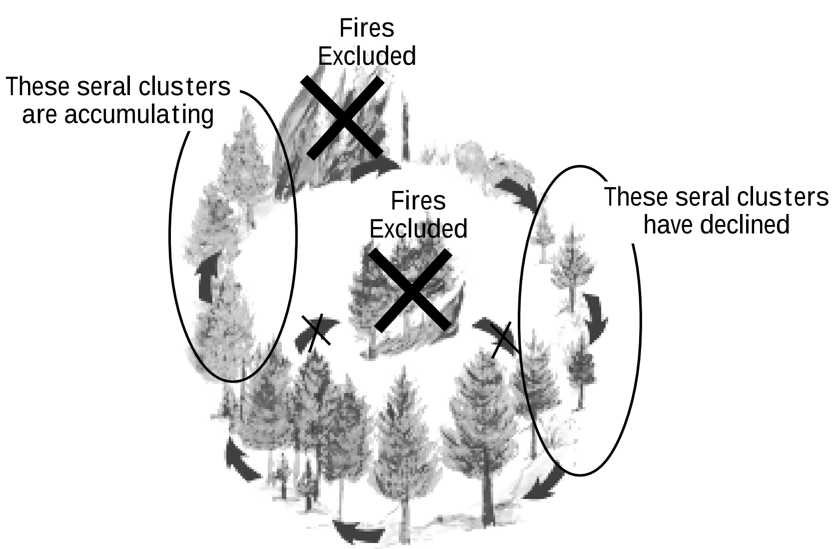


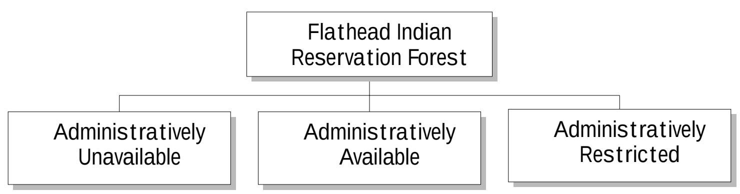
Figure 2-31. When fire and logging are excluded, succession yields an abundance of late seral clusters.

otherwise burned, has resulted in a greater proportion of climax species, particularly Douglas-fir, than would have occurred in pre-European times (figure 2-31). In fact, all data for the Nonlethal Fire Regime show a strong trend away from an open-ponderosa-pine-dominated forest and toward a closed-Douglas-fir/true-fir-climax forest. Climax species are generally more susceptible to damage and mortality due to fire, dwarf mistletoe, and root rots. Today, forest pests affect more than half of the timber stands in the commercial forest.

"We talk about resource management as a way of sustaining the productivity of the land, but what if instead we talked about sustaining the generosity of the land? What if, instead of talking about managing an ecosystem, we spoke of cooperating with the ecosystem?"
— Herb Schroeder, USFS Scientist, 1994

Commodity Management Systems

We have classified the forested acres of the Reservation according to the following simple scheme:



The categories of ***restricted***, ***available***, and ***unavailable*** refer to the availability of a particular parcel of land for general land management activities.

Forest classification according to availability

1. Available Acres

May receive the full range of harvest treatments that are appropriate for the sites involved. Includes all accessible land not included in Unavailable or Restricted classifications.

2. Restricted Acres

Includes areas where the Tribes have set specific management objectives, and the types of culturing and harvest are limited in order to accomplish those objectives. Examples are streamside management zones and roadless areas available for roadless harvest.*

3. Unavailable Areas

Includes areas where forest management activities are not permitted. Examples include the Buffer Zone and wilderness areas.*

The Tribes derive many non-timber benefits from the forest — clean water, medicine and food plants, wildlife, scenic beauty, spiritual solace, and peace of mind to name a few.

* *For a comprehensive list of areas classified as restricted and unavailable see figure 2-33.*

Management Systems

Management relates to the business and organizational aspects forestry. The purpose of management and the use of specific management systems is to accomplish the long term goals and shorter-term objectives of the Tribes. Thus, management systems such as uneven-aged, even-aged, and uneven-aged restoration are fundamental building blocks of a forest-wide management strategy.

Silvicultural systems (such as clearcutting, seed tree, and shelterwood) are applied specifically to a parcel of ground such as a stand or "patch" of timber. Silviculture, as the science and art of managing forest vegetation to meet landowner objectives, provides an array of tools or treatments necessary to develop the desired structure of the future forest. In this plan we discuss three management systems and four silvicultural systems.

The purpose of management, and the use of specific management systems, is to accomplish the long term goals and shorter-term objectives of the Tribes.

Management and silvicultural systems

1. Uneven-aged

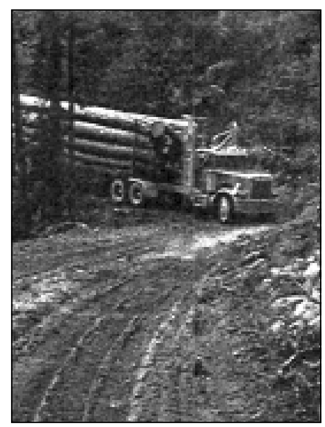
Selection (including group and individual tree)

2. Even-aged

Clearcutting, seed tree, and shelterwood

3. Uneven-aged Restoration

Clearcutting, seed tree, and shelterwood; reverting to selection 50 to 70 years hence



Treatments applied under even-aged and uneven-aged restoration management systems will look identical for the duration of this plan and beyond, because they use the same tools. Uneven-aged restoration treatments are applied to areas where uneven-aged practices would normally be desired, but are infeasible because of insects, diseases, and other problems. Thus, the goal of uneven-aged restoration management is to remedy immediate and urgent forest health problems through even-aged practices. Successive harvests would be designed to move the stand toward structures that can be perpetuated with selection management systems. Because these two management systems each have a unique sequence of future treatments, they must be distinguished for forest planning purposes.

Traditional Systems and Ecosystem Management

Ecosystem management views broad landscapes and defines a range of forest structures and processes that will perpetuate a healthy, resilient forest over the long run. Forest management is the catalyst and link that allows broad ecosystem issues to be resolved through the use of specific silvicultural systems.

Treatments such as thinnings, weeding, clearcutting, planting, or individual tree selection manipulate individual stands of timber to create, maintain, or adjust the form and structure of the forest for the benefit of long term stability, health, and productivity.

Using Management Tools to Imitate the Processes of Nature

As we have stated, even without the intervention of humans forests change dramatically over time. Floods, winds, outbreaks of bark beetles, and other events radically changed the density, average size, and species composition of trees and other plants living on the landscape. Prior to fire control programs, the most consistently influential factor was wildfire.

The purpose of silvicultural treatments is twofold: to create and maintain varied conditions for the long-term health of the forest landscape and to achieve desired outputs such as improved wildlife habitat or forage or lumber production.

Today, for a variety of economic and social reasons, managers attempt to replace uncontrolled and sometimes catastrophic natural events with planned changes in vegetation through harvesting techniques and prescribed fire. It is the goal of this plan to establish a framework in which these tools will be used to imitate natural processes to create a more natural forest structure and composition.

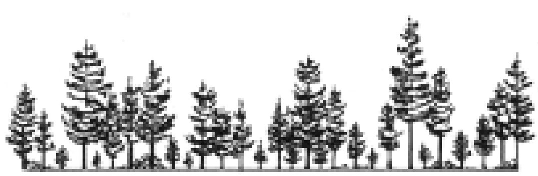
The goal of uneven-aged restoration management is to remedy immediate and urgent forest health problems through even-aged practices. Successive harvests, would be designed to move the stand toward structures that can be perpetuated with selection management systems.

The exclusion of fire for the past 100 years, earlier harvesting, and very high populations of many forest pests (much higher than would have occurred under natural fire conditions) requires the use of restoration practices. For example, clearcutting will be used in some lower elevation Douglas-fir stands to remove heavily mistletoe-infected trees in order to restore the stands of large, older ponderosa pine that once dominated these sites.

The Role of Ecological Classification

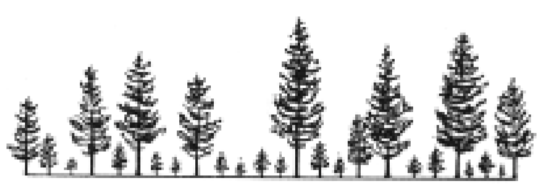
If a forest is left undisturbed by fire or logging, it will grow through a series of stages until, eventually, it arrives at a specific and predictable mix of trees, shrubs, forbs, and grasses

SILVICULTURAL SYSTEMS



Selection

A continuous uneven-aged forest maintained or achieved by selecting a limited number of trees, of various ages and sizes for harvest. Trees are harvested over intervals of 15 to 40 years in small groups (group selection) or individually (individual tree selection).

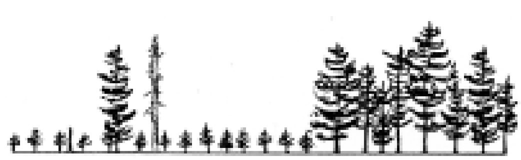


Shelterwood

Trees are removed in a series of harvests designed to establish a new, even-aged stand under the shelter of older trees. The shelter trees may provide seed for regeneration, and, once a new generation is growing, may be either harvested or left depending on the objective.

Seed tree

Selected trees are left standing to provide a natural source of seed for a new even-aged stand. Seed trees may be cut several years later or may be left to provide structural diversity on the site.



Clearcutting

The removal of all trees over an area of two acres or more, in a single harvest. A new, even-aged stand is planted or regenerates naturally. Clearcuts were traditionally shaped in square blocks, but we propose designing cuts to mimic natural fire patterns.

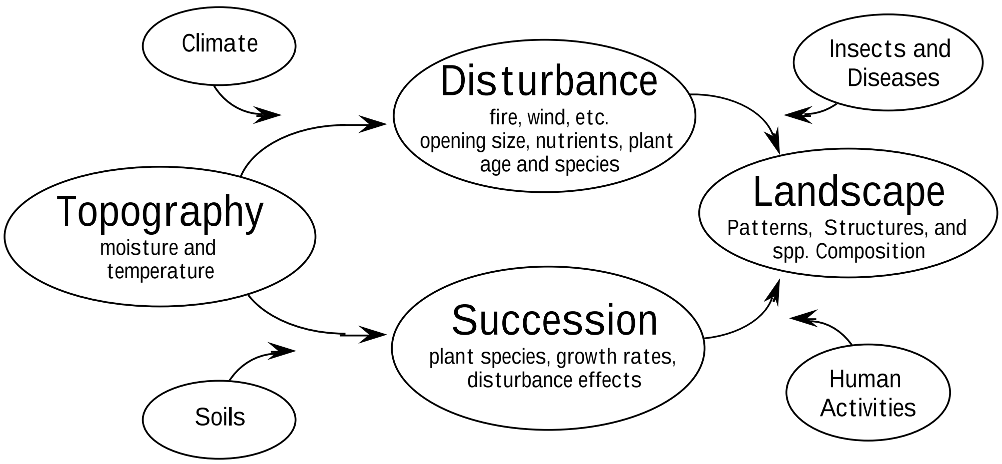
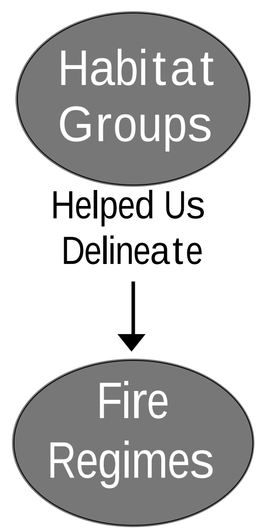


Figure 2-32. The pattern of forest vegetation and its structure and composition is determined by a number of factors. This plan focuses on the structures characterizing fire regimes, which are in large measure a product of both habitat types and fire behavior.

known as climax. These associations of plants can be classified and identified readily in the field using a system known as ***habitat typing***. A given habitat type represents the combined effects of soils, slope, aspect, temperature, moisture regimes, and elevation and suggests a number of useful things for the land manger, including growth rates and the species that are likely to be present. As such, the habitat type represents a kind of biotic potential, that is, the type of community that a particular piece of ground will support when it reaches a climax stage.



The mountain west, with its sharply defined topographic features, readily lends itself to the use of habitat typing. Since slope, aspect, and elevation also affect fire behavior, it is easy to see that habitat types or groups of similar types correspond to fire regimes. In fact, fire regimes are readily predicted from habitat type data. Figure 2-32 shows the relationship between topography, fire, and habitat type.

Thus, even though this plan emphasizes the use of fire regimes and seral clusters, habitat typing and related successional pathway data continue to be used as fundamental tools in forest management on the Reservation. Table 2-3 shows the relationship between fire regimes, habitat groups, management systems, and silvicultural treatments.

Sustained Yield and Ecosystem Sustainability

25CFR 163.1 defines sustained yield as "the yield of forest products that a forest can produce continuously at a given intensity of management." This definition of sustained yield is enveloped within a broader definition of ecosystem sustainability. Ecosystem sustainability is assumed to be achieved when the forest has the primary representative structures that existed during pre-European times, and is shaped by the same processes that shaped pre-European forests (primarily fire). The restoration or retention of forest land in its natural state, which is a primary goal of this plan, is the highest and best use of the land (CFR 163.3(b)(5)).

Under this plan, the yield of forest products results from the harvesting activities that are necessary to develop and maintain target forest structures. Managers will achieve an approximate balance between net growth and harvest (CFR 163.11(c)). Net growth in an ecosystem management setting is less than net growth projected in previous forest management plans.

Table 2-3. Management systems and preferred silvicultural treatments by fire regime. The abbreviations in this table are as follows: ITS—Individual Tree Selection, GS—Group Selection, SW—Shelterwood, ST—Seed Tree, and CC—Clearcut.

Fire Regime	Habitat Groups	Mgt System	Treatments (prefered order)
Non-lethal	Ponderosa pine (A) Very dry Douglas-fir (A)	Uneven-aged	ITS
	Dry Douglas-fir (B)	Uneven-aged Uneven-aged	ITS SW, ST, CC SW, ST, CC
Mixed	Wet Douglas-fir (C)[1]	Uneven-aged Uneven-aged	ITS, GS SW, ST, CC
		Even-aged	ST, CC, SW
Lethal	Wet grand fir (D)	Uneven-aged[2] Even-aged	GS, ITS SW, ST, CC
	Warm subalpine fir (E)	Even-aged	SW, ST, CC
	Cool subalpine fir (F)	Even-aged	SW, ST, CC
Timberline	Cold subalpine fir (G)	Even-aged Uneven-aged	Salvage GS

1. Some low-elevation, southerly sloped sites are classified as Nonlethal.
2. Some dry sites may be more appropriately treated within the Mixed Fire Regime.

Yet, net growth resulting from the application of ecosystem management principles is more desirable because it is consistent with the comprehensive management of all natural resources (CFR 163.11(b)). See "Harvest Scheduling" below for more detailed discussion.

Inventory Statistics

Acreages

The forested acres of the Reservation are classified according to the scheme shown in figure 2-33 (acreage figures are for the Nonlethal, Mixed, and Lethal Fire Regimes only).

Harvest Scheduling

Methodology used for Modeling Harvest

The Tribes developed an EIS for the Draft Forest Management Plan. The EIS evaluated three ecosystem management alternatives, each with its own harvest schedule. The three alternatives covered a broad range of management philosophies within the ecosystem management ideology, and the EIS discussed the issues, actions, and impacts associated with each. At one end of the continuum was an aggressive ecosystem restoration alternative, at the other, a commodities emphasis alternative.

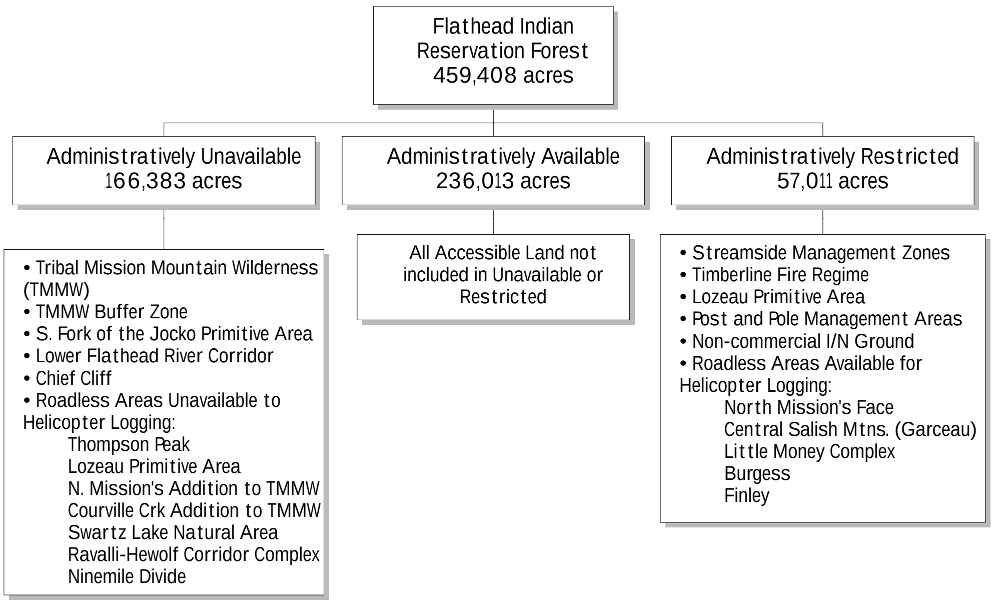


Figure 2-33. Classification of the forest.

The EIS employed two types of models: (1) a complex tree growth model that predicts future development of forest stands under various silvicultural treatments and (2) a linear programming model. The latter is what this plan calls the *vegetation model*. The vegetation model allowed us to integrate treatment choices from the first model, with varied constraints, to produce an optimal or "best" solution for our determined goal.

A brief summary of the key steps in our modeling process follows.

1. Create of Seral Classes and Clusters

The forest was divided into 33 structural types, called seral classes, each describing tree size, stand density, species composition, and layering (or the numbers of canopy levels present). These 33 seral classes were then grouped into 13 seral clusters according to their ecological function. Lumping simplified the evaluation and planning processes (Appendix B).

2. Define and Delineate Fire Regimes

Fire regimes were defined by the kind of fire disturbance that occurred during the pre-European era. Regimes were classified by fire frequency, intensity, and pattern (table 1-1). The three major fire regimes were used in the assessment of alternatives: Nonlethal, Mixed, and Lethal. A forth fire regime, the Timberline, was not used because it occupies such a small part of the forest and because at this point in time there is insufficient data to determine RV's and RMV's.

3. Determine Acreages

The acres occupied by each seral class and fire regime and the acres of various management designations were determined.

Several notable things distinguish this plan from its predecessors, namely its emphasis upon structure and process, its use of a dynamic growth model to develop yield tables, and the use of linear programming.

4. Develop Yield Tables

Several managed yield tables for each seral class-fire regime combination were developed. These tables show change over time for each seral class, including changes in species, size, tree density, volumes, resultant seral class, etc. The model used was the Forest Vegetation Simulator (FVS). The prescriptions applied to each seral class-fire regime combination varied, with the fire regime indicating the major management system most appropriate (even or uneven-aged) and individual prescriptions dependent upon insect and disease considerations, stand densities, growth rates, site considerations, management objectives and other such factors. Data sets for seral class projection were made by creating CFI plot sorts for each seral class-fire regime combination. This produced a great number of possible successional pathways.

The linkage between actual forest growth as measured by the CFI and modeling done for the plan (as described above) consisted of development of short- and long-term growth coefficients from various CFI plot sorts. Two types of adjustment were done.

The first adjustment occurred as a routine procedure of FVS. When an *existing* stand is projected, its growth is adjusted based upon previous growth. This previous growth was calculated by the change in diameter and height of each tree as determined from the 1980 and 1989 CFI measurements. The growth is either scaled up or down from the model prediction. The model then attenuates the growth rates to a level that is midway between the model prediction and the actual measured rate. This occurs because it is assumed that over a longer time frame, the regional model coefficients are a better indicator of growth in semi-managed stands.

For any prescription sequence that used an existing plot sort as its starting point, the above procedure was used to adjust the model. For new stands, such as those that resulted from a seed tree harvest, model coefficients were adjusted to grow the new stand. This was done because it was felt that stands managed from their conception would not be properly simulated using imbedded growth coefficients of a model (FVS) that is based upon primarily semi-managed stands.

Diameter and height coefficients for the major species were estimated for the six primary habitat-type groups. To arrive at these adjustments, CFI data was sorted by habitat group and a select subset of plots from this sort were used to develop diameter scale factors. Plots used in this determination had to be relatively disease free and be in an intermediate stocking range. After diameter adjustments were made for each species, height growth was checked by projecting a hypothetical stand of a single species forward using the adjusted diameter coefficients, and observing the heights at age 50 and 100. If heights at these benchmark points were within 10 percent of the average site index height at age 50 and 100, then no further adjustments were made. If not, the height growth coefficients were iteratively adjusted to cause each species to grow approximately through the two site-index points.

These final coefficients were then used for subsequent modeling of successional pathways for the forest plan.

5. Enter Yield tables into a linear programing

The process described in step 4 produced a large number of possible treatment sequences in the form of managed yield tables. (It should be noted that one treatment was always 'no-treat'). These yield tables were then introduced into a linear programming model. This second level of modeling allowed for the determination of an optimal solution over a 120-year projection period, based upon *constraints* and *goals*, and was done for each of the six landscapes. Constraints included such things as the number of acres available, types and/or the amount of silvicultural treatments permissible on certain seral classes and in certain fire regimes, etc. The goal always related to the number of acres of each type of forest structure desired and is further discussed under steps 6 through 9 below.

6. Estimate HRVs

The ID Team used FVS to estimate the historical range of variability (HRV). Essentially, the HRV is a steady state of vegetation resulting from simulations of historic fire disturbance.

7. Identify Cluster Groups and Establish DCs for each

To simplify and facilitate discussion on the effect of alternatives on forest vegetation, similar functioning seral clusters were lumped into cluster groups (table 1-2). These are described in table 2-5. Desired Condition (DCs) were developed for the seral clusters and cluster groups based on the estimated pre-European seral cluster distribution or HRV, and adjustments determined appropriate from the review of local and regional research, plans, and environmental analysis (table 2-4).

Cluster Group	Existing Condition	Desired Condition
Nonlethal Fire Regime		
A1	19.1	10 to 30
A2	12.9	10 to 30
B	4.9	0 to 10
C/D	10.6	1 to 15
F/G	23.9	10 to 30
J/K	1.7	15 to 55
E/H/I/L	30.2	0 to 20
Mixed Fire Regime		
A	18.1	0 to 25
B	3.3	5 to 15
C/D	15.6	13 to 27
F/G	28.3	25 to 56
J/K	2.0	5 to 20
E/H/I/L	32.7	0 to 20
Lethal Fire Regime		
A	12.1	10 to 20
B	6.4	0 to 5
C/D	22.8	20 to 40
F/G	27.3	35 to 50
J/K	2.0	10 to 25
E/H/I/L	29.5	10 to 30

Table 2-4. The Existing Condition and Desired Condition (DC) for seral clusters and seral cluster groups. The values represent the percent of total acres within the fire regime occupied by that cluster or cluster group.

Table 2-5. Descriptions of cluster groups.

Cluster or Cluster Group	Characteristics	General Descrption[1]
Non-lethal Fire Regime		
Cluster Group A1	Young, open canopy, seral species	Recently disturbed[2], sod, encroached, mostly ponderosa pine, less than 10" dbh, less than 40% canopy closure
Cluster Group A2	Mature and old, open canopy, seral species	Frequently disturbed, woodlands, some potential for park like stands, mostly ponderosa pine, 10" dbh and greater, less than 40% canopy closure
Cluster Group B	Young, moderate canopy, climax species	Likely undisturbed since regeneration, encroached, mostly Douglas-fir, less than 10" dbh, 40 to 69 % canopy closure
Cluster Group C/D	Young, moderate canopy, seral species	Frequently disturbed, mostly ponderosa pine, Douglas-fir may dominate the understory in multi-layered stands, less than 10" dbh, 40% and greater canopy closure
Cluster Group F/G	Mature, moderate and closed canopies, seral species	Frequently disturbed, potential for parklike stands, mostly ponderosa pine, 10 to 21.9" dbh, 40% and greater canopy closure
Cluster Group J/K	Old, moderate and closed canopies, seral species	Frequently disturbed, potential for parklike and old growth stands, mostly ponderosa pine, 21" dbh and larger, 40% and greater canopy closure
Cluster Group E/I/H/L	Mature and old, moderate and closed canopies, climax species	Less frequently disturbed, encroached, some potential for old growth stands, mostly Douglas-fir, 10" dbh and greater, 40% and greater canopy closure
Mixed Fire Regime		
Cluster Group A	Young, mature and old, open canopy, seral species	Frequently disturbed, mostly ponderosa pine and western larch, all sizes, less than 40% canopy closure
Cluster Group B	Young, moderate canopy, climax species	Undisturbed since regeneration, encroached, mostly Douglas-fir and occasionally grand fir, less than 10" dbh, 40 to 69% canopy closure
Cluster Group C/D	Young, moderate and closed canopy, seral species	Less frequently disturbed, mostly ponderosa pine and western larch, Douglas-fir and occasionally grand fir may dominate the understory in multi-layered stands, less than 10" dbh, 40% and greater canopy closure
Cluster Group F/G	Mature, moderate and closed canopies, seral species	Less frequently disturbed, potential for parklike stands, mostly ponderosa pine and western larch, 10 to 21.9" dbh, 40% and greater canopy closure
Cluster Group J/K	Old, moderate and closed canopies, seral species	Frequently disturbed, potential for parklike and old growth stands, mostly ponderosa pine and western larch, 21" dbh and larger, 40% and greater canopy closure
Cluster Group E/I/H/L	Mature and old, moderate and closed canopies, climax species	Infrequently disturbed, encroached, some potential for old growth stands, mostly Douglas-fir and occasionally grand fir, 10" dbh and greater, 40% and greater canopy closure

1. This column describes characteristics of individual components rather than the cluster group as a whole.
2. Disturbances include prescribed fires such as underburns and regeneration cuts as well as natural disturbances such as blowdown, insect and disease outbreaks, and wildfires.

Table 2-5 (cont.). Descriptions of cluster groups (cont.).

Cluster or Cluster Group	Characteristics	General Descrption
Lethal Fire Regime		
Cluster Group A	Young, mature and old, open canopy, seral species	Recently disturbed, mostly larch, lodgepole pine or spruce, all sizes may be present, less than 40% canopy closure
Cluster Group B	Young, moderate canopy, climax species	Undisturbed, mostly grand fir and alpine fir, less than 10" dbh, 40 to 69% canopy coverage
Cluster Group C/D	Young, moderate and closed canopies, seral species	Undisturbed, mostly larch, lodgepole pine or spruce, grand and alpine fir may dominate the understory in multi-layered stands, less than 10" dbh, 40% and greater canopy cover
Cluster Group F/G	Mature, moderate and closed canopies, seral species	Undisturbed, potential for lodgepole pine old growth, mostly larch, lodgepole pine or spruce, 10 to 21.9" dbh, 40% and greater canopy closure
Cluster Group J/K	Old, moderate and closed canopies, seral species	Undisturbed, potential for old growth larch and spruce, mostly larch and spruce, 21" dbh and greater, 40% and greater canopy closure
Cluster Group E/I/H/L	Mature and old, moderate and closed canopies, climax species	Undisturbed, potential for old growth stands, mostly grand fir and alpine fir, 10" dbh and greater, 40% and greater canopy closure

8. Enter the Ranges into the Vegetation Model and Run the Model

Desired condition ranges were entered into the vegetation model as constraints to ensure that the desired mix of seral clusters was developed over time. The vegetation model was run with various objective functions while meeting the above constraints. In most cases, the objective was to minimize deviation about the midpoint of a seral cluster's desired condition for a given alternative. Outputs included ratios of seral clusters and volumes of timber through time.

9. Output

The model provided acreage output for seral cluster and a harvest volume from treatments for each landscape. This data was the nucleus for arranging other data to predict the consequences of this and other alternatives included in the FEIS for the Draft and Final Forest Management Plan.

Annual Allowable Cut (AAC)

The AAC of 18.1 million board feet (mmbf) was estimated by the Vegetation Model's harvest scheduler. It is based on, and will apply to, net volumes from harvest treatments occurring on Available Acres. The AAC will not apply to volume that could occur from the Restricted Acreage Base, which might be harvested to meet special ecosystem objectives. Logging by roadless methods in some roadless areas, treatments within Streamside Management Zones (SMZs), and salvage from wildfire or prescribed fire in the restricted acreage base are conditions where unregulated volume could be harvested. Unregulated volume is volume harvested over and above the AAC in a given year or period.

The AAC estimate was presented in the *Flathead Forest Management Plan: Final Environmental Impact Statement (FEIS)*. It is an estimate based on an average yield occurring during the short-term projection period, or first 30 years. This estimate will be refined during revisions of the *Flathead Inventory Analysis* (which occurs about every ten years) or more often if needed.

Table 2-6. Annual allowable Cut by landscape for the short-term and long-term periods.

AAC (Net mmbf/yr) By Landscape and Projection Period		
Landscape	Short-term Proj. Periods 1 – 3	Long-term Proj. Periods 4 – 12
Jocko	6.2	6.9
Missions	1.4	1.4
North Missions	1.9	1.6
Salish Mountains	2.7	3.0
Southwest	2.2	2.1
West	2.4	3.2
Subtotal Net AAC	16.8	18.2
Net Woodland & Sod Add-on[1]	1.2	0.7
Total Net AAC	18.1[2]	19.0

[1] Harvest volumes generated from woodland and sod restoration treatments. These treatments were estimated outside the Vegetation Model.
[2] It would appear that 18.0 is the correct total. However 18.1 results from a the rounding process used in several spreadsheet applications used to estimate the total AAC.

Short-term and long-term harvest projections are illustrated for reasons discussed in the preceding section. The AAC is based on short-term harvest projections or the average volume estimated to occur during the first 30 years of the projection period.

Harvest projections are shown for each landscape (table 2-6). These projections are based on estimates obtained from the Vegetation Model. Harvest yields from each landscape could be monitored and compared to the landscape projections so that vegetation restoration treatments are balanced proportionately throughout the available acreage base.

Harvest projections were adjusted so that approximately half of the volume resulting from the underburn prescription was counted in the AAC. This adjustment was necessary to assure desired vegetation structures, primarily snags, were left in place after prescribed underburns or when wildfires occur that produced underburn effects.

The AAC will be administered using a five-year regulation system where 75 to 125 percent of 18.1 mmbf may be harvested during the first four years of the regulation period (figure 2-7). This system provides more options to harvest and sell timber when market conditions or other factors are most favorable. Total harvest over a five-year period would not exceed 90.5 mmbf. The regulation system will apply to regulated harvests only as illustrated in table 2-7.

Year	Minimum	Maximum	Average
1	13.6	22.6	18.1
2	13.6	22.6	18.1
3	13.6	22.6	18.1
4	13.6	22.6	18.1
5	0	36.1	18.1
Total			90.5

Table 2-7. The AAC will be administered using a five-year regulation system where 75 to 125 percent of 18.1 mmbf may be harvested during the first four years of the regulation period.

The Scale and Timing of Activities

Ecosystem management further changes the scale and timing of activities within the forest. Timber removal is intended to mimic natural disturbances, and therefore it should occur at a frequency and on a scale comparable to that of natural disturbances. Past management was characterized by frequent but minor disturbances (for example, a site under an individual tree selection prescription might receive 5 entries per rotation). That approach might mimics the frequency of disturbances in the Nonlethal Fire Regime, but not in the Mixed or Lethal Fire Regimes. Natural disturbances were large and infrequent in the Mixed and Lethal Fire Regimes, and therefore management activities in those regimes should follow a similar pattern. Increasing the scale and extending the interval between activities provides the opportunity to create a condition of minimal human disturbance during the intervening periods. For example, activities should be conducted on a subwatershed scale that allows for most management objectives to be achieved on a single entry consistent with the natural cycle. Hydrologic disturbance patterns can more closely mimic natural patterns under this approach. Most roads in the subwatersheds are not needed during the intervening years. All roads not needed for access or fire suppression can be temporarily closed and all culverts removed until the next entry. This approach is a major advance over the traditional approach in that it does not require a permanent and complete network of roads on the landscape. As a result, the range of variability in hydrologic processes is reduced and more closely approximates the natural range.

Forest-wide Objectives for Timber Management

General

1. Develop and update a harvest implementation plan each year based upon recent harvest activities and forest-wide monitoring. The plan will cover a minimum of five years.

2. Update the Interim Old Growth Definitions by December 2002.

These definitions will provide guidelines to use in the mapping and classification of old growth stands. They will reflect old growth characteristics based on vegetation conditions resulting from historical fire disturbance regimes

3. Revise the seral class code by splitting the first density or canopy closure category (0 to 39%) into two categories (0 to 14% and 15 to 39%) by 2001. Revise RVs, RMVs, and DCs to reflect this change by 2001.

Nonlethal Fire Regime

Grasslands

4. Use fire-management-response strategy and prescribed burn treatments on 5,400 acres of existing grasslands within the forest to restore and maintain historical levels of herbaceous and seral shrub vegetation.

Maintain these sites with a fire-management-response strategy and periodic prescribed fire treatments that are consistent with historical fire return intervals (seven to ten years) for the Nonlethal Fire Regime.

5. Use a combination of silvicultural, mechanical, and prescribed fire treatments to restore 4,200 to 5,600 acres of encroached grasslands by the year 2029.

Maintain these sites with a fire-management-response strategy and periodic prescribed fire treatments that are consistent with historical fire return intervals (seven to ten years) for the Nonlethal Fire Regime.

Woodlands and Old Growth

6. Use fire-management-response strategy, silvicultural, mechanical, and prescribed burn treatments on 5,700 to 7,600 acres of existing ponderosa pine woodlands within the forest to maintain pine and bunchgrass communities by 2029.

Burn activities will be consistent with historical fire return intervals for ponderosa pine woodlands within the Nonlethal Fire Regime.

7. Use a combination of silvicultural, mechanical, and prescribed fire treatments to restore and maintain 300 to 400 acres of encroached woodlands by the year 2029.

Maintain these sites with a fire-management-response strategy and periodic prescribed fire treatments that are consistent with historical fire return intervals (10 to 15 years) for ponderosa pine woodlands within the Nonlethal Fire Regime.

Parklike Stands and Old Growth

8. Restore parklike forest structures by increasing Clusters J and K to a combined DC range of 15 to 55 percent by the year 2089. These two clusters are composed of old stands of ponderosa pine with moderate to closed canopies.

This objective will be accomplished through the use of a fire-management-response strategy, mechanical treatments, periodic prescribed fire treatments (20 to 25 year interval), and silvicultural treatments. These clusters will meet the size and density characteristics of old growth, and a portion will be managed for full old-growth conditions as described in the Tribes' *Interim Old-growth Definition* (and future amendments).

Forest Health

9. Decrease favorable habitat conditions for bark beetle complexes by increasing Cluster J to an DC range of 10 to 40 percent by the year 2089. Cluster J is composed of stands of large, ponderosa pine trees with moderate canopy closure.

This objective will be accomplished through the use of prescribed burn treatments and timber harvest treatments.

10. Manage Cluster G at the lower end of its density range (60 to 70%) and for species that are non-host for the prevalent pathogen through the use of harvest treatments and prescribed fire.

Cluster G is composed of mature pine stands with moderate to closed canopies.

11. Reduce the impacts of common root rot complexes, Douglas-fir dwarf mistletoe, and Western spruce budworm by decreasing Clusters E, H, I, and L to an DC range of 0 to 20 percent by the year 2089.

This group of clusters is composed of mature and old stands of Douglas-fir with moderate to closed canopies.

Mixed Fire Regime

Early-Seral Vegetation

12. Maintain Cluster A at an DC range of 0 to 25 percent through a fire-management-response strategy and silvicultural, mechanical, and prescribed fire treatments.

This cluster is composed of young, open stands of ponderosa pine and western larch.

Parklike Stands and Old Growth

13. Restore parklike forest structures by increasing Clusters J and K to a combined DC range of 5 to 20 percent by the year 2089. These two clusters are composed of old stands of ponderosa pine and larch with moderate to closed canopies.

This objective will be accomplished through the use of a fire-management-response strategy, mechanical treatments, prescribed burn treatments, and silvicultural treatments. These clusters will meet the size and density characteristics of old growth, and a portion will be managed for full old-growth conditions as described in the Tribes' *Interim Old-growth Definition* (and future amendments).

Forest Health

14. Reduce the impacts of common root rot complexes, Douglas-fir dwarf mistletoe, and Western spruce budworm by decreasing Clusters E, H, I, and L to an DC range of 0 to 20 percent by the year 2089.

This group of clusters is composed of mature and old stands of Douglas-fir and occasionally grand fir with moderate to closed canopies.

Lethal Fire Regime

Early-Seral Vegetation

15. Maintain Clusters A, B, and C at a combined DC range of 15 to 40 percent using a fire-management-response strategy, and silvicultural, mechanical, and prescribed fire treatments.

This group of clusters is composed of young stands of lodgepole pine, spruce, grand fir, alpine fir, and larch with open, moderate, and closed canopies.

Old Growth

16. Restore old-growth lodgepole pine by increasing Clusters F and G to a combined DC range of 35 to 55 percent by the year 2089.

These clusters are composed of mature stands of larch, lodgepole, and spruce with moderate and closed canopies. They will meet the size and density characteristics of old growth, and a portion will be managed for full old-growth conditions as described in the Tribes' *Interim Old-growth Definition* (and future amendments).

17. Restore old-growth spruce and fir by increasing Clusters K and L to a combined DC range of 15 to 30 percent by the year 2089.

These clusters are composed of mature and old stands of larch, spruce, and fir with moderate to closed canopies. They will meet the size and density characteristics of old growth, and a portion will be managed for full old-growth conditions as described in the Tribes' *Interim Old-growth Definition* (and future amendments).

Timberline Fire Regime

Whitebark Pine

18. Map the extent of whitebark pine by 2009.

19. Reintroduce periodic fire to 6,500 to 8,600 acres of whitebark pine habitats by the year 2029 using a combination of a fire-management-response strategy, fire use for resource benefit, timber harvest activities, mechanical treatments, and planned ignitions.

Stands will be maintained with various methods that will provide fire return intervals of 35 to 50 years.

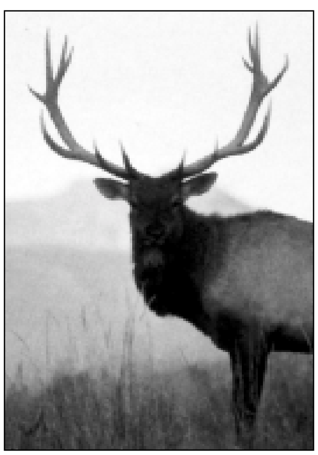
Wildlife: Pre-European Conditions

Wildlife has always been an immensely important part of the lives and traditions of the Salish and Kootenai Tribes. Historically the Tribes relied heavily on game and fur-bearing animals. The introduction of the horse facilitated the hunting of buffalo on the plains east of the Rocky Mountains. As the bison disappeared in the late 1800s, local wildlife populations became the most important sources of meat and raw materials. Pete Beaverhead once described how deer were hunted in the old days:

> When the Indians are going to hunt, they have a head leader called a situs. There will be many, many young men. And when the Indians move from their regular homes and get all their camps set up, they would have their horses all herded back. Everyone at camp was afoot. Then it will be agreed that a certain place was where they will hunt in the morning.
>
> The next morning the men go to this place. It might be a wide place in a draw. They would say, "This one particular draw or canyon is where we will hunt."… They killed around a hundred deer. They didn't kill them all, and they turned the rest loose. The children who were old enough and also the women went along to drag the deer back to camp… It was really something to see… Over towards the Deer Lodge country was where the deer is plentiful.
>
> The Indians did this type of hunting until there was enough meat supply to last them a long time. Then the Indians went back after their horses, which they herded back to their regular homes.
>
> My father was with this group of Indians when they went hunting. He was the one who told me this story.
>
> — Pete Beaverhead
> Pend d'Oreille Elder, 1975

"They killed around a hundred deer. They didn't kill them all, and they turned the rest loose. The children who were old enough and also the women went along to drag the deer back to camp… It was really something to see…"
— Pete Beaverhead
1975

There are both Native American oral and non-Indian written accounts of wildlife conditions in the western United States prior to European settlement. Oral accounts are documented in culture committee archives. Most of the written records are from early explorers, fur traders, and missionaries. The non-Indian people who traveled through the northwest region give varying accounts of the status of wildlife populations. Differences in the authors' understanding of game and their habitats make it exceedingly difficult to ascertain from these documents the preexisting conditions of wildlife populations and wildlife habitat before European-Americans arrived. The native oral accounts, however, make it clear that Indian people were acutely aware of the rise and fall of game populations. The tribes used fire for a variety of reasons, chief among them increasing forage for their horses and big game. The role of natural fire and fires set by Indian people had a major affect on wildlife habitat.



The Thompson party reported elk were very rare and only killed one during the expedition.

The three Tribes made frequent trips eastward to hunt bison and other game on the Great Plains, especially after the introduction of the horse. Bison furnished the tribes with large amounts of meat, hides for tepees and clothing, and bones to make weapons and tools. West of the divide, the Tribes hunted elk, deer, moose, bear, sheep, goats, and caribou. The latter species has been virtually obliterated due to logging of old-growth forests and non-Indian settlements. The spread of white-tailed deer into the area may have also spread disease to caribou.

Written Historical Accounts

The earliest written records of game abundance come from the journals of the Lewis and Clark expedition (1804-1806). The explorers were astounded by the abundance of game on the prairies east of the Continental Divide. As the expedition reached the Bitterroot Valley, game was still in sufficient quantities to keep the party fed, however animals became scarce after they crossed over the Bitterroot Mountains around Lolo Pass, and the group was forced to subsist on stored supplies. They nearly starved to death. On their return trip through this area in June of the following year, game was still scarce, although they managed to kill a few deer.

It is not clear why there appeared to be very few game animals in the area. Koch states that game herds in Idaho and western Montana were relatively poor compared to the abundant herds on the Plains. Ross Cox, a member of the Peter Skene Ogden Expedition, made a trip in 1812 up the Clark Fork River to around present-day Thompson Falls. The expedition nearly starved also and did not see any game until farther upriver where they found bighorn sheep in huntable numbers. He also noted that the Flathead Indians were depending entirely on dried buffalo meat which they obtained from their annual hunt on the plains. David Thompson, also of the Northwest Company, explored the Clark Fork and Kootenai River drainages between 1808 and 1811. Thompson was able to procure only a few "antelope" and had to rely mostly on dried fish and moss bread, a survival food made by the local Indians from tree lichen. (Thompson's "antelope" were probably deer or bighorn sheep.) The Thompson party reported elk as being rare and only killed one during the expedition.

In contrast to this paucity of game comes the report of Alexander Ross, another fur trapper, on an expedition up the same Clark Fork River 12 years after David Thompson in 1823. The Ross expedition was very large and consisted of 55 men, 25 women, and 64 children. In the dead of winter, this party carried no supplies but instead subsisted entirely on the abundant game they found in the region, primarily elk, deer, and bighorn sheep.

Other wildlife species have seen drastic range and population reductions since non-Indians settlement. The most visible species were the larger carnivores such as the grizzly bear, which is now relegated to the Mission Mountains and possibly the Rattlesnake Wilderness Area,

The Ross expedition was very large and consisted of 55 men, 25 women, and 64 children. In the dead of winter, this party carried no supplies but instead subsisted entirely on the abundant game they found in the region, primarily elk, deer, and bighorn sheep.

The Peter Skene Ogden Expedition nearly starved also and did not see any game until they found bighorn sheep in huntable numbers.

South Fork Primitive Area, and the Ninemile Divide. The grizzly once roamed the valley bottoms from the Jocko to Flathead Lake. Wolves were also more common and likely lived throughout the Reservation. It is believed that wolves may have also kept coyote populations lower than present conditions and may have at times controlled big game populations.

A ruffed grouse on her nest. Three species of mountain grouse inhabit the Reservation: blue, spruce and ruffed. Blue grouse use higher elevation open areas within coniferous forests. Spruce grouse prefer spruce forests and pine habitats, and ruffed grouse live in mixed or deciduous stands like the one shown below.

Conflicting Early Reports

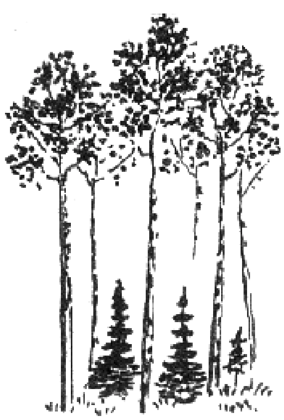
The conflicting reports of early explorers makes it difficult to firmly state how much game was present when non-Indians first arrived. It may well be that Lewis and Clark suffered from a visibility bias when they compared the abundance of game of the more open Great Plains to that of the more densely forested mountain ecosystem. Many people of the period believed that the northwest part of Montana had the potential to support larger big game herds. Some authorities believe that relative to the abundance of the Great Plains, this area supported modest game populations. In other words, game was not necessarily scarce. Wildlife populations are naturally dynamic, always responding to changing conditions. These changing conditions result in periods of population stability as well as population peaks and depressions. Different observations by early explorers may reflect these conditions.

Wildlife Populations and Habitats Today

The federal government opened large areas of the Reservation to non-Indian ownership in the early 1900s. This brought major changes in the quantity and quality of wildlife habitat. Non-Indian settlers converted forests to range and croplands, and fire suppression allowed grassland areas to become forested. Non-Indians introduced exotic species, primarily upland gamebirds, and some of these flourished. The changes resulted in the local eradication of some species and the decline of others.

Today, human activities continue to diminish wildlife habitats. Perhaps the most noticeable changes that have occurred are reductions in the ranges of larger carnivores such as the northern gray wolf and grizzly bear. Another significant change is loss of big game winter range due to high road densities, housing developments, and competition with livestock. In addition, the habitats of other species have been altered by fire suppression, logging, grazing, various forms of development, and the introduction of exotic plant and animal species. Fire suppression alone has had major consequences. For example, at low elevations, open stands of old ponderosa pine, which provided important habitat for many wildlife species, have been converted to dense thickets of Douglas-fir. At higher elevations, fire exclusion policies have meant fewer natural openings, which also provide important habitat. Although there is still great ecological diversity on the Reservation, humans have altered many of the natural ecological processes that influence wildlife habitats. Arresting the degradation and managing wildlife for the long-term benefit of Tribal members is one of the Tribes' highest priorities.

The Federal Endangered Species Act of 1973 established two categories of protected species. An endangered species is defined as a species in danger of extinction throughout most or all of its range. A threatened species is one that is likely to become endangered in the near future. The federal government lists the grizzly bear as threatened in Montana. On the Reservation, grizzlies occur primarily in the Mission Mountains and adjacent areas, although there have been occasional observations in the southern parts of the Reservation.



The federal government lists the bald eagle as a threatened species in Montana, although the FWS has proposed to remove it from the list of threatened species. Fourteen bald eagle breeding territories occur within the Reservation. Most of these are along the Lower Flathead River. Migrant and overwintering bald eagles may number as high as 70 birds during peak periods.

The northern gray wolf is listed as endangered in Montana. It once occupied the Reservation, but was eliminated during the early days of non-Indian settlement. Wolves occasionally pass through the Reservation, and they have denned near the south boundary. They may eventually repopulate some areas of the Reservation.

The Canada lynx has been proposed for listing as a threatened species (figure 2-34). The status of the lynx on the Flathead Indian Reservation is unknown at this time. Track surveys and remote sensing cameras have detected the presence of lynx. Studies of their status are underway.

The peregrine falcon is listed as endangered in Montana. Although no verified breeding records exist for it on the Reservation, the species probably inhabited portions of the Mission Mountains and possibly the Flathead River. Peregrines are observed as occasional migrants during fall and spring, and have been seen during the summer as recently as 1990. In 1992 the Tribes began reintroduction efforts on the Reservation. Habitat conditions for threatened and endangered species are described later in this section. Please see Appendix E for more specific information.

"Arresting this degradation and managing wildlife for the long-term benefit of Tribal members is one of the Tribes' highest priorities."
—CSKT Comprehensive Resources Plan, 1995

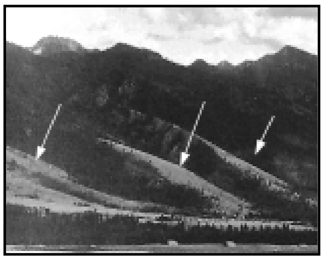
Sensitive species are those for which current viability is a concern, as evidenced by significant downward trends in their population status or habitat. The Tribes classify 39 terrestrial, vertebrate wildlife species on the Reservation as sensitive. Most of these occur in the forest. All are considered sensitive due to low populations, threats to their habitats, or highly restricted distributions. These species do not necessarily have legal protection but are considered sensitive to human activities and attention to their habitat and population needs may be warranted during the planning of resource management activities. The status of many of these species is not known because there have been few population or habitat studies. The following wildlife species are considered sensitive by the Tribes:

Coeur d'alene salamander
Boreal toad
Tailed frog
Common loon
American white pelican
Black-crowned night-heron
White-faced ibis
Trumpeter swan
Harlequin duck
Bald eagle
Northern goshawk
Ferruginous hawk
Peregrine falcon
Columbian sharp-tailed grouse
Black-necked stilt
Franklin's gull
Caspian tern
Common tern
Forster's tern
Black tern
Yellow-billed cuckoo
Flammulated owl
Burrowing owl
Great gray owl
Boreal owl
Black swift
Black-backed woodpecker
Loggerhead shrike
Baird's sparrow
Le conte's sparrow
Townsend's big-eared bat
Northern bog lemming
Gray wolf
Grizzly bear
Lynx
Woodland caribou
Wolverine
Fisher
River Otter

Figure 2-34. Lynx are proposed for listing by the U.S. Fish and Wildlife Service.

Forest Habitats

There are approximately 358 wildlife species found on the reservation. Many have unique habitat requirements. The structural characteristics of timber vegetation play a major role in determining the kinds of habitats available. For example, ***landscape diversity***, a key measure of the ability of an area to support a diversity of wildlife species, is based upon forest habitat types and seral condition or structure and composition of the timber vegetation.



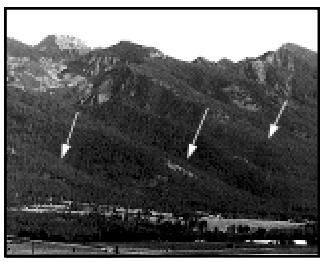


Figure 2-35 a and b. Another trend affecting wildlife is that trees are encroaching into openings that had been maintained by fires. Forest meadows and grasslands such as these in the Missions add a great deal to the diversity of our plant and animal communities—certain insects and birds and some large mammals are dependent on them. Without frequent fires, many of these areas are fast disappearing.

Measures of landscape diversity

1 Richness

Richness is defined by the number of habitat types and seral classes (figure 2-35).

2 Evenness

Evenness indicates how evenly distributed the different habitat types and seral classes are. In other words, if all appear in equal proportions the evenness index is high. If one or two dominate, the index is low.

3 Diversity index

The diversity index is derived by combining the above two measures into a single number.

4 Potential or Theoretical maximum diversity

This is the *potential* the landscape has for overall habitat diversity.

The values of each of these factors for each landscape are presented in Appendix F.

The Jocko landscape has the highest diversity, potential diversity, habitat richness, and evenness of the six Reservation landscapes. This is due to its relatively large size; its highly variable topography; and past logging practices, which have created a broad range of seral classes. The latter is especially true in the Nonlethal Fire Regime. Although data was not available, diversity in the Missions landscape is probably similar to that of the Jocko (figure 2-36).

The North Missions landscape is the least diverse. High annual precipitation reduces the number of dry habitat types and has yielded a more uniform, dense forest with a lower richness index. These various differences in habitat diversity directly or indirectly influence the type of wildlife present and population levels. A more diverse landscape or ecosystem theoretically supports more niches for wildlife to exploit.

Landscape Fragmentation and Diversity

Fragmentation on forested landscapes is caused by a combination of human and natural factors. Human factors that increase fragmentation include forest harvesting, housing development, power transmission lines, hydroelectric development, and road construction. Natural elements that increase fragmentation include meadows, talus slopes, avalanche chutes, ponds, lakes, streams, and rivers (figures 2-35 and 2-36).

Generally, wildlife managers are most concerned with human-caused fragmentation, the impacts of which vary depending upon the needs of individual species. For example, species

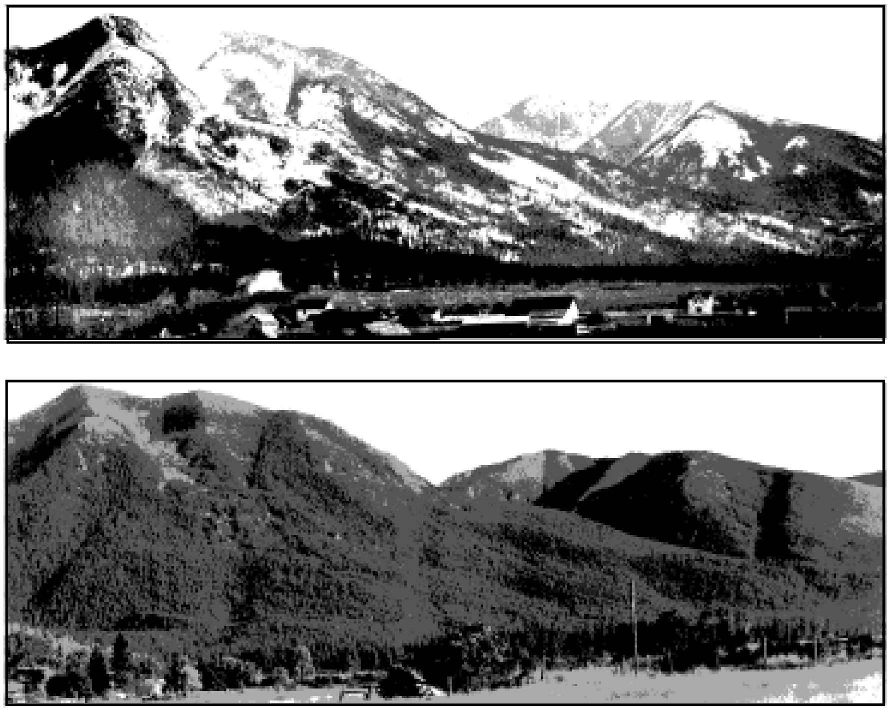


Figure 2-36 a and b. Fire exclusion policies have created major changes in habitat richness and fragmentation as these two photos of the old Jocko Agency area show. The top photo was taken in the early part of this century, the bottom in 1995. The changes have affected wildlife diversity.

such as white-tailed deer, ruffed grouse, and red-tailed hawk benefit from early seral habitats (the kinds of openings created by clearcuts), while other species like fisher, red-backed vole, boreal owl, and olive-sided flycatcher require interior forest habitats (large, contiguous patches of old growth or near old growth).

Wildlife diversity generally increases as large contiguous forests in late seral or old-growth condition are fragmented into smaller stands of varying sized age classes. However, there is a threshold past which increasing fragmentation causes diversity to decrease because the habitats become uniform and simplified in structure.

At first glance high species diversity seems desirable, and often this is the case. However, fragmentation (and the corresponding increase in diversity) can have negative effects on species like lynx, fisher, and pileated woodpecker, because they require large, contiguous forest patches. Species like elk, mule deer, and sharp-tailed grouse that need large open patches can also suffer from fragmentation. Thus, managers need to consider diversity not only at the stand and watershed levels, but also at the landscape level. Working at the landscape scale managers can develop a balance of forest conditions that contain fragmented areas as well as areas with larger patch sizes and more uniform size and age classes of timber.

Fragmentation on the six landscapes is highly variable (see Appendix F). The Missions Landscape is the least fragmented due to fire exclusion and the large acreage now unavailable for timber harvesting because of the Tribal Wilderness and Buffer Zone. The Southwest and Salish landscapes are also relatively unfragmented, although both are broken by large areas of scree slopes, meadows, and steep ground. The North Missions landscape has the largest average clearcut size of the six landscapes and a relatively high patch-dispersion index. (A high patch-dispersion index indicates uniformity in clearcut patterns across the landscape which means very few areas of interior forest remain.) The North Missions also has the highest percentage of its total acreage in clearcuts (17%). The West Landscape is the most fragmented, however, due to a very high patch dispersion index and other factors.

Thermal Cover

Thermal Cover is defined as a stand or patch of coniferous trees at least 40 feet in height with an average canopy closure of 70 percent (Thomas et al. 1979). The amount of thermal cover varies, depending upon fire regime, landscape, and past management practices (table 2-8). Low-elevation forests, particularly ponderosa pine and dry Douglas-fir forests in the Nonlethal Fire Regime, have experienced substantial increases in density due to encroachment by Douglas-fir and young ponderosa pine. In addition, selective logging has removed the old-growth pine trees that once dominated this forest and replaced them with younger trees. Higher stand density has resulted in an increase in thermal cover at the expense of old-growth pine forest. This has probably benefited species such as white-tailed deer, mountain lions, and some songbirds, but hurt species like mule deer and cavity-nesting birds, bats, and other small mammals.

Table 2-8. The existing condition of thermal cover (as a percentage of total acres in the fire regime) by fire regime and landscape.

Landscape	Nonlethal Regime	Mixed Regime	Lethal Regime
North Missions	55.1	58.6	51.9
Missions	60.6	66.1	42.7
Jocko	25.9	33.0	36.1
Southwest	5.9	18.5	26.9
West	4.3	3.4	15.0
Salish	13.0	19.4	19.7

Mid- and upper-elevation stands have undergone a shift in age and size classes due to past logging. The West and Salish Landscapes have low levels of thermal cover while the Missions and North Missions Landscapes have abundant thermal cover. Most of the old-growth stands have been logged except in the Missions Landscape. Existing thermal cover consists of small stands that may be isolated from forage and riparian areas, making them unavailable for use by species like elk, moose, flammulated owls, and ruffed grouse. This situation is found on much of the West Landscape and parts of the Jocko Landscape.

Hiding Cover

Hiding cover is defined as the vegetation structure and topographical terrain capable of hiding 90 percent of a standing adult elk at 200 yards. Hiding cover makes up from 8 to 20 percent of the Nonlethal Fire Regime, 12 to 23 percent of the Mixed Regime, and 25 to 33 percent of the Lethal Regime depending on the landscape (table 2-9). These levels are sufficient for big game. In some areas, the level of hiding cover in the Nonlethal Fire Regime is unnaturally high due to densification by Douglas-fir and fire suppression. In some areas, high road densities have reduced the effectiveness of hiding cover.

Table 2-9. The existing condition of hiding cover (as a percentage of total acres in the fire regime) by fire regime and landscape.

Landscape	Nonlethal Regime	Mixed Regime	Lethal Regime
North Missions	8.9	17.9	25.2
Missions	14.8	16.8	25.7
Jocko	23.0	19.9	31.0
Southwest	12.3	23.0	30.8
West	11.0	11.7	29.2
Salish	20.1	23.6	33.0

Snag Habitat

Snag levels are low across most of the commercial forest base due to past logging. Large snags still exist as individual trees throughout many areas of the forest. Some areas, such as the North Missions and Mission Landscapes, have residual patches with high snag densities (table 2-10). In areas where logging has not occurred due to low stocking or steep and rocky terrain, large snags are still present. Examples include the Seepay Creek watershed and the Perma/Little Money Creek area.

Landscape	Nonlethal Regime	Mixed Regime	Lethal Regime
North Missions	3.3	15.7	11.8
Missions	2.7	7.6	9.5
Jocko	2.4	1.1	1.8
Southwest	0.9	0.5	0.4
West	0.3	0.5	0.0
Salish	1.7	1.0	0.0

Table 2-10. The existing condition of large snag habitat (as a percentage of total acres in the fire regime) by fire regime and landscape.

Down Woody Debris

Conditions are similar to those described for large snag density. Older forests containing high amounts of down woody debris are few because old-growth forests have been largely lost. Some areas in the North Missions and Missions Landscapes retain higher levels because they are inaccessible (table 2-11). These areas include mainly mixed conifer and spruce-fir cover types and are important areas for lynx, red-backed voles, pileated woodpeckers, and many other wildlife species.

Landscape	Nonlethal Regime	Mixed Regime	Lethal Regime
North Missions	3.3	15.7	11.8
Missions	2.7	7.6	9.5
Jocko	2.4	1.1	1.8
Southwest	0.9	0.5	0.4
West	0.3	0.5	0.0
Salish	1.7	1.0	0.0

Table 2-11. The existing condition of down woody debris habitat (as a percentage of total acres in the fire regime) by fire regime and landscape.

Early-Seral/Forage Habitat

A large part of the forest base is currently in an early- to mid-seral condition from intensive timber harvesting and grazing (table 2-12). Within this early-seral base, many acres are either in new clearcuts with little regeneration or in older clearcuts with fairly extensive regeneration. Other areas are natural meadow openings with few or no trees. Early-seral/forage habitat levels are currently not a limiting factor for early seral wildlife species. In some areas (such as the West and Jocko Landscapes), these early seral habitats are probably in a more fragmented pattern than would have occurred naturally.

Table 2-12. The existing condition of early-seral/ forage habitat (as a percentage of total acres in the fire regime) by fire regime and landscape.

Landscape	Nonlethal Regime	Mixed Regime	Lethal Regime
North Missions	24.8	20.2	25.9
Missions	25.2	12.9	22.2
Jocko	35.4	24.2	26.6
Southwest	57.5	33.7	26.9
West	56.8	53.5	35.8
Salish	44.6	36.0	38.5

Pileated woodpeckers, like many species that use old-growth forests, are affected by fragmentation.

Some early-seral/forage habitat is in poor condition due to noxious weed invasions and livestock grazing. This is particularly evident on mountain foothills and in riparian areas in the Nonlethal and Mixed Fire Regimes in areas like Valley Creek, Pistol Creek, Jette, Selow Creek, and Lonepine. Many of these areas do not support the big game and other wildlife populations that they are capable of supporting. This is mainly due to intensive, season-long grazing, which has left little grass for forage and nesting, particularly in riparian zones. Livestock have largely eliminated grassland and shrub vegetative structure from these areas. This has impacted small mammals, big game, and breeding birds and allowed weeds to invade, which has further exacerbated the problem. Cattle grazing has also reduced fine fuels and thus altered fire regime processes (Belsky and Blumenthal 1997).

Early seral habitats at higher elevations (in the Lethal and Timberline Fire Regimes) receive less intensive use because of their steep slopes and a lack of water. Consequently, they are in better condition. Some of these areas are critical big game summer ranges. One concern in these higher elevation areas is fire suppression. Historically, fires maintained early-seral/forage habitat and provided summer range and winter range for big game, grizzly bears, and songbirds. Fire suppression has caused a dramatic reduction in these habitats as forests have grown dense and encroached upon open meadows. This is most evident in the Missions Landscape where there has been no logging or natural fire to provide the disturbances needed to maintain early-seral conditions. Whitebark pine habitat, critical for grizzly bears and some bird species, has been lost due to fire suppression and the introduction of white pine blister rust.

Clearcutting

The extent of clearcutting is discussed in the paragraphs on early-seral/forage habitat.

Fragmentation caused by clearcuts has the potential to impact some wildlife species. All six landscapes have some degree of natural and human-caused fragmentation. The North Missions and West Landscapes have the highest levels of fragmentation from intensive forest practices. They are much more fragmented than they were during the pre-European period, which has probably impacted species that require large patches of contiguous mature forest like the fisher and pileated woodpecker. Big game movement corridors have also been impacted in some areas by extensive clearcutting and high road densities.

The Missions landscape is the least fragmented. It, too, is not representative of the pre-European condition. During the pre-European era, natural and Indian-set fires kept the landscape in a more open condition. A more detailed description of fragmentation for each landscape, including statistics, is included in Appendix F.

Threatened and Endangered Species Habitat

Grizzly Bear

Grizzly bears are found mainly in the Mission, North Missions, and Jocko Landscapes. This area is part of the Northern Continental Divide Grizzly Bear Recovery Zone. Three separate habitat zones are recognized on the Reservation: Situation 1, Situation 2, and Situation 3 (Appendix G). Each of these has a unique set of restrictions on the types of resource management activities allowed, the timing of activities, and mitigation requirements. Grizzly bear management is primarily focused on reducing human-bear conflicts, minimizing bear mortality, and providing secure high quality habitat for bears. Human-bear conflicts are currently the leading cause of bear mortality.

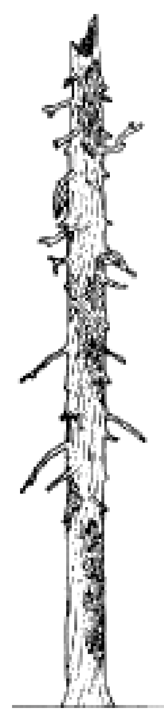
Logging activities can be used to improve habitat for bears. For example, silvicultural prescriptions — logging and prescribed fire — can be used to covert the forest to early-seral stages in order to improve forage conditions. However, intensive forestry — logging that converts a forest to mostly early-seral conditions and that increases road densities — is detrimental for bears.

Rocky Mountain Wolf

Wolves have been documented on the Flathead Indian Reservation. The sightings have been of wolves from existing packs that reside near the Reservation boundary. Because wolves are habitat generalists and are dependent on healthy prey populations, habitat manipulation through logging may not seriously impact wolves unless it lowers prey populations, particularly the populations of big game species. Important big game habitat includes calving and fawning areas, winter range, and summer range. Maintaining healthy prey populations by protecting these important habitats will insure a potential for the wolf's return to the Reservation. If packs become established within the Reservation, more direct management, such as the protection of denning and rendezvous sites, may be needed. Otherwise, most management for wolves would be through the management of big game populations.

Bald Eagle

The Montana Bald Eagle Management Plan (1994) lists specific objectives for eagle habitat. On the Reservation, the major bald eagle habitat is Flathead Lake and the Flathead River. Other important habitat is located around major reservoirs and mountain lakes. Eagle habitat consists of three major components: nesting, roosting, and foraging habitat. Important nesting habitat consists of large open-canopied trees adjacent to large water bodies. The nesting period is critical for eagle productivity. Resource extraction activities need to be well planned to avoid interference with nesting and disruptions that could endanger future nesting. Foraging habitat



consists of maintaining an adequate fisheries food base and large and tall trees and snags for perching. Roosting habitat consists of mature forest with moderate to closed canopies. Human activities like logging, highway construction, and mining can disrupt the use of these habitats and force eagles to abandon areas. Resource management or construction activities need to consider impacts to bald eagles to maintain or increase existing eagle populations and eagle habitat.

Grizzly bear management is primarily focused on reducing human-bear conflicts, minimizing bear mortality, and providing secure high quality habitat for bears.

Currently, bald eagles are present along Flathead Lake and the Flathead River. Although many areas are occupied by nesting bald eagles, the recruitment of nestlings and juveniles into the breeding population is low. The reasons for this are not known, but it may be due to pollutants in Flathead Lake or disturbances during the breeding season.

Peregrine Falcon

This species was once more common on the Flathead Indian Reservation but habitat destruction and the widespread use of DDT and other pesticides have dramatically reduced the numbers. Since DDT has been banned in the U.S. and a captive breeding program started, peregrine falcons have increased steadily in many parts of their former range. Two reintroduction sites were established on the Reservation in the early 1990s. Reintroduction has been successful at one of these. Potential habitat exists, primarily in the Mission Mountains and along the Flathead River.

Managing for peregrine falcons involves protecting nesting falcons from disturbances and maintaining a prey base. Typical peregrine nesting habitat includes large cliffs, but the species is also known to nest on bridges, the ground, and city skyscrapers. Prey species include waterfowl, doves, grouse, and other upland game birds. Potential disturbances include logging, explosives, and general construction activities. Competition for nest sites occurs between peregrine and prairie falcons and great horned owls. Predation from great horned owls can also be a problem.

Canada Lynx

The Canada lynx has been proposed for listing as a threatened species. The status of the lynx on the Flathead Indian Reservation is unknown at this time, although it is known lynx habitat exists on the Reservation, and track surveys and remote sensing cameras have detected the presence of lynx. Studies of their status are underway.

Lynx prefer subalpine fir communities, that occur at higher elevations than the drier ponderosa pine and Douglas-fir types. The subalpine fir types provide both foraging and denning habitat. They also provide habitat for the primary prey of lynx, the snowshoe hare.

During pre-European settlement times, there were relatively long intervals between fires in the subalpine, but the fires that did occur were generally large, stand-replacement fires. The burns regenerated into dense stands of lodgepole pine, subalpine fir, and spruce that provided large expanses of lynx habitat. Decades of fire suppression and timber harvesting have resulted in a forest mosaic that has lower quality lynx habitat.

Old Growth

Very few stands of old growth exist within the commercial base of the forest. Most old growth was logged many years ago, especially old growth ponderosa pine, western redcedar, and larch. Some old growth that is inaccessible to logging remains in the North Missions Landscape. Many parts of the noncommercial forest, such as the Mission Mountains Tribal Wilderness and South Fork of the Jocko Primitive Area, retain old-growth communities.

Forest-wide Objectives for Wildlife

1. **Follow ecosystem management objectives to improve wildlife habitats and population levels except when objectives may conflict with threatened and endangered species and other species of concern.**

   Examples are important travel corridors and linkage zones and habitats deemed critical for the survival of a species or community of species.

2. **Rehabilitate big game summer and winter ranges by effectively reducing road densities, minimizing competition with livestock grazing, reducing exotic weed invasions, managing human development in critical areas, and using harvesting, wildfire, prescribed fire, and herbicides.**

3. **Develop snag guidelines to account for slow snag recruitment areas and losses to firewood cutting by 2002. Develop guidelines for downed woody material important for mid-sized carnivores like marten, fisher, and lynx by 2002.**

4. **Restore, to the extent possible, pre-European old-growth forests in all fire regimes by 2089.**

5. **Reduce fragmentation in all landscapes with particular emphasis on the Nonlethal and Lethal Fire Regimes.**

6. **Develop a Reservation wildlife management plan by 2002 that will compliment other Reservation management plans.**

7. **Continue work on restoring and managing pre-European wildlife species and populations.**

   Continue interagency activities to improve wildlife and habitats within the reservation and on aboriginal territory, especially for sensitive species and species of concern.

8. **Continue monitoring populations and habitats for big game, waterfowl, neo-tropical migrant and resident land birds, forest owls and other raptors, forest carnivores, and reptiles and amphibians.**

9. **Continue mitigation efforts for Kerr, Hungry Horse and Libby dams.**

10. **Increase big game habitat effectiveness (figure 2-37) to an average of 40 percent (3 miles of open road per square mile) in the Lethal Fire Regime, and to an average of 30 percent (4 miles of open road per square mile) in the Nonlethal and Mixed Fire Regimes by the year 2009.**

    Road closure methods will include permanent abandonment in the Lethal Fire Regime, and barriers and recontouring in the Nonlethal and Mixed Fire Regimes.

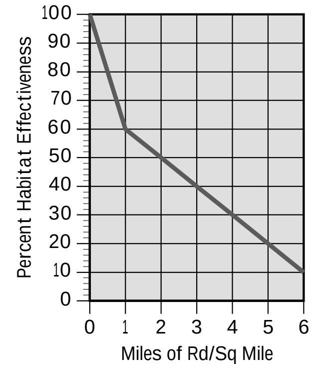


Figure 2-37. Open road density (the number of miles of open road per sq. mile) is a measure of habitat effectiveness for big game. As open road density increases, habitat effectiveness decreases. To increase habitat effectiveness, roads need to be closed either temporarily (with barriers) or permanently (by ripping and seeding, or recontouring the road bed).

11. Restore and maintain Clusters G, H, K, and L at the following DC ranges by the year 2009 to provide forest areas within each landscape that offer closed canopies for wildlife.

Fire Regime	Percent of Fire Regime
Nonlethal Fire Regime	10 to 45%
Mixed Fire Regime	22 to 55%
Lethal Fire Regime	55 to 90%

This objective will be accomplished by deferring harvest and thinning or where appropriate, through the use of silvicultural prescriptions and fire.

12. Restore and maintain Clusters B, C, and D at the following DC ranges by the year 2009 to provide areas within each landscape that offer hiding cover for big game.

Fire Regime	Percent of Fire Regime
Nonlethal Fire Regime	10 to 25%
Mixed Fire Regime	20 to 40%
Lethal Fire Regime	20 to 45%

This objective will be accomplished through the use of silvicultural prescriptions and fire.

13. Restore and maintain Clusters I, J, K, and L at the following DC ranges by the year 2089 to provide areas within each landscape that offer snag habitat for cavity-nesting wildlife species and down and dead woody debris for wildlife.

Fire Regime	Percent of Fire Regime
Nonlethal Fire Regime	15 to 65%
Mixed Fire Regime	5 to 30%
Lethal Fire Regime	15 to 40%

This objective will be accomplished by deferring harvest and thinning or where appropriate, through the use of silvicultural prescriptions and fire.

14. Restore and maintain Clusters A, B, and C at the following DC ranges by the year 2009 to provide areas within each landscape that offer forage and breeding habitat for early-seral wildlife species.

Fire Regime	Percent of Fire Regime
Nonlethal Fire Regime	20 to 80%
Mixed Fire Regime	15 to 60%
Lethal Fire Regime	15 to 40%

This objective will be accomplished through the use of silvicultural treatments and fire.

15. Maintain and restore the species composition of 70 percent of forested riparian areas by 2020 so that the type and number of species is the same as that of undisturbed reference riparian areas.

Methods used will include the removal of noxious weeds or other invasive, nonnative species and the implementation of management prescriptions that reverse conifer densification in the Nonlethal and Mixed Fire Regimes.

Water and Fisheries

Water: Yesterday and Today

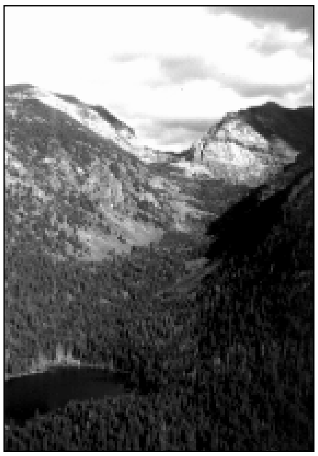


Figure 2-38. Many of the forested watersheds on the Reservation start out in high basins like the headwaters of Hellroaring Creek.

The water resources found within the Flathead Indian Reservation include all or part of three river systems, the south half of Flathead Lake, hundreds of streams, extensive and diverse wetland systems, and large groundwater aquifers. Waters entering the Reservation and streams arising in the high country of the Reservation are generally of good to excellent quality. Native fish species such as cutthroat, bull trout, and mountain whitefish depend on clean water, adequate instream flows, and high quality stream and lake habitats. Most of the amphibians, reptiles, birds, and mammals indigenous to the Reservation also require clean water and the food and cover that borders streams, ponds, and lakes. Large mammals like grizzly bears use riparian areas as feeding and travel corridors.

Reservation watersheds contain extensive pristine aquatic habitat — much of it in headwater forested areas (figure 2-38). However, each increment of activity has the potential to detrimentally impact aquatic resources, and as traditional and new development pressures increase, the high quality and interconnectedness of aquatic resources decreases.

The Reservation's surface and ground waters remained relatively undisturbed until the Flathead Allotment Act of 1904. This act eventually led to the construction of an extensive irrigation network that now includes approximately 1,200 miles of canal and seventeen irrigation reservoirs, nine of which are in forested areas. Development within the forested landscape over the last century has prompted the construction of an extensive road network with large sections of road within riparian areas and innumerable stream-crossing structures. Vegetative manipulation has influenced the timing and magnitude of streamflows within individual watersheds. Grazing management practices have generally allowed livestock unrestricted access to stream corridors. The influence of this practice is minimal where conifer vegetation is dense, as it is in the Lethal Fire Regime. However, in the Nonlethal Fire

The Jocko River conveys large volumes of high quality water and is well known for its fishing.

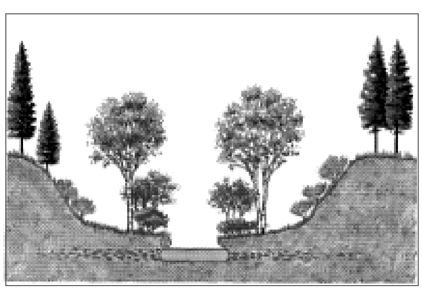
Regime, and to a lesser extent in the Mixed Fire Regime, unrestricted livestock access has had a significant influence on streamside corridors. In addition, commercial and homesite development within floodplain environments is increasingly influencing the character and quality of streamside environments.

Stream Channel Complexity

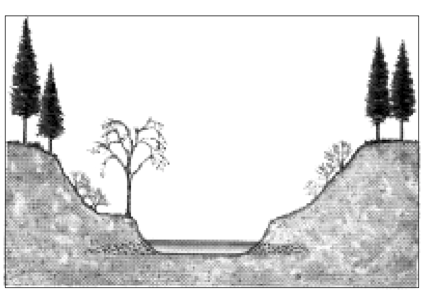
Stream channel complexity is a term used to characterize the diversity and range of aquatic habitats and the interconnectedness between habitats. Channel complexity is defined within the context of the stream environment being evaluated. For example, a high gradient alpine stream with a narrow floodplain may have less natural complexity than a low gradient stream with a wide floodplain. At the project level, channel complexity is defined with the following set of measurable aquatic attributes.

- Width of accessible floodplain environment and geomorphic features found in the floodplain environment. Geomorphic features may include cutoff channels, wetlands, and surface water-groundwater interaction zones.
- Variability in streambed elevation in a downstream direction can be a surrogate measure of the longitudinal diversity of the bed and indirectly characterizes hydraulic diversity, depth, and inchannel habitat diversity.
- The amount, quality, and diversity of inchannel habitat units including pools, riffles, tailouts, side channels, and other habitat features provides a measure of channel complexity.
- Substrate patchiness, or the variability in particle size distribution on the bed surface partly accounts for substrate habitat diversity and also the amount of fine sediment covering or infiltrating into the streambed.

When Healthy Streams are Degraded



In a healthy stream (left), the stream banks and channel are in good condition. Healthy riparian vegetation helps to stabilize the banks.



The stream channel widens and gets shallower in response to deteriorating upland and/or riparian vegetation conditions. Eventually, the stream becomes even wider and shallower and swings back and forth in the channel.

- Large woody debris features in the channel, and the potential for continued large woody debris recruitment, are a significant component of channel complexity in forested streams.
- Bank margin diversity, including overhanging banks, roughness elements on banks, and bank cover characteristics are incorporated into channel complexity.

The primary influence from past forestry practices has been extensive roading of watersheds resulting in cases of delivery of sediment and encroachment on channels.

Reservation-wide surveys have not been completed to measure the components of channel complexity. Comprehensive surveys for recent project-level activities indicate that there is a moderate to high level of impact in the lower portions of most watersheds, which translates into decreased channel complexity. Loss of channel complexity at higher elevations generally is associated with stream crossing sites or previously-employed harvest methods.

Stream Connectivity

The connectivity between tributary streams and downstream, larger water bodies may be disrupted by irrigation structures, impassible stream crossings or other inchannel barriers. Due primarily to construction of the irrigation project, connectivity between upstream and downstream water bodies has been significantly disrupted. Many of the barriers occur in high-elevation canals located in the forested landscape. Table 2-13 estimates the percentage of streams with barriers that impact connectivity in each landscape.

Table 2-13. Percentage of streams with barriers that interrupt the connectivity between upstream and downstream water bodies

Landscape	Percentage of Streams
West	> 95%
Southwest	< 25%
Salish	< 25%
Jocko	> 80%
Mission	> 95%
North Missions	< 50%

Fluvial Geomorphology

Forested watersheds on the Reservation exhibit a recognizable downstream trend in stream channel and floodplain characteristics. This trend, illustrated in figure 2-39, is largely controlled by decreasing valley slope and increasing floodplain width in a downstream direction.

The summary below is taken from Makepeace (1998). That report contains a compilation of geomorphic data at over 20 reference reaches in forested watersheds and should be referenced for more in-depth information.

In headwater, first-order drainage basins, soil moisture accumulates and moves downslope via shallow, subsurface pathways. Across some transitional zone, which is often influenced by a change in geology or valley slope, the magnitude and duration of soil moisture moving downslope produces an incised stream channel. Incised headwater channels form the ephemeral channel network in Reservation forested drainages.

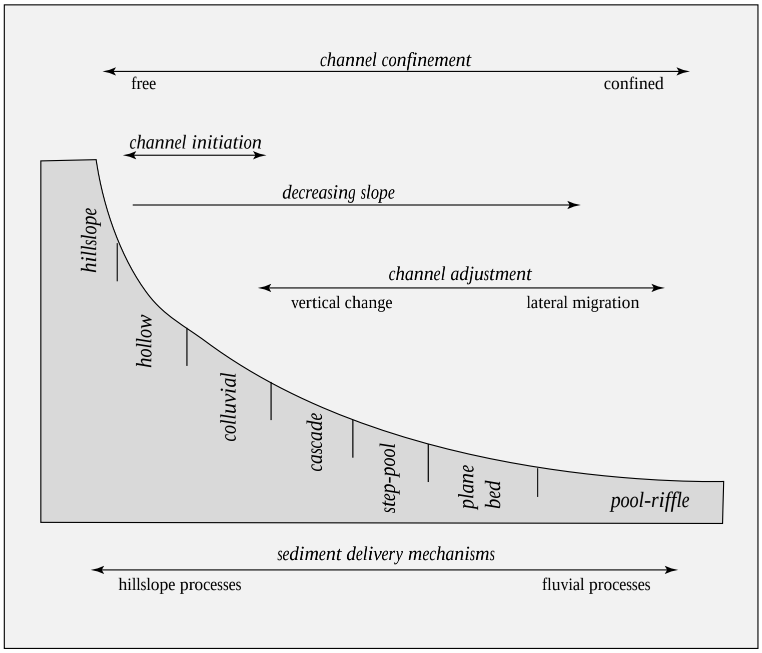


Figure 2-39. Longitudinal profile through a stream channel network (adapted from Montgomery and Buffington 1997)

Cascade stream channels develop in uppermost perennial stream reaches. Cascade channels are formed of irregularly spaced, large bed elements, including boulders and inchannel wood accumulations. Cascade channels are generally incised and have limited floodplain development. Downstream and often separated by cascade reaches, step-pool channel morphologies develop.

Step-pools channels are comprised of generally discrete, spaced accumulations of large-bed elements that form channel steps. Steps are separated by lower gradient pool areas where gravel size fractions accumulate (Grant et al. 1990). Cascade and step-pool channel morphologies are observed in most forested watersheds and forested stream reaches on the Reservation.

Plane bed channels are characterized as straight reaches with uniform substrate sizes and a channel which lacks the rhythmic alteration in bedforms found in most other channel types (Montgomery and Buffington 1997). Plane bed channels, though they occur in several forested watersheds, are not as widespread as cascade and step-pool morphologies (Makepeace 1998).

Pool and riffle channels are not well developed in forested watersheds because the alluvial valley width is generally restricted, and the meandering pattern which initiates pool-riffle sequences does not develop. Makepeace (1998) does report reference reaches with forced pool-riffle morphologies. These are channel types where pools form behind obstructions as backwater features. Riffle sections are generally not well developed, but occur as patches of gravel in depositional areas.

Concurrent with the downstream change in channel morphologies in forested watersheds, there is generally a decrease in sediment delivery from hillslope sources and an increase in sediment delivery from fluvial, or near-channel sources (figure 2-39). This transition often coincides with an increase in floodplain width in a downstream direction.

Hillslope sediment delivery mechanisms include dry gravel from hillslopes, shallow seated earthflows, and debris flows. Often these are episodic sediment inputs which occur during or after extreme weather events. Fluvial sediment sources include channels scoured in the floodplain or sediment scoured from the floodplain during overbank flows. Often streambank sediment sources are limited in forested reaches due to dense vegetation along channel margins (Makepeace 1998).

Water Quality

Reservation-wide water quality information is detailed in two recent reports (CSKT 1997 and Makepeace 1999). The following review of water quality is abstracted from these reports, and they should be examined for more detailed information on water quality in forested watersheds.

At the outset it is important to recognize that there are two predominant land types on the Reservation: (1) forested areas and (2) lower-elevation palouse-prairie grasslands. The grassland land type has been almost entirely converted to agricultural or development uses. Overall, water quality data demonstrate that instream water quality declines as agricultural impacts reach stream corridors, but that water quality generally remains high in forested watersheds.

It is also important to recognize that water quality sampling has historically targeted valley-floor stream segments because of the elevated impacts which occur on the valley floor. Consequently, the number of water quality stations that isolate forest activities is more limited.

Water quality in forested watersheds is characterized as a calcium bicarbonate water type with total dissolved solids concentrations that do not exceed 200 mg/l. Dissolved oxygen concentrations range between 8 mg/l and 12 mg/l with occasional determinations outside of this range. Increases in water temperature are generally not observed in forested watersheds, partly because of the short distance between headwaters and mouth in most channels, but also because of BMP restrictions on riparian harvest.

Episodic, wet weather events have led to increased suspended solids loads in streams and decreased water clarity, but generally in forested drainages existing data indicate water clarity is generally high. Suspended solids and turbidity data do demonstrate a notable decrease in water clarity as agricultural impacts reach stream corridors.

Nutrient data (nitrogen and phosphorus) indicate significant increases in nutrients where irrigation return flows reach streams. However, in forested watersheds it is difficult to detect downstream increases in nutrients, and the magnitude of nutrient concentrations are similar for managed and unmanaged drainages.

Wetlands

At the present there is not a comprehensive inventory of forested wetlands. The Tribes cooperated with, and supported the development of the USFWS National Wetlands Inventory (NWI) for Reservation wetlands. The inventory is based in part on aerial photographic delineation of wetlands, and where forest canopy exists, the inventory procedure could not be utilized to delineate forested wetlands.

Forested wetlands that occur in association with stream corridors are generally considered riparian land types. The Tribes have contracted with the University of Montana to complete riparian inventories in specific forested watersheds for project-level work. These data are very generally summarized in Makepeace (1999) and are available in CSKT staff project files.

Forest wetlands and riparian areas exhibit a wide range of diversity, and classification efforts defined in Hanson and others (1995) and Sirucek and others (1995) can be used as tools to characterize the forested wetlands and riparian areas found on the Reservation.

Monitoring

Tribal staff recognize the important role that monitoring plays in resource assessment and management, both from the perspective of identifying the existing characteristics of an environmental feature, and from the perspective of defining the range of variability and rate of change of an environmental feature.

The Tribes maintain hydrologic monitoring programs in forested watersheds. These can generally be categorized into four areas: water supply or streamflow discharge monitoring, instream water quality monitoring, fluvial geomorphic monitoring, and project-level monitoring.

Streamflow Discharge Monitoring

Streamflow discharge is measured at a number of locations in forested watersheds. Often streamflow is measured at canal-stream intersections, but there is a core network of nine streamflow gages maintained by the USGS and supported by the Tribes at natural flow stations in forested watersheds. The period of record for these gages is 1983 to the present, and as the period of record increases at these stations the value of this data increases substantially. Data are reported in USGS Water Supply Reports for Montana.

USGS-maintained streamflow stations are located in all the major hydrologic response units on the Reservation, and the data are used in project-level, cumulative effects modeling to evaluate peak flow increases.

Instream Water Quality Monitoring

Instream water quality has historically been monitored in a number of forested watersheds. This effort is supported by the EPA and completed by Tribal staff.

Instream water quality is monitored to characterize the range in water quality found in Reservation watersheds, and as the period of record increases at key monitoring stations temporal trends in water quality can be evaluated. Current instream water quality monitoring efforts are detailed in Natural Resources Department Project Files. Summaries of previous data collection efforts are available in CSKT (1997) and Makepeace (1999).

Fluvial Geomorphic Monitoring

Beginning in 1995, Tribal staff have been measuring geomorphic features at a set of reference (or representative) stream reaches in forested watersheds. Data are collected generally following procedures in Harrelson and others (1995) and information for approximately 20 reaches are reported in Makepeace (1998).

At each reach, survey information includes cross sections, particle size distributions, Rosgen classification information (Rosgen, 1994), riparian habitat typing (Hanson and others, 1995), pool and large woody debris characterization, and general reach descriptions.

At a subset of reaches, repeated data are collected to evaluate the response of channel parameters over time.

Project-level Monitoring

Project-level monitoring is completed as part of individual timber sale planning efforts. Although the form of project-level monitoring varies based on the scale of the project and the features found within the watershed, there is generally a basic set of information collected that includes a roads and road crossing inventory, a sediment source survey, a qualitative to quantitative stream channel survey, an evaluation of past harvesting activities, and a qualitative evaluation of grazing impacts.

Project-level monitoring is also completed during active timber sales to document compliance or noncompliance with best management practices for forestry activities (CSKT, 1995).

Project-level monitoring results are maintained in Natural Resources Department staff files and are often reported in Environmental Assessments for specific projects.

Planned Hydrologic Monitoring

Tribal staff will maintain and adapt their hydrologic monitoring activities in forested watersheds throughout the implementation of the Forest Management Plan. Tribal staff intend to maintain their current streamflow monitoring network and core instream water quality network.

Tribal staff intend to expand their geomorphic monitoring effort to include more reference reaches and to collect more detailed information at existing reference reaches. Tribal staff also intend to expand their effort in project-level monitoring for sale planning and active sales.

Fisheries Today

The fisheries resources of the Flathead Reservation have been affected by a variety of human activities. The initial and probably greatest influence has been the construction and operation of the Flathead Indian Irrigation Project. Historic impacts from irrigation include stream dewatering, the blockage of migration routes by diversion structures, and the loss of large numbers of fish as water is diverted into the canal system. Another major influence on the Reservation fisheries has been the introduction of exotic species. These introductions have produced some thriving fisheries, but have reduced native populations through competition and hybridization. Agriculture and grazing have influenced fisheries by degrading water quality and modifying stream bank vegetation. The primary influence from past forestry practices has been extensive roading in watersheds, which has resulted in increases in sediment and encroachment on channels.

Fisheries management on the Flathead Reservation was conducted by both state and Federal agencies from the 1930s to the mid-1800s. In 1985, the Tribal Fisheries Program assumed management responsibilities.

Populations of cutthroat and bull trout on the Flathead Reservation (figure 40) have been greatly reduced from pre-European levels, and because many of today's populations are not secure, the decline is probably continuing. Reasons for the decline include impacts from irrigation practices, the introduction of exotic species, and habitat degradation. Artificial migration barriers have isolated many populations. The barriers have hastened the demise of some populations but protected others by preventing exotic species from invading. Habitat condition will likely stabilize or improve if road densities decrease and road standards improve.

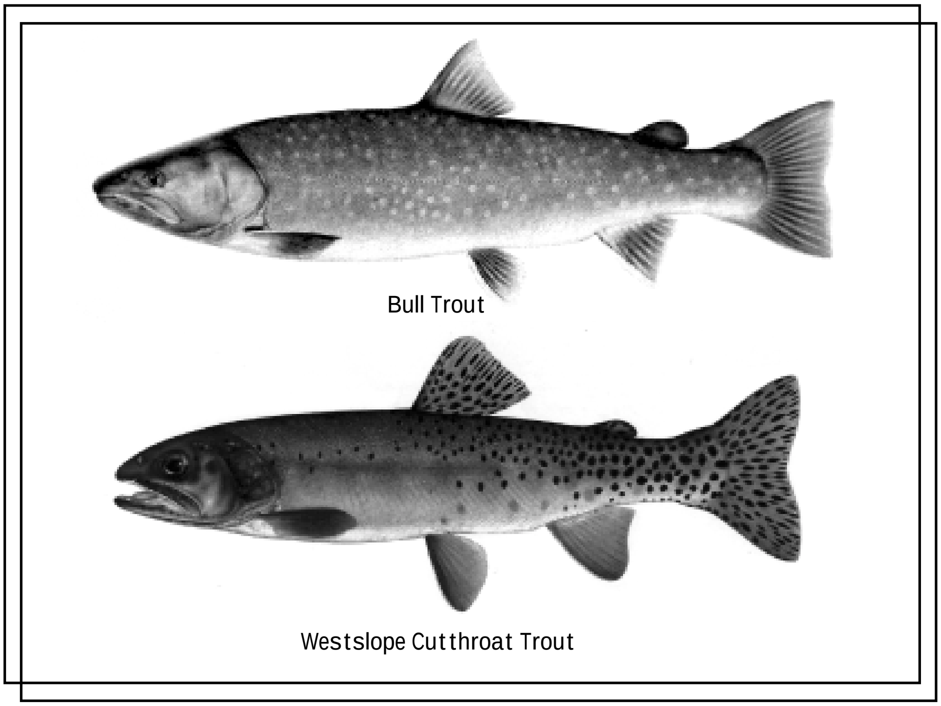


Figure 2-40. Bull trout (top) become sexually mature at about four to five years when they are 11 to 15 inches long. By eight or nine years they can grow to be 35 to 37 inches long. The species is in serious trouble over much of its range. The size of westslope cutthroat trout (bottom) varies depending on where they live. In small headwater reaches of streams they may not grow larger than 10 inches, while in lakes and larger streams they may reach 16 to 18 inches and weigh several pounds or more. This species is also facing problems over much of its range.

The Status of Key Parameters

Stream Substrate Condition

Between 1994 and 1997 the Tribes collected samples from 15 streambeds using the McNeil coring method (McNeil and Ahnell 1964). The samples were from sites in both the commercial and noncommercial forest. For each stream the samples contained an average content of particles less than 4.75 mm in diameter ranging from 9 to 40 percent.

Riparian Condition

Between 1993 and 1997 the University of Montana Riparian and Wetland Research Program evaluated 102 reaches of streams on the Reservation. The average score for all reaches was 74, which is described as a functional riparian condition, but considered at risk if remedial management actions are not taken. Of the 102 inventoried reaches, 15 rated as nonfunctional, 46 were functional but at risk, and 41 were in proper functioning condition.

Threatened Species

Five populations of bull trout survive within the Flathead Indian Reservation. Prior to the construction of dams, adults from these populations may all have shared habitats within the Flathead River and Flathead Lake. Today three populations are isolated behind dams at the base of the Mission Mountains. They spawn in streams within noncommercial forest lands and are most vulnerable to changes in dam operations and to hybridization with nonnative brook trout. There is no timber harvest or roading planned within the ranges of these three populations. The population of bull trout that resides in Flathead Lake spawns off the

Reservation and is only minimally influenced by forestry activities on the Reservation. The population that resides in the Jocko and Flathead rivers is the most subject to influence by forestry activities. Much of its range is in the forks of the Jocko River, in areas that are noncommercial forest lands.

By 1999, the Tribal Fisheries Program had identified 21 separate populations of pure-strain westslope cutthroat trout. Most of these are isolated behind barriers and are widely distributed across the forested landscape. Perpetuation of these populations will require protecting habitat, reducing fragmentation, and separating them from introduced brook and rainbow trout.

Forest-wide Objectives for Water and Fisheries

General

1. By 2001 all proposed timber sale activities will achieve the following aquatic-resource related objectives:

- **Restore and maintain the chemical, physical, and biological integrity of Reservation streams to ensure compliance with applicable water quality standards and beneficial uses of Reservation water resources.**
- **Remove or treat 100 percent of identified point sources of pollution in each sale analysis area.**
- **Adhere to individual standards identified in the forest-wide standards for water and fish.**

Compliance with this objective will be evaluated by a water resources or fishery resources representative for each sale. Those specific instances where silvicultural or other resource restoration objectives might prevent managers from meeting this objective or any of the applicable standards will be evaluated by water resources and fishery resources staff during the NEPA planning process for the sale. The justification for any deviation will be documented in the NEPA record.

2. By 2001 evaluate the potential for adjusting Forest Management Plan standards, objectives, and scheduling to ensure consistency with parallel Tribal planning efforts designed to achieve the restoration of specific watersheds.

Channel Complexity

3. Ensure that a full range of channel complexity occurs over 70 percent of channel length by 2019.

4. Quantify the range of variability in stream form and habitat, and maintain the reference stream-reach monitoring program.

Riparian and Wetland Areas

5. Inventory 80 percent of all forested riparian areas by the year 2004 using the methods set forth by the Montana Riparian and Wetland Association.

6. Complete an inventory of forested wetland resources for each timber sale that includes significant wetlands.

Timber sale areas containing significant wetland resources will be identified during the NEPA planning process and inventories will be documented in the NEPA record for the sale. Tribal Natural Resources Department Staff will complete forested wetland inventories and recommend measures to preserve wetland functions and achieve wetland-related BMP compliance.

Water Quality

7. Remove or treat 80 percent of identified point- and non-point pollution sources by 2019. Sources will be identified by the Natural Resources and Forestry Departments.

8. Conduct sediment source surveys of all watersheds by 2004. Prioritize the survey based on the results of the survey of stream bed composition.

Fish

9. Maintain or enhance cutthroat and bull trout populations in all drainages where they currently exist.

10. Restore cutthroat trout to two drainages and bull trout to one drainage within the Reservation.

11. Every ten years assess the population viability and abundance of all cutthroat trout populations and evaluate opportunities for either expanding their range or isolating the populations to protect them from exotic species invasions.

12. By 2005, remove barriers where conditions allow the reconnection of cutthroat trout populations and where invasion of exotic species is not a possibility.

13. Eliminate exotic species where expansion of cutthroat trout habitat is possible.

BMPs

14. Complete a review and update of the *CSKT Forestry Best Management Practices* (BMP) by 2002.

Tribal Cultural Resources

Cultural resources —Tribal elders, languages, cultural traditions, and cultural sites—are intimately tied to the forests of the Reservation. Tribal traditions depend on native fish and wildlife, food and medicinal plants, landmarks, traditional use sites, and other areas where Tribal members practice cultural traditions. Hunting, fishing, plant harvesting, hide-tanning, food and medicine preparation, singing, dancing, praying, feasting, story telling, and practicing ceremonies are examples of age-old traditions that rely on the land and the community of life it supports.

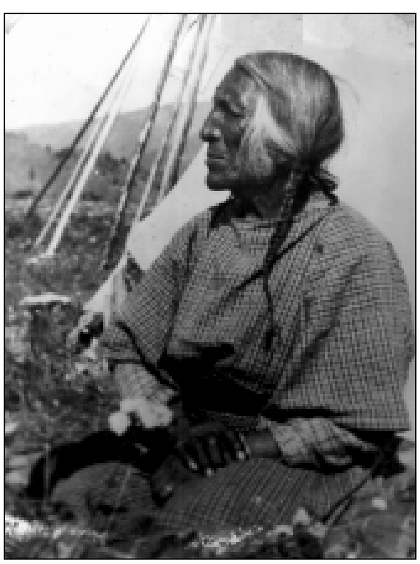
Many cultural resources are nonrenewable resources. Their destruction is a gross violation of everything we value.
— Flathead Culture Committee, 1995

Although each of the Tribes on the Reservation possesses distinctive beliefs and practices, the people share one important similarity: the Tribes view the Earth—its air, water, and land — as the foundation of Indian culture. In the words of the Salish and Pend d'Oreille Culture Committee: "The Earth is our historian, it is made of our ancestors' bones. It provides us with nourishment, medicine, and comfort. It is the source of our independence; it is our Mother. We do not dominate Her, but harmonize with Her." The Tribes believe everything in nature is embodied with a spirit. The spirits are woven tightly together to form a sacred whole (the Earth). Changes, even subtle changes, that affect one part of this web affect other parts.

Protecting cultural resources in the forest is essential, and this is one of the most important goals of Tribal natural resource management. It is also a goal that the Tribes have for Tribal aboriginal territories managed by other entities.

Existing Conditions

Cultural traditions rely on abundant populations of native fish and wildlife, healthy plant communities, clean air and water. Undisturbed spiritual sites, traditional campsites, dwellings, burial sites, and other cultural sites are important, too, because they, in the words of the Salish Culture Committee, "reaffirm the presence of our ancestors…we are alive today…because of them. These places are part of the basis of our spiritual life." They provide young people with a connection to ancestors and native traditions.



Mary Arlee. Tribal cultural traditions rely on healthy forests that support populations of native fish, wildlife, and plants, as well as clean air and water. The ecosystem management practices in this plan attempt to restore and maintain healthy forests.

Many food and medicinal plants grow on Reservation and aboriginal lands. Some grow in mountain areas, others along river and stream corridors, still others in arid places. Many have multiple uses. The Tribes have used most of them for thousands of years.

Tribal elders report that some human activities, such as logging and grazing, have damaged some of the areas where these plants grow. Work is ongoing to protect these sites.

Salish and Kootenai cultural resource specialists use the term "site" for areas of historical, cultural, or spiritual importance. These areas sometimes, but not always contain artifacts. They may be the site of past activities or they may still be in use. The Tribes do not study these areas in any scientific sense, but consider them to be a living part of Tribal culture and use them as such. Many archaeologists and historians, however, view a site as a location of past human activity. Archaeological sites often contain physical remains or artifacts. Scientists and others use them for research and educational purposes.

Important cultural sites have been destroyed over time. Often, when the Tribes or others have disclosed their locations, visitors have stolen from or vandalized them. Many people do not understand the value of these resources to the Tribes.

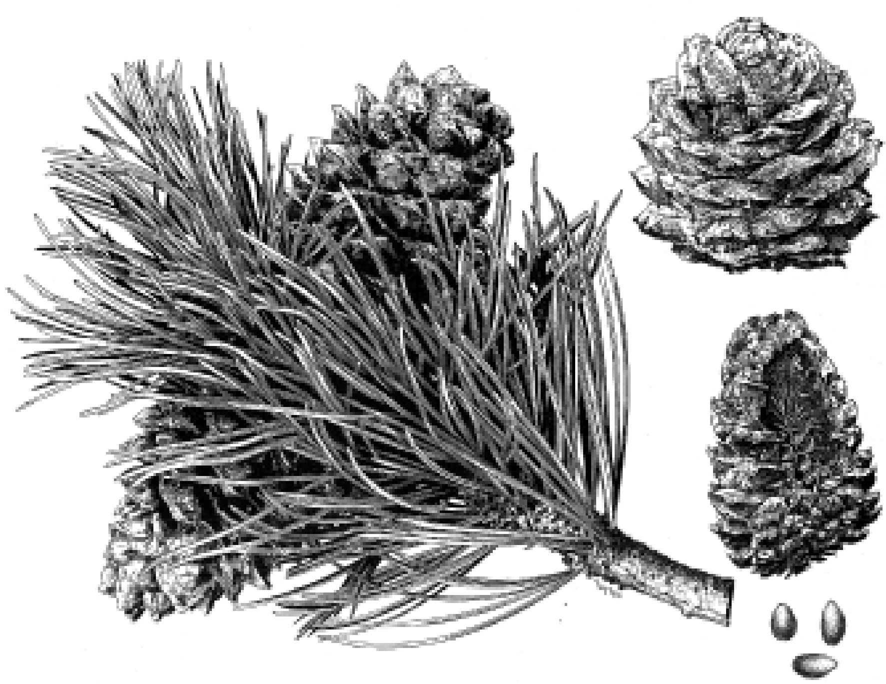
Tribal, Federal, and state laws prohibit the destruction of land-based cultural resources. The Salish and Kootenai Culture Committees and the Tribal Preservation Office provide training to natural resource managers about the importance of cultural resources. They teach managers how to recognize them and how to protect them. To protect sites, the committees have developed cultural awareness programs for people interested in Tribal cultures and resources. They work with Federal, state, and local agencies, as well as Tribal departments for cultural resource protection both on and off the Reservation.

"The Earth is our historian, it is made of our ancestors' bones. It provides us with nourishment, medicine, and comfort. It is the source of our independence; it is our Mother. We do not dominate Her, but harmonize with Her."

— Flathead Culture Committee, 1995

Culturally Important Plants

Plants that were important to the Salish and Kootenai people of ancestral times continue to be used for cultural practices and other uses by present-day Tribal people. All plant species that have been Federally listed under the Endangered Species Act and all plants that are considered culturally important by the Salish and Kootenai Culture Committees and Tribal Ethnobotanist are classified as Tribal Plants of Special Concern. The Tribes maintain a Tribal Ethnobotanical database that currently lists 158 vascular and non-vascular species classified as Tribal Plants of Special Concern. Twenty-seven of these species have been listed as Cultural Plants of Priority Concern. Many more species, both vascular and non-vascular, are undergoing analysis for cultural relevance and incorporation into the Tribal database.



Whitebark pine nuts were gathered during most years. The nuts, are high in fat and protein and are an important cultural food. The tree, however, has not fared well in recent times. An introduced disease, the white pine blister rust, and fire exclusion policies have all but eliminated cone crops.

In addition, the Tribes have established a Tribal registry of significant plants which groups plants into the following four categories:

Western Redcedar

1. Tribal Plants

All plant species, including exotics, used by the Tribes and found within the Reservation boundaries and aboriginal areas;

2. Tribal Plants of Special Concern

Plant species determined to be critically important as food or medicine, or that are of spiritual importance. This includes species found in traditional harvest areas not accessible to Tribal harvesters due to land status.

3. Tribal Plants At Risk

Plant species determined to be threatened biologically by land development activities, commercial harvest, timber sale activities, herbicide treatment activities, agriculture practices, over harvest, and other environmental degradation.

4. Tribal Watch Plants

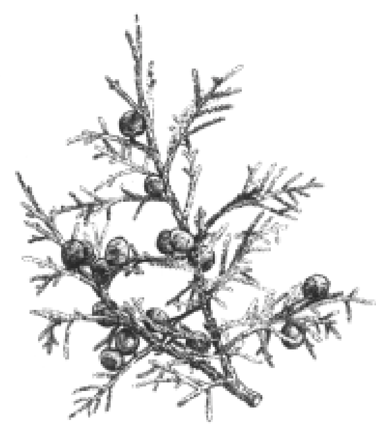
Plant species identified by cultural elders that are in need of botanical taxonomic identification. Many of these species or the communities in which they occurred are potentially extirpated.

Plant harvesting is still an important activity for many Tribal families.

Drying meat was an important and regular task.

Programs and Policies

In 1975, the Tribal Council passed Resolution 4762. It formally established the Flathead and the Kootenai Culture Committees to develop Salish and Kootenai cultural awarenes programs for schools so that they might "enhance the understanding and appreciation of th past and present Indian peoples." Since then, the responsibilities of the culture committee have grown. They now work "to preserve, protect, perpetuate and enhance" all cultura resources essential for the survival of the Salish and Kootenai cultures.



Rocky Mountain Juniper

Role of the two culture committees

1. **Conduct historical research to create a repository of historical, cultural and general Tribal information for reference and study.**

   Activities include gathering language, song, and history books and tapes; photographs an genealogies; and samples of food and medicinal plants.

2. **Act as representatives of the Elders to learning groups and Tribal organizations.**
3. **Conduct and participate in traditional activities.**
4. **Sponsor culture and language camps.**

The big pines of the Nonlethal Fire Regime provided campsites during pre-European times. These sites remain important camp areas for Tribal members.

The Tribes have, for thousands of years, maintained unwritten policies regarding cultural resources. In recent times Federal and state governments have developed their own policies to protect these resources. Their actions include Federal and state antiquities acts, the National Historic Preservation Act of 1966, the American Indian Religious Freedom Act of 1978, the Archaeological Resource Protection Act of 1979, and the Native American Graves Protection and Repatriation Act.

After tremendous Tribal pressure, the Federal government has begun to recognize the significance of Tribal cultural resources and the Tribes' role in protecting these resources both on and off Reservation lands. New amendments to the National Historic Preservation Act expressly provide for the protection of sacred sites and traditional and cultural properties, and affirm Tribal authority over these resources. The 1992 amendments provided Tribes the opportunity to assume all State Historic Preservation Office (SHPO) authority and responsibilities within the exterior boundaries of their reservations. Under Section 101(d)(2) of this act the Confederated Salish and Kootenai Tribes assumed SHPO authority for the Flathead Reservation. In 1990, the Federal government passed the Native American Languages Act and the Native American Graves Protection and Repatriation Act. In addition, the National Indian Forest Resource Management Act and the Archaeological Resource Protection Act also affirm Tribal authority over cultural resources. The State of Montana passed the Montana Human Skeletal Remains and Burial Site Protection Act in 1991. It protects unmarked burials on state and private land.

In 1995, the Confederated Salish and Kootenai Tribes approved the Cultural Resource Protection Ordinance (Ordinance 95), which provided the framework and guidelines for the Tribal Historic Preservation Office. In 1996, the Tribal Historic Preservation Office (TPO) was established to identify, evaluate, and protect Tribal cultural, historical, and archaeological resources. The TPO reviews proposals for site disturbing activities — development, road-building, logging, and the like — and through consultation with elders, Culture Committees, and other sources, determines whether the activity is a potential threat to any cultural or historic sites. It then takes appropriate action using a number of Tribal and Federal laws and regulations.

For standards relating to cultural issues, please see Tribal Ordinance 95, the Cultural Resource Protection Ordinance.

Forest-wide Objectives for Culture

1. **Complete an inventory of cultural resources (including a literature search and field survey) for each timber sale.**

2. **After consultation with the Culture Committees and the TPO, designate Limited Access Areas (table 2-14) by the year 2002 in order to provide a variety of natural areas and recreational settings that Tribal members can use for solitude, cultural activities, and recreational pursuits. Limited Public Access Areas are areas where some or all uses are closed to the non-Tribal public.**

Landscape	Limited Public Access Area
Southwest	One of the following: Entire landscape; Magpie drainage; Seepay and Burgess drainages
West	All forested Tribal lands except the Dog Lake area, the Upper and Lower Dry Fork Reservoir areas, and the Hot Springs drainage
Salish Mountains	The eastern portion of the Lower Flathead River Corridor from Buffalo Bridge to Sloans Bridge
North Missions	The Hellroaring drainage area
Missions	One of the following: the McDonald Lake to Mollman drainage area; the Swartz Lake and Terrace lake drainage area; or the McDonald Peak Grizzly Bear Conservation Zone
Jocko	Continue to maintain the South Fork Primitive Area

Table 2-14. Limited Public Access Areas.

3. **Develop a plan to identify, inventory, and maintain culturally important areas, trails, and campsites within the Reservation by the year 2004.**

4. **Beginning in the year 2002, utilize Tribal ethnobotanists to identify sites within proposed sale management areas that may contain plants important to the cultures of the Tribes.**

5. **Develop training sessions to be supervised by both culture committees in coordination with the Tribal Preservation Office, the Natural Resources Department, and the Forestry Department.**

   These sessions will focus on Tribal values associated with cultural sites and plants and will include information on the culture and history of the Tribes, the significance of cultural sites and artifacts to the Tribes, the care and handling of cultural sites and artifacts that may be inadvertently discovered, and the importance of traditional and medicinal plants to the cultures of the Tribes. Sessions will be offered every two years (or more frequently if requested) beginning in the year 2001.

6. **The Natural Resource and Forestry Departments will incorporate Salish and Kootenai languages into resource documents, signs, and everyday use by the year 2001.**

   With assistance from the Culture Committees, the two departments will also develop lists of plant and animal species names in both languages by the year 2002. The list will include those species commonly encountered on the Reservation.

7. **The Natural Resources and Forestry Departments will, under the supervision of the Culture Committees, develop a reservation map of place names with labels in both the Salish and Kootenai languages by the end of the year 2001.**

Scenery and Recreation

Scenery: Pre-European Conditions

The scenery of the Reservation is influenced to a large degree by the condition of the vegetation. Vegetation provides color and texture on mountain slopes, and when the vegetation varies in a natural way, as was the case during pre-European times, the effect is usually pleasing to humans. Judging from historical accounts and old photos, there was tremendous vegetative diversity during the pre-European period — the mountains looked very different than they do today, largely because of frequent fires, many of which were set by Native Americans.

The patterns that resulted varied with slope, aspect, the type of fuel, and the timing of the fire. Small fires often occurred in many different areas and produced a mosaic of burned and unburned patches over time. These burned areas varied in size, shape, and location. Ridges, which are vulnerable to lightning strikes, often burned completely, while narrow valleys burned with a more spotty pattern or not at all. Old photos reveal that frequent fires in the 1800s and early 1900s created a tremendously diverse mosaic pattern of vegetation of different ages, heights, textures, and colors (figure 2-41).

As the saying goes, beauty is in the eye of the beholder. The forests of today that we consider so beautiful and natural-looking because they haven't experienced any kind of disturbance for half a century, might have been considered quite unnatural looking several hundred years ago. Indeed, the hunters and berry pickers of the time probably would have considered the forest ripe for a few human-lit fires.

Figure 2-41. The Missions east of St. Ignatius in the early part of this century.

Foreground Viewing

From the floor of the Mission Valley, viewers looked out upon broad grassy rangelands and rolling hills. Periodic fire maintained the grass types in the valley. In fact, Native Americans set fires to stimulate growth of grasses to increase forage for their horses and increase the quantity of edible plants for their own use.

Pockets of ancient ponderosa pine were scattered throughout the Valley. Frequent fires killed off shrubs and other conifers growing beneath them. But the big trees, which are resistant to fire, survived. The result was a visually appealing, parklike forest (figure 2-42).

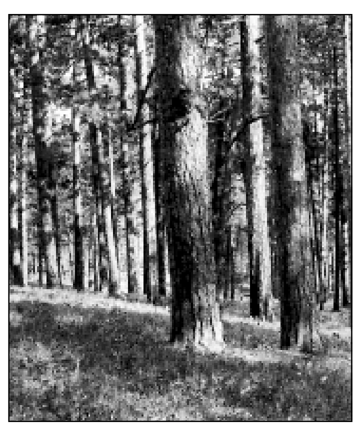


Figure 2-42. An old growth ponderosa pine stand typical of those found in the Nonlethal Fire Regime all across the Reservation.

What many view as natural today, for example the forests of the west slope of the Missions, are not natural at all, but the product of many decades of fire exclusion. What is natural appearing may actually be a very unnatural landscape.

Mid-Ground and Background Viewing

Native Americans in the Mission Valley had a spectacular view of the Mission Mountains to the east. There they saw a mosaic of vegetation created by fire; irregularly shaped mountain meadows were interspersed with stands of young and mature timber (figure 2-43). Mountain fires were ignited primarily by lightning although Indian-lit fires also burned substantial acreages.

Figure 2-43. The Missions east of Pablo in the 1920s.

Scenery Today

Figure 2-46 shows how the scenery of the Reservation is perceived today in terms of naturalness. It is important to point out that fire suppression efforts in the last 50 to 100 years has interrupted the natural cycle of periodic fire on the Flathead Reservation, and the absence of fire has allowed thick vegetation to grow under once-open stands of large ponderosa pine (figure 2-44). The visual appeal of these former parklike stands has been reduced, although they still appear natural. Mountain slopes are now mostly covered by mature timber (figure 2-45). The pattern is much more uniform in its color and texture as seen from the Mission Valley than it was in pre-European times, although this pattern, too, is perceived by many as natural.

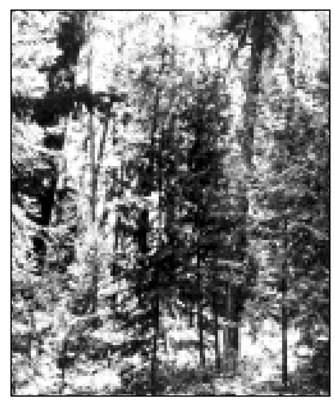


Figure 2-44. Heavy growth of Douglas-fir in the Nonlethal Fire Regime. In today's forests, much of this formerly parklike regime has converted to this kind of structure.

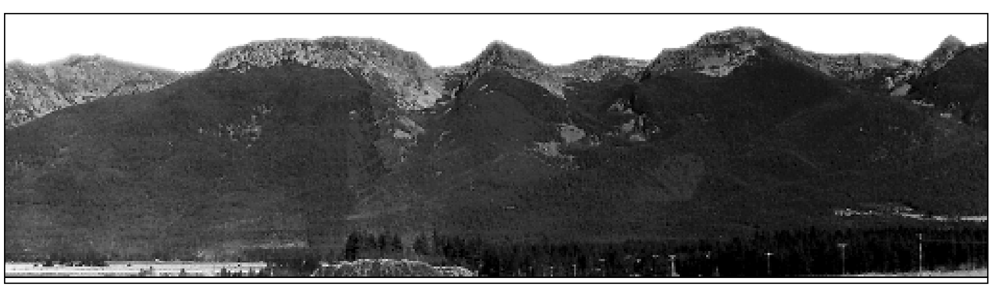


Figure 2-45. The Missions east of Pablo in 1995.

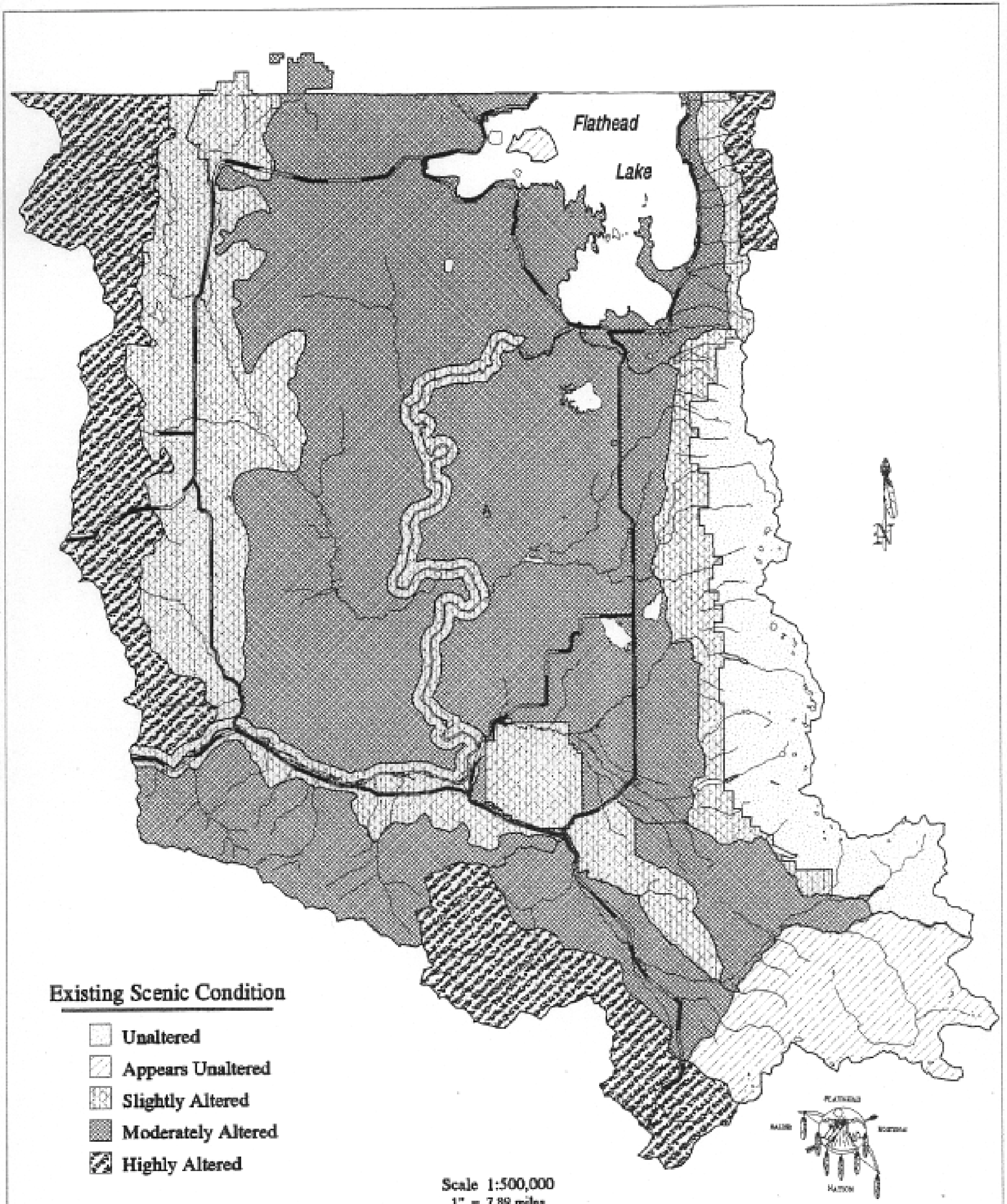


Figure 2-46. Scenic integrity levels reflect unique visual features and visual sensitivity to disturbances such as clearcuts and roading. Definitions for terms used can be found in table 3-3.

The Flathead Indian Reservation remains one of the most scenic areas in the U.S. and the preservation of a high quality visual environment concerns both Indian and non-Indian residents. Currently, Tribal government provides only limited management direction on visual resources.

Aside from the Forest Management Plan, the 1993 Wilderness Buffer Zone Management Plan is the only Tribal management plan that addresses any type of guidelines or limits for activities that would alter the forest's scenery. The Buffer Zone Plan states that "retention will be used as the visual quality objective for all resource management activities within the Buffer Zone." (Retention means that management activities are not evident to the casual observer.)

By feathering the edges of clearcuts and by leaving islands and ribbons of trees, clearcuts can be made to look more natural, more like old burns. The result is more aesthetically pleasing.

The Tribes prohibit commercial forest harvest activities within the boundaries of Tribal recreation sites, the Tribal Wilderness Area, the Buffer Zone, the South Fork Primitive Area, the Chief Cliff Management Area, and the Lower Flathead River Corridor. In addition, the National Bison Range and Wildhorse Island State Park both have restrictive development policies designed to preserve scenic integrity.

Many areas identified for special attention in the forest plan have not been managed for preservation of visual quality, but the overall impacts from past logging may be recovered in time by achieving the Reservation-wide scenery objectives. Figure 2-47 demonstrates how areas can be rehabilitated so they are more aesthetically appealing. In the lower photo (a computer simulation), the square boundaries of clearcuts so evident today have been feathered and made to follow natural contours. The bottom simulation also assumes about fifteen years of regrowth.

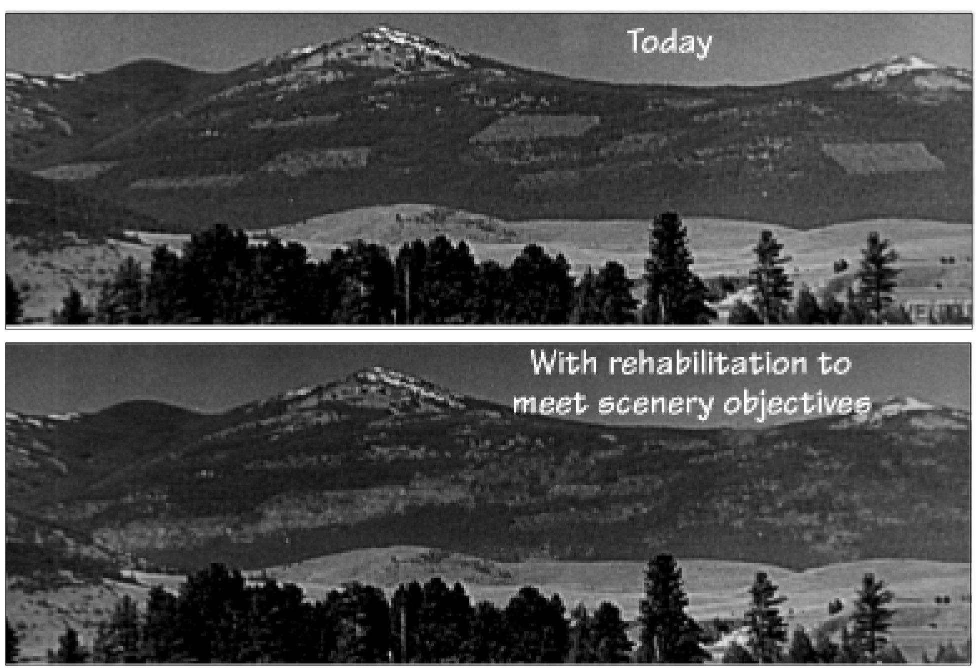


Figure 2-47. The Revais Creek area as it exists today, and a computer simulation of how it might look after scenic rehabilitation efforts are completed and fifteen years of regrowth.

Forest-wide Policies and Objectives for Scenery

1. **Meet established Scenic Integrity Level objectives for the area (these appear in Chapter 3 of this plan).**

2. **Whenever practical, use ecosystem management practices to restore variety, texture, and diversity to vegetation mosaics to mimic what would have occurred under natural fire conditions.**

3. **Acquire personnel and develop resources to enable the Tribes to conduct project-level and landscape-level scenery analysis.**

Figure 2-48. Forested areas on the Reservation are used by Tribal members for a variety of purposes. Pictured above (from left to right) are Pascal Charlo, Mitch Smallsalmon, and John Peter Paul.

Recreation: Existing Conditions

Generations of Tribal members have enjoyed the beauty of the natural environment and the recreational amenities it has to offer (figure 2-48). The recreational resources of the Reservation continue to enrich the lives of Tribal members. In addition, they provide economic development opportunities.

During 1990, approximately 768,000 out-of-state vacationers drove through the Reservation on Highways 93, 200, and 28. Natural features that attract visitors to Reservation forests include the Mission Mountains, Flathead Lake, the Flathead River, and the Jocko River. These and many other areas provide the setting for a variety of recreational activities, particularly during the summer. Although recreational use is most frequent during the summer months, winter activities such as cross country skiing, snowmobiling, and ice fishing are also popular. Figure 2-49 shows Tribal Recreation Permit income for the last twenty years.

Rivers, lakes, streams, and roadless areas, such as the Mission Mountains Tribal Wilderness, receive the majority of recreation use, most occurring on Tribal land. Over 40 Tribal campgrounds and recreation sites and 60 miles of backcountry trails are maintained each year.

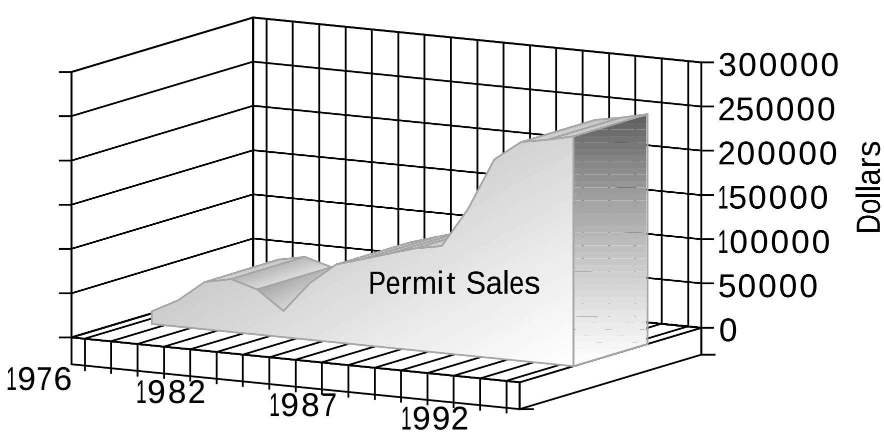
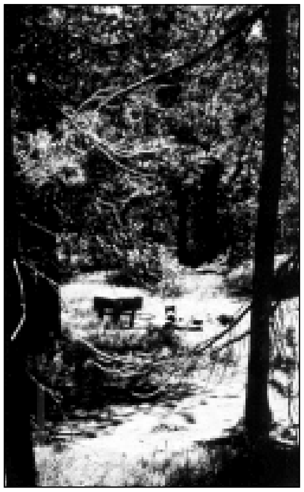


Figure 2-49. Nonmembers, too, use these lands as demonstrated by recreation permit sales, shown in the graph at right.



A typical backcountry campsite on the Reservation.

The lower Flathead River is an important recreation area. Many Tribal members boat, swim, and fish its waters and hunt, camp, and practice traditional activities in the forested areas along its banks. The river provides other opportunities as well. Because it is substantially undeveloped, has large rapids, runs, and backwaters, and supports a variety of fish and wildlife species, it attracts people engaged in many types of primitive and water-related recreational activities.

A large percentage of the Reservation's recreational use occurs in forested areas in and adjacent to the Mission Valley. The primary activities include fishing at reservoirs, streams, and lakes; waterfowl and upland gamebird hunting; and use of the Mission Mountains Tribal Wilderness. The wilderness, which extends along the eastern border of the Mission Valley, provides hiking, fishing, camping, solitude, and horseback opportunities, and it serves as an outdoor classroom for schools and groups. Trout fishing occurs on most of the streams in the valley, however, large tracts of privately owned land limit access. McDonald Lake, Mission Reservoir, St. Mary's Reservoir, and Twin Lakes provide facilities for fishing, as well as camping, picnicking, and hiking.

The Jocko Valley also offers a variety of quality recreational opportunities. The Jocko River and its tributaries are excellent trout fisheries. The South Fork of the Jocko Primitive Area is a recreational and cultural use area reserved for Tribal members and their families. The Jocko Range, which includes a portion of the Jocko Primitive Area and borders the federally designated Rattlesnake Wilderness, contains one of the largest roadless tracts on the Reservation. These mountains are crossed by a series of backcountry trails that lead to high mountain lakes. The Pistol Creek Range, which forms the northern border of the valley, is an important big game hunting area.

The Perma-Dixon area receives a large amount of recreational use from visitors to the National Bison Range, Tribal member big game hunters, fishermen, backcountry hikers and horseback riders. Wildlife viewing at the Little Money and Ferry Basin areas has also become a popular activity. The Reservation Divide along the south end of the Perma-Dixon area offers a range of backcountry recreational experiences. Many people visit and camp at the Agnes Vanderburg Cultural Camp, located in the Valley Creek drainage. The Three Lakes Peak, Black Tail Basin, and Reservation Divide Trails receive moderate use from hikers and horseback riders.

The primary recreation activities in the Camas-Hot Springs area are Tribal member big game hunting in the mountains and northern pike fishing in Dog (Rainbow) Lake, the Little Bitterroot River, Lonepine Reservoir, and the Upper Dry Fork Reservoir. Other activities include hiking, horseback riding, and bird hunting.

The Lozeau Primitive Area, the Salish Mountains, and dozens of streams and lakes also attract recreationists. The Lozeau Primitive Area, established for the exclusive use of Tribal members and their families, offers stream fishing, camping, and hunting opportunities. In addition, Tribal members enjoy big game hunting in the Salish Mountains. Local residents fish streams in the Polson-Elmo area, but use is light. Hiking, camping, and horseback riding are popular activities, particularly in the Jette-Sunny Slope area northwest of Polson. Surrounding landowners fish Jette Lake.

The primary uses of the north end of the Mission Range include snowmobiling, crossing-country skiing, fishing, and Tribal member hunting. Boulder Road receives a large amount of snowmobile use, and the area from Hellroaring Pass to Moss Peak snow cabin receives cross-country skiing use during the winter. The Hellroaring Pass Trail also receives summer use from hikers accessing the federally designated Mission Mountains Wilderness Area to the east.

Pete Beaverhead once said that he would go up into the mountains for weeks at a time and then would not want to come back down because "it was so clear up there. The air made your breathing easy. I didn't want to come back down because I knew the air down below would be bad. It was the stink from the roads and the other things the white man has made."

Existing Recreation Policies

The Tribal Hunting and Fishing Conservation Ordinance (44-D) is the principal Tribal policy pertaining to fish, wildlife, and recreation uses. This ordinance prescribes the regulation of Tribal member and nonmember hunting and fishing on the Reservation, and recreation uses on Tribal and other trust lands and waters. Land use plans for the wilderness, Flathead River, and Wilderness Buffer Zone also provide recreational management policies as do various site-specific Tribal Council resolutions.

The Tribal Council established the Division of Fish, Wildlife, Recreation and Conservation, which includes the Tribal Wildland Recreation Program charged with overseeing management of all recreational resources except fish and wildlife. It coordinates administrative and private activities affecting either the quality of recreational experiences or the amount, timing, and distribution of recreational use. Priority areas for the program include the Mission Mountains Tribal Wilderness, the two primitive areas, the Lower Flathead River Corridor, and Tribal parks and recreation areas.

The Tribes use an interdisciplinary approach in the management of its recreational resources. The process involves many Tribal programs and departments as well as other affected parties. An example is the Wilderness Buffer Zone Administrative Use Committee established in 1986 to manage land use activities along the western base of the Mission Mountains Tribal Wilderness. The committee consists of Tribal Council and culture committee members and specialists from natural resources programs.

Current Tribal management strategies recognize the importance of the Reservation's diverse outdoor recreation opportunities. Managers determine development and maintenance activities using integrated resource management strategies that consider the protection of cultural uses, landowner concerns, timber and grazing values, water quality, and sensitive plant and wildlife habitats.

Forest-wide Objectives for Recreation

1. Meet the following Diversified Recreation Opportunity Level objectives for all areas by 2005 (table 2-15):

Area	DROL Classification	Special Restrictions
Chief Cliff	Semi-Primitive Motorized	No commercial logging activities
Irvine West Face	Semi-Primitive Motorized	Maintain natural appearance, require full rehabilitation* of any new roadway construction after use.
Revais Creek Riparian Area	Roaded Natural	Maintain as scenic drive corridor, buffer road from logging activities, maintain natural appearance of foreground viewshed along roadway.
Seepay Riparian Area	Roaded Natural	Maintain as scenic drive corridor, buffer road from logging activities, maintain natural appearance of viewshed along full length of corridor.
Dog Lk, Inlet Marsh & Camas to Cutoff Rd	Roaded Natural	Maintain as scenic drive corridor, buffer road from logging activities, maintain natural appearance of foreground viewshed along roadway.
Hot Springs Creek	Roaded Natural	Maintain as scenic drive corridor, buffer road from logging activities, maintain natural appearance of foreground viewshed along roadway.
Little Bitterroot Canyon	Semi-Primitive Motorized	Prohibit logging, protect and maintain river corridor' s outstanding natural envirnoment for cultural and recreational uses, use manager ignited fires to achieve seral cluster goals.
Little Bitterrroot-Basso-Mill Creek	Roaded Natural	Maintain as scenic drive corridor, maintain and protect main transportation routes with the stream and river corridor for cultural and recreational uses, buffer road from logging and maintain natural appearance of foreground viewshed along roadway.
Upper Dry Fork Reservoir	Roaded Natural	Maintain lower reaches of Dry Fork Creek and Reservoir and the surrounding riparian vegetation for cultural and recreational purposes, buffer all foreground viewshed areas from logging, and prohibit all logging within immediate use areas.
Boulder Road Scenic Route	Roaded Natural	Maintain as scenic drive corridor from Highway 35 to the range divide, buffer road from logging, maintain natural appearance of foreground viewshed along roadway.
Hellroaring Road	Roaded Natural	Maintain as scenic drive corridor from Highway 35 to the range divide, buffer road from logging, maintain natural appearance of foreground viewshed along roadway.
Wilderness Buffer Zone	Roaded Natural	No commercial logging activities, expand the wilderness fire plan to include the Buffer Zone land tracts and cluster goals.
Jocko River Corridor	Semi-Primitive Motorized	Maintain as a scenic drive corridor, buffer road from logging activites, maintain natural appearance of foreground viewshed along roadway.
Kelly' s Ridge	Semi-Primitive Motorized	Maintain current roadless acreage.
South Fork Primitive Area	Primitive	No commercial logging activities.
South Fork Road System (Fingers and Corridors)	Semi-Primitive Motorized	Maintain outstnding scenic roadway qualities, utilize native materials on stream crossings and other roadway facilities whenever practicable.

* Full rehabilitation of a road means the road will be recontoured.

2. Whenever practical, use ecosystem management practices to restore the vegetation mosaics that are important for Tribal Member recreational uses and subsistence hunting and plant collecting.

3. Evaluate and develop the North Missions Landscape for additional winter recreation activities to serve the entire Reservation by 2005.

4. Prepare a Reservation-wide outdoor recreation use plan by 2005.

5. Develop legal descriptions for and designate the following roadless and wilderness areas within two years of Forest Plan approval (tables 2-16, 2-17, and 2-18). Develop management plans for these areas within four years of Forest Plan Approval.

The roadless designations prohibit roading on 33,118 acres in eight areas (see Chapter 3 for specific locations). Although helicopter logging would be allowed in all but two of these areas (Ravalli/Valley Complex and Swartz Lake), the prohibition on roading is intended to preserve each area's scenic beauty and maintain opportunities for semi-primitive, non-motorized forms of recreation. Two areas totaling 22,416 acres would be designated as new Tribal wilderness areas, and another two areas totaling 4,553 acres would be added to the existing Mission Mountains Tribal Wilderness Area. Road building and logging are prohibited in Tribal wilderness areas. These designations will preserve each area's scenic integrity and maintain opportunities for Tribal cultural pursuits and primitive recreation activities. The Division of Fish, Wildlife, Recreation and Conservation (FWRC), in coordination with the Division of Fire Management, will be responsible for preparation of the management plans for wilderness areas and those roadless areas where logging is prohibited. The Forestry Department, in coordination with FWRC, will be responsible for management plans for those roadless areas where logging is allowed but restricted to roadless methods. Figure 2-50 shows these designated roadless areas, new wilderness areas, and wilderness additions.

Roadless Area	Acerage
Oliver Point (Sal)	8,175
Burgess	2,219
Little Money (Bighorn Sheep) Complex	1,561
Blue Bay (N. Missions)	4,756
Finley Lake	5,176

Table 2-16. Roadless areas with logging restricted to roadless harvest

Roadless Area	Acerage
Ravalli/Valley (Ravalli/Hewolf) Complex	11,166
Swartz Lake	157

Table 2-17. Roadless areas with logging prohibited

Area	Acerage
Thompson Peak Wilderness Area	4,838
Sleeping Woman (Ninemile Divide) Wilderness Area	17,578
North Missions Addition	4,404
Courville Creek Addition	149

Table 2-18. Wilderness areas and wilderness additions

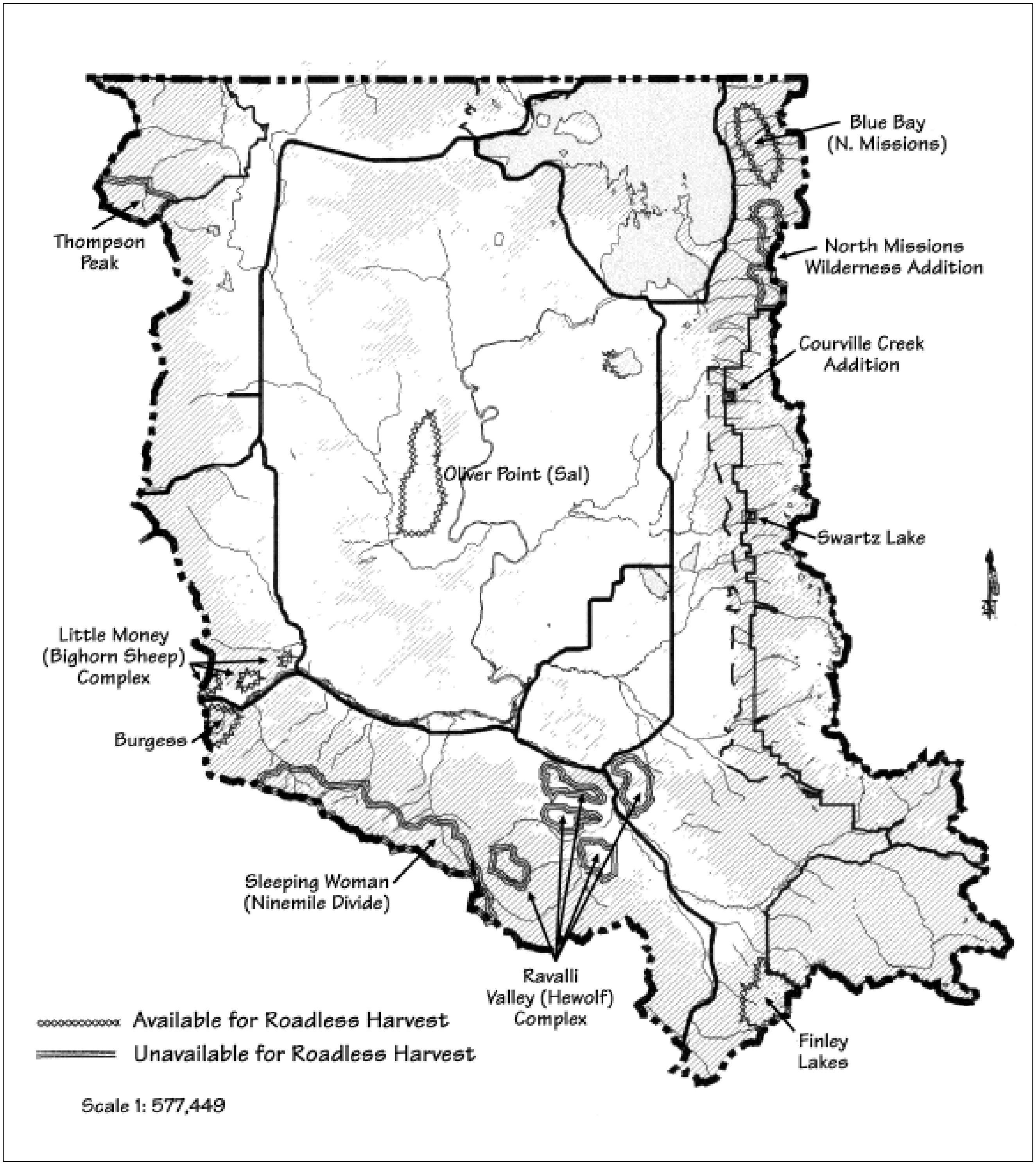


Figure 2-50. Designated roadless areas, new wilderness areas, and wilderness additions.

Transportation: The Existing Condition

Currently, there are approximately 2,930 miles of forest roads within the Reservation. As shown in table 2-19, 701 miles of these are classified as main haul roads, 836 are classified as major spurs, and 1,397 are classified as minor spurs.

Forest roads are essential for logging and other forest management activities. Most forest roads on the Flathead Reservation are constructed or reconstructed for removing timber and other forest products. However, they also provide access for hunting, fishing, recreation, forest administration, fire control, and other uses. Some forest roads provide the only access for scattered private fee lands and State inholdings. In addition, there are a number of county roads that connect to forest roads.

Although most forest roads on the Flathead Reservation have been constructed for removing timber and other forest products, they also provide access for hunting, fishing, recreation, forest administration, fire control, and many other uses.

A portion of the present Flathead Reservation road system evolved from road and trail construction during the 1930s and early 1940s under the Civilian Conservation Corps-Indian Department (CCC-ID). Created during the Great Depression by President Franklin D. Roosevelt, the CCC-ID built or rebuilt and improved many miles of primary access roads up the major drainages and over major ridges. The main justification for these projects was fire protection, but the roads were also expected to be useful for future logging, and this probably determined locations and lengths. Some have become important main haul roads. Many of the existing main haul roads are now on the Bureau of Indian Affairs (BIA) Road System. Past timber sales generally incorporated these access routes and any other old or existing roads and trails into the road system in order to reduce costs.

The Tribal Forestry Department is in the process of developing a Forestry Transportation Plan. The primary reason for formulating and completing the plan is to do a needs analysis for access while balancing other resource concerns. Several projects mentioned in the last Reservation forest management plan have been completed, including the orthophoto mapping of forest areas, the mapping and identification of forest roads by number, and the signing of all forest roads.

Road Classification

Forest Road Units and Numbering System

The Reservation has been divided into 15 Forest Road Units. Road unit boundaries are defined by the Reservation boundary, major highways or primary access roads, major topographical features, and section lines. Within each road unit, all forest roads have been systematically identified by a common letter or letters followed by a four-digit number (i.e. D-1000 for Dixon Forest Road Unit 1000 Road, HS-4000 for Hot Springs Forest Road Unit 4000 Road, etc.). This identifies road type and its relative location. In addition, road types are designated by a different number sequence. For example, main haul roads have an even thousand number, 1000, 2000, 3000, etc. Major spurs add 100s or 50s to the 1000s, and minor spurs add 10s or 1s. Nearly all forest roads have forest road number signs posted at the beginnings and intersections.

	Main Haul (1000s)	Major Spur (100s)	Major Spur (50s)	Minor Spur (10s)	Minor Spur (1s)
Road Miles	701	583	253	683	714

Table 2-19. Miles of each road type on the Reservation.

BIA Road System

There are 39 designated BIA forest roads. Together they total approximately 345 miles. This mileage is included in the 2,930 total miles of forest roads. Unlike Tribal roads which are not public, BIA roads are public and provide free public access, a requirement for Federal construction and maintenance funds. BIA roads have a BIA road number and, in addition, a forest road number (see Appendix L for the list of BIA roads that serve as main hauls and their corresponding Forest Road numbers). The BIA number is not posted, but the Forest Road number is. There are 12 bridges on the BIA system.

One of the main reasons for considering road densities is the impact roads have on fish and wildlife. Open roads affect habitat security and both open and closed roads may affect fish because of the sediment roads can generate. Having sustainable populations of fish or wildlife may require lowering road densities substantially, as well as meeting BMPs.

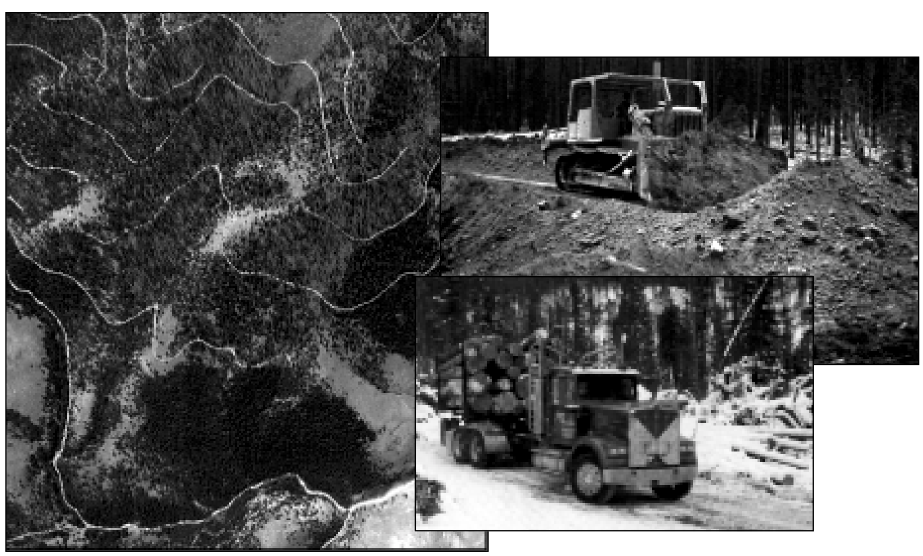
Inventory and Condition

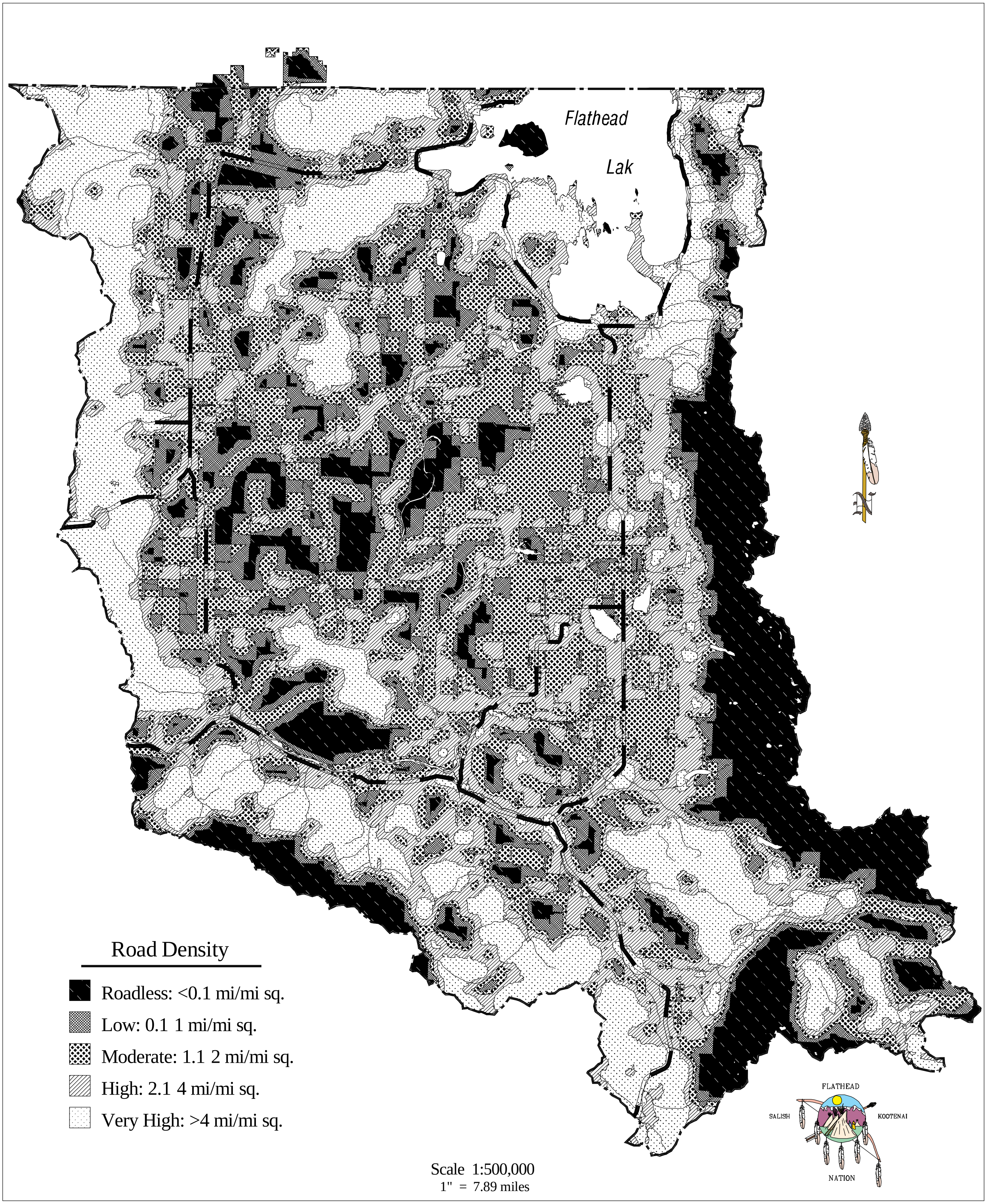
At present, an estimated one-third or 1,000 miles of the forest road network is considered usable. Approximately 900 miles of the total 2,930 miles of forest roads have been field inventoried. The inspections and reports are done as field personnel have time or during individual timber sale preparation.

The BIA Road System portion of forest roads has been inspected every three years on average and the results are reported in the *BIA Road Condition Report*. Most of these roads have generally fair to poor surface conditions. BIA bridges are constructed out of timber and are in good to poor condition. A formal engineering bridge inspection is conducted every two years by a consultant for the BIA Portland Area Office. Tribal staff also conduct inspections.

Road Densities

Road densities as of 1999 are shown in figure 2-51.




Flathead
Lak
Road Density
Roadless: <0.1 mi/mi sq.
Low: 0.1 1 mi/mi sq.
Moderate: 1.1 2 mi/mi sq.
High: 2.1 4 mi/mi sq.
Very High: >4 mi/mi sq.
Scale 1:500,000
1" = 7.89 miles
FLATHEAD
SALISH
KOOTENAI
NATION

Existing Road Policies and Guidelines

1. The Tribal Council passed the CSKT Forestry Best Management Practices (BMPs) on January 6, 1995. The BMPs are designed to protect soil, water, and fish. BMPs provide standards and guidelines for road placement, construction, and use.

2. The Maximum Open Road Density policy is 4 miles of open road per square mile. The policy is designed to protect wildlife and other forest resources.

A portable railroad flatcar provides access across streams less than 10 feet wide with minimal disturbance to the stream banks or bed. This type of stream crossing is consistent with Best Management Practices.

Density and Spacing

Current forest transportation system planning, which targets an average road spacing of 1000 feet slope distance or a total road density of 6.6 miles per section, reflects the Tribal Council's desire to protect wildlife and water quality. (The previous average for total road density was 7.5 miles of forest roads per section with spacing averaging 900 feet of slope distance.)

The density and spacing requirements vary depending on the degree of slope. For example, on slopes greater than 45 percent and suitable for cable skidding, road spacing averages 750 feet slope distance. On slopes less than 45 percent, average road spacing ranges from 900 to 1300 feet slope distance. If the average slope in the forest is approximately 35 percent, the average miles per section would be close to 6.6 miles of road per square mile. In the future, road spacing averages on slopes greater than 35 percent should be at least 800 to 1200 feet. On slopes less than 35 percent road spacing averages should be at least 1200 to 1800 feet.

Most timber sale entries now eliminate some old roads to meet the 1000-foot spacing criteria. If new roads are planned, more old roads are eliminated and permanently put to bed. Abandoned roads are reseeded to return them to productive growing sites and to limit sediment production.

The Effect of Roads on Scenery

Careful consideration is given to the visual impact that roads have. Each timber sale that affects scenic resources includes a Geographic Information System (GIS) graphic depicting the visual impacts of each alternative in an environmental assessment or impact statement. The aesthetic importance and visual degradation of areas as viewed from close up is also important; swaths cut through the forest for roads, cut and fill, erosion and other soil disturbance from roads and road construction affect our aesthetic sensibilities. Although some modification of the forest and visual environment must be expected from roads, the key is the degree and magnitude of the change.

Maintenance

All roads, including newly constructed or reconstructed roads, are seeded with grass immediately after construction and after logging activity has ceased. Issues like dust abatement, weed control, and weight limits are considered for each timber sale.

BIA Road Maintenance

In past years, the limited amount of BIA road maintenance funding has been able to keep approximately only a small percentage of the BIA system maintained. Considerable expense goes to snow removal and pavement maintenance for streets in Tribal homesites. The remaining funds are used for brushing, signing, grading, bridge repair, and some culvert installation.

While roads are only one factor that affects a viewshed, they can have long-term affects. Cumulatively, roads can degrade a viewshed, which is one reason why their location, spacing, density, and standards are important.

Timber Sale Maintenance

Roads and bridges are improved prior to the start of a logging operation to bring them up to standards for logging trucks. The timber sale contractor is required to maintain logging roads in a condition suitable for logging trucks and to do it in an environmentally sound manner.

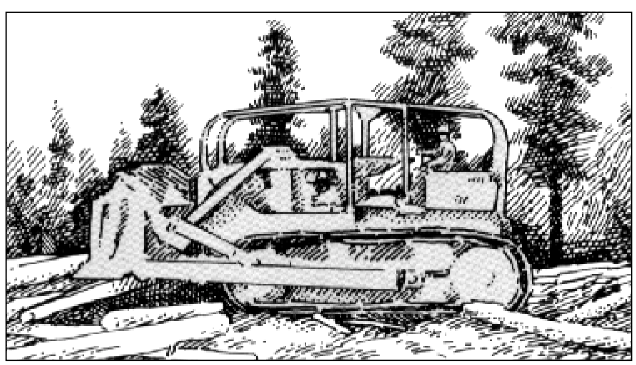
Wildland Recreation and Safety of Dams

Occasionally Wildland Recreation and Safety of Dams carry out limited road or bridge maintenance on roads that are important for recreation and irrigation.

Road Access Management

Road access management in this context refers to the determination of which roads will be closed or remain open. As of January 1993, the Tribal Council directed no more than a maximum of four miles of open road per section.

Effective road closure is critical to minimize disturbance of wildlife and to protect habitat. Road access management is coordinated by the Forest Transportation Planner with input from key Tribal resource staff. Each access management plan is then reviewed and modified and alternatives are developed by an Interdisciplinary Team (IDT). The plan is then proposed to the Tribal Council for a final decision regarding closures. BIA roads may be restricted in use or closed to public access in certain situations. “When required for public safety, fire prevention or suppression, or fish or game protection, or to prevent damage to unstable roadbed, the [Secretary] may restrict the use of them or may close them to public use.” Additional reasons to close forest roads are to protect cultural resources, reduce road maintenance costs, and to discourage trespassing on Tribal lands.



The following guidelines for closed or abandoned roads are in the BMPs.

Guidelines for closed or abandoned roads

1. Stabilize cut and fill slopes, borrow areas, and any other road-related feature.

2. Remove cross drainage and ditch relief culverts and provide for permanent runoff control on abandoned roads.

3. **Reseed all road surfaces, cut and fill slopes, log decking areas, and borrow areas.**
4. **When culverts and bridges are retained, provide for long term maintenance.**
5. **When culverts and bridges are removed, reconstruct stream crossings to a stable configuration.**

Access to closed roads for necessary forestry or other activities is regulated by a Tribal permit system enforced through Tribal Fish and Game.

Seasonal Closures

When a road is closed for a portion of the year for reasons such as wildlife management, road condition, or fire danger, but the intent is to reopen the road again when possible, a seasonal closure is used. Seasonally restricted access is often accomplished by barriers. The duration of closure may be short-term or long-term, depending on the situation.

Temporary Closures

Temporary closures may be long-term, for example, until the next timber sale entry period. The closure alternatives are determined by the interdisciplinary team as part of a road access management plan. Temporary closures are usually accomplished by ripping up the first 100 feet of road surface.

Abandonment

A road is abandoned for use and returned it to its natural condition if it is no longer needed or there are other benefits that outweigh its remaining open. Abandonment is accomplished by ripping the entire length, removing culverts, installing water-bars, grass seeding, and blocking access.

Forest-wide Objectives for Transportation

1. **In timber sale planning areas, improve the condition of 100 percent of the road segments that are adjacent to riparian areas or stream channels or that are degrading stream channels.**

   The initial focus of road improvement efforts should be to reroute roads out of riparian areas. If this practice cannot be achieved for a road segment, road upgrades should be developed that minimize or eliminate impacts within riparian areas. The steps outlined to achieve this objective will be tracked as part of the NEPA planning process for the sale.

2. Prepare, within 18 months of Forest Management Plan adoption, a comprehensive Forest-wide Transportation Plan containing the following:

- Summary of all landscape and forest-wide transportation and road access goals, objectives, and standards consistent with the Forest Management Plan and current Threatened and Endangered Species standards and guidelines;
- Forest Best Management Practices (BMPs) standards and guidelines;
- Road design, construction, reconstruction, temporary closure, and abandonment standards and guidelines;
- Data updates and monitoring procedures;
- Permitting and Enforcement procedures and guidelines;
- Implementation plan including training and public education/notification procedures.

3. Review and update all parts of the Transportation Plan every two years after initial completion.

4. Increase big game habitat effectiveness to an average of 40 percent (3 miles of open road per square mile) in the Lethal Fire Regime, and to an average of 30 percent (4 miles of open road per square mile) in the Nonlethal and Mixed Fire Regimes by the year 2009.

Road closure methods will include permanent abandonment in the Lethal Fire Regime, and barriers and recontouring in the Nonlethal and Mixed Fire Regimes.

Before Europeans arrived, Indian people did not think the smoke from wildfires was a bad thing. To the contrary, before the days of industrial and automobile pollution, they considered the air clean, even with all the smoke from wildfires.

Air Quality: The Pre-European Condition

Although there is no known historical air quality data for the pre-European period on the Reservation, it is known that fires and smoky conditions were common. Journals from early day explorers and priests as well as newspaper articles from the late 1800s often mention the almost continuous smoke in the air caused by fires burning in western Montana and northern Idaho. Fires ignited by lightning or by Native Americans would have generated smoke visible for periods of as short as a few hours to as long as 90 to 120 days. Yet Indian people did not consider the smoke from wildfires a bad thing. To the contrary, before the days of industrial and automobile pollution, they considered the air clean, even with all the smoke from wildfires. In the words of Mitch Smallsalmon, a Pend d'Oreille elder, "A long time ago…the earth was clean, the air was clean, everything was good. " Pete Beaverhead, another Tribal elder once said that he would go up into the mountains for weeks at a time and then would be afraid to come back down because "the air [in the mountains] made your breathing easy. I didn't want to come back down because I knew the air down below would be bad. It was the stink from the roads and the other things the white man has made."

Air Quality: The Existing Condition

The Flathead Indian Reservation is a designated Class I Airshed. This designation was initiated through Tribal Resolution in July, 1979. A Class I classification provides the highest level of air quality protection to Tribal lands by limiting the amount of additional human-caused air pollution that can be added to the airshed. Under this classification, existing air quality can not be significantly degraded from what it was in 1979.

The Tribal Forestry Department will cooperate with the Tribal Air Quality Department and the State of Montana Air Quality Bureau to assure that Tribal, State, and Federal air quality standards are met or exceeded, and that the airshed meets constraints established by the *Montana State Airshed Group's Memorandum of Understanding*, 1985.

The combustion products from prescribed burning include; water vapor, particulate matter, hydrocarbons, trace minerals, and noxious gases (carbon dioxide, carbon monoxide, and nitrogen oxides). Particulate matter generally has the most potential for reducing air quality below health standards. Specifically, particulate matter less than or equal to 10 micrometers in aerodynamic diameter (PM 10) is the size that can penetrate the inner recesses of the lungs and cause health problems.

The communities of Ronan and Polson are classified as non-attainment areas for national ambient air quality standard of PM 10 by the Environmental Protection Agency. These communities are local areas where potential health problems exist from poor seasonal air quality impacts from automobile, road dust, wood stoves, industrial, agricultural, and prescribed fire emission sources. At times, the Flathead Indian Reservation is impacted by off-site emissions from wildfire, prescribed fire, and agricultural burning activities in western Montana, Idaho, and eastern Washington.

Flathead Indian Reservation air quality is impacted by various activities associated with timber harvesting, prescribed burning, and wildfires. Wildfires and prescribed fire smoke emissions cause temporary particulate and visibility impacts on local air quality. These effects are dependent on the type of burn, the amount or type of fuel consumed, and seasonal airshed characteristics that affect smoke dispersal. The annual amount of smoke generated from forest and range fires has generally decreased since the early 1900s, even with today's use of prescribed fire. The decrease is due to a total fire suppression policy.

Reservation prescribed-fire-smoke emissions are estimated to average 342 tons of particulate and 270 tons of PM10 particulate per year. Total smoke emissions range from an estimated 214 tons total particulate and 169 tons PM10 particulate in 1986 to 544 tons total particulate and 430 tons PM10 particulate in 1991. Annual emissions from wildfires and prescribed natural fires have not been calculated.

All prescribed fire activities are conducted under excellent to good smoke dispersal conditions and have not significantly impacted Reservation sensitive or non-attainment areas. Most of the burning projects are conducted during spring and early summer months, which are generally the best months for smoke dispersal. Limited broadcast burning and dozer pile burning are conducted during the fall burn season under the Montana Airshed Group burn permit system. Prescribed burning is not conducted during the winter months.

Grazing: The Existing Condition

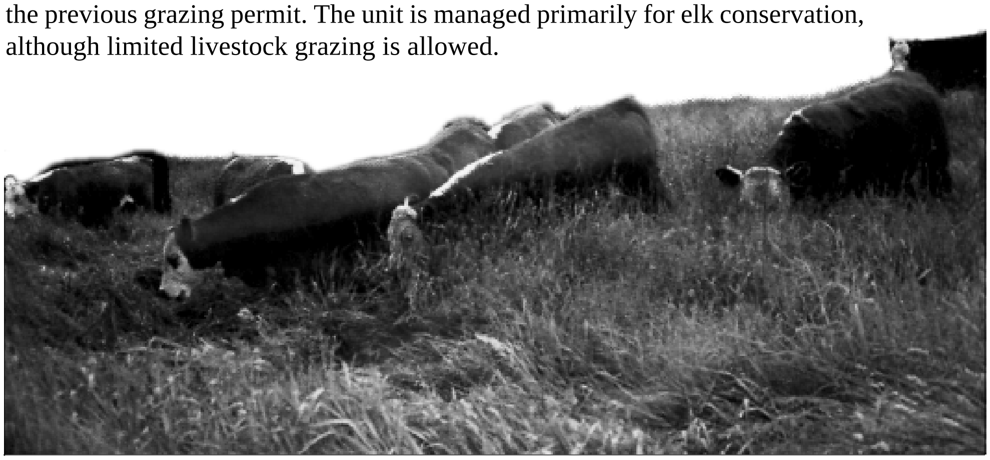
Domestic Livestock

The Reservation now has 51 designated range units encompassing more than 320,000 acres. Most are permitted to six Indian stock associations and to individual Tribal member stockmen. Forested and woodland areas account for approximately 80 percent of the total acreage.

The Tribes first grazed livestock (horses) in the late 1600s or early 1700s. Within a few years of cattle coming to the reservation in the late 1800s, some Tribal people had established large herds. By the 1930s, non-Indians had large numbers of livestock, particularly sheep. The continuous, season-long grazing and overstocking during that period damaged Tribal grazing lands and degraded other resources. Native forage species declined while introduced species, including undesirable grasses and noxious weeds, increased. The Indian Reorganization Act of 1934 enabled the Tribes to gain control over unsettled lands and consolidate them into timber and range tracts. This land consolidation created the basis for the present Tribal range units.

The Reservation now has 51 designated range units encompassing more than 320,000 acres. Most of these range units are permitted to six Indian stock associations and to individual Tribal-member stockmen. They include open and forested units, but forested and woodland areas account for approximately 80 percent of the total.

Domestic livestock grazing occurs in all of the forest landscapes. In the North Missions, however, there are no range units and only a few Tribal tracts in the Turtle Lake area are leased for livestock use. Seven range units are designated in the Missions Landscape but they are all inactive. Past Tribal Council action has idled them to favor wildlife. Pasture leases occur in the foothills, from Ronan south to St. Ignatius. Those in the Wilderness Buffer Zone are specifically targeted for inventory and stocking rates with seasons of use established prior to leasing, as required by the Buffer Zone Plan. Grazing leases are managed with interdisciplinary input, especially the leases that occur in grizzly bear habitat. All seven range units in the Jocko Landscape are active. Those in the Thorn Creek area are used in combination with adjoining pasture leases in order to incorporate seasons of use and pasture rotations. Three range units and a few pasture leases occupy most of the Southwest Landscape. All of the Tribal lands in the West Landscape are either in range units or pasture leases. Seventeen range units and numerous pasture leases occur within the Salish Mountains Landscape. Until 1999, grazing in the McDonald and Ferry Basins was authorized by a grazing permit (the areas were not designated range units) and a lease. In 1999, the Tribal Council made the McDonald and Ferry Basin areas into an official range unit operated under the same guidelines and strategies as the previous grazing permit. The unit is managed primarily for elk conservation, although limited livestock grazing is allowed.



The most recent vegetation inventory was conducted during 1979 and 1980, and it showed that most timbered range units were in fair to good condition. Some areas were in good to excellent condition, meaning they contain a predominance of desirable native species.

Economic Benefits of Grazing

In the late 1940s, the federal government established a program to provide seed stock to start Tribal members in the livestock business. Since that time, the livestock industry has become an important source of income for many Tribal members and is a major component of the regional economy.

Current stocking rates for all the range units allow for about 7,000 head of cattle. Some permits allow for horses or sheep. Forested range units are permitted for grazing during the growing season. Stocking rates in the timbered range units vary from three to over 25 acres per animal unit month (AUM).

Approximately eighty-five Tribal members and their families are supported, at least partially, by forest agriculture (range unit permittees and/or grazing lessees). The most recent census data for 1990 indicates wide variabilities in reported farm income. The census data is not specific to enrolled members of the Confederated Salish and Kootenai Tribes, and does not identify whether or not the reporting household used forest agricultural resources. The data was collected with persons "self-identifying" their principal tribe, whether enrolled or not. Table 2-20 reports the mean annual household income during 1989 by source. Farm self-employed income is net money income (gross income minus operating expenses) by the owner, renter or share cropper. Wage and salary income is the total gross money earnings, before deductions.

Claimed Tribal Affiliation	Wage and Salary Income (# reporting)	Farm Self-Employed Income (# reporting)
Kootenai	$20,121 (115)	$890 (4)
Salish	$18,769 (760)	$5,897 (51)
Salish and Kootenai	$17,921 (505)	$9,497 (53)

Table 2-20. The mean annual household income of families making a major part of their living from range units or grazing leases.

Annual Tribal revenue from forest grazing is approximately $45,000, which is deposited in the Tribal general fund. Of the 116 personnel in the Tribal Natural Resources Department (NRD), 10 are employed within the Agriculture Program of the Division of Lands. There is one range conservationist and one range technician to manage all the Tribal range units. The Agriculture Program uses an interdisciplinary team approach to manage lands and requests expert input from other NRD Divisions and Tribal programs to assist in the formulation of management alternatives.

Forest-wide Objectives for Grazing

1. **Grazing will be managed to improve or maintain the biodiversity of existing grassland types, to restore grasslands to a healthy ecological (fair or better) condition, and to promote restoration of nonfunctional and functioning-at-risk riparian areas to a functional level under the Montana Riparian and Wetland Association classification system.**

2. **Grazing land inventories will be initiated and completed on active grazing units as funding and other workload allow beginning in 2002.**

3. **Permanent range and riparian monitoring sites with photo points will be established and monitored at least biennially (once every two years).**

   The sites will be used to evaluate grazing management and to build a long-term data base on domestic livestock grazing permits and leases.

4. **Best Management Practices for domestic livestock grazing and a monitoring plan will be developed by 2002 and implemented on a case-by-case basis.**

5. **Forage inventories of priority grazing leases will be conducted prior to leasing.**

   The information gathered, in addition to other resource management considerations, will be used to establish stocking rates and seasons of use. Priority leases will be those with unique resource considerations such as riparian areas and grizzly bear habitat.

6. **Range unit grazing plans will be developed cooperatively between a Tribal interdisciplinary team and the land users.**

   Plans will be developed as funding allows and other resources are available. The dependency of the Tribal ranching community on forest grazing will be considered during the planning process.

Forest-wide Objectives for Weeds

1. **Aggressively manage noxious weeds on 80 percent of infested areas.**

Minerals: The Existing Condition

The Flathead Reservation lies in the Rocky Mountain trench, which extends from the southern part of the Reservation into Canada. Rocks are mainly of the Precambrian Belt supergroup and more than 30,000 feet thick. Tertiary rocks cover the Precambrian rocks in the northwestern part of the Reservation. Valley bottoms contain thick deposits of glacial till and lake sediments of Pleistocene age.

During pre-European times, Tribal people used small amounts of earth for building, hunting, fishing, warfare, domestic, and religious purposes. Commercial development of mineral resources on the Reservation by non-Indians started in the early 1900s. Miners staked many claims and established a few mining operations between 1910 and 1949. These small-scale mines produced modest quantities of gold, silver, and copper. Since 1917, sand and gravel have also been mined. In the mid 1980s, several oil companies leased land and explored for gas and oil. Activity has since subsided, and there is little interest in further exploration. Small, low grade, noncommercial coal deposits also occur.

Metallic minerals on the Reservation include copper, lead, zinc, silver, gold, platinum, and palladium. The Prichard Formation, the same formation from which lead, zinc, and silver are mined in British Columbia, underlies a large part of the Reservation. Mines in the southern part of the Reservation have produced small quantities of metals in the past, but there are no mines producing now. About 9,000 tons of copper ore was mined at the Revais Creek mining district from 1910 to 1949. Patented mining claims in the Camas Prairie mining district yielded almost 1,500 tons of copper ore, mostly during the 1940s. Total recorded mineral production has been small. Only narrow, high-grade veins have been mined, and only mineral occurrences with surface exposures have been prospected. The Flathead Mine near the north boundary of the Reservation has produced over seven million tons of lead-silver ore. It is currently not active due to low silver prices. Prospecting pits occur in Hog Heaven, Camas Prairie, Ferry Basin, and the Southwest portion of the Reservation. There is one active, noncommercial mine near the Ferry Basin lookout.

Sand and gravel deposits found throughout the Reservation are the most valuable nonmetallic mineral resource. They are used primarily for road construction projects. There has been recent interest in mining stone, clay, and other deposits for building projects.

Mines in the southern part of the Reservation have produced small quantities of metals in the past, but there are no mines producing now. About 9,000 tons of copper ore was mined at the Revais Creek mining district from 1910 to 1949. Patented mining claims in the Camas Prairie mining district yielded almost 1,500 tons of copper ore, mostly during the 1940s. Total recorded mineral production has been small.

Socio-economic: The Existing Condition

Analysis Area

The analysis area can be divided into two overlapping parts. The first is the study area. This is the area within the exterior boundaries of the Reservation. The second is the socio-economic impact area. Forest management related activities—for example, harvesting, thinning, planting, road building—affect areas outside the Reservation and therefore have social and economic effects in surrounding counties and communities.

Portions of four counties occur within the Reservation. Lake and Sanders Counties comprise the largest portion, making up 54.7 percent and 35.1 percent of the land area, respectively. Missoula County makes up 7.9 percent and Flathead County 2.3 percent. The Reservation encompasses a total of about 1.3 million acres, 71,800 acres of which are lakes and rivers. Tribally owned lands (trust) comprise about 656,000 acres or about 50 percent of the land. Of these trust lands, 459,408 acres are forested, and about 293,000 are managed as commercial forestland.

The Reservation is primarily rural but includes four main towns—Polson, Ronan, St. Ignatius and Arlee. The Reservation also includes a handful of smaller towns—Hot Springs, Dixon, Ravalli, Big Arm, Elmo, and Lone Pine. The remainder of the population is thinly dispersed on farms, ranches, and rural homes.

Social Setting

Settlement Patterns

To understand many of the diversity and population trends we see today, it helps to know the history of the Reservation. The Hellgate Treaty of 1855 established the Reservation boundaries, but it took more than 35 years before the federal government forced most of the Tribal members onto the Reservation. As a prelude to allotting the lands and opening the Reservation to homesteading by nonmembers, the federal government "enrolled" reservation Indians as Tribal members between 1902 and 1909 . In 1910, the Reservation was opened to homesteaders. Some 1.1 million acres became available to the new settlers. The vast majority of the homesteaded land was in the agriculturally rich valleys. The Indians were left with most of the forested land and scattered allotments. Over the years, much of the allotted land was sold to nonmembers. In recent years, however, the Tribes have started an aggressive land acquisition effort in an attempt to reverse this trend.

As a result of this settlement pattern most of the forested land remained in Tribal hands, while most of the land suitable for agriculture was transferred to nonmembers. Nonmember populations grew larger than Tribal populations in a short time, and today three-quarters of the population is non-tribal.

Considerable social conflict has resulted from this history of settlement. Jurisdictional disputes are common, and a degree of racial antagonism and segregation exists, with both sides asserting a certain amount of authority over resources and amenities.

Lifestyles

The study area is predominantly rural. Residents, both Tribal and non-Tribal, tend to be conservative fiscally if not politically. There is generally resistance to rapid change. Attitudes toward forest management and harvest are also conservative.

The Tribes own the vast majority of the forested land within the Reservation and are dependent upon it sociologically, culturally, and economically. Forested lands form a large part of the economic base of the Tribes; they comprise nearly 70 percent of the total Tribal land base.

The presence and use of the forest resource influences the lifestyles of all Reservation residents. The forest provides not just raw materials for the wood products industry, but also offers opportunities for recreational, cultural, spiritual, and aesthetic activities. While the dollar values of these activities are not easily quantified, they are considered important to both the Tribal and non-Tribal public, and are incorporated into forest management decisions.

Population

The Reservation is home to both Tribal members and nonmembers. Table 2-21 summarizes the distribution of population by counties and the Reservation as a whole.

Table 2-21. Flathead Reservation Population (U.S. Census 1980 and 1990)*

	Lake Co. Portion	Sanders Co. Portion	Missoula Co. Portion	Flathead Co. Portion	Reservation Total
1990					
Indian	4469	371	283	7	5130
Non-Indian	14426	1267	421	15	16129
Total	18895	1638	704	22	21259
1980					
Indian	3140	344	283	4	3771
Non-Indian	13918	1543	370	26	15857
Total	17058	1887	653	30	19628
Change: 1980 - 1990					
Indian	42%	8%	0%	15%	36%
Non-Indian	4%	-18%	14%	-42%	2%
Total	11%	-13%	8%	-27%	8%

* From CSKT, Comprehensive Resources Plan 4-3 (Draft) Identification as Indian does not necessarily mean respondents were Tribal members.

Both Tribal and County officials believe the 1990 census data are lower than actual numbers (Shelby, Sanderson 1992).

The most striking statistic from the table is the increase in Indian population. During the decade of the 1980s, Indian population increased from 19 percent to 24 percent of the total Reservation population. It is not possible to determine whether this shows an actual increase, a willingness to declare Indian status, or some other factor. In any case, the Indian to Non-Indian ratio has changed from 1 to 4 in 1980 to 1 to 3 in 1990. This is a large change and may have significant social and political effects.

Social Conditions

The rural character of the Reservation has gradually changed over the past thirty years, and the rate of change has accelerated over the last five years. What was once an agriculture- based economy is becoming a more urbanized one. Small businesses are opening, many of those catering to the tourist trade. Land values are escalating rapidly as disgruntled city dwellers retreat to the security of small towns with their perceived low crime rates and high amenity values. These immigrants bring with them many values from the cities. Polson in particular is changing from an agriculturally supported community to one supported largely by recreation and tourism.

At the same time, public attitudes about logging have shifted. Considerations for recreation, wildlife, water quality, aesthetics, and culture have reduced harvest volumes from 70,000,000 board feet per year in the early 1970s to less than 40,000,000 board feet per year in the early 1990s. In 1994 the volume cut under contract was less than 6,000,000 board feet. As harvest volumes have declined, so have some of the high paying jobs in mills and logging operations. Some of those jobs have been replaced with lower paying jobs in the service sector of the economy. Because the forest base represents such a large part of the Tribal economy, economic effects are felt strongly by the Tribal public.

Table 2-22 summarizes some of the socio-economic differences between Indians and non-Indians on the Reservation.

Table 2-22. Socio-economic characteristics of Indians and Non-Indians on the Flathead Indian Reservation. (U.S. Census 1990)*

Trait	Indian	Non-Indian
Median Age	23.7 years	35.8 years
Per Capita Income	$6,428	$10,098
Graduated High School	73%	77%
Hold Bachelors Degree	5.5%	15.3%
Unemployment Rate	17%	9%
% at or below Poverty Level	38.5%	20.5%

Area Economy

Natural resources provide the economic base for the reservation. The productive agricultural lands of the valley represent the largest segment of the economy of the study area, however most of the income from these lands goes to nonmembers. The surrounding Tribally owned forest lands provide income from wood products and recreation-related activities. Flathead Lake draws recreational income into the area economy; most of that income goes to the Polson area. The majestic natural setting of the Mission Mountains and Flathead Lake has attracted many retirees.

Forest Related Employment and Personal Earnings

The economic effects of major forest product harvest (contract timber sales) was analyzed by the Bureau of Business and Economic Research at the University of Montana and M. Nicholucci of the Forest Service, using 1993 volume data. Table 2-23 shows the jobs and income generated by the harvest of each million boardfeet of timber. “Direct” refers to the actual forest harvest and mill jobs and income attributable to harvest. Indirect refers to

Table 2-23. Jobs and income produced by timber harvest (per MMBF) (Bureau of Business and Economic Research).

Type	Jobs	Income
Direct	11.03	$350,170
Indirect and Induced	22.17	437,713
Total	32.20	$787,883

services purchased by those engaged in harvest, and induced refers to income and jobs generated when the direct workers spend their money in the local economy.

These figures apply to the entire socio-economic area, not just the study area. Some percentage of benefits goes to surrounding communities where raw materials are milled and services are purchased.

There is little information on how many of these jobs are held by Tribal members. Contractors who win major timber sales are required to employ at least 25 percent Tribal members for the harvest operation, and records show that they are meeting the requirement. Although data is unavailable, it is unlikely that mills employ Tribal members in proportion to the percentage of the population they represent on the Reservation.

Major Forest Products Based Industries

Agriculture, retail trade and services, forestry, and recreation are the major segments of the Reservation economy. The only forest-based major industry left on the Reservation is the Plum Creek Lumber Mill in Pablo, which employs about 200 full-time people. This mill is heavily reliant on raw material from the Reservation. A lumber mill in Polson closed in 1990 because of timber shortages and high prices caused by reductions in harvest levels on National Forests. A Tribal post and pole yard also closed in 1990.

Minor Forest Products Based Industries

Small post and pole yards open and close periodically on the Reservation, as do yards that receive cord wood. One small mill, Hunt’s Timbers near Post Creek, continues to buy timber from small wood lots and individuals.

Forest Receipts

Table 2-24 shows the Forest Receipts and Volumes cut since 1980.

Volumes cut since 1980 have ranged from 5,454,000 to 37,199,000 boardfeet, and values received have ranged from $800,469 to $10,204,985. These ranges reflect the volatile nature of the timber industry. Over the eighteen-year period, volume harvested has averaged 20,800,000 boardfeet and income has averaged $3,545,000 annually. The Tribal Council had set an annual harvest goal of 38.4 million boardfeet, but that was not reached during the period.

Besides the timber harvested under contract, additional timber is sold under permits to Indian loggers. The volume of these sales ranged from 335,000 to 11,700,000 boardfeet with values ranging from $41,000 to $484,000. Free use permits are also issued to Tribal members. Over the period these volumes ranged from 2.8 million boardfeet to 5.4 million boardfeet. Values ranged from $85,000 to $300,000. This income went directly to the Tribal members rather than the Tribal government.

Volumes from all these activities combined ranged from 15.7 to 64 million boardfeet during the period; values ranged from $1 million to $10.5 million.

Harvest is not the only forest management activity that generates income. About $470,000 comes to the Reservation annually for forest development activities (planting, thinning, site preparation) and mistletoe control. Additional income comes from Christmas tree cutting. From 1,200 to 1,500 bales per year were harvest by about 250 Tribal members. Each bale brought $7.25 per bale.

Forestry Management Employment

There are 58 full time, 10 seasonal forestry employees, and 28 seasonal fire fighters. Planting, thinning, cone collection, and site preparation work employs about 60 to 70 Tribal members

Table 2-24. Forest receipts and volumes.

Year	Contracts Volume	Contracts Value	Avg. Stumpage
1980	14,489,000	$1,907,810.00	$131.67
1981	14,225,000	$1,392,412.00	$97.88
1982	12,888,000	$1,070,060.00	$83.03
1983	19,633,000	$1,673,670.00	$85.25
1984	31,943,000	$3,230,518.00	$101.13
1985	15,389,000	$1,448,314.00	$94.11
1986	7,415,000	$800,469.00	$107.95
1987	14,113,000	$1,373,078.00	$97.29
1988	25,160,000	$2,874,416.00	$114.25
1989	30,900,000	$3,141,485.00	$101.67
1990	28,988,000	$3,748,043.00	$129.30
1991	20,613,000	$3,629,092.00	$176.06
1992	37,199,000	$8,581,296.00	$230.69
1993	33,552,000	$10,204,985.00	$304.15
1994	5,454,000	$1,841,645.00	$337.69
1995	24,805,000	$6,789,476.00	$273.71
1996	18,324,000	$5,056,181.00	$275.93
1997	18,474,000	$5,058,629.00	$273.82
Total	373,564,000	$63,821,579.00	
Average/Year	20,753,500	$3,545,643..00	$167.53

seasonally, and it is estimated that 135 Tribal members cut post and poles, cordwood, and firewood. Sale preparation involves the combined efforts of specialists from the Forestry and Natural Resources Departments and uses perhaps 20 people part time.

Recreation

Recreation activities also occur on forested lands. These activities have significant social and economic effects. Data about numbers of recreational-use days for Tribal members is lacking, but the numbers are significant and certainly exceed use by nonmembers. The number of recreation permits sold to nonmembers between 1992 to 1994 is shown in table 2-25.

Table 2-25. Recreational Use by Nonmembers

Year	Annual Permits	3-Day Permits	Value*
91 - 92	17,343	combined with annual	$224,690
92 - 93	14,588	3,940	$247,085
93 - 94	14,696	4,642	$252,600

* Source for income from permit fees is Tom McDonald, CSKT Wildland Recreation Program.

Flathead Lake is probably the biggest recreational draw on the Reservation. It receives about 150,000 user days per year, and over a million sightseers. The Flathead River attracts in excess of 20,000 users annually. The Mission Mountains Tribal Wilderness averages about 5,000 user days per year. The South Fork Primitive area, which is used only by Tribal members, has about 1,500 user days per year. The Bison Range attracts 185,000 visitors per year.

Forest management activities like timber harvesting and road building affect recreation use because they impact the aesthetics of the forest. There is no quantitative data, however, on the affect of these activities on visitor-use days or income from recreation.

Forest-wide Socio-Economic Objectives

1. **Provide income to the Tribal government from an estimated annual harvest of 700 thousand board feet of ponderosa pine and 17.4 million board feet of other species for the first thirty-year period.**

   At current stumpage rates these volumes will generate approximately $4,300,000. This includes two to three million board feet set-aside for Indian loggers in small sales and paid permits. (The stumpage values used for Indian loggers is 36 percent of the contract stumpage. This is the average value of Indian stumpage versus non-Indian stumpage for the period 1988 through 1997.)

2. **Provide employment to between 85 and 105 Tribal government employees.**

3. **Provide employment to about 200 other wood products workers based on an annual harvest of approximately 18.1 million board feet generating about $6.3 million in wages annually.**

4. **Provide information on site specific resources to Tribal members' developing business plans for forest-related concessions or outfitting enterprises.**

Communication and Education

Forest-wide Objectives for Communication and Education

1. **Develop interpretive trails at Boulder (the Blue Bay Interpretive Trail) by 2005 and Swartz Lake (the Swartz Lake Interpretive Trail) by 2003.**

2. **Develop "points of interest" stops along V-1000 & V-1200 roads in Valley Creek and Saddle Mountain by 2005.**

3. **Improve communications and awareness of forest issues with Tribal youth, educational institutions, neighbors and the public by making annual presentations; participating in intertribal youth practicums, science fairs, and career days; holding summer field trips for the Tribal Council and the public; attending annual coordination meetings with Federal, state, county, and rural cooperators; writing feature articles for local newspapers; and promoting "Project Learning Tree" at local schools.**

4. **Contribute to our profession and its knowledge of Indian natural resource management by providing staff as trainers and presenters for local, regional and national training programs.**

5. **Improve and maintain coordination and communication between the Tribal Natural Resource and Forestry Departments by developing common goals annually, holding annual field trips to present and discuss key projects, and developing and maintaining a home page to display public information feature articles by the year 2002.**

6. **Promote a fire-role and fire-use message for decision makers and the public by developing and implementing an action plan for a comprehensive education program by December 2009.**

7. **Develop and fill a public information and education officer position by 2005.**

Chapter 3: Landscape Descriptions and Desired Future Conditions

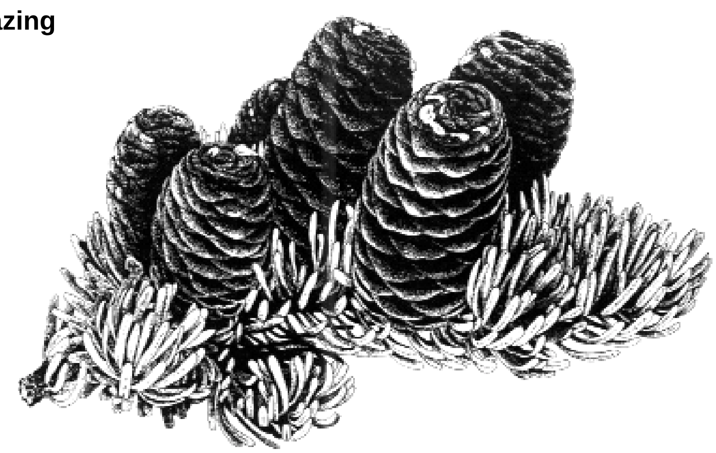
Landscape-Specific Descriptions

This chapter details our analysis and desired future conditions for each of the Reservation's six landscapes. Generally, the issues and resources discussed are the same as those presented in the previous section except they are presented in more detail. Cultural issues are not discussed on a landscape scale because of their sensitivity. Tribal Ordinance 95, the Cultural Resources Protection Ordinance, covers Tribal policy regarding cultural sites. The Reservation's landscapes are shown in figure 3-1.

Mountain Chickadee

Issues and resources described for each landscape

1. Disturbance
2. Smoke and Air Quality
3. Vegetation
4. Wildlife and Diversity
5. Water and Fisheries
6. Scenery and Recreation
7. Transportation
8. Grazing



Subalpine Fir

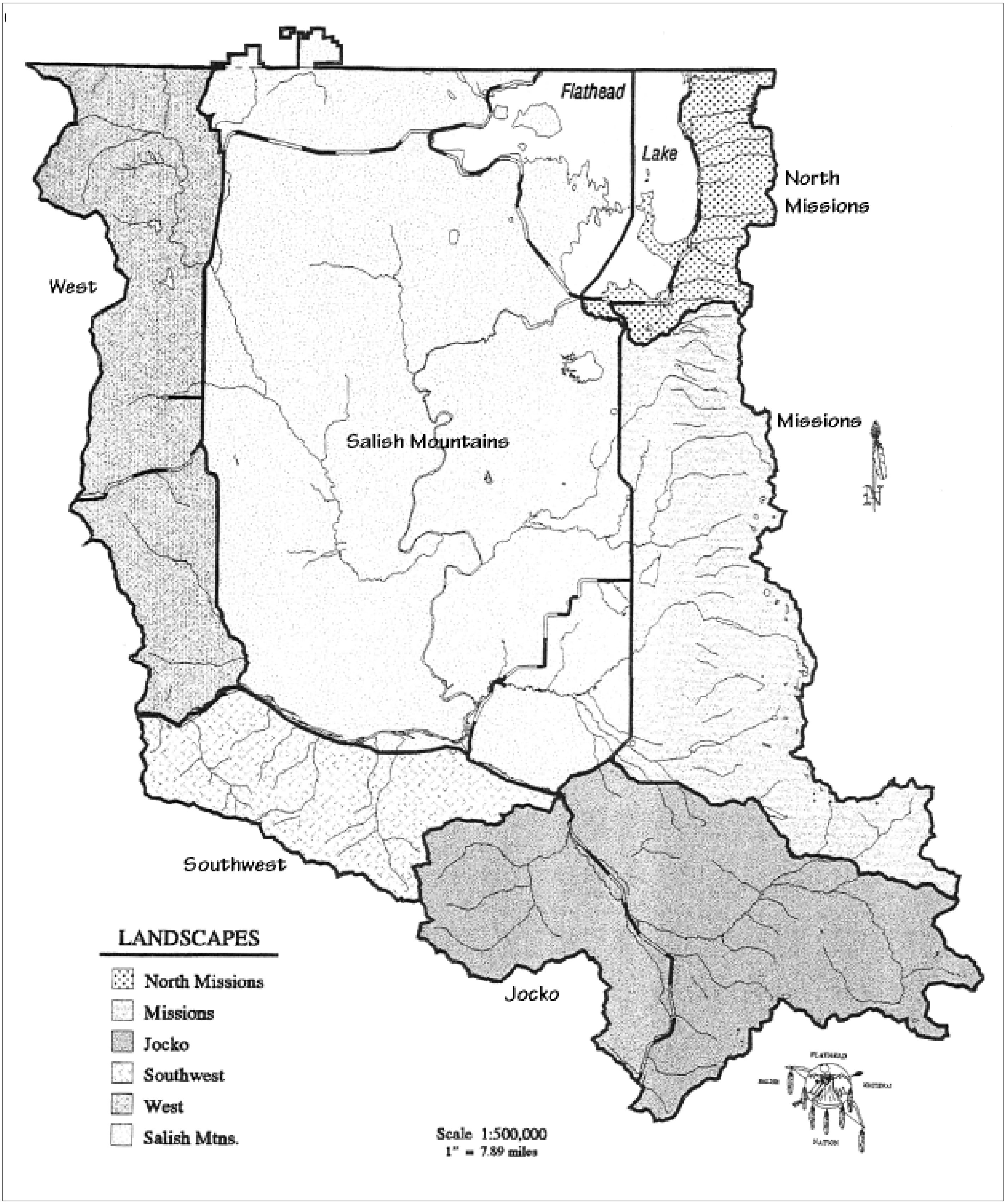


Figure 3-1. The six Reservation landscapes. Delineations are based on watershed boundaries and common features.

North Missions Landscape

General Description

The North Missions Landscape is located in the northeast corner of the Reservation. The Tribal Wilderness Area forms the southern boundary, and the western boundary runs along Highway 93 to Polson and up the center of Flathead Lake.

The area is primarily forested but has some small areas of urban development at Turtle Lake and just east of Polson. Highway 35, the preferred route to Glacier National Park from Polson, runs the landscape's entire length. Blue Bay, Yellow Bay, and Finley Point State Park are important recreation areas.

Disturbance and Vegetation

Fire: The Existing Condition

Fire regimes are shown in figure 3-2.

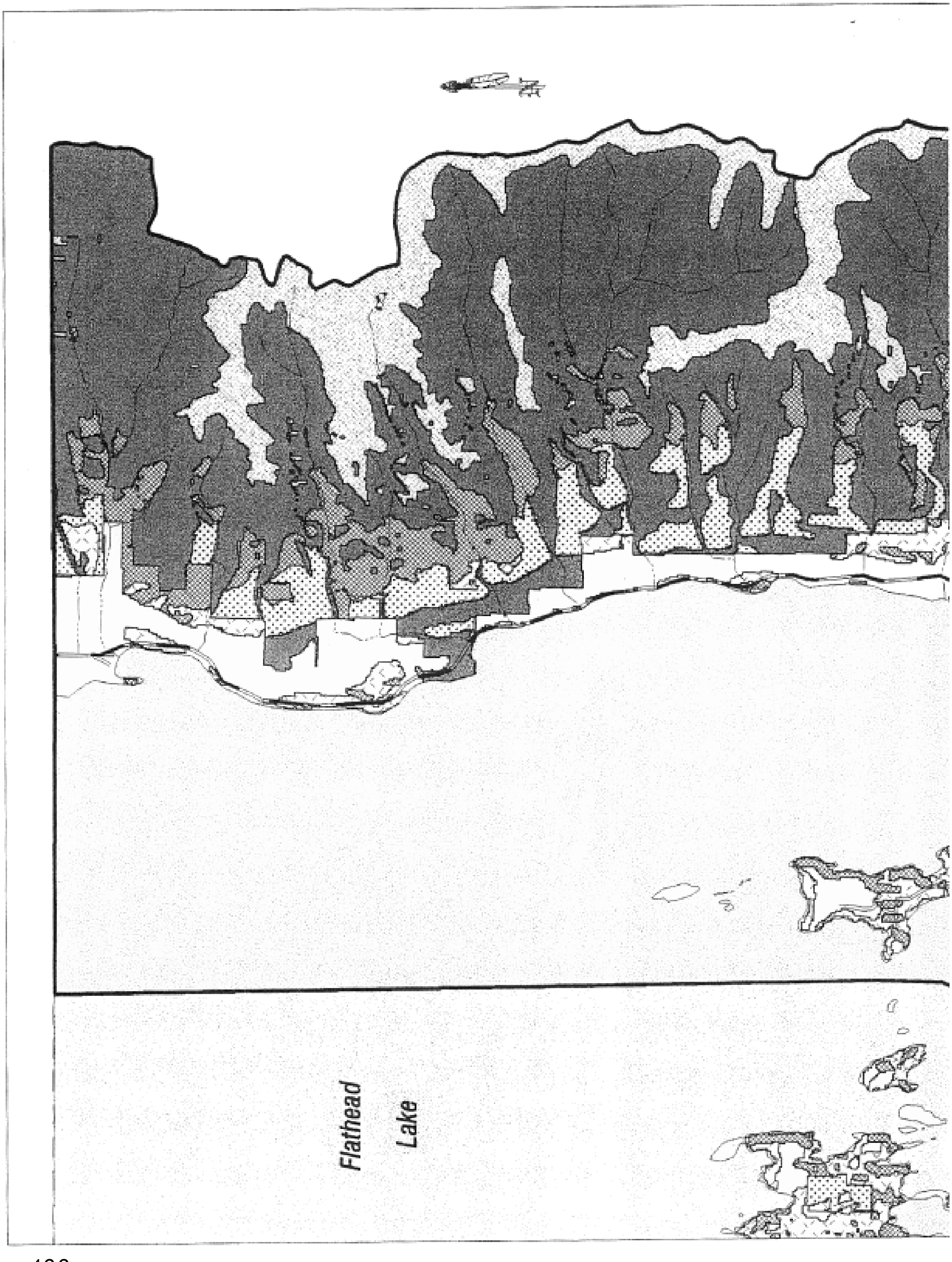
Landform and high levels of moisture have had a strong influence on vegetation composition and structure in the North Missions. Fire exclusion policies have changed the forest and increased the risk of large wildfires, insects, and diseases. The area is especially vulnerable to large, partial stand-replacement and stand-replacement wildfires under drought or high wind conditions.

The Low-Elevation Zone

The low-elevation zone, which encompasses the wildland-residential intermix part of the landscape, is composed of mature timber in the Nonlethal and Mixed Fire Regimes and is intersected by dense grand-fir and western redcedar riparian corridors. Patches of spruce wetlands and logged areas are widely scattered. Wildfires are infrequent and typically small to medium in size. Overall fire risk is moderate to high because of past logging activity, above average precipitation, fair-road access, human-caused fire hazards, and moderate to steep topography. Homesites within this part of the landscape are at high risk of fire due to poor transportation systems, heavy fuels build up from past fire exclusion, poor homeowner fuels management practices, and local crown fire potential.

The Mid-Elevation Zone

This zone is characterized by a diverse mixture of mature seral, mid-seral, and climax timber and lies in both the Lethal and Mixed Fire Regimes. Moderate to large patches of brush, talus, and logged areas provide habitat edge from the core matrix of mature, unlogged timber. Past logging activity, complex landform, and a high level of past fire activity provides greater stand structural diversity than is found in lower-elevation stands. The health of existing stands is poor, and Douglas-fir regeneration in the understory has increased as a result of fire exclusion. Fire risk is rated high because of existing fuel loadings, limited road access, steep slopes, high crown fire potential from closed canopy stands, and high exposure to prevailing westerly winds.


Flathead
Lake

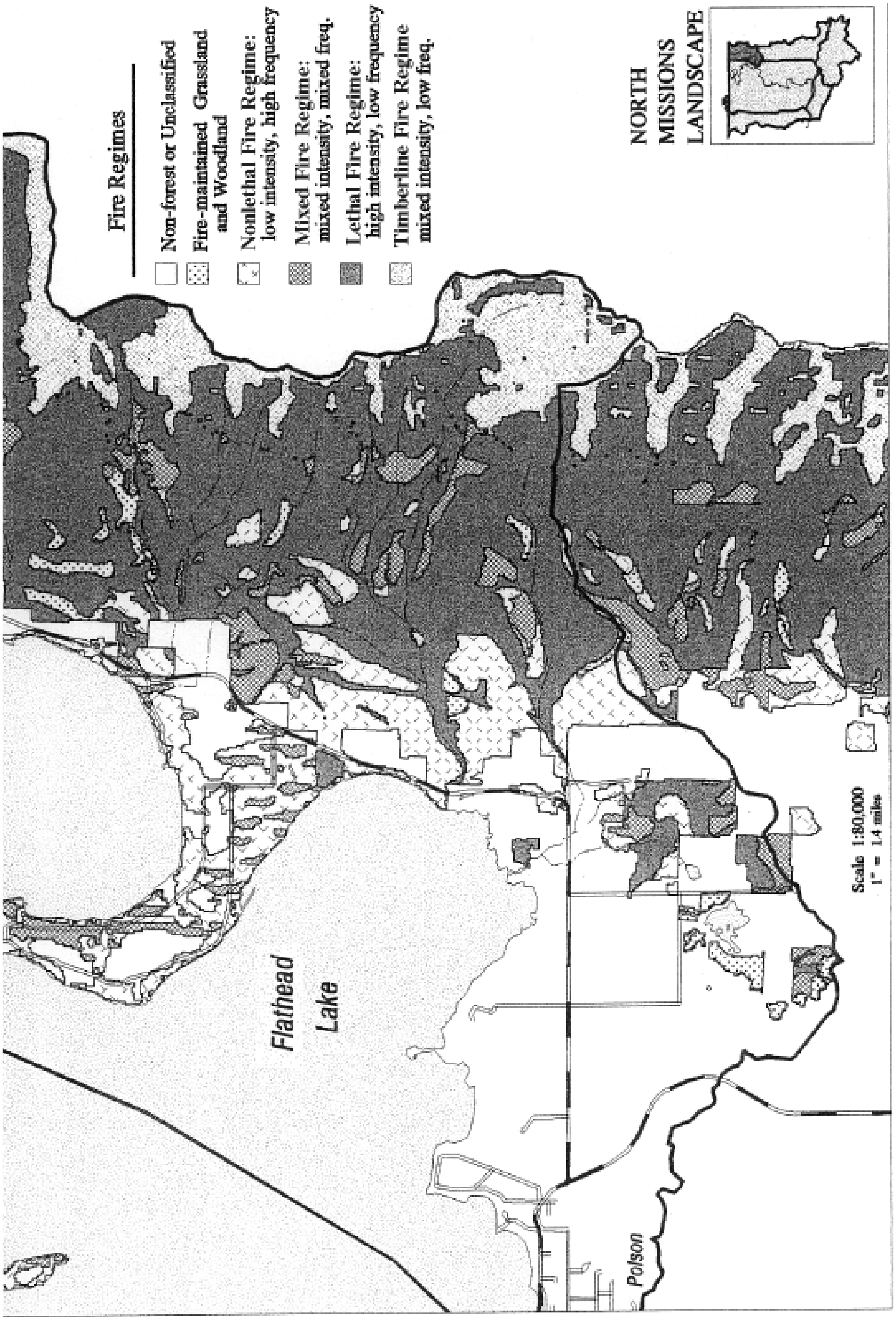


Figure 3-2. Distribution of fire regimes within the North Missions Landscape.

North Missions LS

The High-Elevation Zone

The high-elevation zone includes the Boulder Plateau, which has experienced extensive stand-replacement wildfires that initiated a very uniform, even-aged forest matrix. The area was extensively logged in the recent past. Even-age harvest units, high-elevation meadows, and brushfields occur as moderate to large-sized patches within the matrix. Fuel loadings are high and continuous in unlogged stands, but soils and fuels are moist or wet much of the year. Fires occur infrequently and fire size is typically small from the high amounts of precipitation from summer thunderstorms. The potential for large, severe fires would be extreme under drought conditions.

Smoke and Air Quality

Smoke dispersal is a problem in the lower subunits. Smoke that occurs at mid slope or lower has a tendency to flow downslope and pool at lake level during nighttime conditions, thus impacting people who live along the east shore, at Turtle Lake, and in the community of Polson. Prescribed fires in the Boulder Plateau Subunit will be conducted during summer burning conditions where higher elevation and summer weather patterns will provide better smoke dispersal with little impact on local communities.

Fire Management Objectives

1. **Maintain strategic fire suppression access on the following Tribal and BIA roads to protect wildland-residential intermix areas: B-1000/1100, B-2004/2003/2100/ 2660/2700, B-3000/3020/3100, B-4000/4021/4200, B-5000/5003/5200.**

Vegetation

Forested acres in the North Missions are classified as shown in table 3-1. The location of restricted and unavailable areas (excluding streamside management zones or SMZs) are shown in figure 3-4.

Table 3-1. Acre Distributions by Administrative Category, North Missions Landscape

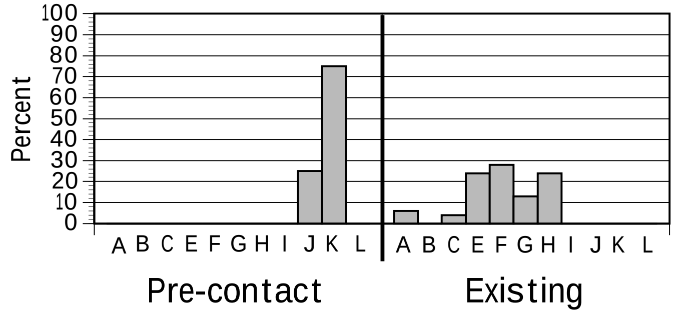
North Missions Landscape Fire Regime	Available Acres	Restricted Acres	Unavailable Acres	Total
Nonlethal Fire Regime	1,720	24	304	2,048
Encroached Timber	1,171	0	268	1,439
Encroached Woodland/Sod	635	0	62	697
Encroached Woodland/Parks	0	0	0	0
Non-lethal Fire Regime with Encroached Acres	3,526	24	634	4,184
Mixed Fire Regime	1,107	586	967	2,660
Lethal Fire Regime	12,887	2,073	5,962	20,922
Timberline Fire Regime	2,899	76	2,339	5,314
Total	20,419	2,760	9,902	33,081

Pre-European and existing seral cluster distributions

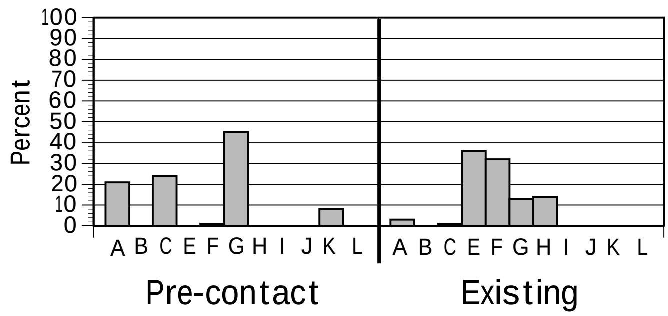
The pre-European and existing seral cluster distributions for the Nonlethal, Mixed, and Lethal Fire Regimes in the North Missions Landscape are shown in figure 3-3. Figure 3-5 shows the location of existing seral clusters. For a description of each seral cluster, please see figure 1-9.

Figure 3-3 a, b, and c. Pre- and existing seral cluster distributions

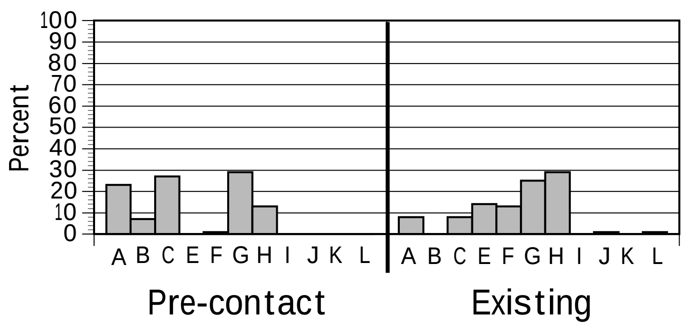
Nonlethal Fire Regime



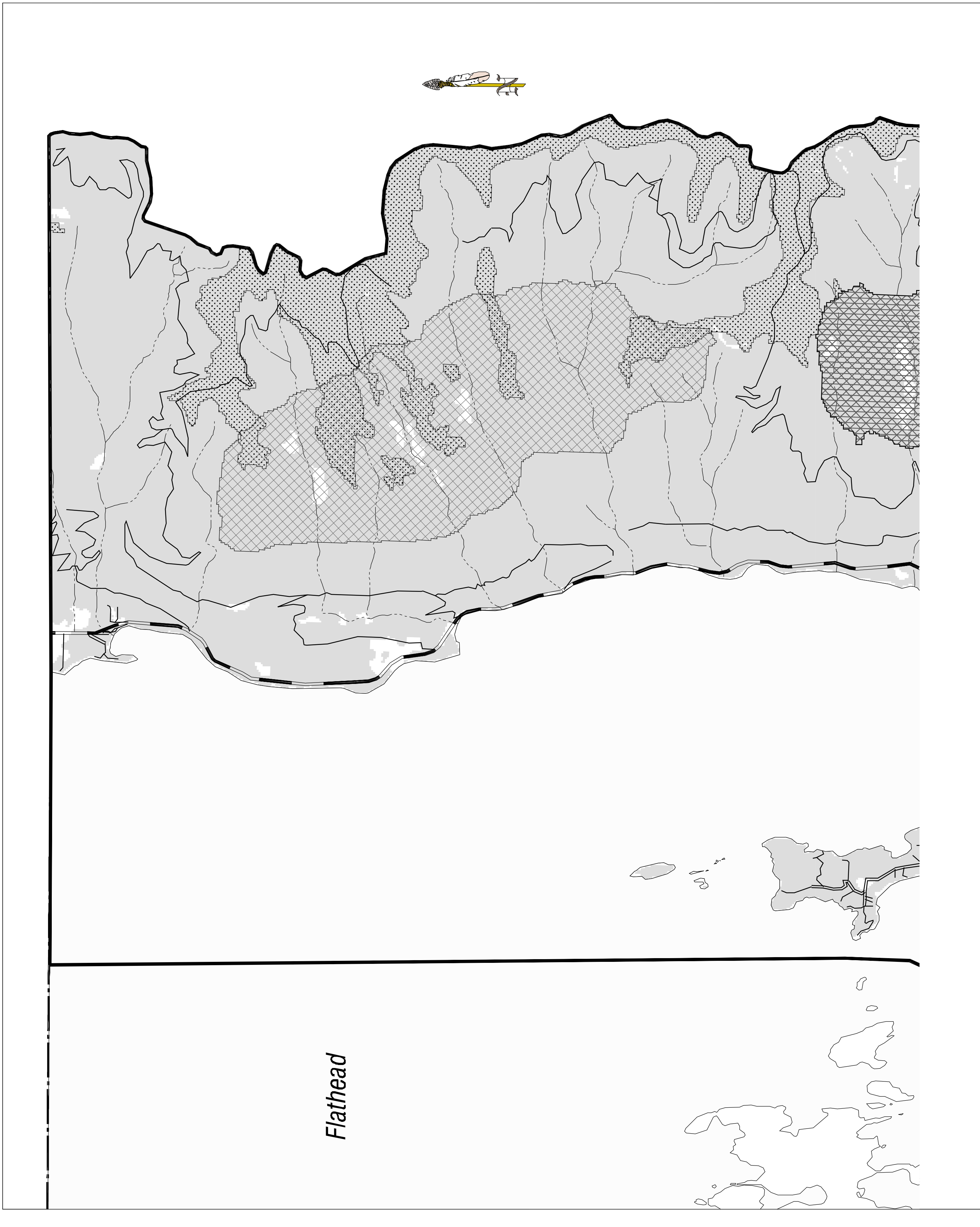
Mixed Fire Regime



Lethal Fire Regime



North Missions LS


Flathead

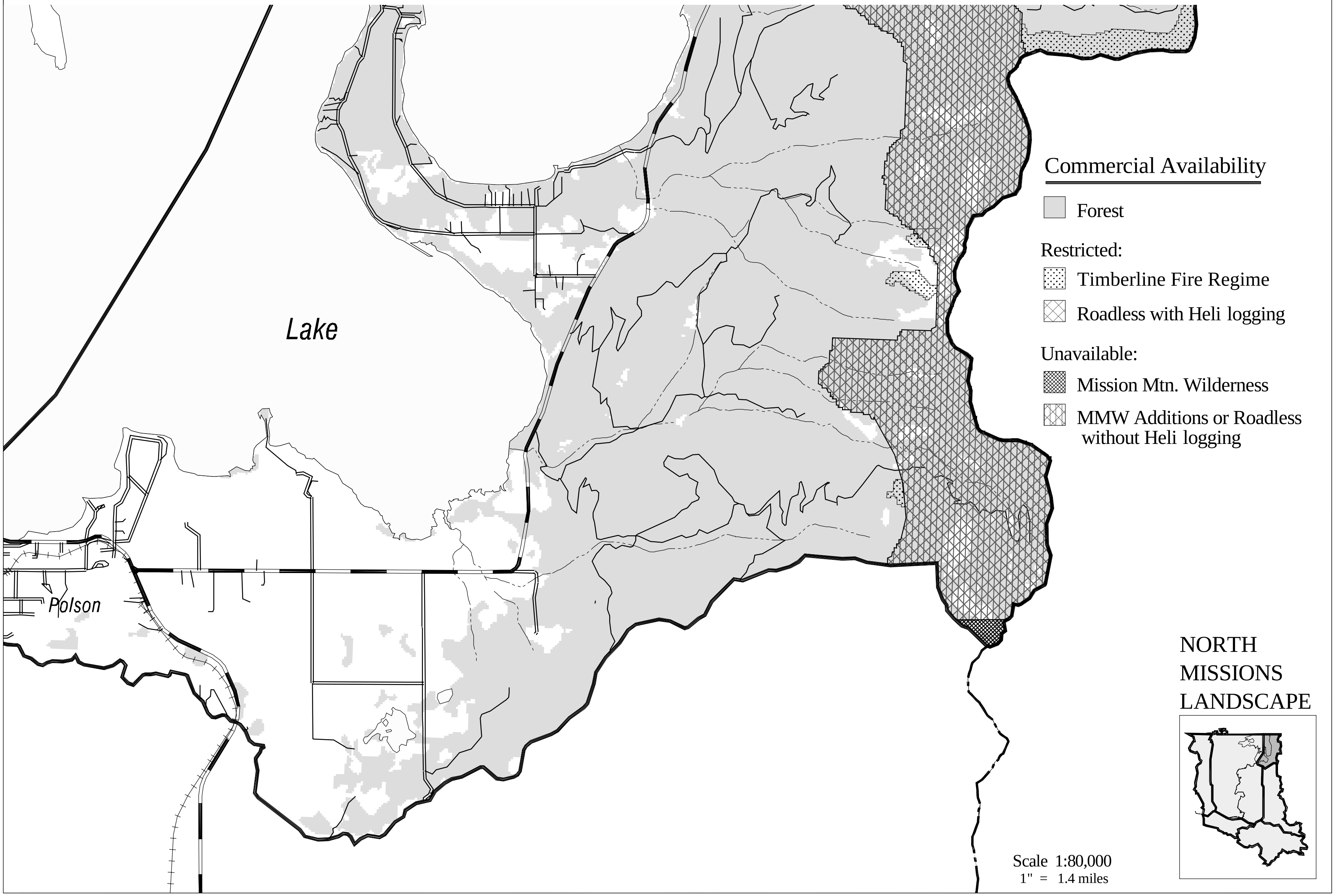
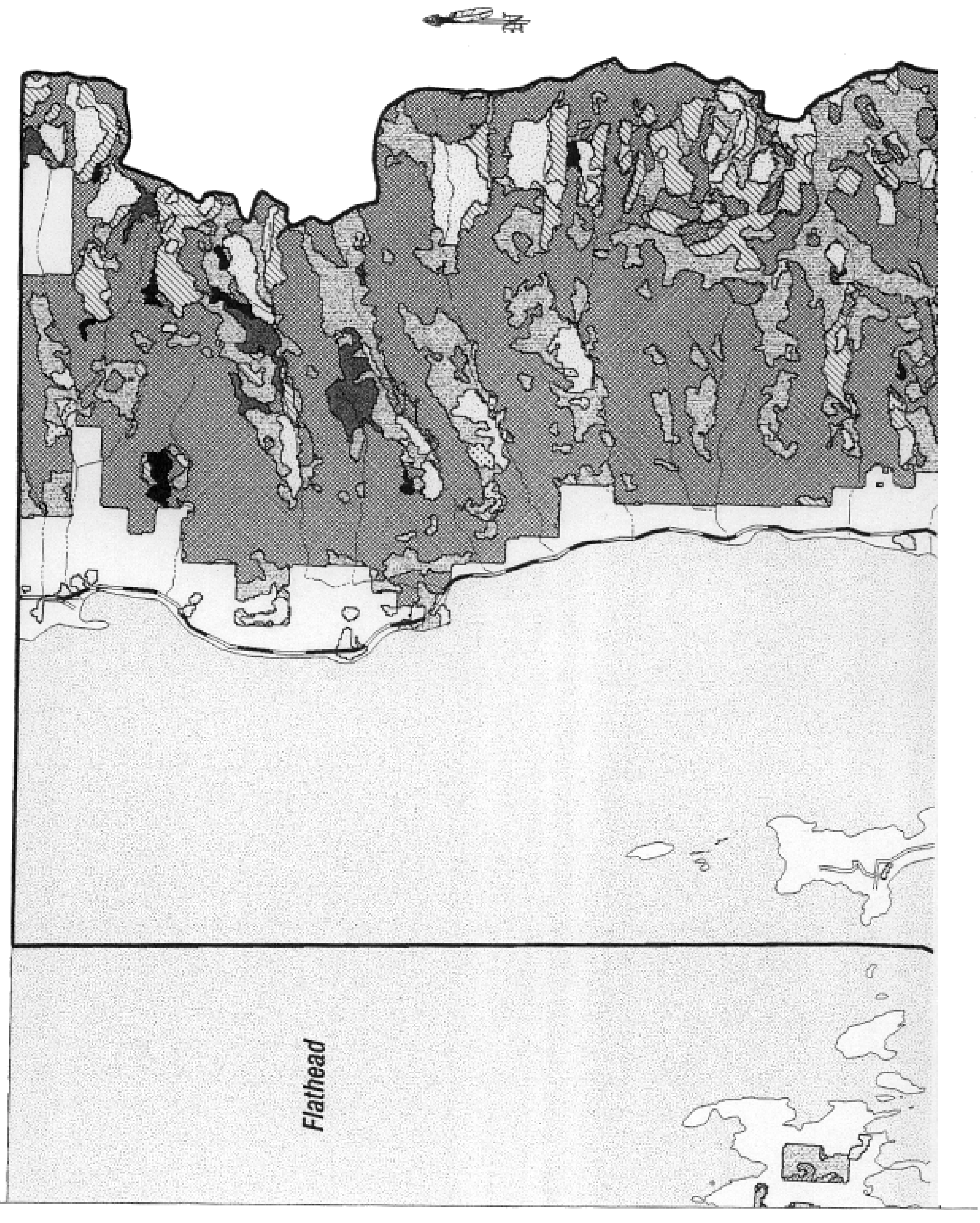


Figure 3-4. Unavailable and restricted areas in the North Missions Landscape (not including streamside management zones (SMZs) and inaccessible and noncommercial (I&N) ground).


Flathead

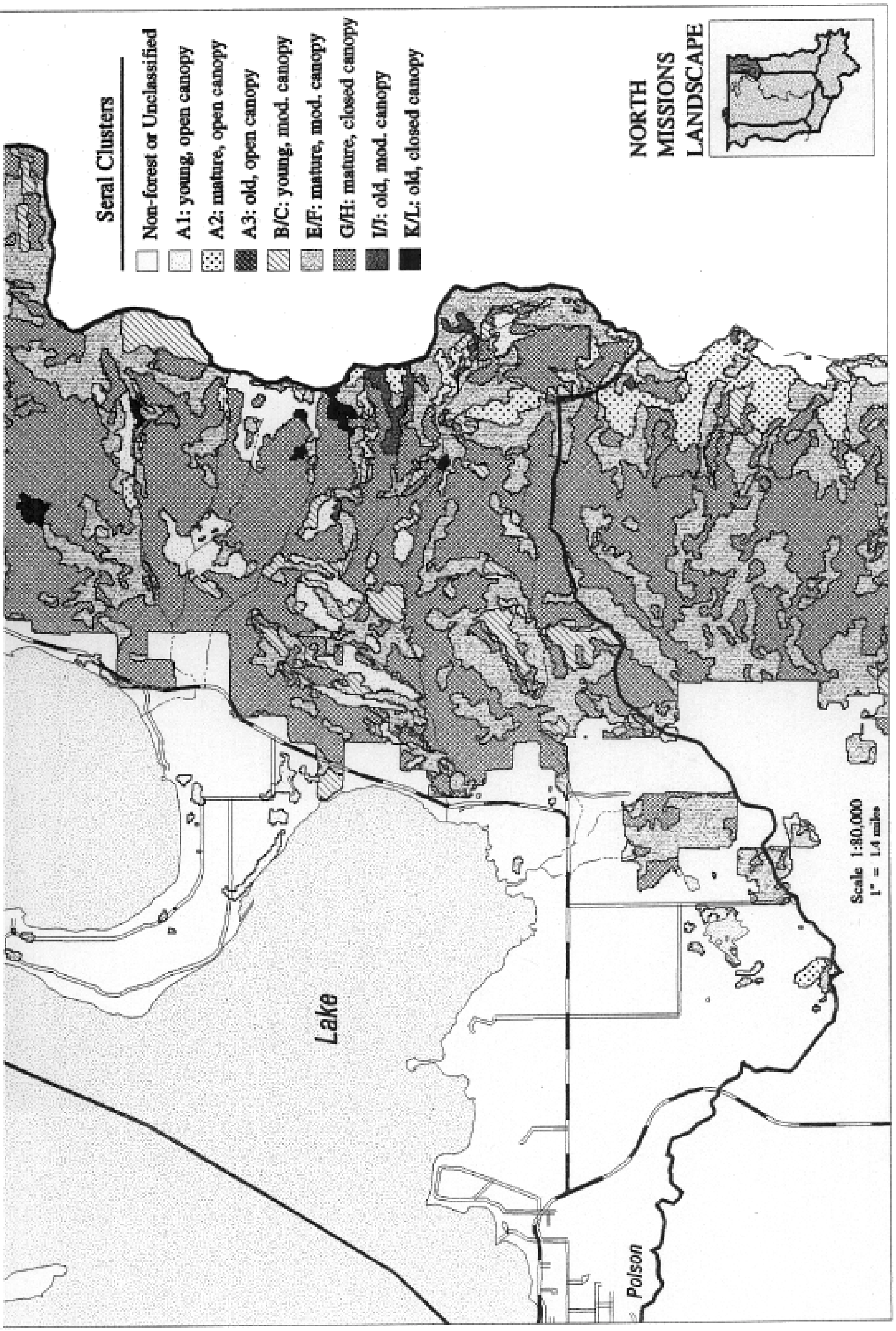


Figure 3-5. Seral cluster distributions in the North Missions Landscape. Seral clusters represent patches of trees with similar ages (or sizes), canopy closures, and layering.

North Missions LS

Vegetation Objectives

1. Achieve the following seral cluster distributions by 2089 (table 3-2).*

Table 3-2 a and b. Desired Conditions for Seral Clusters.

	Seral Clusters						
Fire Regime	A/A1	A2	B	C	D	E	F
Nonlethal	10-30%	10-30%	0-10%	0-10%	0-5%	0-5%	5-15%
Mixed	0-25%	N/A	5-15%	10-20%	3-7%	0-5%	0-24%
Lethal	10-20%	N/A	0-5%	5-15%	15-25%	0-5%	5-20%

	Seral Clusters					
Fire Regime	G	H	I	J	K	L
Nonlethal	5-15%	0-5%	0-5%	10-40%	5-15%	0-5%
Mixed	25-32%	0-5%	0-5%	0-5%	5-15%	0-5%
Lethal	30-35%	5-10%	0-5%	0-5%	10-20%	5-10%

* These tables use seral clusters, whereas the tables in the vegetation section uses seral cluster groups. We shift to seral clusters here to facilitate sale planning. Meeting seral cluster goals means that seral cluster groups will automatically be met.

Wildlife and Diversity

Wildlife Habitat by Fire Regime

The Nonlethal Fire Regime

Most of this fire regime is composed of Douglas-fir/pinegrass, Douglas-fir/snowberry, and Douglas-fir/ninebark habitat types. Remote sensing data shows the regime is composed of small patches of mature and moderate to closed-canopied stands intermixed with more open stands. Western larch and ponderosa pine are present, but those stands are dominated by Douglas-fir.

The regime is important to big game and mountain grouse during the winter months. It provides bedding sites, hiding cover, and feeding areas. The shrub patches are important for breeding birds that use early seral vegetation. Forage and early-seral bird habitat will become less available unless fire or other kinds of disturbances open the canopy.

The Mixed Fire Regime

This fire regime consists of mostly Douglas-fir/huckleberry, Douglas-fir/snowberry, and Douglas-fir/pinegrass habitat types. It is found mostly in the Hellroaring and Centipede drainages, although it also occurs around Turtle Lake and in the mid to upper regions of most watersheds in the landscape. Most of the regime is in early and mid-seral condition. On south slopes the stands tend to have an open understory and are used by big game in winter.

Canopy closure varies, but the patch size and the size and age classes of timber are relatively uniform and show less variability than would have occurred under natural fire conditions. As a consequence, wildlife species diversity is probably less than pre-European times. Housing development limits wildlife use of some areas, particularly around Turtle Lake and along Highway 35.

The Lethal Fire Regime

This fire regime is dominated by grand fir, western redcedar, and subalpine fir habitat types. Where there has been no timber harvesting, stands are in a mid-seral condition. Where timber harvesting has occurred, they are in early seral stages. Very few late seral, old growth stands exist due to fires that burned through the area in the 19th century. Subalpine fir makes up most of what little old-growth there is.

Much of this fire regime has been fragmented by heavy logging that occurred in the 1970s. The logging reduced the amount of interior forest habitat that supports species like lynx, fisher, red-backed vole, boreal owl, and barred owl. High road densities have reduced habitat effectiveness in important big game summer range. Heavy snowmobile use during winter months may displace and add additional stress to many wildlife species.

The Timberline Fire Regime

This fire regime is composed of mostly subalpine fir/woodrush habitat types. These areas occur along the reservation boundary and in a few upper watersheds. They are particularly important for elk as summer range and calving areas. Seral conditions and impacts are similar to those found in the Lethal Fire Regime.

Wildlife and Diversity Objectives

1. **Reduce fragmentation in the Lethal and Timberline Fire Regimes by restoring natural vegetation patterns. Maintain travel corridors for wildlife.**

2. **Increase diversity and wildlife habitat quality in the Nonlethal and Mixed Fire Regimes through the use of silvicultural and fire prescriptions.**

3. **Limit winter recreation activities to designated use areas in order to increase use of the area by wildlife. This will require enforcement by Tribal fish and game wardens.**

4. **Follow established guidelines for threatened and endangered species.**

Water and Fish

The Existing Condition

The North Missions Landscape consists of a series of parallel drainages which flow directly into Flathead Lake. There is no interconnection between them. For our analysis, we delineated three physiographic zones, descriptions of which follow.

The Low-Elevation Zone

The terrace area at the foot of the mountains exhibits the greatest diversity in the North Missions Landscape. Sediments underlying it are derived from continental glaciers emanating from the Flathead Valley. Generally, they trend from bouldery clays in the north end of the landscape to coarse sands and gravels in the south end. In addition to perennial streams, there are extensive springs, seeps, and linear draws with saturated soil conditions. Saturated areas are extensive because of the high water holding capability of the glacial sediments and the widespread heterogeneity in the sediments.

The Mid-Elevation Zone

The high slope, mountain front areas are primarily underlain by the St. Regis Formation (argillites). This formation is extremely resistant and maintains the high slope angles found on the North Mission Front. Soils are generally thin and poorly developed and soil moisture is limiting. Streams are usually perennial, high-gradient cascades. They receive much of their flow from the upper basin zone. Several smaller drainages begin in the upper elevations. The primary geomorphic process occurring is soil creep and stream downcutting.

The High-Elevation Zone

Upper basin areas are underlain by Carbonate rocks (Middle Belt Carbonate). The Carbonates have developed a deep residuum from weathering in place. Additionally, most of the area has either volcanic, or volcanic-influenced soils. The combination of deep subsoils and volcanic soils produce near surface materials that have very high water holding capacities.

Although this area is in a high precipitation zone (>50 inches), most, or all precipitation infiltrates into the soil and subsoil profile. This moisture is available for plant uptake through the growing season. Additionally, soil moisture is released to down-gradient stream channels throughout the summer season. Delayed release of soil moisture decreases the magnitude of peak stream flows and increases the magnitude of fall and winter base flows. Since most precipitation infiltrates into the subsurface, all stream courses in upper basin areas are intermittent to ephemeral.

Primary geomorphic processes responsible for sediment movement and landscape change include weathering, the mobilization of dissolved solids, and the breakdown of carbonate rocks; soil and subsoil creep on greater slopes; and the movement of saturated lobes of sediment.

Fish

The streams of this area are unique in that they do not exhibit a wide range of discharges, and they all flow into Flathead Lake. They are typically high gradient, and most support isolated populations of resident westslope cutthroat trout. Passage of fish out of Flathead Lake into these streams is precluded by shoreline gravel berms or high gradient channels. While these streams do not provide spawning habitat for Flathead Lake fish, they do have the potential to export fish to the Flathead Lake system. They are characterized by complete canopy coverage. Instream habitat is defined by boulders that provide small pools. Riparian vegetation is ungrazed by cattle.

Water and Fish Objectives

1. Reconnect tributaries to Flathead Lake by removing passage barriers which include poorly placed culverts, shoreline gravel berms, dams, canals, and severely degraded channels.

Scenery

The Existing Condition

The existing scenic integrity level was evaluated using the following scheme (table 3-3).

Table 3-3. Existing condition Scenic Integrity Level definitions.

Level	Definition
Unaltered (Very High)	Area viewed is intact with only minor deviations. Visual harmony is expressed at its highest level.
Appears Unaltered (High)	Appears intact. Deviations are not evident because the repeat form, line, color, texture, and pattern common to landscape chatacter
Slightly Altered (Moderate)	Appears slightly fragmented. Noticeable deviations are subordinate to the landscape character. Visual harmony slightly reduced.
Moderately Altered (Low)	Appears moderately fragmented. Deviations begin to dominate, but still borrow from attributes such as size, shape, edge effect, and pattern of natural openings.
Heavily Altered (Very Low)	Appears extremely fragmented. Deviations extremely dominant and borrow little from landscape character. In need of rehabilitation. (Not to be used as management standard.)

Recommended scenic integrity levels for the North Missions Landscape are shown in figure 3-6. Definitions of terms used follow (table 3-4).

Table 3-4. Recommended Scenic Integrity Level definitions.

Level	Definition
Distinctive	The following Areas are distinctive: Mission Mountains Tribal Wilderness, everything above 6,000' in the Jocko and Southwest Landscapes, the River Corridor, and everything within three miles of the Flathead Lake Shoreline.
Common	Everything not classified as distinctive is considered common. There are four common subclassifications:
Very High	Visible from 3 or more viewpoints, slopes greater than 30%
High	Visible from 3 or more viewpoints, slopes less than 30%
Moderate	Visible from less than 3 viewpoints, slopes less than 30%
Low	Not visible

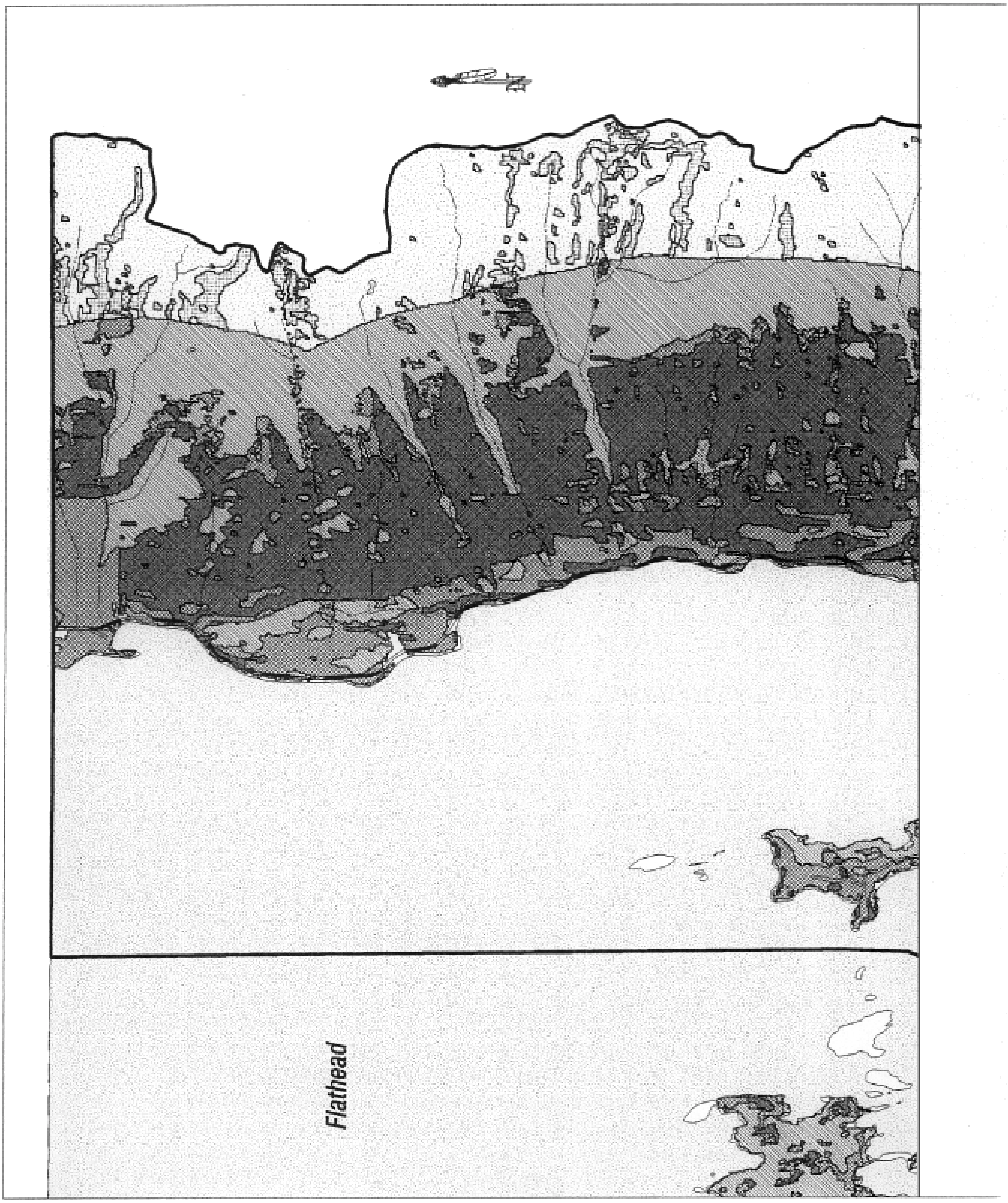
The North Missions landscape is divided into three subunits.

The Low-Elevation Zone

The overall scenic integrity level is Moderately Altered. Small openings from clearcuts, housing developments, and fruit orchards appear frequently. Straight-lines from powerlines and roading are noticeable. The variety class is common. The sensitivity level is 1.

The Mid-Elevation Zone

The overall scenic integrity level is Slightly Altered. The north half is primarily unroaded with virgin stands of forest. The south half is roaded with past even-age and uneven-age timber harvests. Recent clearcuts are evident between the Boulder and Hellroaring drainages. The variety class is distinctive, and the sensitivity level is 1.


Flathead

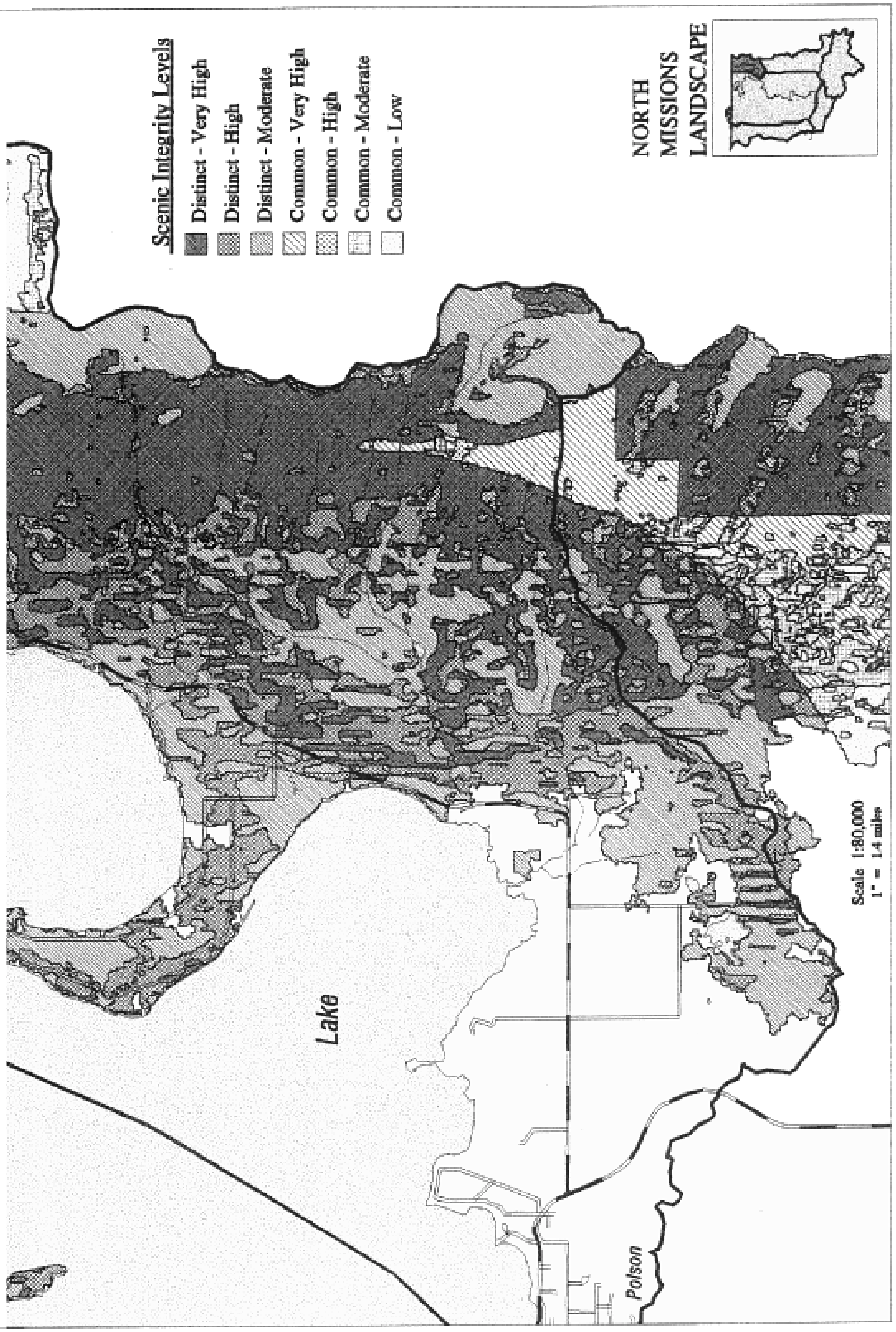


Figure 3-6 Recommended scenic integrity for the North Missions Landscape.

The High-Elevation Zone

The overall scenic integrity level is rated as Heavily Altered (HA) because of the number of clearcuts. This area is located on the plateau of the North Missions and has been intensively managed for timber production. The tree species found here require even-age treatments for regeneration. The variety class is common, and the sensitivity level is 1.

For viewpoints used to analyze this landscape and other methods used see Appendix M.

Scenery Under the Forest Plan: A Computer Simulation

Figure 3-7 shows the North Missions Landscape as it appears today (top) and as it might appear in the future (bottom). The bottom picture, a simulation, shows more openings, which will be created by silvicultural and fire prescriptions designed to mimic natural fire.

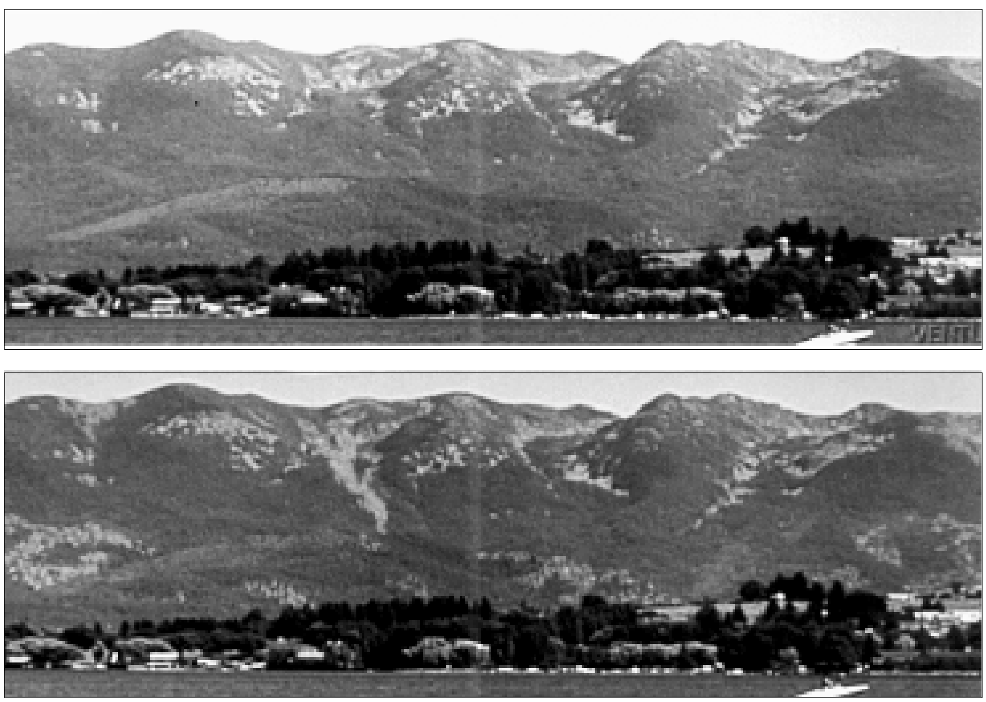


Figure 3-7. North Missions Landscape in 1995 and as it might appear in the future based on a computer simulation.

Scenery and Recreation Objectives

1. Rehabilitate the existing visual condition of the area from Hellroaring Creek to Station Creek to meet recommended scenic integrity levels by 2008.

2. Evaluate and develop the North Missions Landscape for additional winter recreation activities to serve the entire Reservation by 2005.

3. Provide a site development plan for Blue Bay Campground for enhanced facilities and uses by 2001.

4. Define and Implement (as needed) a Limited Public Access Area for Hellroaring drainage by 2002.

5. Provide concession-guide opportunities in the Blue Bay-Boulder area.

6. Enhance wildlife viewing opportunities in East Bay.

7. Evaluate a Scenic Corridor Plan for Highway 35 by the year 2008.

North Missions Roadless and Wilderness Area Objectives

1. Designate the Blue Bay Roadless Area and the North Missions Wilderness Addition within two years of Forest Plan approval. Develop Management plans for these areas within four years of Forest Plan approval.

Transportation

Existing road densities as of 1999 are shown in figure 3-8.

North Missions Transportation Objectives

1. Develop specific landscape level transportation objectives within one year of the Final FMP adoption. These will be included within the Forest-wide Transportation Plan.

2. Develop a scenic road tour on Boulder road system for summer vehicle use by 2006.

3. Evaluate a Scenic Highway corridor plan for Highway 35 by 2008.

4. Maintain the Hellroaring/Station Creek Roadless Area as roadless by permanently abandoning roads where feasible and adding it to the wilderness area.

Missions LS

Missions Landscape

General Description

This landscape includes the 92,000 acre Mission Mountains Tribal Wilderness Area and all lands due west to Highway 93. It encompasses the Wilderness Buffer Zone, Kicking Horse Reservoir, McDonald Lake, Mission and St. Mary's Reservoirs, and Swartz Lake. The town of St. Ignatius and portions of Ronan and Pablo are located within the landscape boundaries, as is the Kicking Horse Job Corp Center.

The Mission Mountains foothill region includes a high number of homes and ranchettes and the primary feeder canal for the irrigation system that serves the entire Mission Valley.

Disturbance and Vegetation

Fire: The Existing Condition

Figure 3-9 shows the major fire regimes within the landscape.

The effects of fire on landscape patterns have varied within the Missions Landscape because of the way steep slopes and the prevailing westerly winds have affected fire behavior. Excluding fire has produced a higher accumulation of biomass and caused the loss of open areas. Fuel beds are now continuous. The area is especially vulnerable to large, partial stand-replacement and full stand-replacement fires during periods of drought or high winds.

The Foothills-Valley Zone

The Wildland-Residential Intermix Subunit fuels complex is composed of a mosaic of multi-storied, Nonlethal and Mixed Fire Regimes with scattered patches of wetlands, pastures and logged areas. Narrow, well defined riparian corridors are common. The mature timber matrix is fragmented by agricultural lands occurring on mostly non-tribal ownerships. Timber stand fuel conditions vary widely according to stand density, species composition, past fires, and logging and thinning activity. Wildfires that occur are typically small to medium in size due to high effective moisture, early detection, and fair road access. The subunit includes widely dispersed to densely concentrated residential homesites that are at moderate to high fire risk from poor transportation systems, local crown fire potential, and high exposure to prevailing winds.

The Mission Mountains Tribal Wilderness

The Missions Mountain Tribal Wilderness Subunit is composed of a mature timber matrix of mixed seral, closed-canopy vegetative types in the Lethal and Timberline Fire Regimes. The area has a well defined timberline and is interspersed with large patches of rock cliffs, brushfields, and avalanche chutes at mid-slope and higher. Fire exclusion has produced uniform stands of closed-canopy timber with very little diversity and continuous fuel beds of vulnerable to stand-replacement fires. Soils and fuels are usually wet on these sites. The sites also receive abundant moisture from summer thunderstorms. Wildfires are usually infrequent and small, but are expected to be large and severe under extreme drought or high wind conditions. Fire danger is high due to difficult terrain, extremely poor access, and existing crown fire potential.

Smoke and Air Quality

Lower-elevation smoke dispersal can be difficult in this landscape because smoke tends to flow downslope and pool at the valley floor under nighttime or stable daytime atmospheric conditions. Emissions could affect local populations in or near the Buffer Zone and the communities of Ronan and St. Ignatius.

Prescribed natural fires will be managed during the summer months under proper smoke dispersal conditions. However, the potential for poor air quality is high if large wildfires were to occur at mid-slope or lower.

Fire Management Objectives

1. **Where feasible, restore and maintain vegetation mosaics and fuels in a natural state of continuity, arrangement, depth, and loading through the implementation of a Mission Mountains Tribal Wilderness Plan and the Wildland Fire for Resource Benefit Ops Plan.**

2. **Maintain strategic fire suppression access on the following Tribal and BIA roads to protect wildland-residential intermix areas : B-5000/5001/5200, M-1200; M-2004, M-3200, M-3300/3320, M-4000/4010, M-4300, M-440/4410, M-5000.**

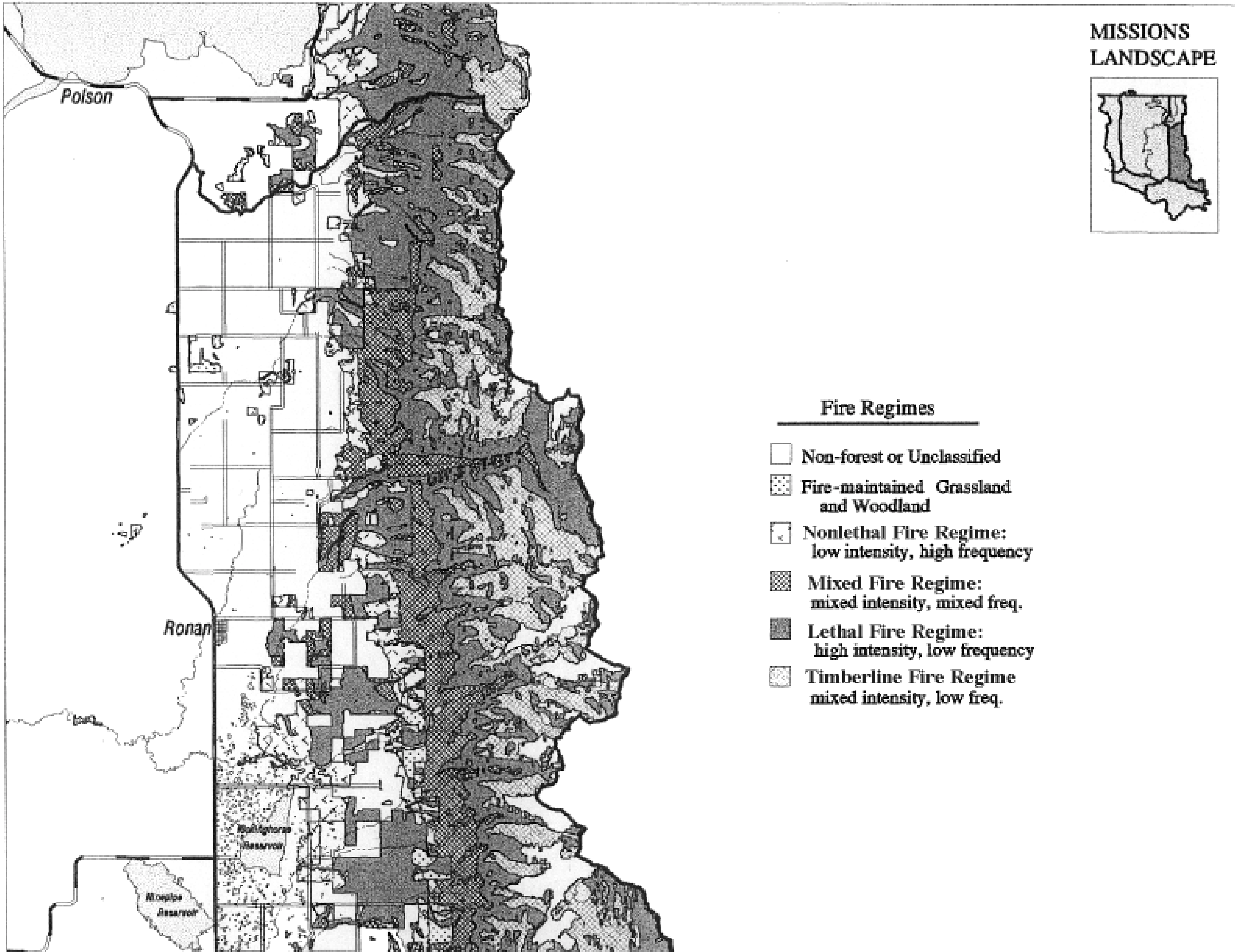
Vegetation

Forested acres in the Missions are classified as shown in table 3-5. The location of restricted and unavailable areas (excluding streamside management zones or SMZs) are shown in figure 3-10.

Table 3-5. Acre Distributions in the Missions Landscape by Administrative Category

Missions Landscape Fire Regime	Available Acres	Restricted Acres	Unavailable Acres	Total
Nonlethal Fire Regime	1,037	62	2,933	4,032
Encroached Timber	47	1	1,751	1,799
Encroached Woodland/Sod	109	3	1,144	1,256
Encroached Woodland/Parks	10	0	0	10
Non-lethal Fire Regime with Encroached Acres	1,203	66	5,828	7,097
Mixed Fire Regime	1,233	195	16,998	18,426
Lethal Fire Regime	5,904	1,217	34,421	62,464
Timberline Fire Regime	0	17	18,671	18,688
Total	8,339	1,496	75,918	85,753

Missions LS


MISSIONS
LANDSCAPE
Polson
Ronan
Fire Regimes
Non-forest or Unclassified
Fire-maintained Grassland and Woodland
Nonlethal Fire Regime: low intensity, high frequency
Mixed Fire Regime: mixed intensity, mixed freq.
Lethal Fire Regime: high intensity, low frequency
Timberline Fire Regime mixed intensity, low freq.

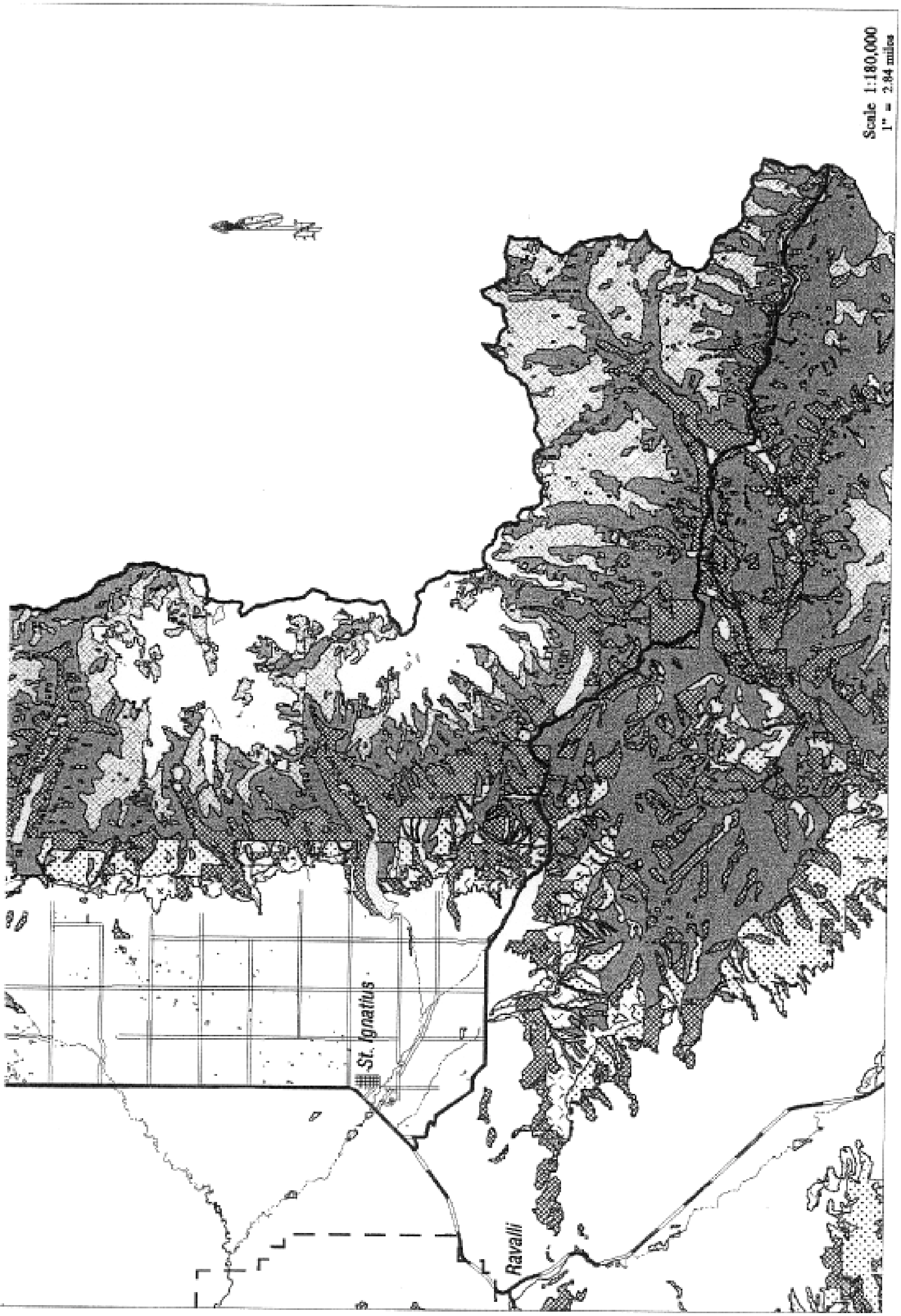
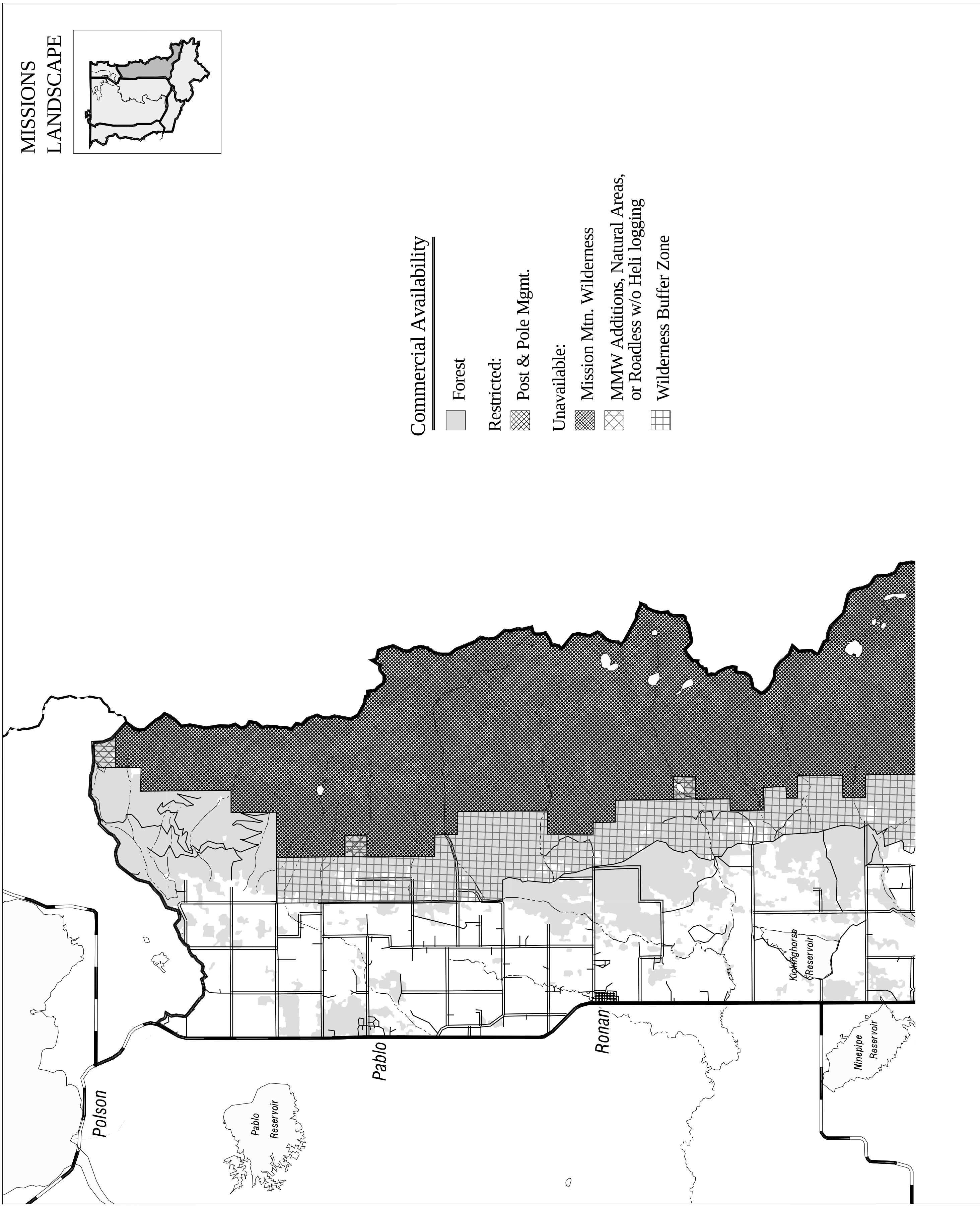


Figure 3-9. Distribution of fire regimes within the Missions Landscape.


MISSIONS
LANDSCAPE
Commercial Availability
Forest
Restricted:
Post & Pole Mgmt.
Unavailable:
Mission Mtn. Wilderness
MMW Additions, Natural Areas,
or Roadless w/o Heli logging
Wilderness Buffer Zone
Polson
Pablo
Ronan
Pablo
Reservoir
Kickinghorse
Reservoir
Ninepipe
Reservoir

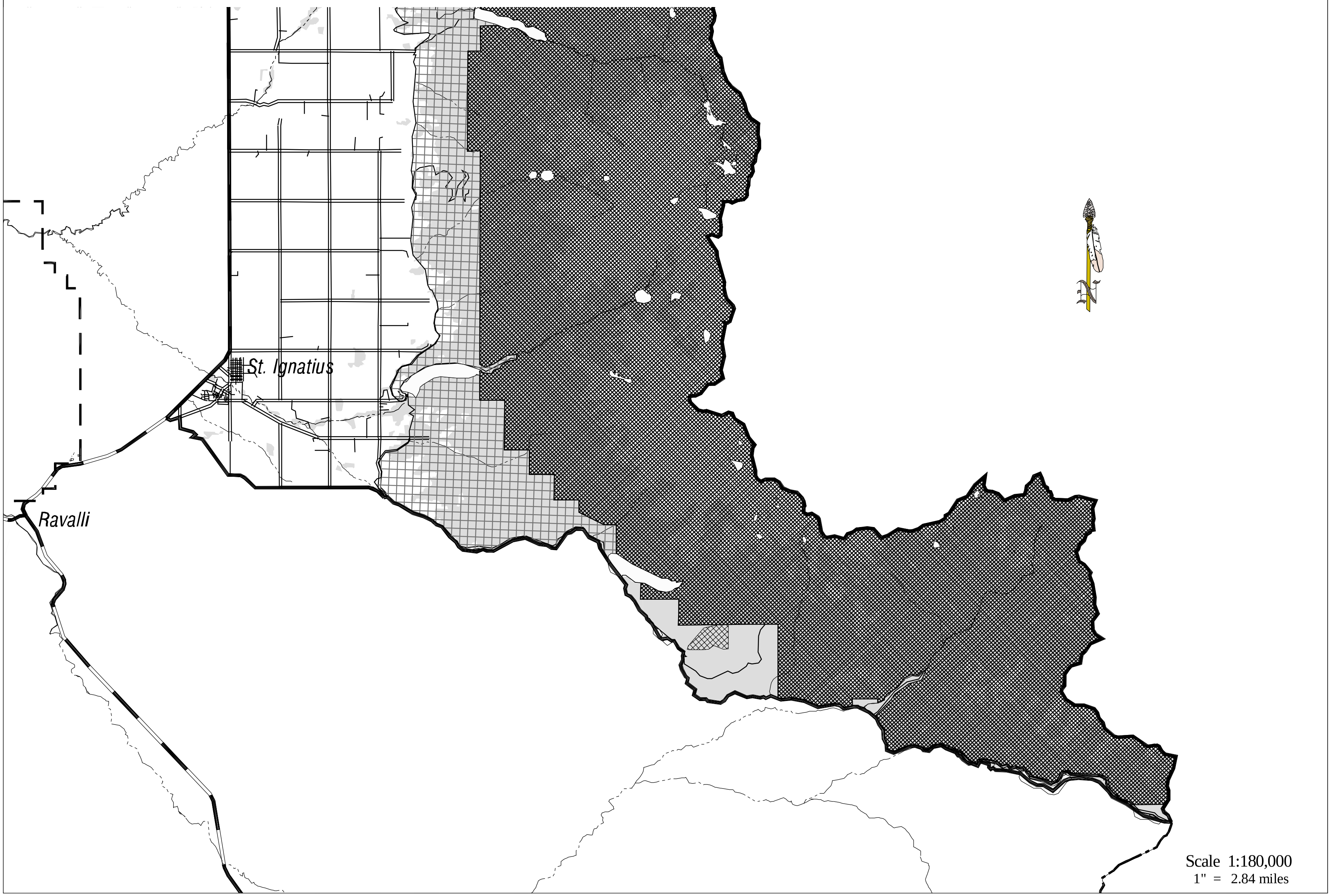


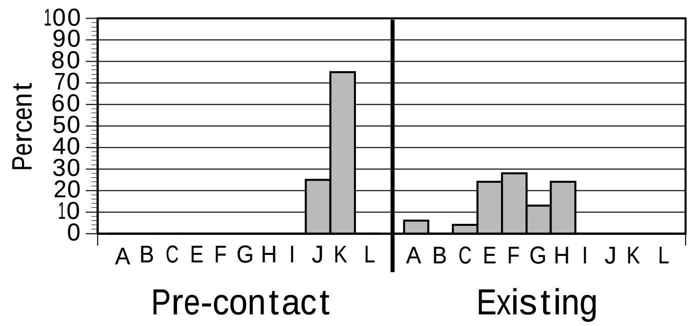
Figure 3-10. Unavailable and restricted areas in the Missions Landscape (not including streamside management zones (SMZs) and inaccessible and noncommercial (I&N) ground).

Pre-European and existing seral cluster distributions

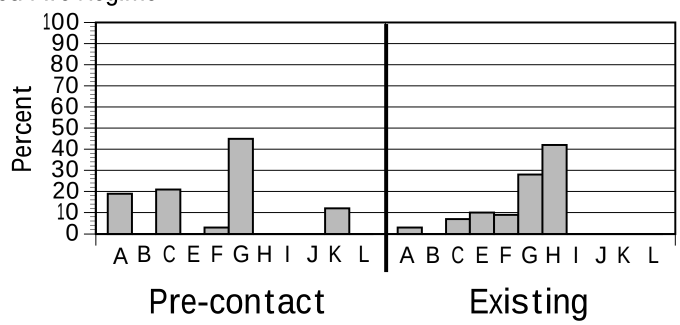
The pre-European and existing seral cluster distributions for the Nonlethal, Mixed, and Lethal Fire Regimes in the Missions Landscape are shown in figure 3-11. Figure 3-12 shows the location of existing seral clusters.

Figure 3-11 a, b, and c. Pre-European and existing seral cluster distributions

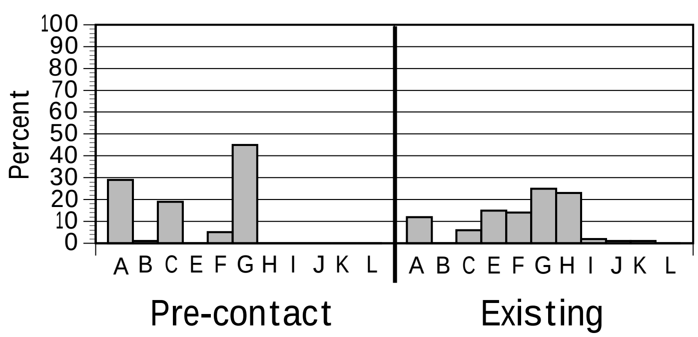
Nonlethal Fire Regime



Mixed Fire Regime



Lethal Fire Regime



Vegetation Objectives

1. Achieve the following seral cluster distributions by 2089 (table 3-6).

Table 3-6 a and b. Desired Conditions for Seral Clusters.

	Seral Clusters						
Fire Regime	A/A1	A2	B	C	D	E	F
Nonlethal	10-30%	10-30%	0-10%	0-10%	0-5%	0-5%	5-15%
Mixed	0-25%	N/A	5-15%	10-20%	3-7%	0-5%	0-24%
Lethal	10-20%	N/A	0-5%	5-15%	15-25%	0-5%	5-20%

	Seral Clusters					
Fire Regime	G	H	I	J	K	L
Nonlethal	5-15%	0-5%	0-5%	10-40%	5-15%	0-5%
Mixed	25-32%	0-5%	0-5%	0-5%	5-15%	0-5%
Lethal	30-35%	5-10%	0-5%	0-5%	10-20%	5-10%

Wildlife and Diversity

Wildlife Habitat by Fire Regime

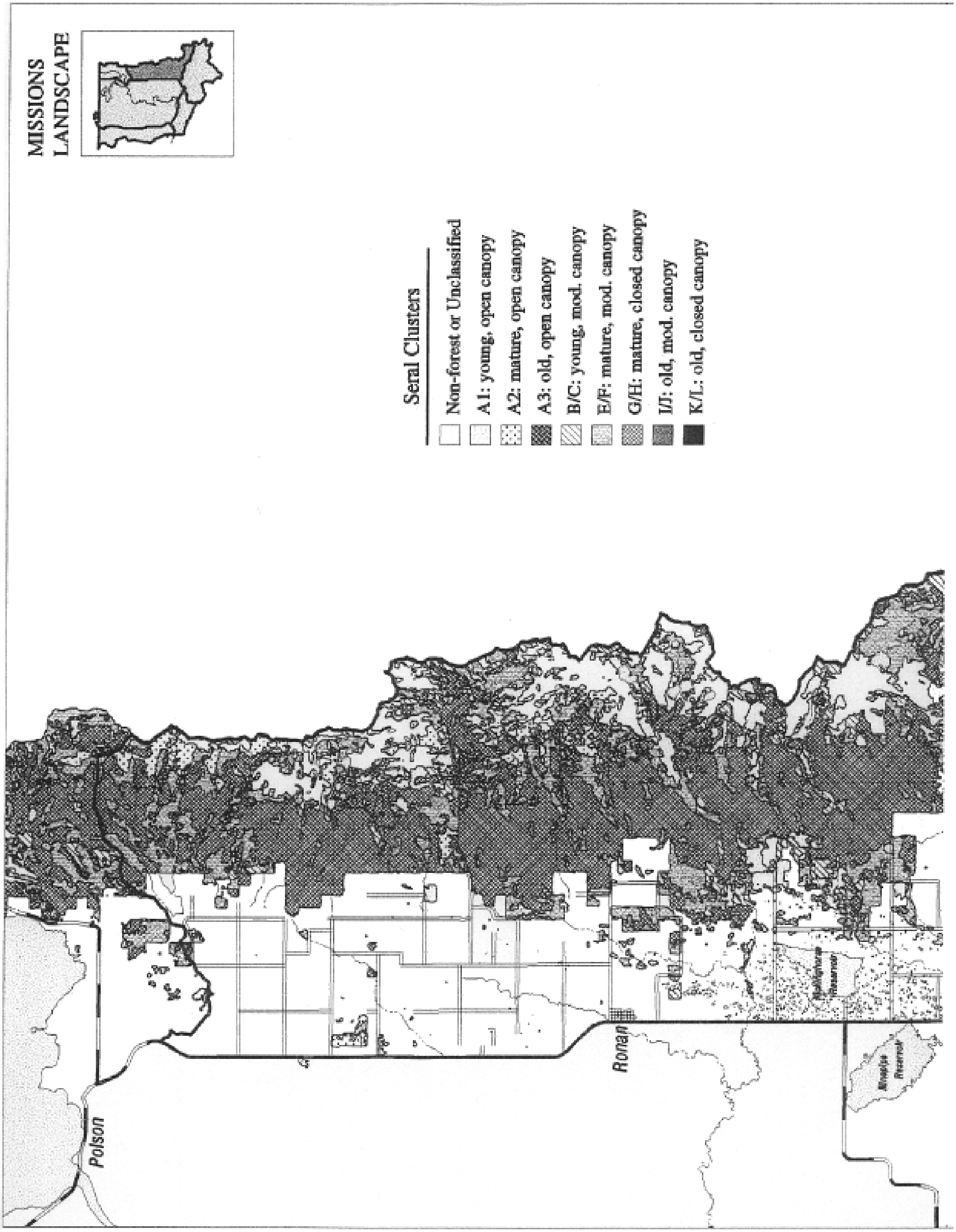
The Nonlethal Fire Regime

This fire regime includes a few ponderosa pine habitat types but is dominated by Douglas-fir/snowberry, Douglas-fir/ninebark, and Douglas-fir/pinegrass habitat types. It is found mostly in the Mission foothills and in the forested wetland complex between the foothills and Kicking Horse Reservoir. Most of the stands are mature timber with a high Douglas-fir component. In pre-European times, ponderosa pine was the major seral component because of frequent ground fires.

Fragmentation from logging and fire is minimal but fragmentation from housing development is extensive. Fire exclusion has increased the amount of hiding cover for big game, but most of this is unavailable because of residential development. During pre-European times, stands were more open and provided important winter habitat for big game and breeding grounds for waterfowl. Human impacts continue to seriously alter this regime.

The Mixed Fire Regime

Most of the Mixed Fire Regime falls within the Tribal Wilderness, and it is dominated by Douglas-fir habitat types. During pre-European times it was much more patchy. The many openings provided important forage for big game and grizzly bears and breeding habitat for many different bird species. Due to the exclusion of fire and logging, these areas are now nearly all in a mid-seral condition. Continued fire exclusion will result in an increasingly uniform interior forest. This condition will benefit some species but will reduce or eliminate habitat for others. General diversity has declined and will continue to decline until some type of disturbance is restored to the landscape.


MISSIONS LANDSCAPE
Seral Clusters
Non-forest or Unclassified
A1: young, open canopy
A2: mature, open canopy
A3: old, open canopy
B/C: young, mod. canopy
E/F: mature, mod. canopy
G/H: mature, closed canopy
I/J: old, mod. canopy
K/L: old, closed canopy
Polson
Ronan

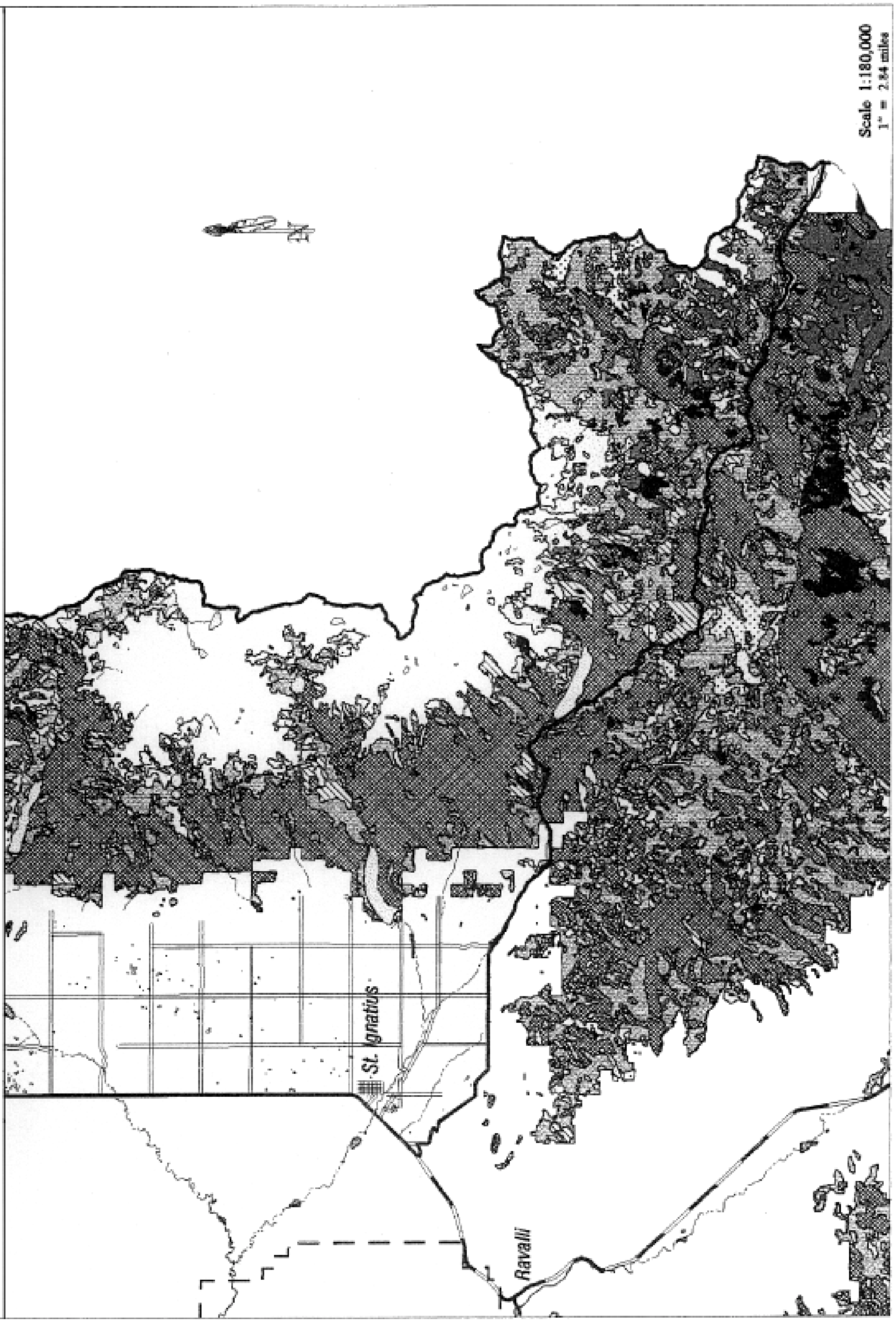


Figure 3-12. Seral cluster distributions in the Missions Landscape. Seral clusters represent patches of trees with similar ages (or sizes), canopy closures, and layering.

Missions LS

The Lethal Fire Regime

In the Missions Landscape, most of the Lethal Fire Regime is within the Tribal Wilderness, although there are small patches around Kicking Horse Reservoir. The regime includes Engelmann spruce, grand fir, western redcedar, and subalpine fir habitat types. Most stands are in a mid-seral condition due to the absence of fire and logging in this century. Old-growth is limited due to extensive burns that occurred in the 19th century. The only fragmentation that does occur is from natural meadows, blowdown, and avalanches. Although fires have been effectively excluded from this fire regime over the last 50 to 100 years, fire return intervals and patch sizes are still within the natural range of variability. However, many species of wildlife including big game, grizzly bears, and many small mammals and birds would benefit from the return of periodic fires.

The Timberline Fire Regime

These habitat types include subalpine fir, alpine larch, and whitebark pine. They occur in the Tribal Wilderness at or near the treeline and are most extensive in the North Fork of the Jocko River Drainage; both are slow-growing sites. The regime serves as big game summer range and winter habitat for white-tailed ptarmigan. Whitebark pine, important as a food source for grizzly bears, has been seriously affected by the exclusion of fire and white pine blister rust.

Wildlife and Diversity Objectives

1. **Reintroduce natural and prescribed fire where possible to increase habitat and wildlife diversity in all fire regimes with particular emphasis on the Nonlethal, Mixed, and Timberline Fire Regimes.**

2. **Update the Tribal Wilderness Fire Plan.**

3. **Incorporate better land-use planning and grazing management to reduce human encroachment and grazing impacts in sensitive areas like the Buffer Zone and forested wetlands.**

4. **Follow established guidelines for threatened and endangered species.**

Water and Fish

The Existing Conditions

The Missions Landscape is diverse because of the broad range of elevations and the extensive glaciation that occurred during the last ice age. Generally, the upper basins have been scoured by glaciers. Steep cirque headwalls, numerous glacial lakes, and very poor soil development are common characteristics. Widespread glacial deposits cover foothill areas. These are generally clay-rich gravels deposited in sequences of lateral and terminal moraines. Morainal features begin in constricted portions of the valleys and impinge on the valley floor, creating the topography that forms much of the foothills and Buffer Zone area.

Streams vary in size, and all are intercepted by the Pablo Feeder Canal as they emerge from the Mission Mountains. Cutthroat, rainbow, bull, and brook trout are all present and form resident populations due to the migration barriers presented by irrigation structures. Instream habitat is dominated by boulders and woody debris. Livestock grazing occurs at a level sufficient to modify riparian vegetation.

Water and Fish — Objectives

1. Maintain the wilderness character of streams, riparian zones, and wetlands throughout the Missions Landscape.

2. Evaluate and implement solutions to passage barriers on streams intercepted by the Pablo feeder canal.

Scenery

The Existing Condition

Recommended scenic integrity levels are shown in figure 3-13. Terms used are defined in tables 3-3 and 3-4. The Missions Landscape is divided into three subunits.

The Foothills-Valley Zone

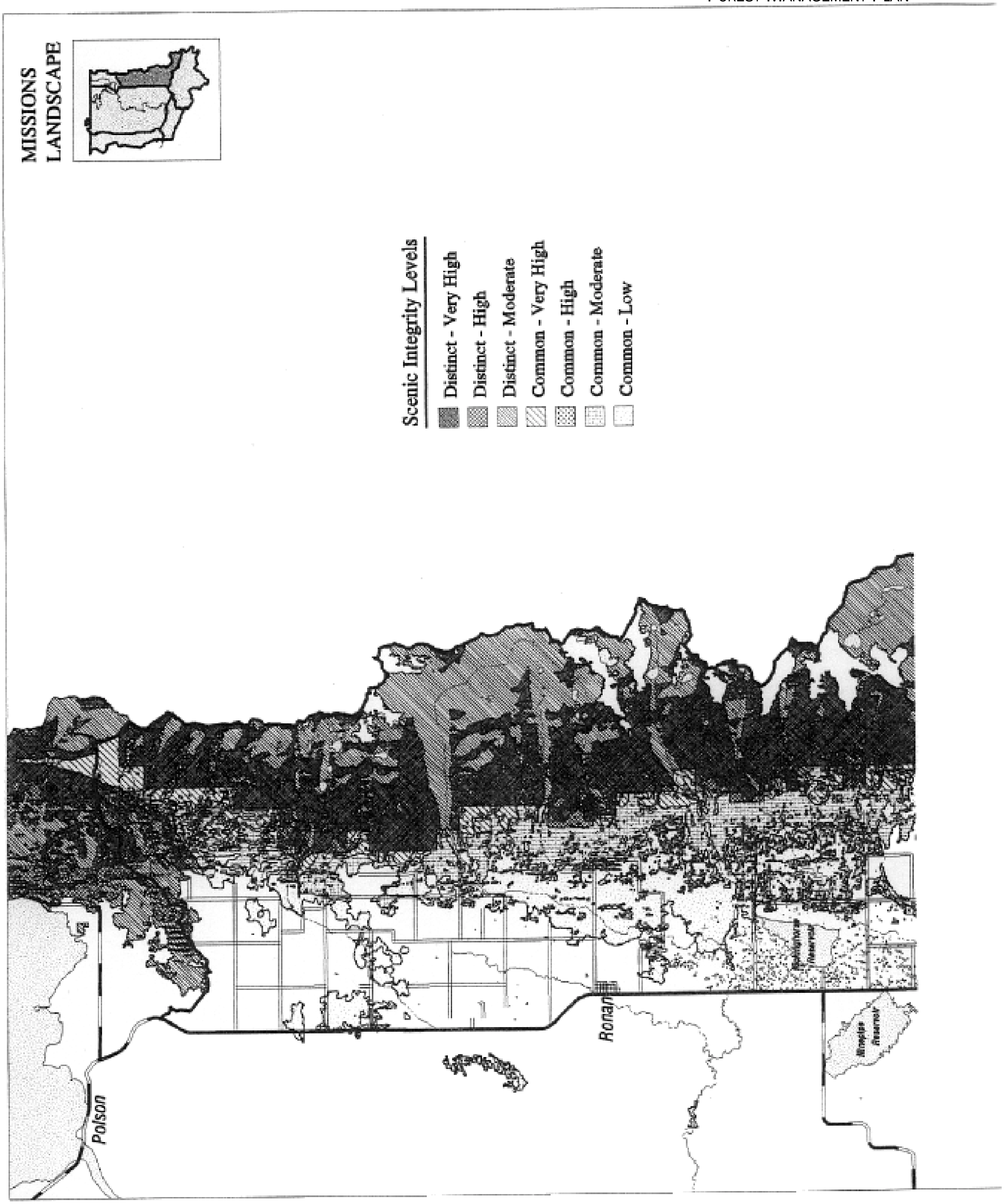
The overall scenic integrity level is rated as Slightly Altered (SA). Major features include residential development; reservoirs; canals; and small, private timber harvesting areas. Vegetation is characterized by dense forest stands of mixed species intermixed with range and farmlands. The variety class is common, and the sensitivity level is 1.

The overall scenic integrity level is rated as Moderately Altered (MA). The variety class is common, and the sensitivity level is 1.

The Missions Mountain Tribal Wilderness

The overall scenic integrity level is rated as Unaltered (UA). The Mission Mountains Tribal Wilderness Area is one of the most photographed landscapes in Montana. It provides a sensational viewshed for people living and traveling through the Mission Valley. The variety class is distinctive, and the sensitivity level is 1.

For viewpoints used to analyze this landscape and other methods used see Appendix M.


MISSIONS LANDSCAPE
Scenic Integrity Levels
Distinct - Very High
Distinct - High
Distinct - Moderate
Common - Very High
Common - High
Common - Moderate
Common - Low
Polson
Ronan

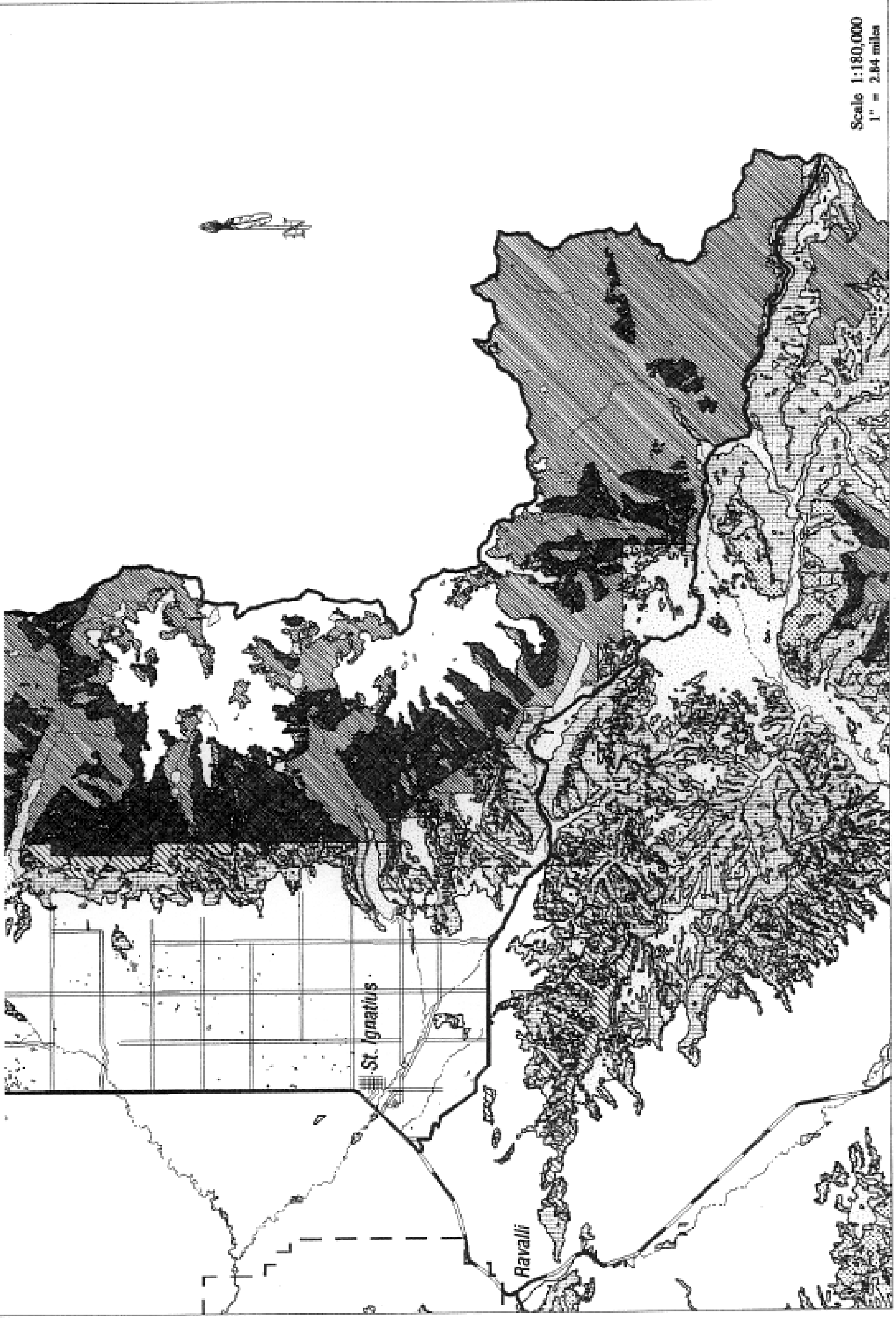


Figure 3-13. Recommended scenic integrity for the Missions Landscape.

Missions LS

Scenery Under the Forest Plan: A Computer Simulation

Figure 3-14 shows the Missions Landscape as it appears today (top) and as it might appear in the future (bottom). The bottom picture, a computer simulation, shows more openings which will be created through the use of silvicultural and fire prescriptions designed to mimic natural fire.

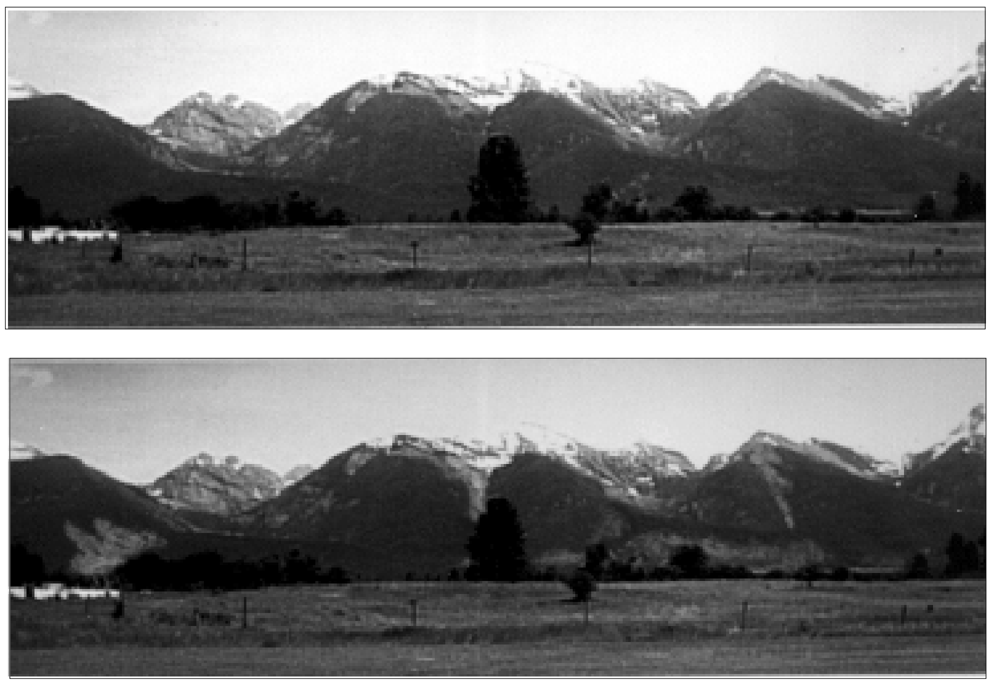


Figure 3-14. Missions Landscape in 1995 and as it might appear in the future based on a computer simulation.

Scenery and Recreation Objectives

1. **Provide visual rehabilitation projects to enhance the scenic integrity level for future Safety of Dams Program activities at McDonald Lake, St. Mary's Lake, and Mission Reservoir.**

2. **Define and implement a Limited Public Access Area by 2002.**

3. **Enhance boating, fishing, bird hunting, and day use opportunities at Kicking Horse Reservoir Recreation Area by 2005.**

4. **Develop a Swartz Lake interpretive trail for educational and group use by 2004.**

5. Enhance fishing opportunities at Crow, Post, Mission, and Spring Creeks by securing funding for access development by 2006.

Missions Roadless and Wilderness Area Objectives

1. Designate the Swartz Lake Roadless Area and the Courville Creek Wilderness Addition within two years of Forest Plan approval. Develop Management plans for these areas within four years of Forest Plan approval.

Transportation

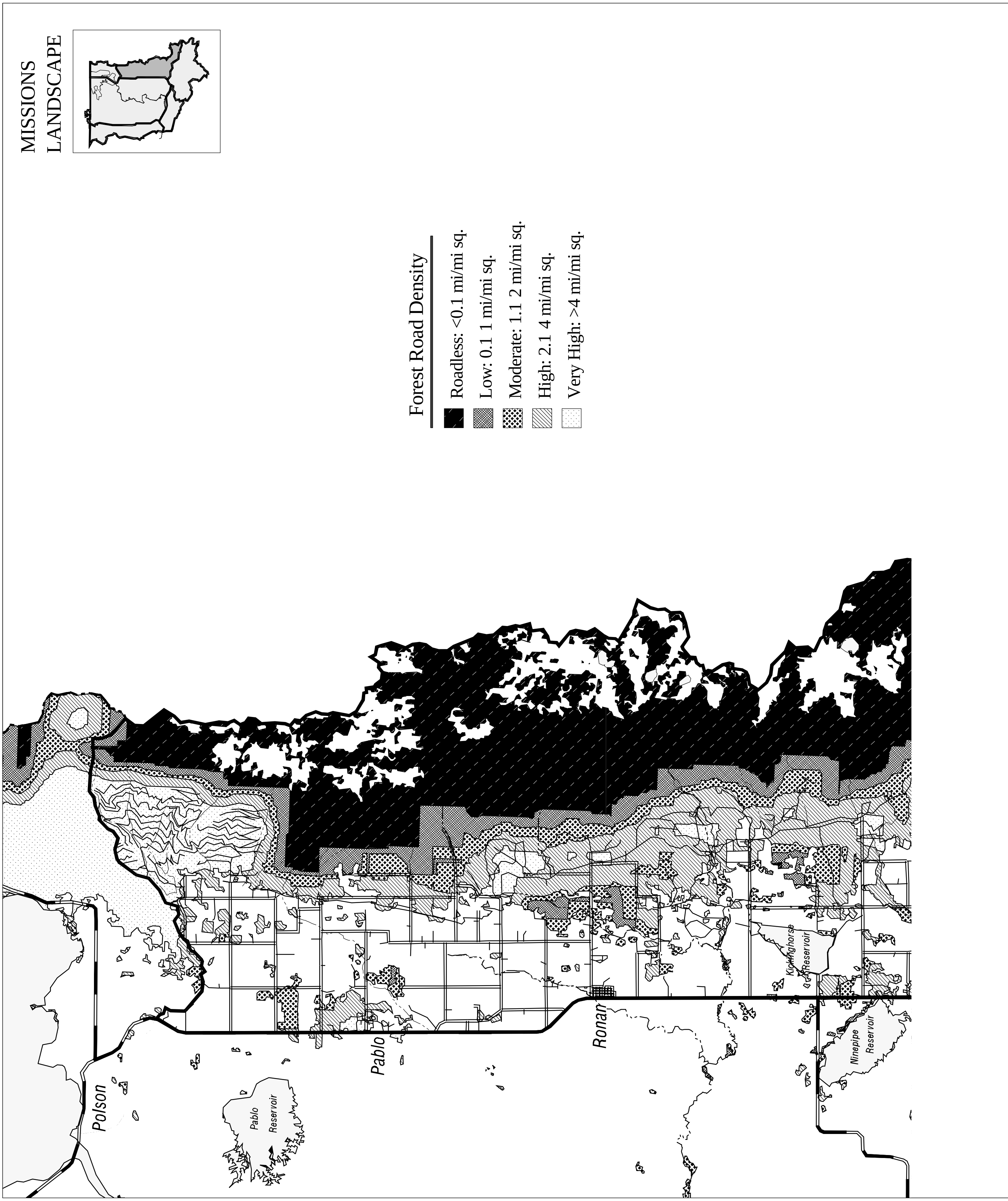
Existing road densities as of 1999 are shown in figure 3-15.

Missions Transportation Objectives

1. Reduce road density in the Buffer Zone by following the interim guidelines for grizzly bear recovery.

2. Close the road to Mission Creek Trailhead at the campground located at the east end of the reservoir by 2005.

3. Develop specific landscape level transportation objectives within one year of the Final Forest Plan adoption. These will be included within the Forest-wide Transportation Plan


MISSIONS LANDSCAPE
Forest Road Density
Roadless: <0.1 mi/mi sq.
Low: 0.1 1 mi/mi sq.
Moderate: 1.1 2 mi/mi sq.
High: 2.1 4 mi/mi sq.
Very High: >4 mi/mi sq.
Polson
Pablo
Pablo Reservoir
Ronan
Kicking Horse Reservoir
Ninepipe Reservoir

Jocko Landscape

General Description

This landscape lies in the southeast corner of the Reservation and is made up primarily of the Jocko River watershed. It includes the 59,000 acre South Fork Primitive Area; the Pistol Creek Mountains; the Ninemile Divide area, which runs from Evaro to Valley Creek; and the communities of Arlee, Ravalli, Evaro, and the southern edge of St. Ignatius. Highway 93 bisects the area, and the Jocko-Seeley Lake Road provides a major secondary access route to and from the Seeley-Swan area.

Disturbance and Vegetation

Fire: The Existing Condition

Fire regimes are shown in figure 3-16.

The Jocko Landscape is a mosaic of diverse fuel complexes within Lethal, Mixed, and Nonlethal Fire Regimes. Past land management such as logging and grazing, combined with the effects of fire exclusion, have resulted in large forested stands with heavy accumulations of dead vegetation and unnatural fuel arrangements, structures, and compositions. Forest health is relatively poor. Most timber stands are subject to *armellaria* and mistletoe infestations that are adding to the already high fuel loadings. Fire exclusion efforts have dramatically altered the Jocko Landscape fire regimes so that future wildfires will tend to be larger and more severe than in the past.

The Jocko Primitive Area

This area is composed of multi-storied, mature and old subalpine fir, lodgepole pine, Engelmann spruce, and timberline-whitebark pine forest types under Mixed to Lethal Fire Regimes. Small to medium-sized meadows and extensive burned areas, brushfields, and rock talus are present within the matrix. Most timber stands are characterized by relatively large amounts of downed woody fuels with dense understories that provide fuel ladders to overstory tree crowns. Soils and fuels are moist or wet much of the year, so fires occur infrequently and are typically small. Overall fire risk is low under normal summer conditions, but the potential for crown fires and large fires is extreme (especially during droughts) due to continuous, dense fuelbeds.

The balance of the landscape

The rest of the landscape is characterized by a mature timber matrix of seral lodgepole pine, multi-storied mixed seral types at lower elevations and climax types at upper elevations on north and east slopes. Narrow, well defined riparian corridors and small to large patches of logging, sod, rock talus, brushfields, and wetland occur within the matrix. Fuel conditions vary widely according to stand density, species composition, age, and previous logging and pre-commercial thinning activities. Wildfires that have occurred in the recent past have typically been kept small to medium in size. Early detection and extensive road access have helped suppression efforts. Crown fire potential and overall fire risk is moderate to high because of the steep topography, above average fire occurrence, fuel buildups from fire exclusion, and continuous fuel beds. High risk wildland-residential intermix conditions exist in forested residential areas.

Smoke and Air Quality

Landscape air quality is usually good to excellent, but could be degraded by smoke during periods of cool inversions in late fall and winter seasons. With the prevailing westerly winds, sensitive areas include the communities of St. Ignatius, Arlee, Ravalli, Dixon, Seeley Lake, and areas with views of the Missions Mountains Tribal Wilderness. Frenchtown and Missoula could be impacted during smoky periods when winds are blowing to the south.

Fire Management Objectives

1. **Maintain strategic fire suppression access on the following Tribal and BIA roads to protect wildland-residential intermix areas: P-1000/3000/3010/4100/5000, P-7200/7250/7251/7300/7310/7310/7500, P-8000/8100/8150, V-2610, A-1030/1050/1051, A-2004/2050/2300, F-1000/1200/2004, F-2150/3000/3100.**

Vegetation

Forested acres in the Jocko Landscape are classified as shown in table 3-7. The location of restricted and unavailable areas (excluding streamside management zones or SMZs are shown in figure 3-17.

Table 3-7. Acre Distributions in the Jocko Landscape by Administrative Category

Jocko Landscape Fire Regime	Available Acres	Restricted Acres	Unavailable Acres	Total
Nonlethal Fire Regime	10,193	605	37	10,835
Encroached Timber	6,905	162	101	7,168
Encroached Woodland/Sod	4,850	191	150	5,191
Encroached Woodland/Parks	121	6	0	127
Non-lethal Fire Regime with Encroached Acres	22,070	965	289	23,324
Mixed Fire Regime	19,878	2,458	9,144	31,480
Lethal Fire Regime	30,989	8,087	32,110	71,186
Timberline Fire Regime	472	705	19,908	21,085
Total	73,409	12,216	61,450	147,075

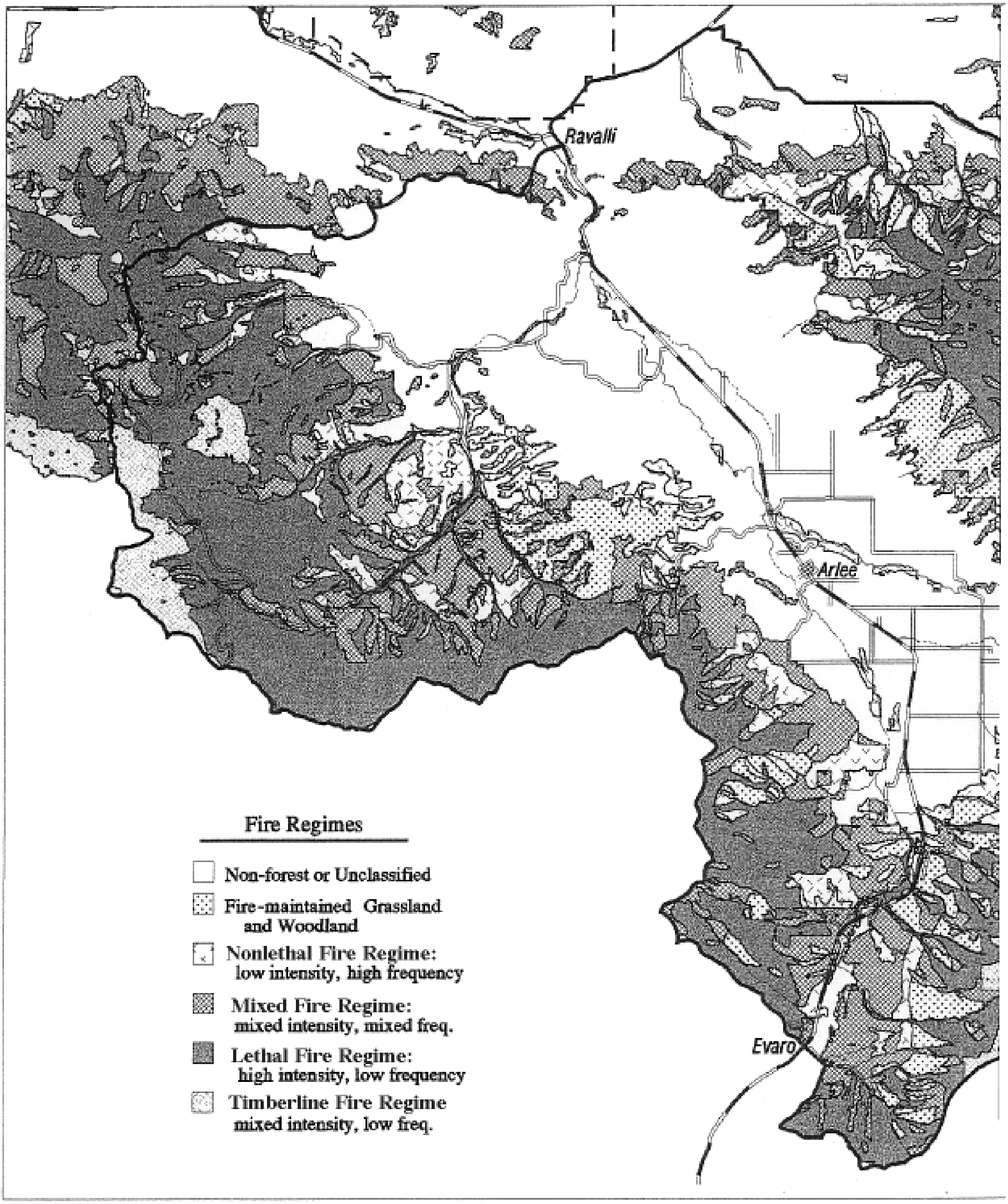
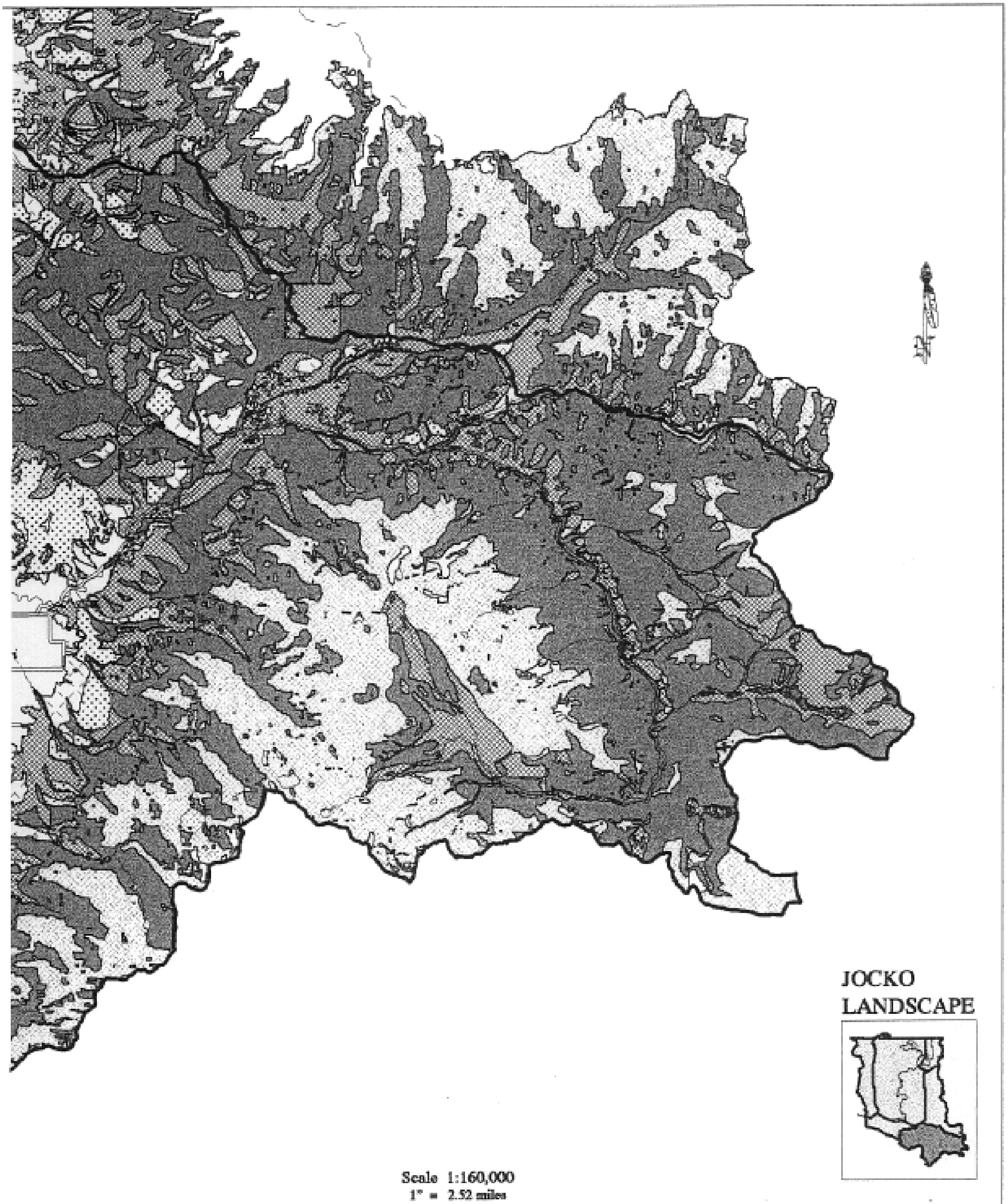


Figure 3-16. Distribution of fire regimes within the Jocko Landscape.


JOCKO
LANDSCAPE
Scale 1:160,000
1" = 2.52 miles

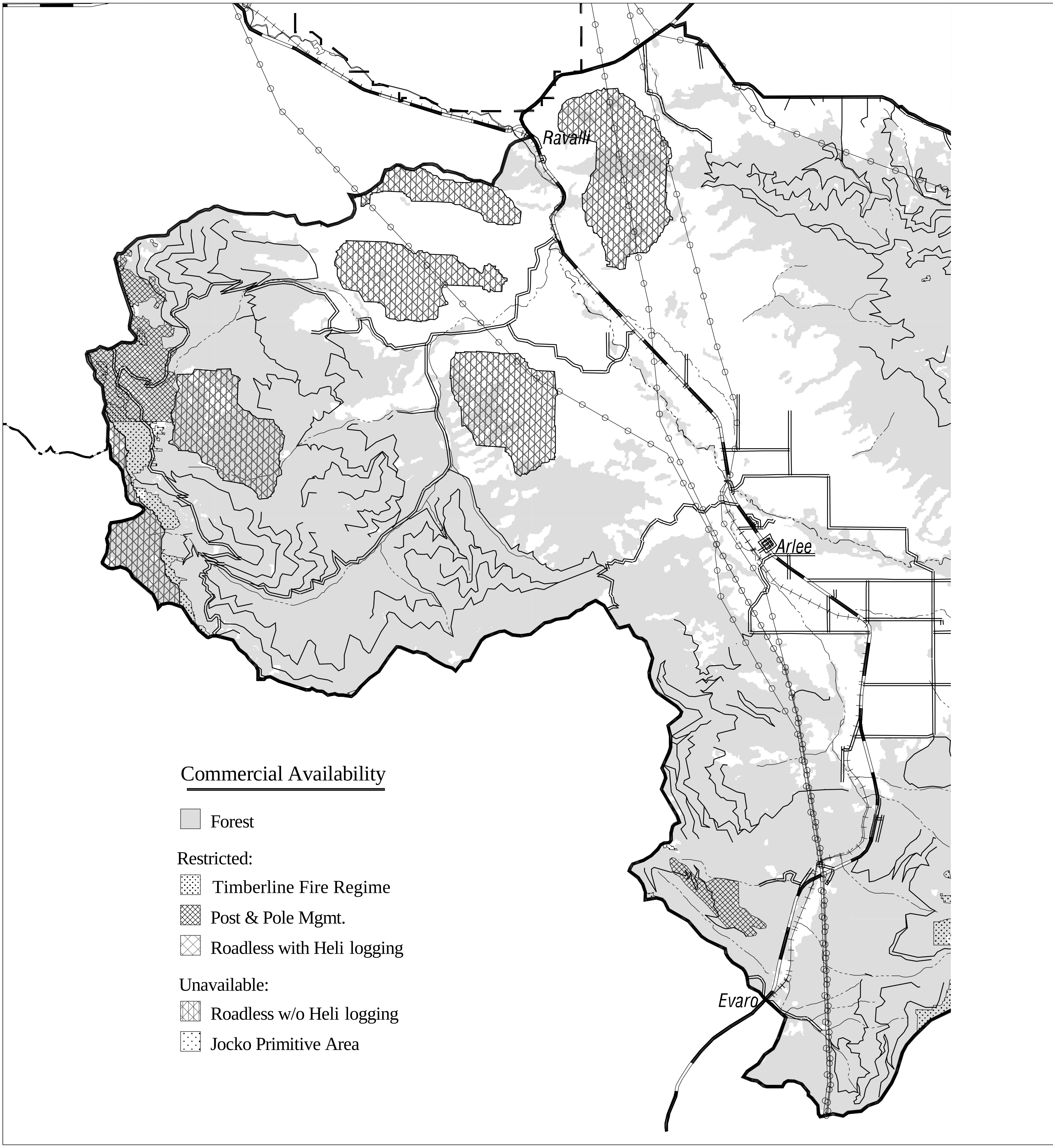
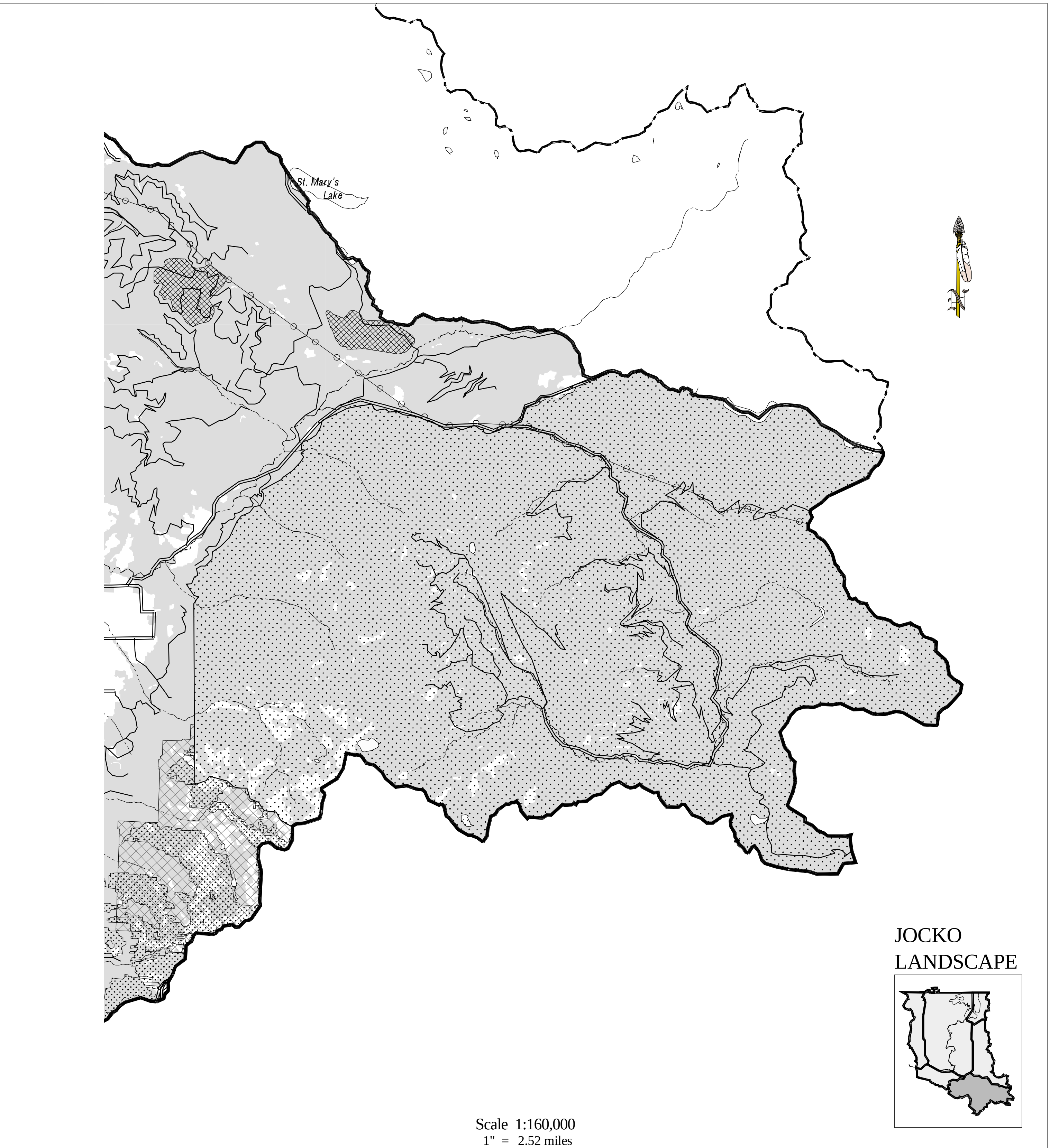


Figure 3-17. Unavailable and restricted areas in the Jocko Landscape (not including streamside management zones (SMZs) and inaccessible and noncommercial (I&N) ground).

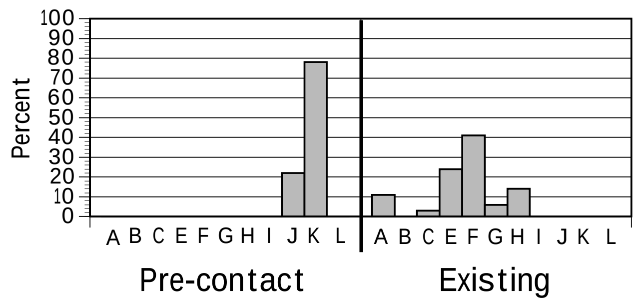

St. Mary's
Lake
N
JOCKO
LANDSCAPE
Scale 1:160,000
1" = 2.52 miles

Pre-European and existing seral cluster distributions

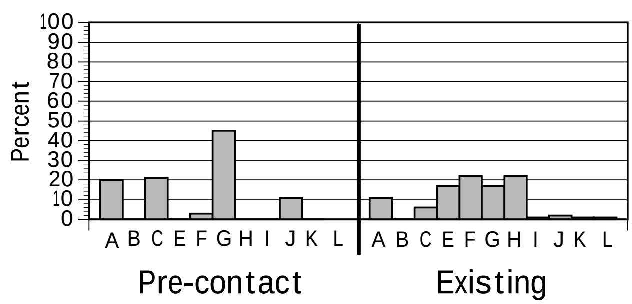
The pre-European and existing seral cluster distributions for the Nonlethal, Mixed, and Lethal Fire Regimes in the Jocko Landscape are shown in figure 3-18. Figure 3-19 shows the location of existing seral clusters.

Figure 3-18 a, b, and c. Pre-European and existing seral cluster distributions

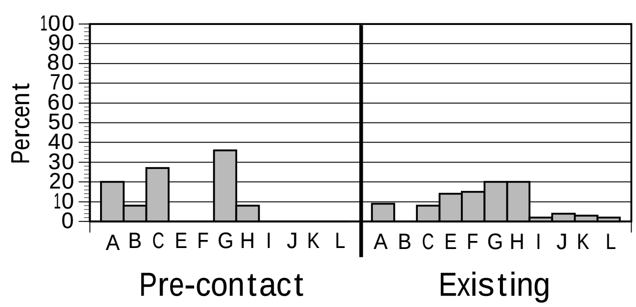
Nonlethal Fire Regime



Mixed Fire Regime



Lethal Fire Regime



Vegetation Objectives

1. Achieve the following seral cluster distributions by 2089 (table 3-8).

Table 3-8 a and b. Desired Conditions for Seral Clusters.

	Seral Clusters						
Fire Regime	A/A1	A2	B	C	D	E	F
Nonlethal	10-30%	10-30%	0-10%	0-10%	0-5%	0-5%	5-15%
Mixed	0-25%	N/A	5-15%	10-20%	3-7%	0-5%	0-24%
Lethal	10-20%	N/A	0-5%	5-15%	15-25%	0-5%	5-20%

	Seral Clusters					
Fire Regime	G	H	I	J	K	L
Nonlethal	5-15%	0-5%	0-5%	10-40%	5-15%	0-5%
Mixed	25-32%	0-5%	0-5%	0-5%	5-15%	0-5%
Lethal	30-35%	5-10%	0-5%	0-5%	10-20%	5-10%

Wildlife and Diversity

Wildlife Habitat by Fire Regime

The Nonlethal Fire Regime

This fire regime is dominated by ponderosa pine and dry Douglas-fir types and is found scattered throughout lower elevations of the landscape. Most of these acres are in mid-seral condition. About one third is in an early seral stage, and there are only a few small stands in a late seral condition. Some fragmentation occurs in the areas of Thorne Creek, Sabine Creek, Hewolf Creek, and Valley Creek.

Douglas-fir types with pinegrass understories are important winter range for big game, while those with ninebark and snowberry understories are important for mountain grouse, especially where they adjoin riparian areas. Impacts from logging and grazing are likely to result in reduced available forage for big game and reduced brood-rearing habitat for grouse and early-seral bird species.

The Mixed Fire Regime

This fire regime is made up of Douglas-fir types at lower to mid elevations and subalpine fir types in the upper reaches of several watersheds. The Douglas-fir types are the most prevalent and are relatively evenly distributed. Many of the stands are densely canopied and provide thermal cover and hiding cover for big game and abundant habitat for interior forest birds. However, fragmentation from deforestation and high road densities has reduced habitat effectiveness for big game.

The subalpine fir types are found in the North and South Fork Jocko River drainages and the Liberty Creek drainage. These occur in wet areas adjacent to meadows and creek bottoms and are important summer range for elk, moose, and spruce grouse. Impacts from cattle can be severe on the wet soils that occur in these areas throughout the year.

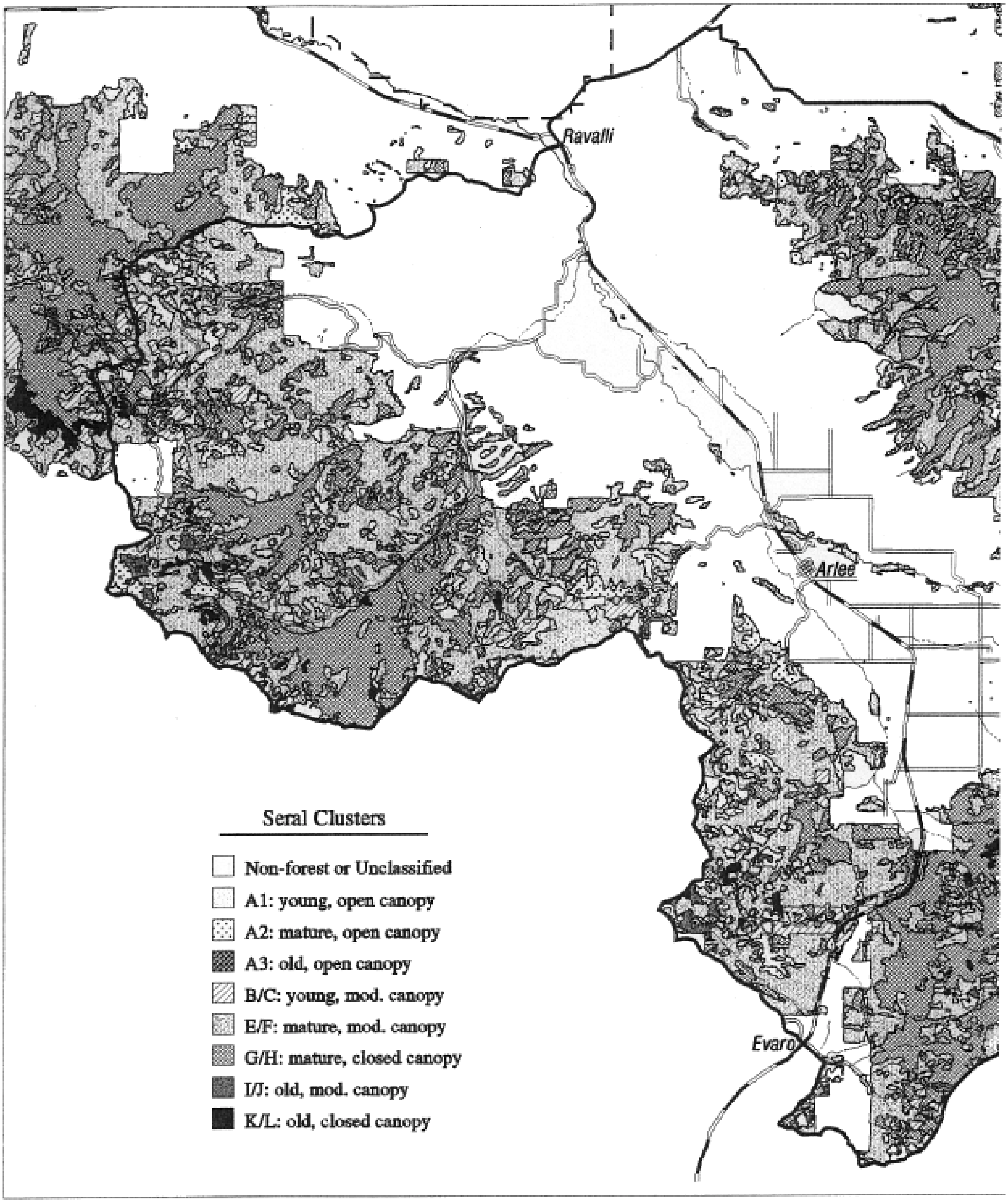
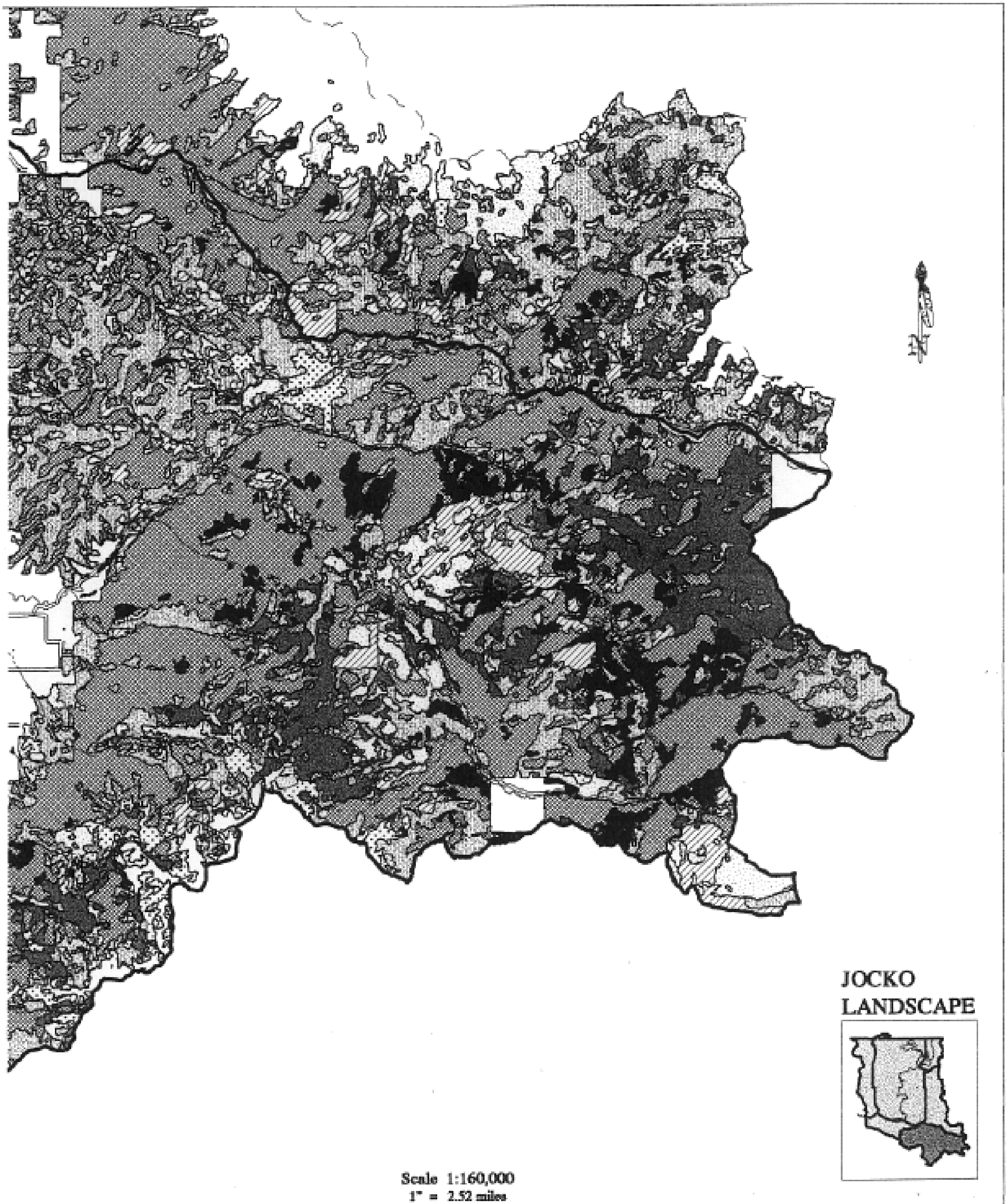


Figure 3-19. Seral cluster distributions in the Jocko Landscape. Seral clusters represent patches of trees with similar ages (or sizes), canopy closures, and layering.


JOCKO
LANDSCAPE
Scale 1:160,000
1" = 2.52 miles

The Lethal Fire Regime

This fire regime contains most of the forested acres in the landscape. Major habitats types include grand fir, western redcedar, and subalpine fir. Large areas of seral lodgepole pine also are present. A wide variety of seral classes exist, although most of the acres are in a mid- or early-seral condition. The mosaic is in large part the result of intensive logging, recent fires, and old, extensive burns that occurred in the Jocko in the 1840s and early 20th century. Several hundred acres of late seral forests survived these fires and occur in widely scattered patches throughout the landscape. There is a high level of fragmentation from past logging and high road densities, that seriously impacts moose, elk, and grizzly bear habitat. Areas that served as important big game habitat during pre-European times (Pistol Creek, Kelly's Ridge, and Valley Creek) are now surrounded by clearcuts and roads. Excellent habitat still exists in both the North and South Forks of the Jocko Rivers.

The Timberline Fire Regime

This fire regime occurs in upper-elevation habitats dominated by subalpine fir and whitebark pine. It includes large, unfragmented areas in the North and South Forks of the Jocko River. Whitebark pine, an important species for wildlife, is a seral dominant and occurs on drier sites, while subalpine fir is found on moister sites. This regime is probably the most important summer range for big game at the present time on the reservation. Many other wildlife species including grizzly bear, mountain goat, spruce grouse, white-tailed ptarmigan, and boreal owls also use this fire regime at one or more times of the year. The regime is sensitive to disturbance; once disturbed, it takes a long time to recover.

Wildlife and Diversity Objectives

1. **Reintroduce fire into all fire regimes where applicable.**

2. **Reduce fragmentation in the Lethal Fire Regime so it more closely resembles pre-European conditions.**

3. **Improve important wildlife riparian habitats while providing for multiple-use objectives.**

   Key areas include Valley Creek, Thorne Creek, Sabine Creek, and Pistol Creek (including tributaries and Skunk Meadows).

4. **Maintain an effective travel corridor and linkage zone between the Rattle-snake Divide and Ninemile Divide ecosystems in the Evaro area.**

5. **Continue to follow grizzly bear recovery guidelines in Situation 2 habitat.**

6. **Implement and monitor bighorn sheep reintroduction efforts in the South Fork of the Jocko Primitive Area.**

7. **Follow established guidelines for threatened and endangered species.**

Water and Fish

The Existing Conditions

The ID Team identified three general physiographic units in the Jocko Landscape: glaciated mountainous areas, unglaciated mountainous areas, and areas underlain by a wide variety of unconsolidated sediments. Unconsolidated sediments generally occur in lower elevation areas.

Glaciated mountainous areas have thin soil profiles, extensive areas of exposed bedrock, and small alpine lake systems. Unglaciated mountainous areas generally have much thicker soil profiles and do not have lakes. Unconsolidated sediments range from glacial moraines to alluvial deposits to landslide deposits. These sediments generally have thick soil profiles and high water-holding capacities.

Fish

The Jocko River and it tributaries provide habitat, especially spawning habitat, for the migratory that reside in the Flathead River. The Jocko River upstream of Highway 93 supports the largest stream-dwelling populations of native cutthroat trout and bull trout on the Reservation. Habitat conditions are generally ideal and are characterized by deep pools, abundant woody debris, and a complete assortment of substrate sizes. Irrigation diversion structures have been seasonal migration barriers but are scheduled to be modified to allow fish passage in the near future. Livestock grazing occurs at a level sufficient to modify riparian vegetation.

Water and Fish — Objectives

1. **Evaluate and refine the grazing management plan initiated in 1999 in the Valley Creek drainage, specifically the North and East Forks of Valley Creek.**

2. **By 2002 reestablish the connectivity of headwater tributaries in Valley Creek through watershed restoration projects and the possible installation of a downstream barrier below the confluence of the tributaries, in coordination with the Jocko River Restoration Plan.**

3. **By 2002 remove and/or replace the numerous natural timber and earth fill stream crossings in the South Fork of the Jocko River drainage.**

   These crossings are currently failing and contributing sediment to this important bull trout stream. Removal, whether for closure or replacement, must be done carefully to prevent large, additional releases of sediment. Catastrophic releases of sediment are imminent if these stream crossings are not fixed.

Scenery

The Existing Conditions

Recommended scenic integrity levels are shown in figure 3-21. The Jocko landscape is divided into five subunits.

East St. Mary's, Pistol Creek, Twin Lakes, and Jammer

The overall scenic integrity of this subunit is rated as Moderately Altered (MA). Views of recent, even-aged, straight-edged timber harvests, plus roads and a transmission line almost dominate the landscape. The forest structure seems moderately fragmented. The variety class is common, and the sensitivity level is 1.

Highway 93 Corridor and Jocko Valley

The overall scenic integrity of this subunit is rated as Moderately Altered (MA). The vegetation patterns include open farmlands and the riparian corridors along the Jocko River. Deviations often dominate the landscape character but they borrow from the features and patterns of natural openings. The effects of a major transmission line and pipeline are visible within this corridor.

Extensive subdivisions, highway signs, and the residential areas of Arlee can be seen from many viewpoints. The variety class is minimal, and the sensitivity level is 1.

Schley Creek to Valley Forested Areas

The overall scenic integrity of this area appears Heavily Altered (HA). The effects of intensive logging since the early 1970s dominate the landscape from most of the viewpoints. Although the average age of the cutting units may be over twenty years, revegetation has not recovered enough to screen the straight-line treatments. The majority of the forest appears extremely fragmented due to the effects of clearcuts which are separated by areas of dense timber. The Evaro area is also compromised by the straight-line effect of a pipeline clearing and a transmission line. The variety class is common, and the sensitivity level is 1.

South Fork Primitive Area to Schley Creek

The majority of this area has a very high scenic integrity level and is rated as Unaltered (UA). The remaining portion of the subunit is rated as Appearing Unaltered (AU), because of visibility of salvage logging from the 1960s and early 1970s, the major Montana Power Company transmission line, and the Jocko and Black Lake dams. The casual observer would notice the powerline corridor and the tidal zones of the reservoirs as artificial features, but would probably consider the majority of the unit to be natural appearing. The variety class is distinctive, and the sensitivity level is 1.

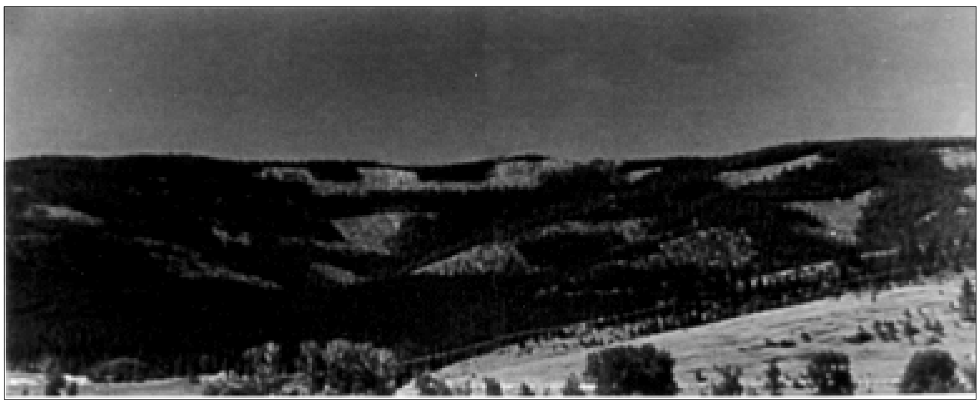
West St. Mary's, Lamoose and West Stevens

The scenic integrity level appears Slightly Altered (SA). Views of past timber harvesting activities, roading, and transmission lines are evident, but the scale of these modifications makes them visually subordinate to features of the natural landscape. A casual observer would consider the majority of this unit natural appearing. The variety class is common, and the sensitivity level is 1.

For viewpoints used to analyze this landscape and other methods used see Appendix M.

Scenery Under the Forest Plan: A Computer Simulation

Figure 3-20 shows the Jocko Landscape as it appears today (top) and as it might appear in the future (bottom). The bottom picture, a simulation, shows one possible rehabilitation scenario. The planner attempted to make old clearcuts appear more natural.



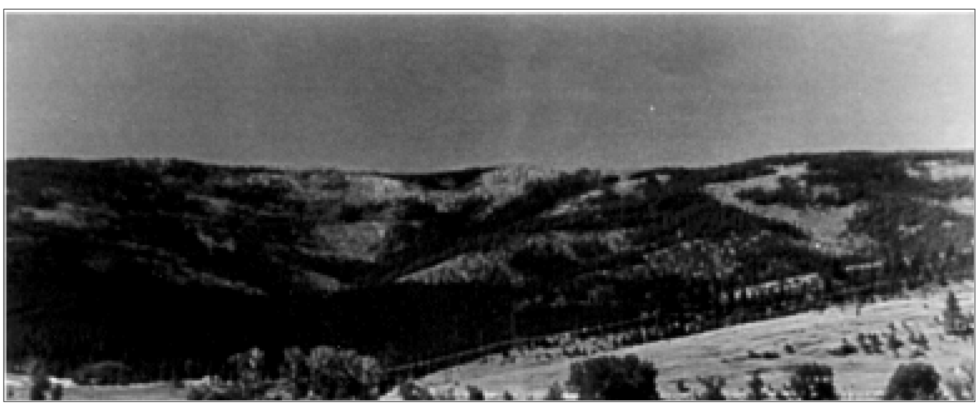


Figure 3-20. Jocko Landscape in 1995 and as it might appear in the future based on a computer simulation.

Scenery and Recreation Objectives

1. **Rehabilitate the visual quality of the St. Mary's, Evaro, Stevens, and Charity areas by 2008.**

2. **Rehabilitate the visual quality of the Valley area by 2008.**

3. **Maintain the South Fork of the Jocko Primitive Area for Tribal Member use in order to provide opportunities for solitude and recreation.**

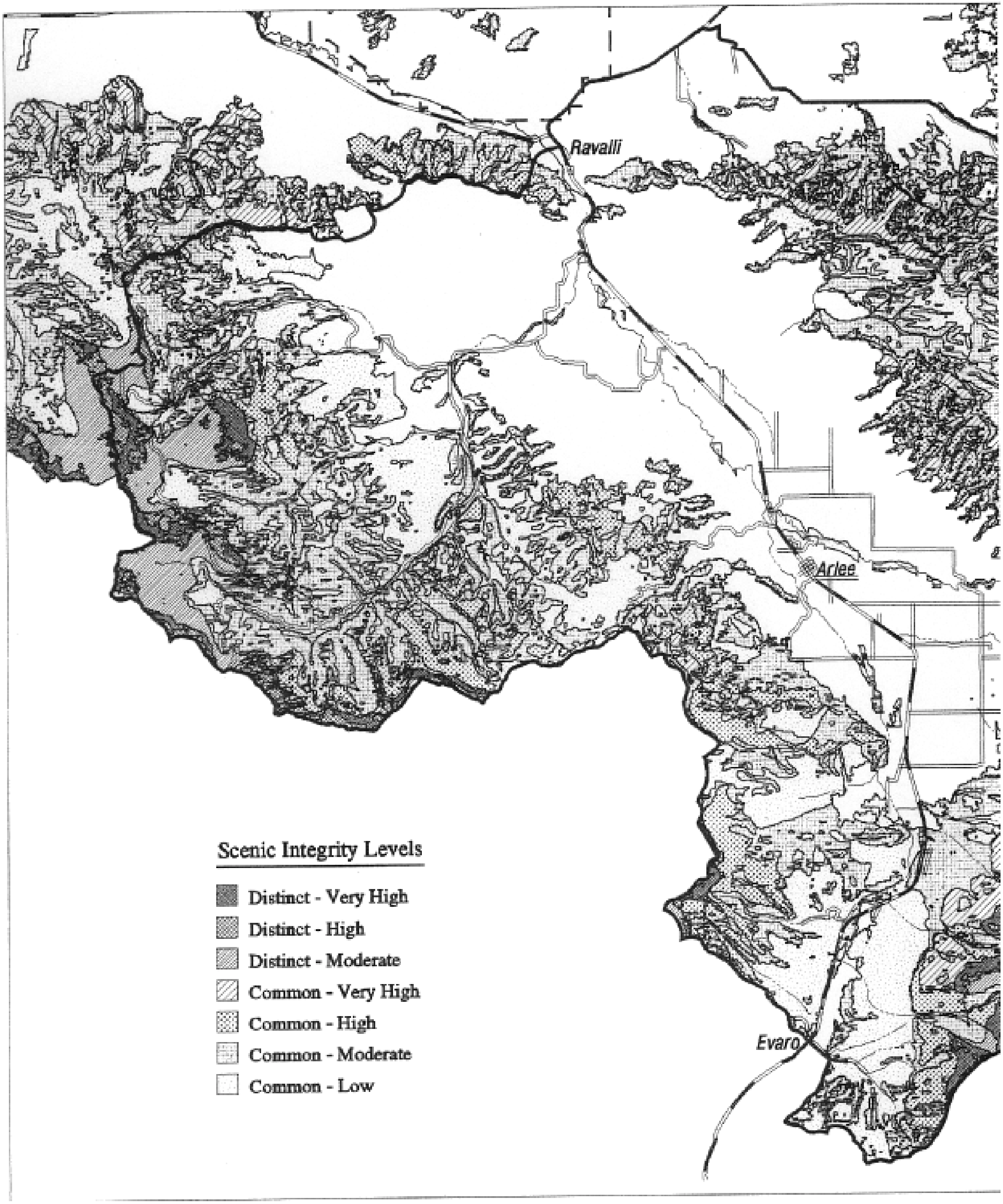
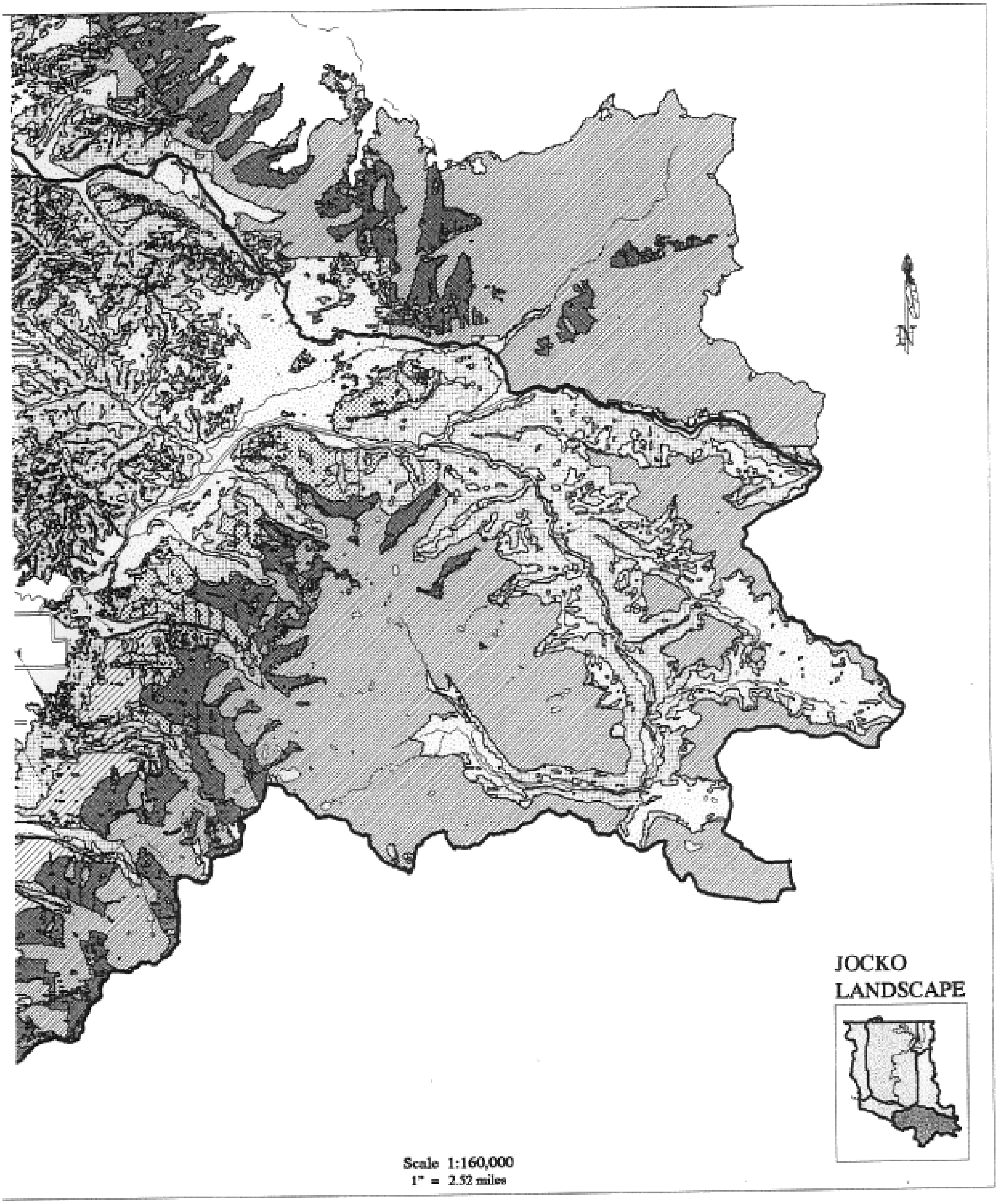


Figure 3-21. Recommended scenic integrity for the Jocko Landscape.


JOCKO
LANDSCAPE
Scale 1:160,000
1" = 2.52 miles

Jocko LS

4. **Enhance annual trail and road maintenance funding for Crazy Fish, Sa-ol-Sooth, Vanderburg, Eagle, Mad Bull, Finley Lakes, Big Knife, Liberty, and Yellow Lake trails.**

5. **Increase annual funding for maintenance of the Vanderburg Cultural Camp, the Jocko River, Job Corp Camps 1 and 2, Twin Lakes, the South Fork Gate Cabin, the Middle Fork Campground, and eight sites in the Primitive Area.**

6. **Enhance fishing opportunities at Valley and Spring Creeks and the Jocko River by securing funding for access development by 2006.**

7. **Discourage snowmobiling use in the Jocko Landscape, and shift that use to the North Missions Landscape by 2005.**

Jocko Roadless and Wilderness Area Objectives

1. **Designate the Ravalli-Valley Roadless Complex and the Finley Lake Roadless Area within two years of Forest Plan approval. Develop management plans for these areas within four years of Forest Plan approval.**

Transportation

Existing road densities as of 1999 are shown in figure 3-22.

Jocko Transportation Objectives

1. **Develop specific landscape level transportation objectives within one year of the Final FMP adoption. These will be included within the Forest-wide Transportation Plan.**

Grazing

Grazing objectives

1. **Acquire Montana State grazing leases at Skunk Meadow when it becomes available.**

   State of Montana grazing leases in the Skunk Meadow area present a continuing trespass situation on the Tribal Range Unit 22. Range management would be dramatically improved if the State grazing leases were acquired by the Tribes.

2. **Complete the grazing-land inventory of Tribal Range Unit 22 and an interdisciplinary grazing plan by 2004.**

Southwest LS

Southwest Landscape

General Description

This landscape includes all the lands south of Highway 200 and west of the Valley Creek drainage divide. The Ninemile Divide Roadless Area is located along the southern boundary. Most of the area is mountainous and forested. The communities of Dixon and Perma and the western end of Ravalli are located within the landscape.

Disturbance and Vegetation

Fire: The Existing Condition

Fire regimes are shown in figure 3-24.

In the Southwest Landscape fires have created a very diverse, patchy pattern of dry Douglas-fir and Douglas-fir/larch forests at lower elevations and lodgepole pine, subalpine fir, and spruce forests at higher elevations. The landscape is dominated by partial and full stand-replacement fire conditions. Formerly, the open, parklike Nonlethal Fire Regime dominated lower elevations along the Flathead River. Now large wildfires occasionally occur within this landscape. Poor access, steep slopes, high local fire occurrence, and continuous fuelbeds give most areas in the landscape a high fire risk status.

The Ninemile Divide Roadless Area

This subunit experienced extensive stand-replacement fires that initiated a very uniform, even-aged forest matrix. Narrow, well defined riparian corridors are present and large patches of rock talus occur at upper elevations. Moderate-sized wildfires in the 1910s and 1920s produced large, scattered, lodgepole pine stands, diversifying the species composition of the matrix. Fuels are moist or wet most of the season, so wildfires are typically infrequent and small in size. The subunit has a high fire risk rating because of its even-age structure and composition, and because past fire exclusion policies have increased fuels. Large, catastrophic wildfires will occur under extreme drought conditions.

The balance of the landscape

The rest of the landscape is composed of a multi-storied, mature timber matrix dominated by dry, continuous fuels complexes on moderate to extremely steep slopes. Vegetative types and ages are diverse and patchy due to influence of complex landforms and an above average fire-occurrence history. Moderate to large, widely scattered patches of logging, sod, and brushfields occur within the subunit. Fire risk is moderate to high due to crown fire potential and long fire-suppression response times. Fire exclusion has caused a substantial build up of ground fuels and allowed ladder fuels to build; both have increased the potential for crown fires. Wildland-residential intermix hazards are limited to widely scattered homesites along Highway 200 and high risk areas along Revais Creek.

Smoke and Air Quality

Landscape air quality is usually good to excellent, but the potential for critically poor smoke conditions exists from large wildfire events and poorly planned prescribed burns. Sensitive areas include the communities of Dixon, Charlo, St. Ignatius, and Ronan. Other sensitive areas include the Mission Mountains Tribal Wilderness viewshed and the Highway 200 corridor.

Fire Management Objectives

1. **Maintain strategic fire suppression access on the following Tribal and BIA roads to protect wildland-residential intermix areas: D-1000, D-2004, D-3000/3100/ 3200, D-5000/5050/5100, D-6000/6050/6100, D-7000/7100/7350, D-8000/8200.**

Vegetation

Forested acres in the Southwest Landscape are classified as shown in the table 3-9. The location of restricted and unavailable acres (excluding streamside management zones) are shown in figure 3-25.

Table 3-9. Acre Distributions in the Southwest Landscape by Administrative Category

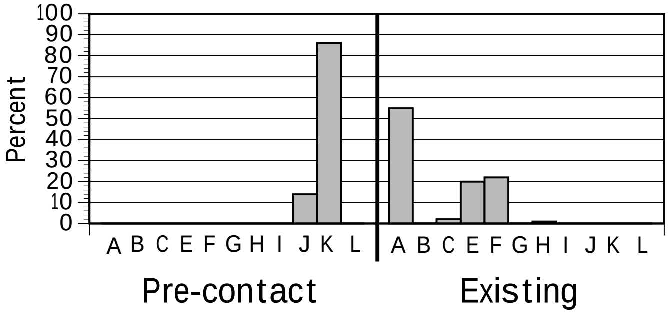
Southwest Landscape Fire Regime	Available Acres	Restricted Acres	Unavailable Acres	Total
Nonlethal Fire Regime	2,232	562	531	3,325
Encroached Timber	889	36	0	925
Encroached Woodland/Sod	2,177	80	0	2,257
Encroached Woodland/Parks	131	12	32	175
Non-lethal Fire Regime with Encroached Acres	5,429	690	564	6,683
Mixed Fire Regime	12,346	4,505	1,768	18,619
Lethal Fire Regime	9,600	6,691	6,750	23,041
Timberline Fire Regime	162	1,215	6,243	7,620
Total	27,539	13,101	15,324	55,964

Pre-European and existing seral cluster distributions

The pre-European and existing seral cluster distributions for the Nonlethal, Mixed, and Lethal Fire Regimes in the Southwest Landscape are shown in figure 3-23. Figure 3-26 shows the location of existing seral clusters.

Figure 3-23 a, b, and c. Pre-European and existing seral cluster distributions

Nonlethal Fire Regime



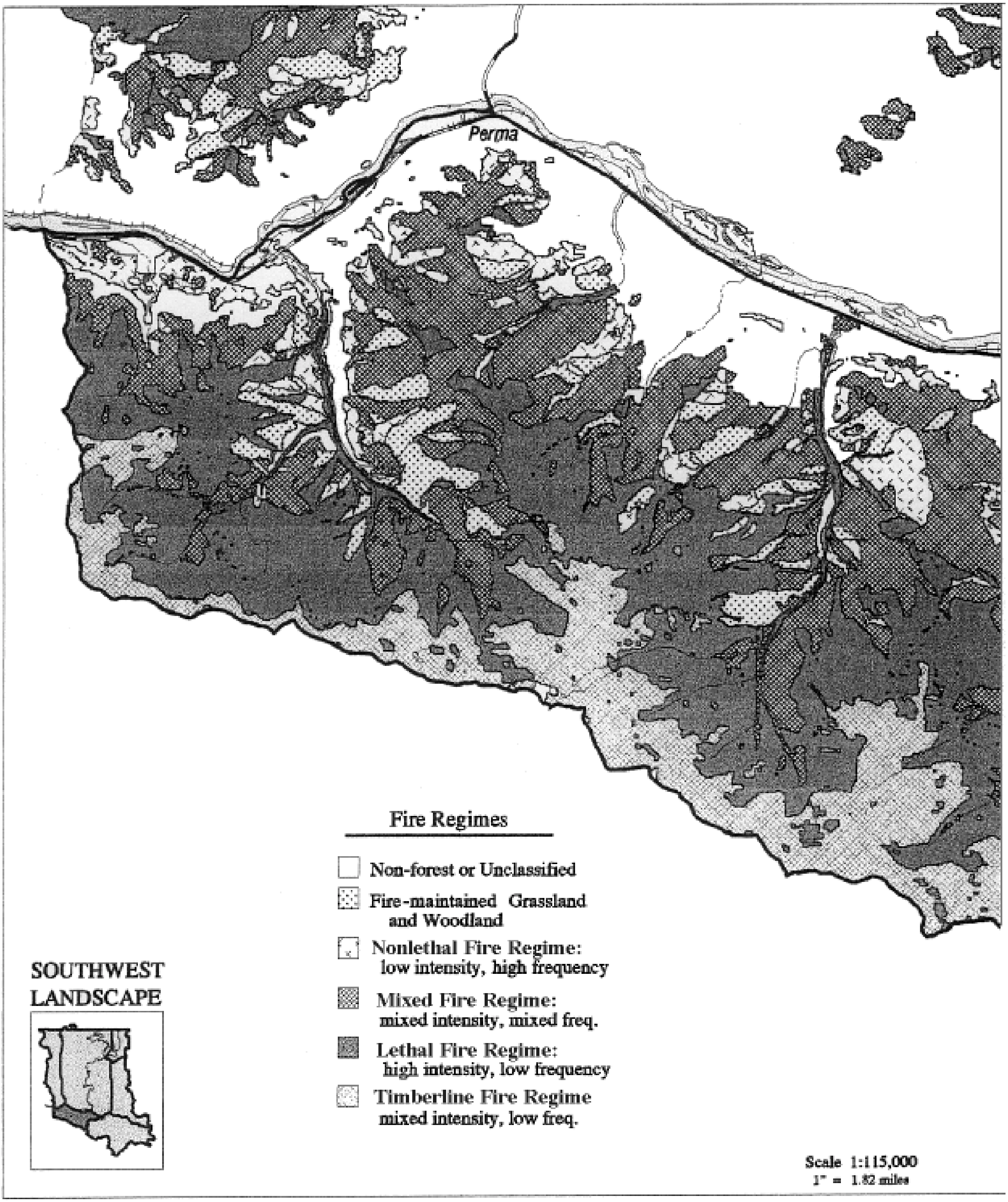
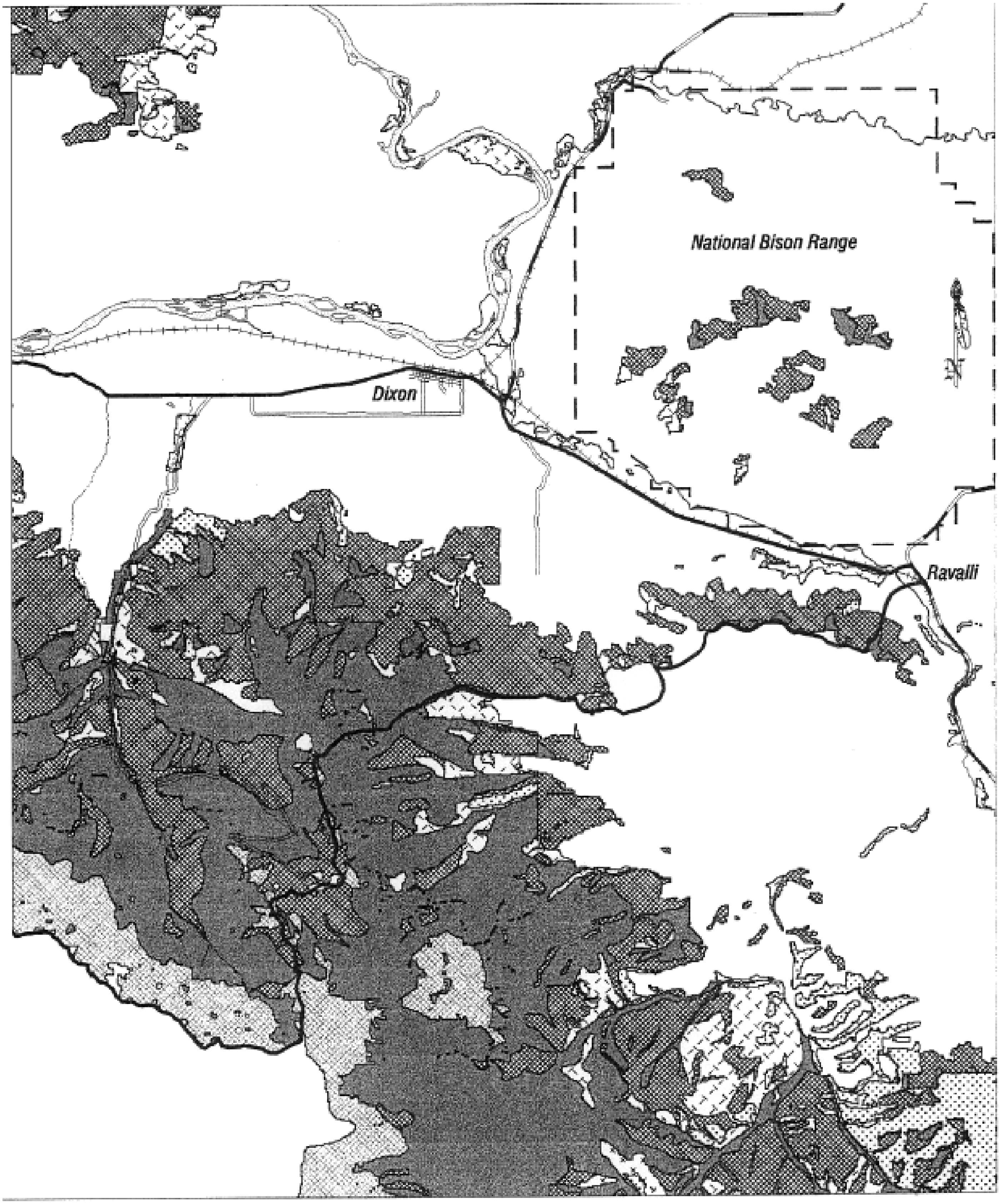


Figure 3-24. Distribution of fire regimes within the Southwest Landscape.


National Bison Range
Dixon
Ravalli

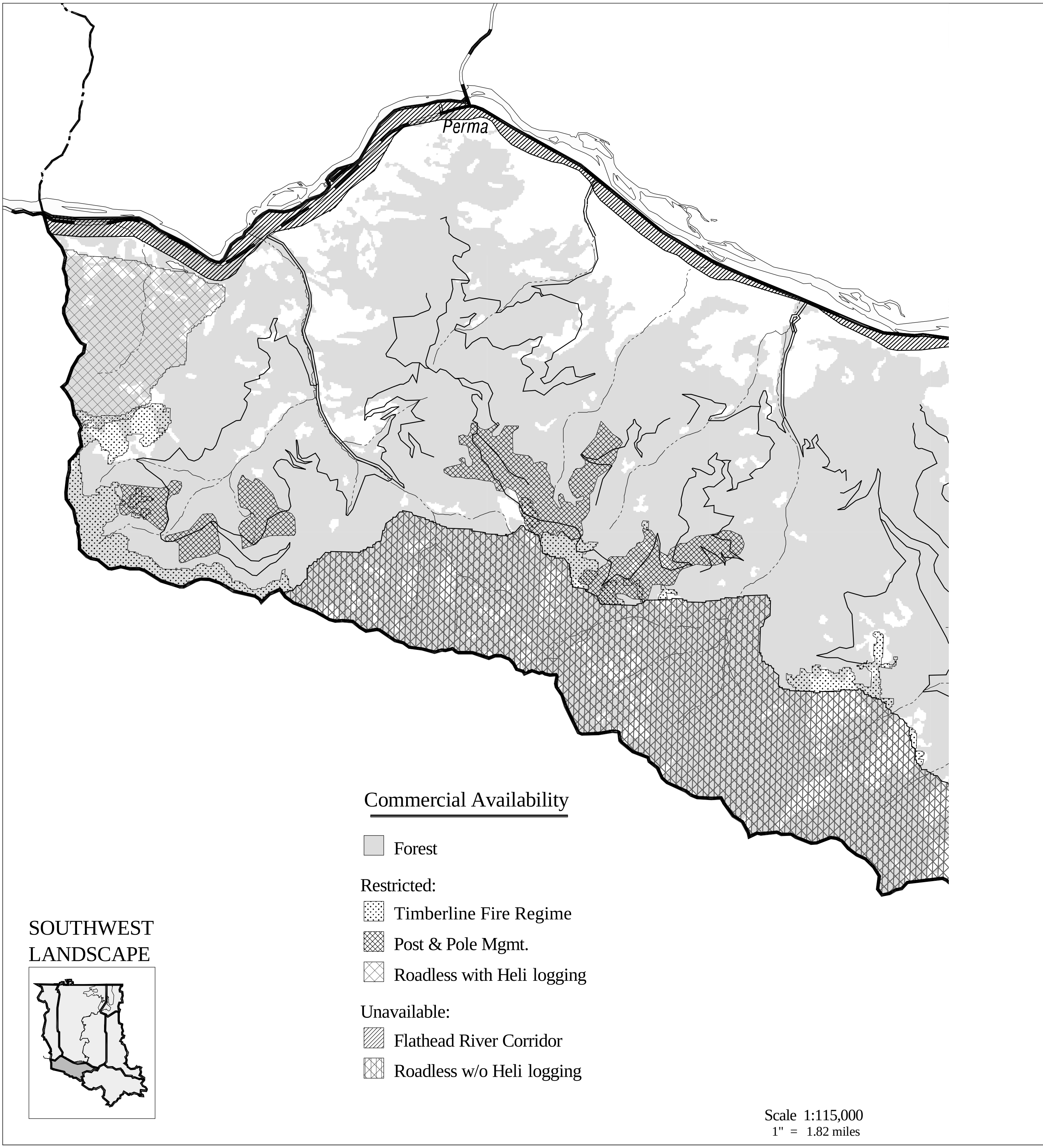
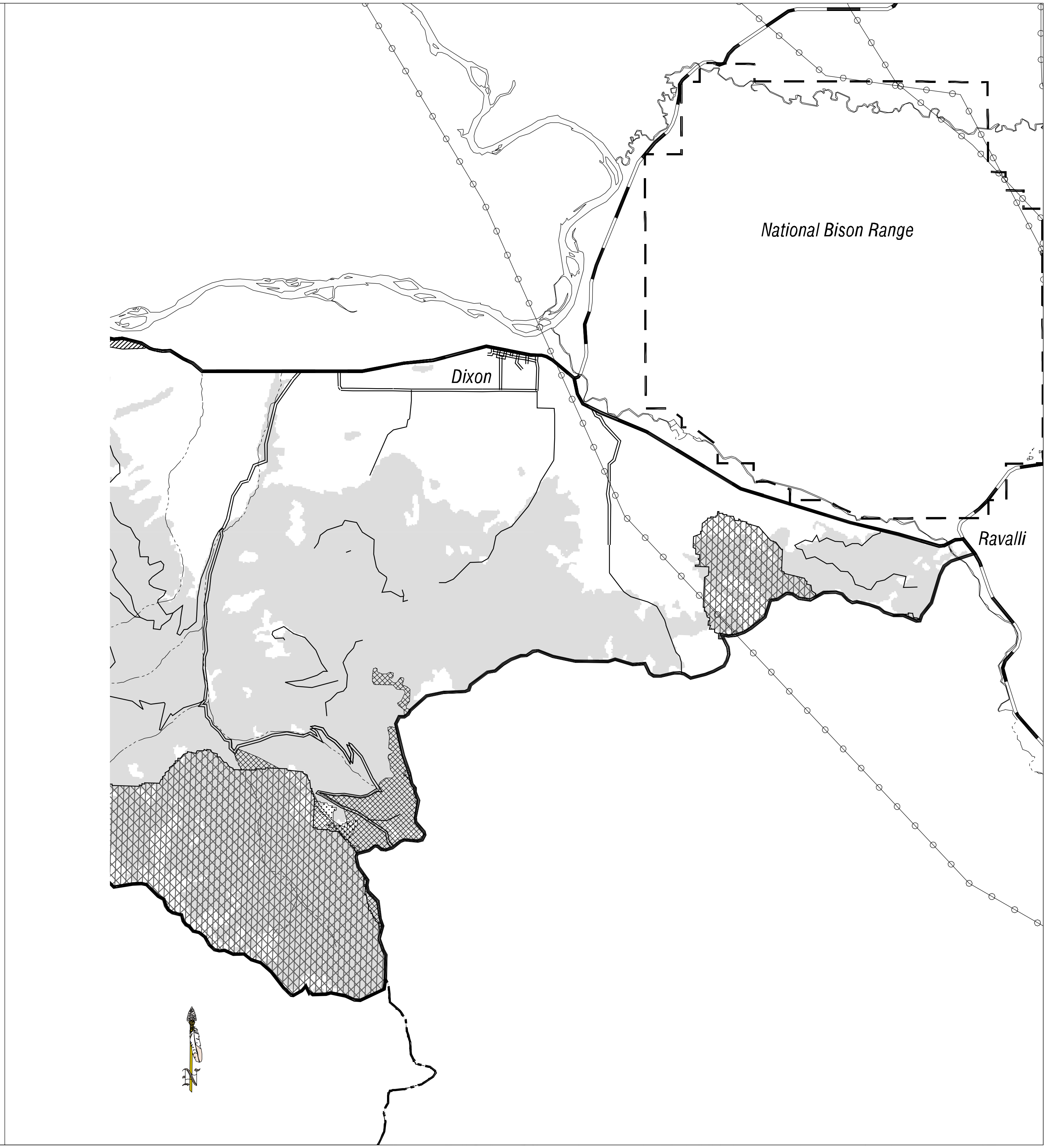


Figure 3-25. Unavailable and restricted areas in the Southwest Landscape (not including streamside management zones (SMZs) and inaccessible and noncommercial (I&N) ground).


National Bison Range
Dixon
Ravalli
N

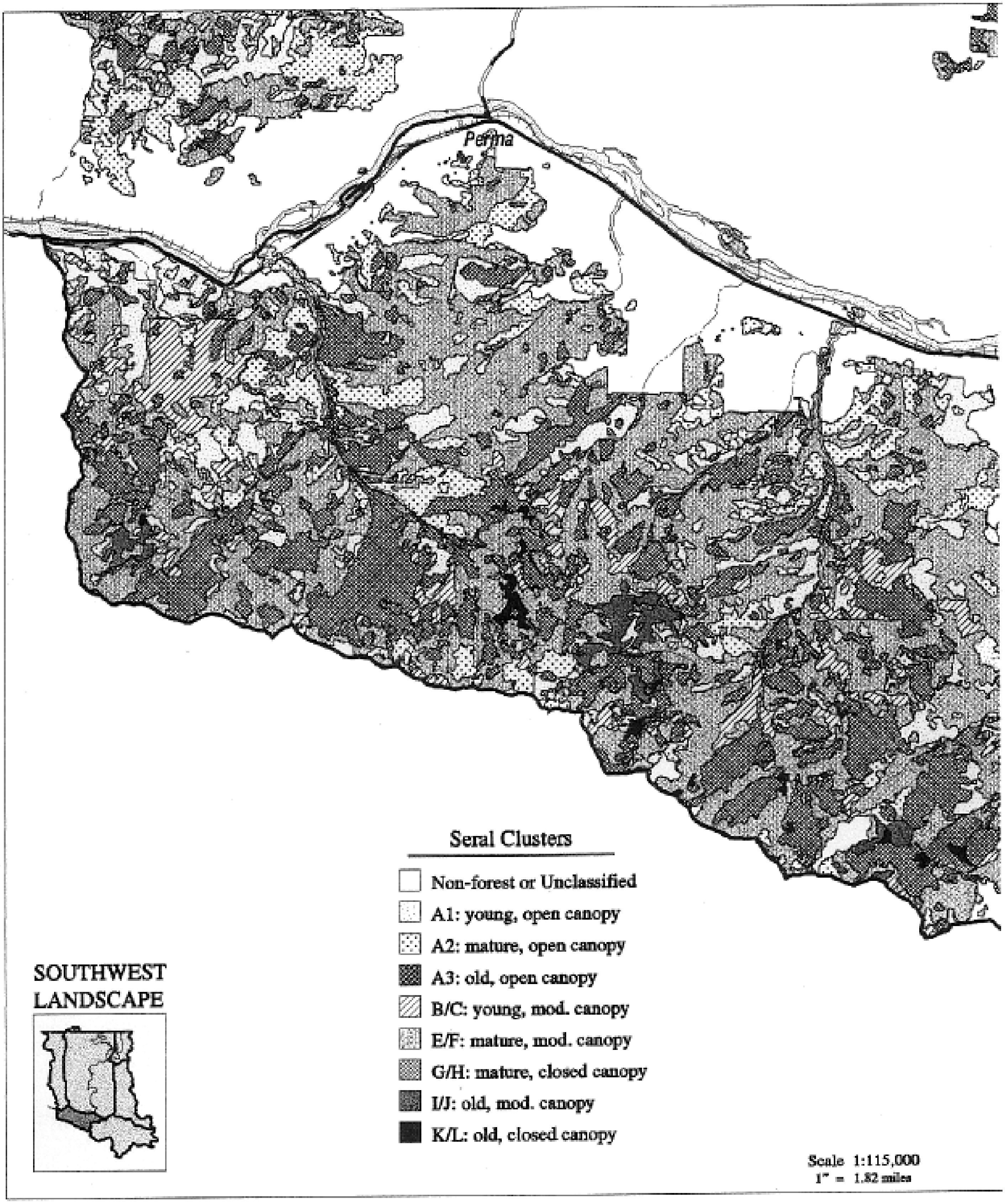
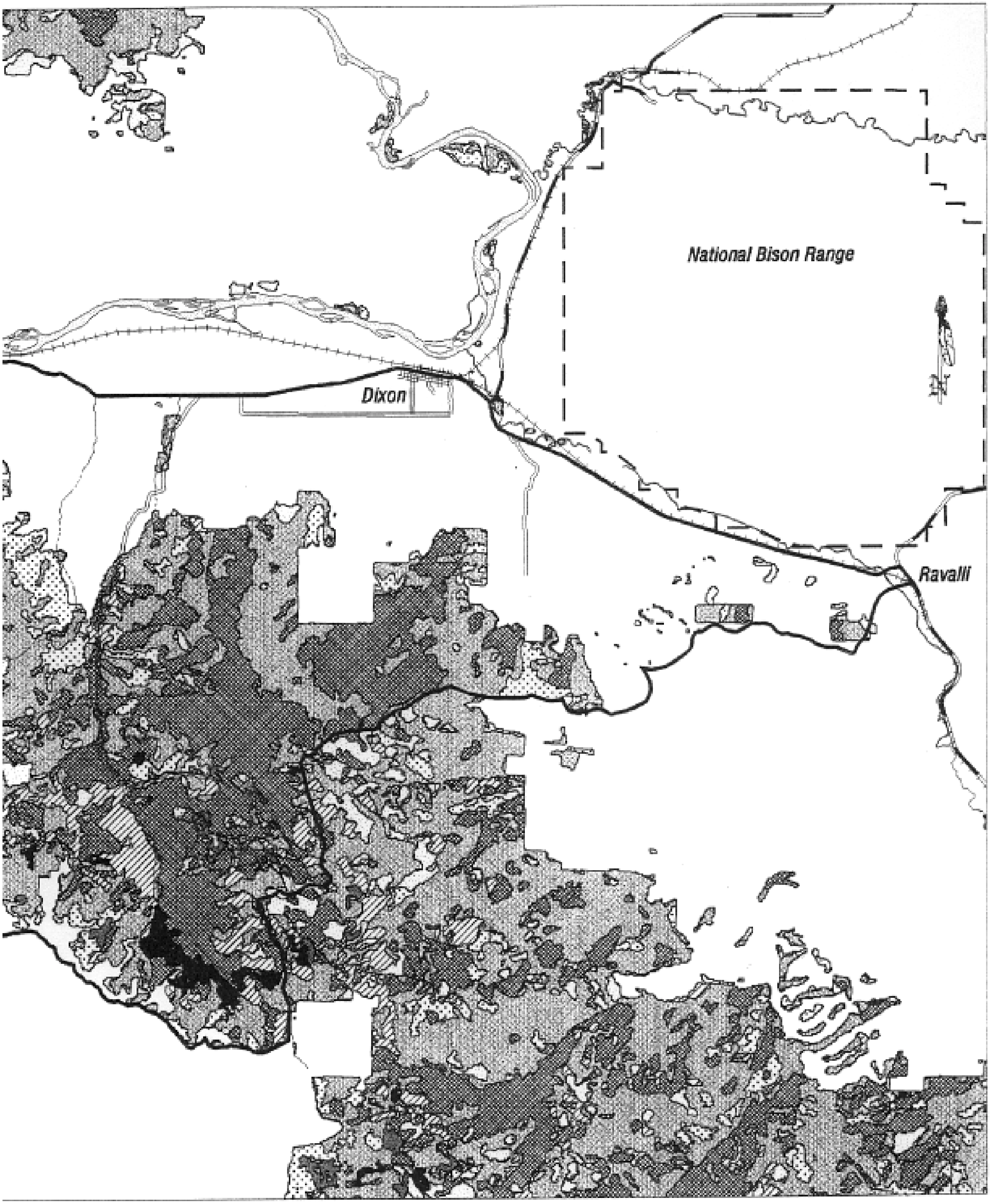
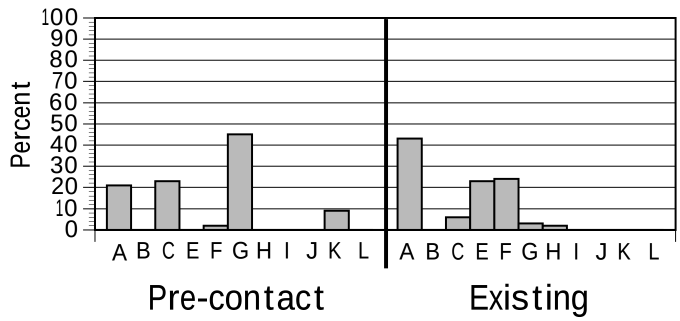


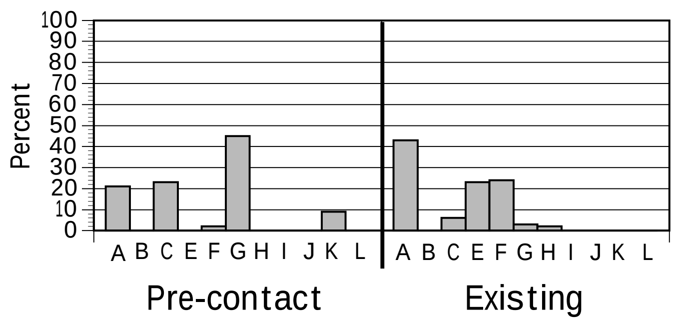
Figure 3-26. Seral cluster distributions in the Southwest Landscape. Seral clusters represent patches of trees with similar ages (or sizes), canopy closures, and layering.


National Bison Range
Dixon
Ravalli

Mixed Fire Regime



Lethal Fire Regime



Vegetation Objectives

1. Achieve the following seral cluster distributions by 2089 (table 3-10).

Table 3-10 a and b. Desired Conditions for Seral Clusters.

	Seral Clusters						
Fire Regime	A/A1	A2	B	C	D	E	F
Nonlethal	10-30%	10-30%	0-10%	0-10%	0-5%	0-5%	5-15%
Mixed	0-25%	N/A	5-15%	10-20%	3-7%	0-5%	0-24%
Lethal	10-20%	N/A	0-5%	5-15%	15-25%	0-5%	5-20%

	Seral Clusters					
Fire Regime	G	H	I	J	K	L
Nonlethal	5-15%	0-5%	0-5%	10-40%	5-15%	0-5%
Mixed	25-32%	0-5%	0-5%	0-5%	5-15%	0-5%
Lethal	30-35%	5-10%	0-5%	0-5%	10-20%	5-10%

Wildlife and Diversity

Wildlife Habitat by Fire Regime

The Nonlethal Fire Regime

This regime accounts for only a small percentage of the landscape and is found mainly in the lower Seepay and Revais Creek watersheds. It is made up of mostly ponderosa pine and dry Douglas-fir habitat types in mid-seral and open to moderately open stands. Much of it is adjacent to open scree slopes. The regime provides some big game winter range. Many areas are high in snag density and contain some large ponderosa pine trees, both of which are important for cavity-nesting birds. Bighorn sheep use these stands occasionally.

The Mixed Fire Regime

This regime is mainly in the foothills at low to mid elevations and composed of Douglas-fir habitat types with a patchy distribution. Most are in a mid-seral condition and have moderately open canopies. These areas are important for many birds. Mountain grouse surveys have revealed relatively high densities of breeding grouse. Ruffed grouse occupy riparian habitats while blue grouse utilize the semi-open Douglas-fir habitats. Black bears and mountain lions are also quite common. This regime has been only slightly fragmented by human activities.

The Lethal Fire Regime

Habitat types in this regime include grand fir and subalpine fir. Most stands are in mid-seral condition and have moderate to closed canopies, although there are a few late-seral subalpine fir stands. These areas are important big game summer range especially for elk. They contain abundant forage and offer high value as thermal cover by providing shelter from hot summer weather. Openings created by clearcutting provide additional forage. This regime is moderately fragmented from timber harvesting.

The Timberline Fire Regime

This is a relatively remote area with difficult access. It is mostly upper subalpine forests intermixed with abundant scree slopes and alpine communities. It is very important as summer range for big game, and has a unique assemblage of timberline wildlife that includes wolves, spruce grouse, pika, and hoary marmots. There is no timber harvesting in this regime. The area is naturally fragmented by terrain.

Wildlife and Diversity Objectives

1. **Maintain the integrity of the Ninemile and Burgess Lake Roadless Areas as important wildlife habitat.**

2. **Reduce the number of logging roads connecting adjacent watersheds in order to provide better habitat security for big game.**

Southwest LS

3. **Reaffirm and maintain the Seepay Creek watershed as a Big Game Management Area.**

   Proposed logging operations will have the primary goal of benefiting big game populations and habitat. Interdisciplinary reviews of grazing lease renewals will seek to minimize competition between livestock and big game and improve range conditions for all users.

4. **Restore riparian areas by working with Tribal range personnel and lessees.**

   Key areas of concern are Selow and Vanderburg creeks.

5. **Follow established guidelines for threatened and endangered species.**

Water and Fish

The Existing Conditions

Limited glaciation occurred in upper basin areas of this landscape. Most of the landscape contains unglaciated mountainous areas with deep soil profiles on north slopes and shallow profiles on scree slopes and south-facing slopes. Soils on north slopes have been modified by deposits of volcanic ash and have high soil moisture holding capacities.

Streams are tributaries to the Flathead River, but have only limited exchange of fish with the river because of natural barriers near the mouths caused by subsurface infiltration and stream dewatering. Most support resident, native westslope cutthroat populations. Typically they flow through dense riparian areas with complete canopy closure and have high gradient channels. Their instream habitat is of high quality and is dominated by boulders and woody debris.

Water and Fish — Objectives

1. **Do not initiate harvest activities in headwater areas above 6,000 feet when those activities may detrimentally influence seasonal streamflow patterns.**

2. **Maintain the wilderness quality of streams, riparian zones, and wetlands in high-elevation basins.**

3. **Maintain the high level of integrity of stream channels and riparian zones throughout the landscape.**

Scenery

The Existing Conditions

Recommended scenic integrity levels are shown in figure 3-28. Terms used are defined in tables 3-3 and 3-4. The Southwest Landscape is divided into two subunits.

Jocko and Flathead River Valley Corridors

The overall scenic integrity level is rated as Slightly Altered (SA). Viewers would consider this unit to be of a rural, agricultural nature with mountain and river scenes as the background. Features that are visible include bridges, a train trestle, a transmission line corridor, some commercial development, and farmlands. Riparian vegetation adds to the variety. The variety class is common, and the sensitivity level is 1.

Selow to Seepay Forested Areas

The overall scenic integrity level is rated as Moderately Altered (MA). Viewers will notice recent changes in the forested canopies due to clearcuts. Roads are also evident. The landscape appears moderately fragmented due to the series of clearcuts and roads. The variety class is distinctive, and the sensitivity level is 1.

For viewpoints used to analyze this landscape and other methods used see Appendix M.

Scenery Under the Forest Plan: A Computer Simulation

Figure 3-27 shows the Southwest Landscape as it appears today (top) and as it might appear in the future (bottom). The bottom picture, a simulation, shows one possible rehabilitation scenario, which is an attempt to make old clearcuts appear more natural. This simulation also assumes about ten years of regrowth.

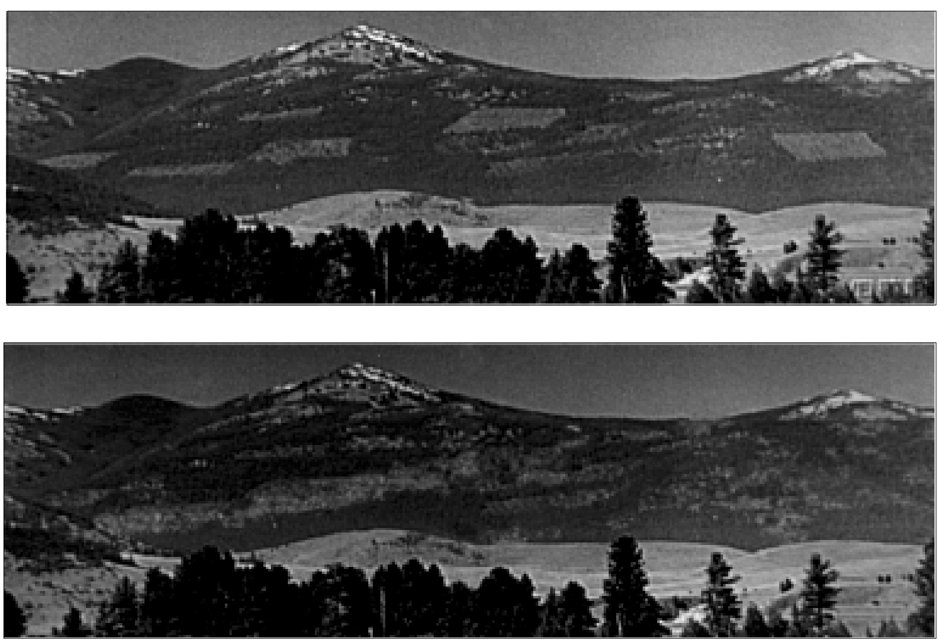


Figure 3-27. Southwest Landscape in 1995 and as it might appear in the future based on a computer simulation.

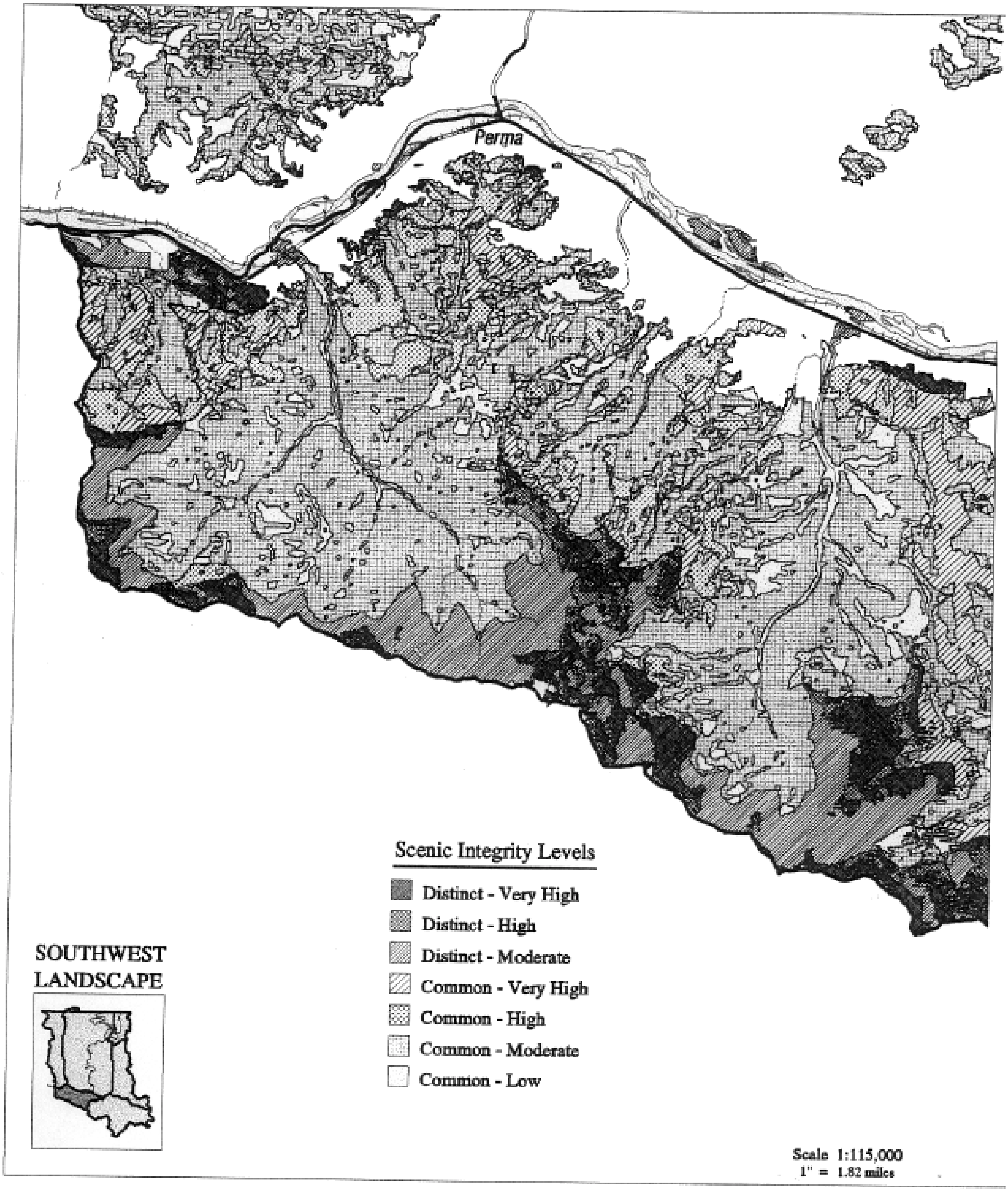


Figure 3-28. Recommended scenic integrity for the Southwest Landscape.


National Bison Range
Dixon
Ravalli

Southwest LS

Scenery and Recreation Objectives

1. Rehabilitate the visual quality of the Revais area by 2006.

2. Evaluate a Scenic Highway designation for Highway 200 by 2008.

3. Implement the objectives of the Lower Flathead River Plan.

4. Within 2 years, increase funding levels to maintain the diversified recreational opportunity levels and to minimize use impacts for the following management activities: increased trail maintenance for Three Lakes Peak, Black Tail, and Burgess Lake; increased trail monitoring for the Reservation Divide and Seepay Creek; and increased monitoring of impromptu campsite in the Revais, Magpie, and Seepay Creek drainages.

5. Define and implement as needed a Limited Public Access Area for the landscape by 2002.

Southwest Roadless and Wilderness Area Objectives

1. Designate the Ravalli-Valley Roadless Complex, the Burgess Lake Roadless Area and the Sleeping Woman Wilderness Area within two years of Forest Plan approval. Develop management plans for these areas within four years of Forest Plan approval.

Transportation

Road densities as of 1999 are shown in figure 3-29.

Southwest Transportation Objectives

1. Develop specific landscape level transportation objectives within one year of the Final FMP adoption. These will be included within the Forest-wide Transportation Plan.

Grazing

Grazing objectives

1. **Acquire State grazing leases in the Selow Creek area.**

   State of Montana grazing leases in the Selow Creek area present a continuing trespass situation. Range management would be dramatically improved in the landscape if the State grazing leases were acquired by the Tribes.

West LS

West Landscape

General Description

The West landscape consists mainly of what many refer to as the Little Bitterroot Mountain Range. It lies west of Highways 28 and 382, and north of Highway 200. The 39,000 acre Lozeau Primitive Area, Dog Lake, Upper and Lower Lonepine reservoirs, and the town of Hot Springs are located within the landscape.

Disturbance and Vegetation

Fire: The Existing Condition

Fire regimes are shown in figure 3-31.

A very active wildfire history has created a diverse fuels matrix in the West Landscape. The forest matrix is characterized by mature and old, upper-elevation climax and seral stands, and, at low elevations, mixed seral stands of varying ages, canopy closures, and downed fuel loadings. All four major fire regimes are present in the landscape, although fire exclusion policies have dramatically altered them. Future wildfires will tend to be large and more severe than what would have occurred under natural fuels conditions. The landscape is well roaded and has been extensively logged. Logging and fuels management follow-up has partially mitigated the fuel build ups.

The Lozeau Primitive Area

This area is not very different from the rest of the landscape in its structure, species composition, fire regime types, and topography. The mature timber matrix is extensive and not affected by fragmentation. Small, widely scattered patches of sod and wetlands are present. The unit has been extensively logged in the past. Wildland-residential intermix homesites are widely scattered and are at low to moderate fire risk. Nonlethal Fire Regime types in the Pikes Camp and Mill Pocket areas have excellent potential for fire regime restoration with a prescribed underburn strategy.

The balance of the landscape

The rest of the landscape is primarily composed of a multi-storied mosaic that includes dry Douglas-fir habitat types in the Nonlethal Fire Regime at lower elevations, a Mixed Fire Regime at mid-slope, and Lethal Fire Regime at the uppermost elevations and on wetter aspects. Riparian corridors and moderate-sized patches of logging, sod, rock talus, and wetlands are present. Unique hardwood habitats exist in the Clear Creek and Cottonwood areas. Fire occurrence and vegetation types are strongly influenced by the typically droughty weather conditions and moderate to steep slopes. Fire risk is moderate to high due to long fire suppression response times, moderate to steep slopes, and extensive, closed-canopy fuel complexes. Wildland-residential intermix fire risk is high to extreme, especially where the community of Hot Springs meets Tribal timberlands in the Hot Springs Creek watershed.

Smoke and Air Quality

Landscape air quality is usually fair to good, but topography in the Hot Springs area provides the potential for critically poor smoke dispersal during fires. Sensitive areas include the community of Hot Springs and the scenery along the state highway.

Fire Management Objectives

1. Maintain strategic fire suppression access on the following Tribal and BIA roads to protect wildland-residential intermix areas: HS-1000/3000/3010/3040/3041, HS-3100/4000/4010/4060, HS-5000/5010/5011, HS-6000/6001/6010, HS-6020/6021, C-2004/3000/4150/5200.

Vegetation

Forested acres in the West Landscape are classified as shown in table 3-11. The location of restricted and unavailable areas (excluding streamside management zones or SMZs) are shown in figure 3-32.

Table 3-11. Acre Distributions in the West Landscape by Administrative Category

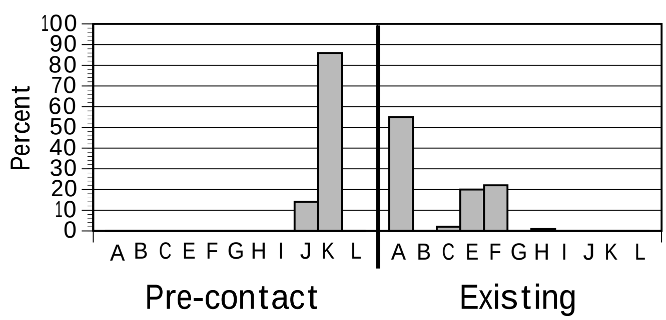
West Landscape Fire Regime	Available Acres	Restricted Acres	Unavailable Acres	Total
Nonlethal Fire Regime	8,500	1,551	12	10,063
Encroached Timber	2,229	303	0	2,532
Encroached Woodland/Sod	4,694	254	0	4,948
Encroached Woodland/Parks	3,004	253	0	3,257
Non-lethal Fire Regime with Encroached Acres	18,427	2,361	12	20,800
Mixed Fire Regime	14,924	4,200	189	19,313
Lethal Fire Regime	24,129	14,688	0	38,817
Timberline Fire Regime	0	450	0	450
Total	57,482	21,698	201	79,381

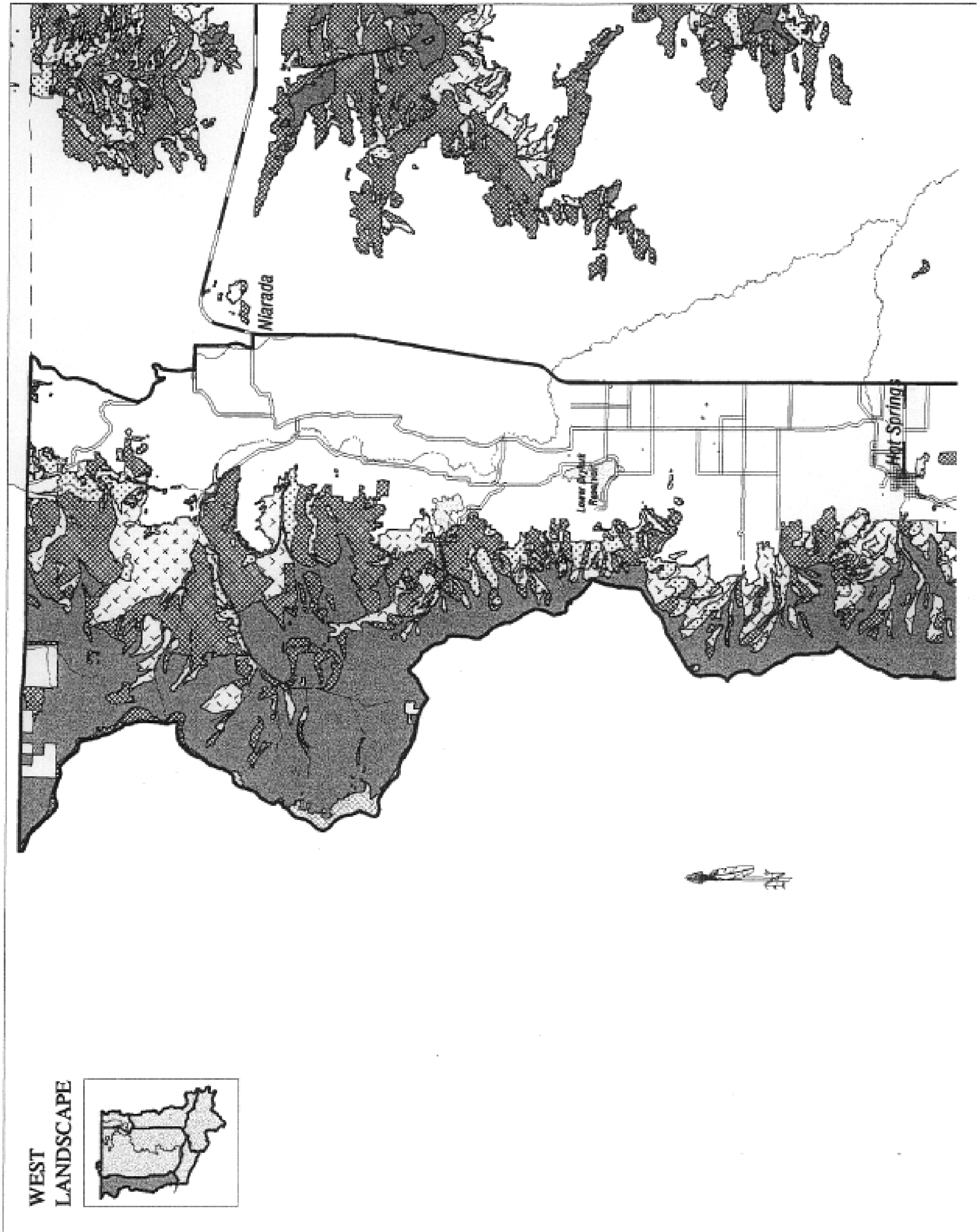
Pre-European and existing seral cluster distributions

The pre-European and existing seral cluster distributions for the Nonlethal, Mixed, and Lethal Fire Regimes in the West Landscape are shown in figure 3-30. Figure 3-33 shows the location of existing seral clusters.

Figure 3-30 a, b, and c. Pre-European and existing seral cluster distributions

Nonlethal Fire Regime




Niarada
Hot Springs
WEST
LANDSCAPE

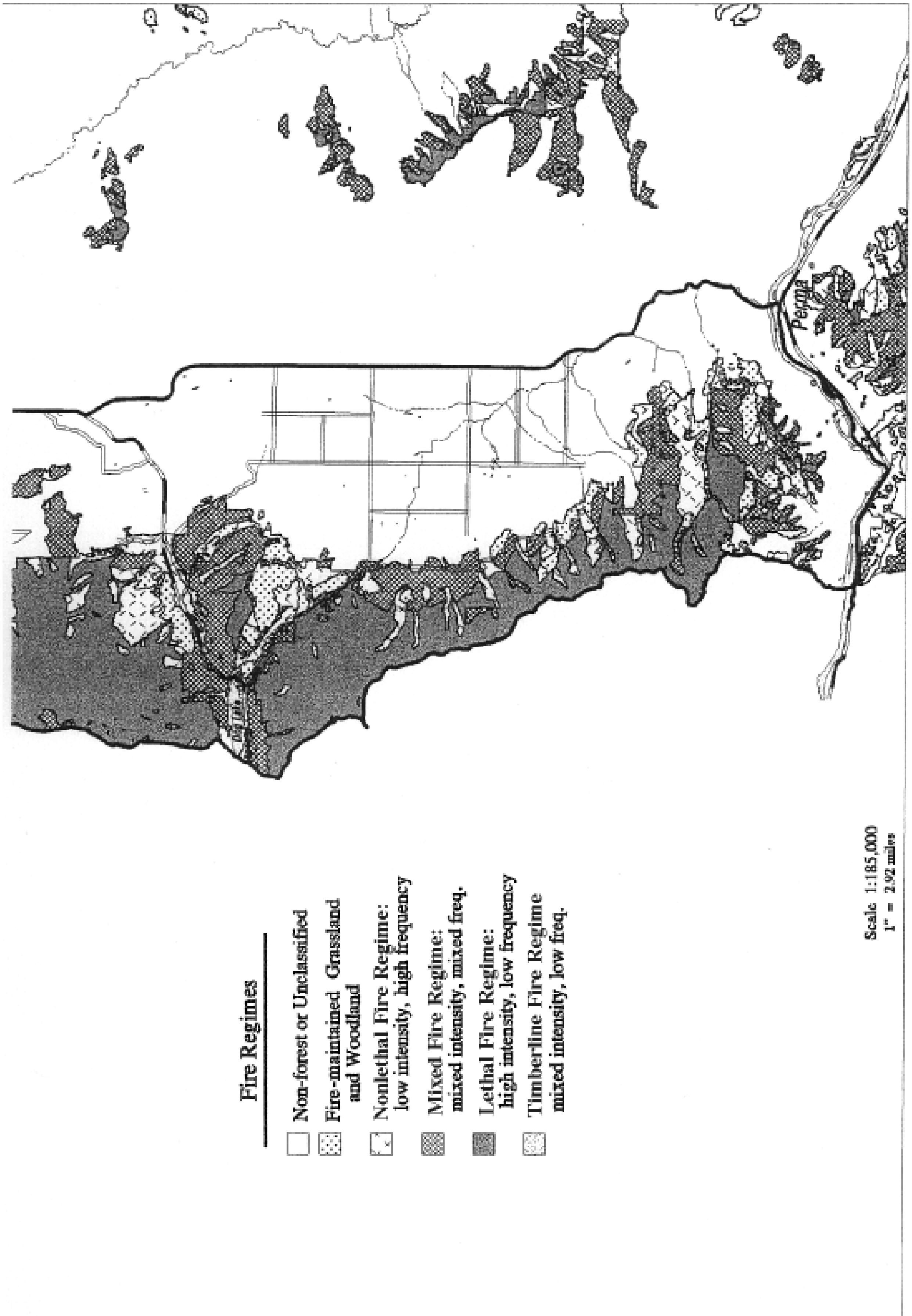
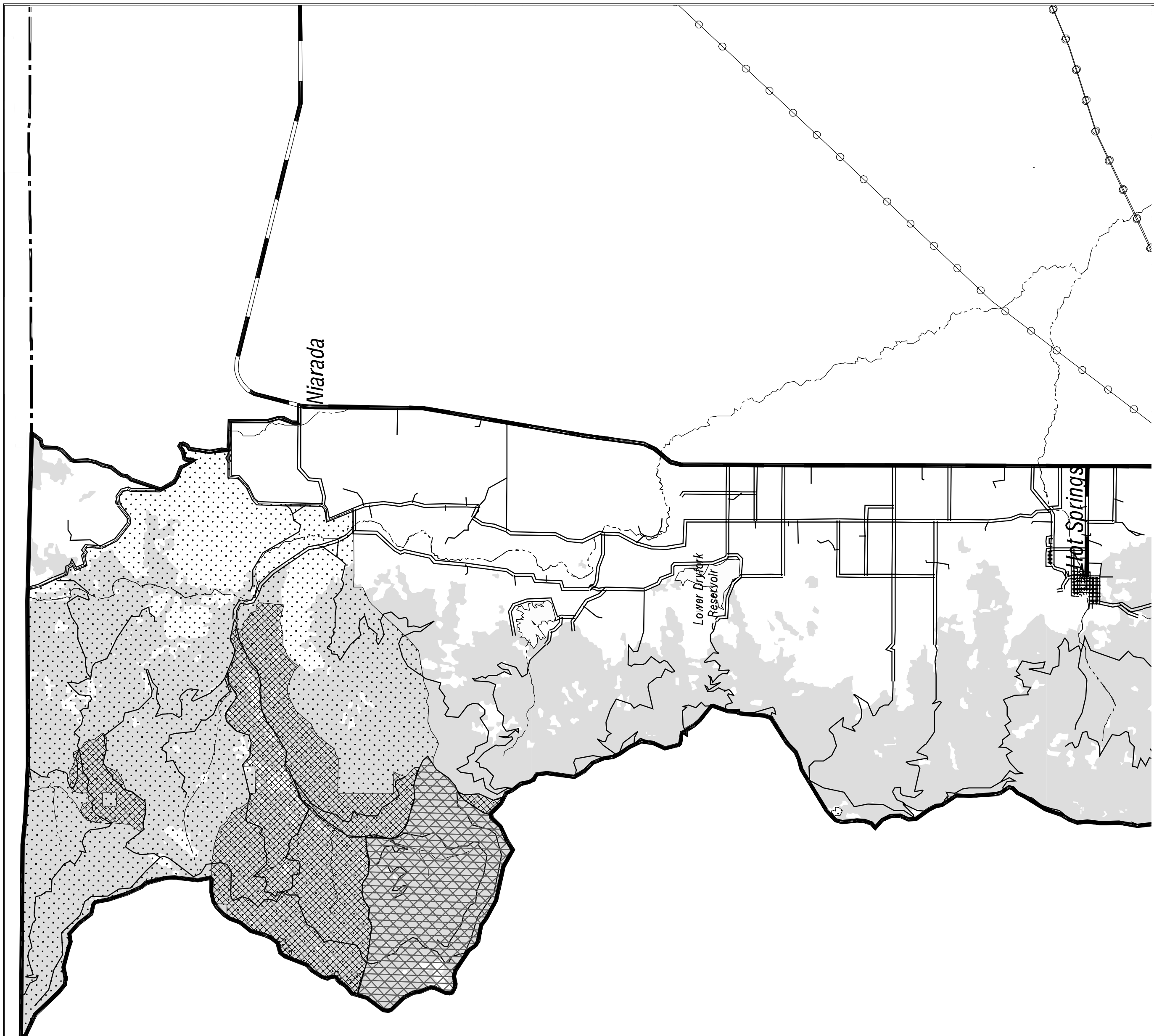
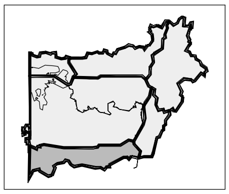


Figure 3-31. Distribution of fire regimes within the West Landscape.



WEST
LANDSCAPE



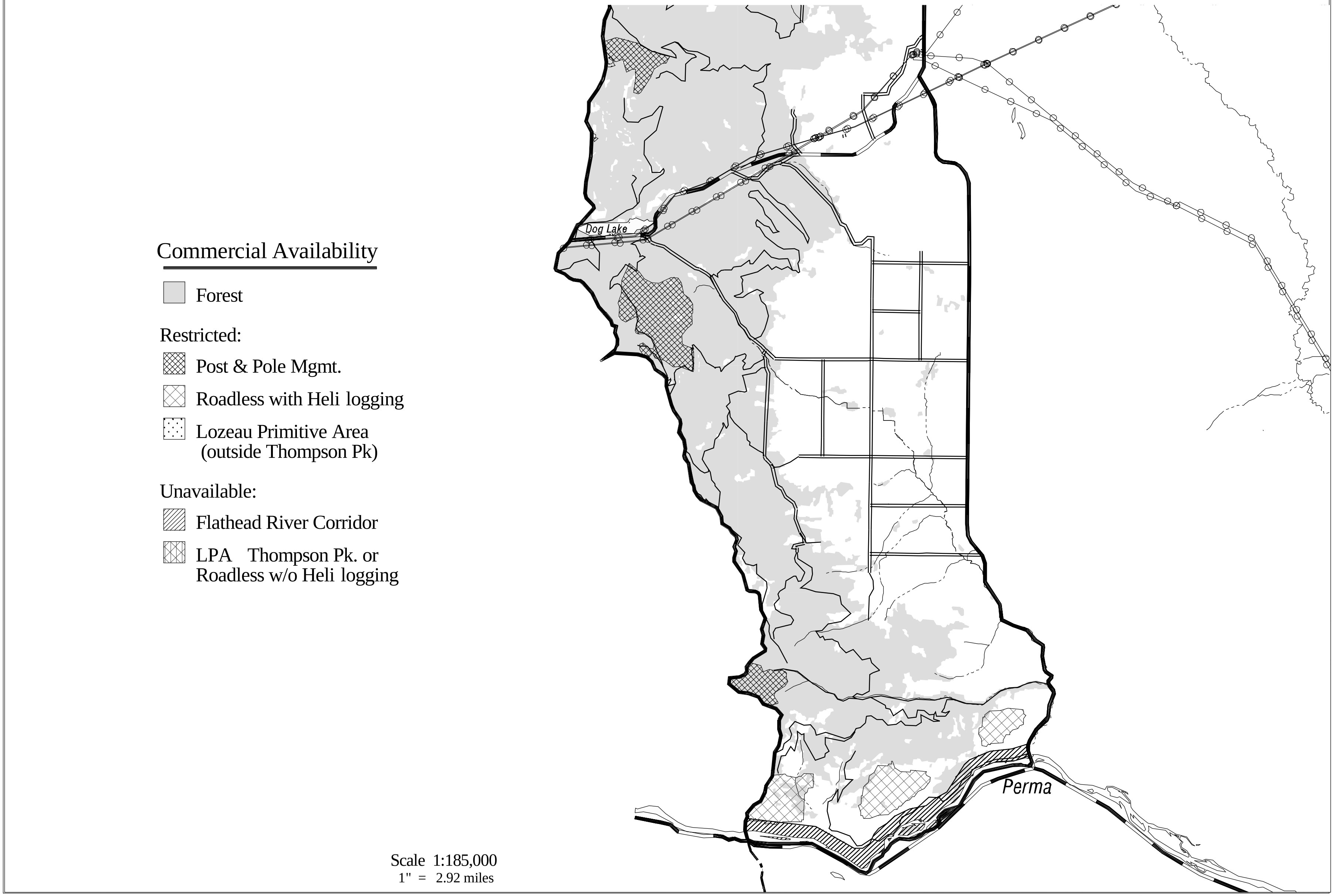
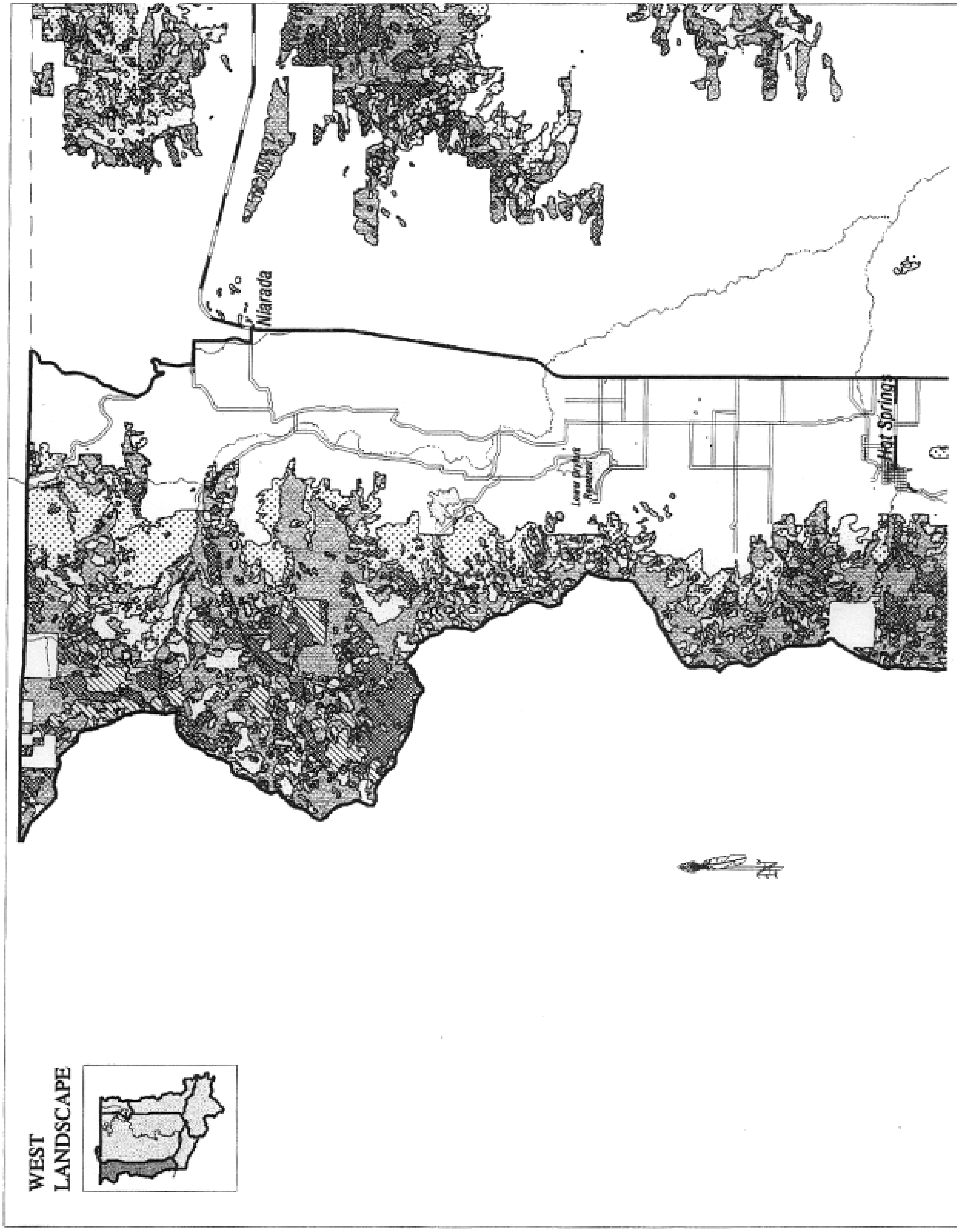


Figure 3-32. Unavailable and restricted areas in the West Landscape (not including streamside management zones (SMZs) and inaccessible and noncommercial (I&N) ground).


Wiarada
Hot Springs
WEST
LANDSCAPE

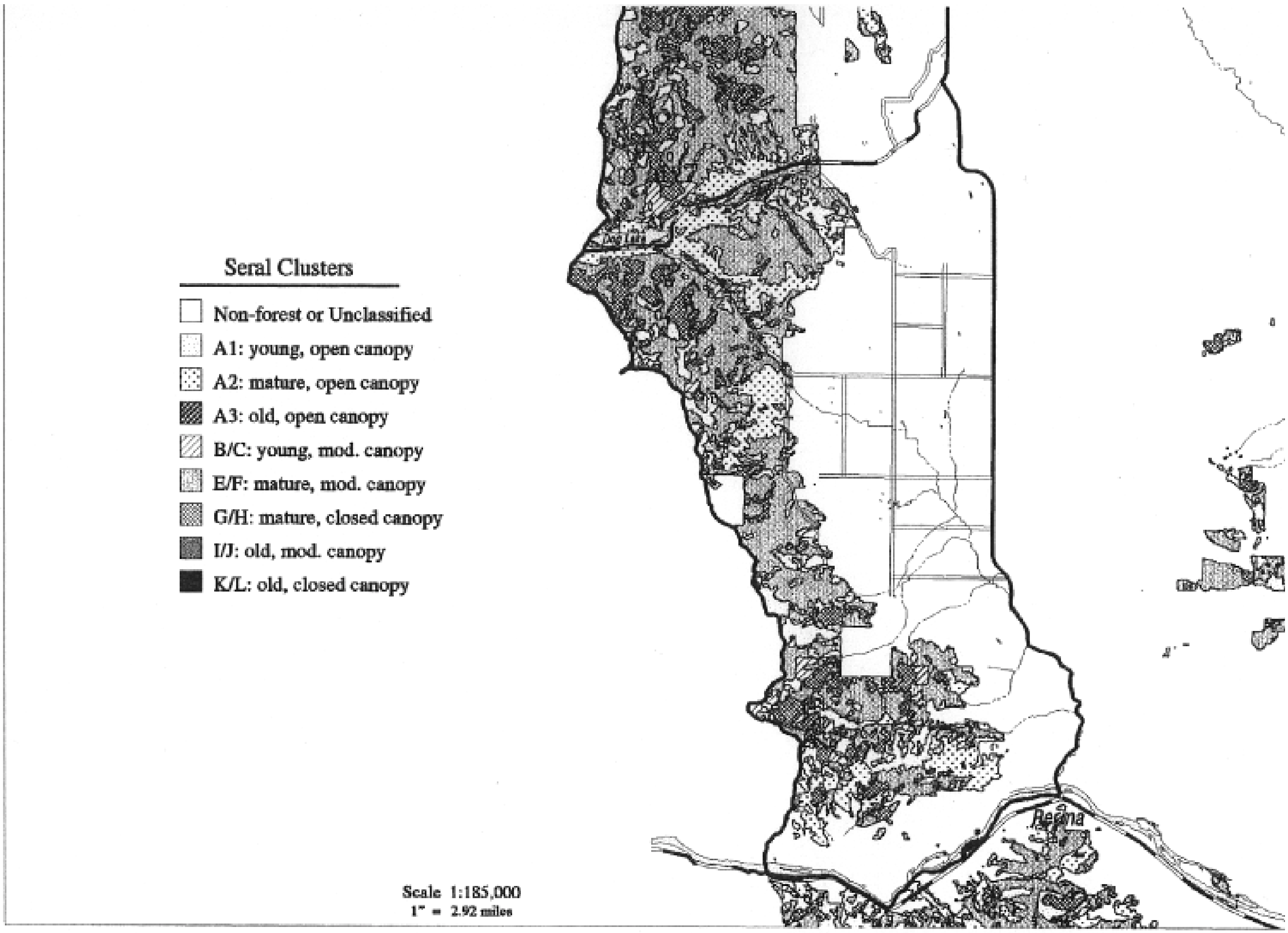
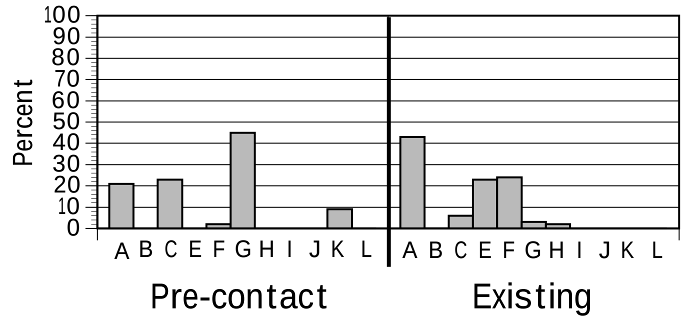
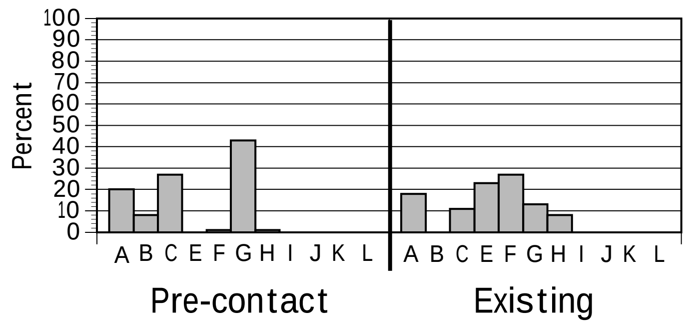


Figure 3-33. Seral cluster distributions in the West Landscape. Seral clusters represent patches of trees with similar ages (or sizes), canopy closures, and layering.

Mixed Fire Regime



Lethal Fire Regime



West LS

Vegetation Objectives

1. Achieve the following seral cluster distributions by 2089 (table 3-12).

Table 3-12 a and b. Desired Conditions for Seral Clusters.

	Seral Clusters						
Fire Regime	A/A1	A2	B	C	D	E	F
Nonlethal	10-30%	10-30%	0-10%	0-10%	0-5%	0-5%	5-15%
Mixed	0-25%	N/A	5-15%	10-20%	3-7%	0-5%	0-24%
Lethal	10-20%	N/A	0-5%	5-15%	15-25%	0-5%	5-20%

	Seral Clusters					
Fire Regime	G	H	I	J	K	L
Nonlethal	5-15%	0-5%	0-5%	10-40%	5-15%	0-5%
Mixed	25-32%	0-5%	0-5%	0-5%	5-15%	0-5%
Lethal	30-35%	5-10%	0-5%	0-5%	10-20%	5-10%

Wildlife and Diversity

Wildlife Habitat by Fire Regime

The Nonlethal Fire Regime

This fire regime consists of a few ponderosa pine types but is dominated by dry to moderately moist Douglas-fir types in a mid-seral condition. Although some stands are in an early seral stage, there are no late seral stands. The largest areas with this fire regime are in the Clear Creek drainage, Welcome Springs area, Garden Creek, and Bassoo Creek areas. During pre-European periods these were high quality big game winter ranges. Large ponderosa pine was more prevalent then, and forage was more abundant and of a higher quality. Encroachment by Douglas-fir and weeds, high road densities, and competition with livestock have dramatically reduced forage quality.

The Mixed Fire Regime

This regime is dominated by moderately moist types similar to those in the Nonlethal Fire Regime although they are slightly more extensive in area. During pre-European times they were moderately important as winter range. Presently, most stands are in a mid-seral condition and have open to moderately closed canopies. Theoretically they should provide modest hiding and thermal cover for big game, depending upon the topography. However, high road densities have reduced their value. This regime serves as quality habitat for a diverse community of forest birds, including blue grouse. Riparian habitats such as those associated with Clear Creek, Cottonwood Creek, and Garden Creek are exceptionally important due to the dry character of the landscape. They have, however, been heavily altered by logging, roads, livestock grazing, and irrigation.

The Lethal Fire Regime

This fire regime is made up of mostly Douglas-fir, grand fir, and subalpine fir habitat types in early and mid-seral condition. Upper elevations are potential summer range for big game, however high road densities, invasions of noxious weeds, and competition for forage with livestock has reduced the areas effectiveness as wildlife habitat. Fragmentation is the highest on the reservation and has reduced big game hiding cover, thermal cover, and interior forest wildlife. Road densities are also among the highest on the reservation. Overall habitat effectiveness for elk on this landscape is near 0 percent.

The Timberline Fire Regime

This regime consists of a small area adjacent to Thompson Peak in the northwest corner of the landscape. It is important for big game and mountain grouse and contributes to the overall diversity of the West Landscape.

Wildlife and Diversity Objectives

1. Coordinate riparian restoration projects with other Tribal resource programs on a cost-share basis.

Key areas include Clear Creek (Camas Prairie), Hot Springs Creek, Dog Lake, Upper and Lower Dry Fork Reservoirs, and Lozeau Primitive Area.

2. **Reduce fragmentation so vegetation patterns more closely resemble what would have occurred under natural fire regimes.**

   Priority should be given to areas within the Lethal Fire Regime.

3. **Achieve a better balance between range management and wildlife management to provide for multiple use of the range resource and to allow for increases in big game use.**

4. **Continue management of the Sheep Conservation Area. Maintain the integrity of the travel corridor between Perma and Ferry Basin for bighorn sheep and elk. Improve the quality of the Little Bitterroot River riparian corridor for moose.**

5. **Continue efforts to reintroduce peregrine falcons in the Perma area.**

6. **Follow established guidelines for threatened and endangered species.**

Water and Fish

The Existing Conditions

The West Landscape drains a mountainous area of moderate elevation. Watersheds are generally parallel to each other and drain from west to east into Camas Prairie or the Little Bitterroot Valley. There is little interconnectivity between watersheds; they are either intercepted by the irrigation network or infiltrate into the soil when they emerge onto the valley floor. There is little indication of alpine glaciation in forested watersheds.

This landscape is underlain by Revett, Burke, and Prichard Formation sediments, which are resistant to erosion and produce thin soil horizons. Unconsolidated Tertiary sediments and glacio-lacustrine sediments from Glacial lake Missoula are sporadically exposed up to an elevation of about 4,200 feet. At higher elevations, there are extensive areas where the soils contain volcanic ash.

Streams of this area are typically small and of moderate gradient. Most are severely degraded in their valley reaches. These conditions and irrigation structures cause the headwaters to be biologically separated from the mainstem streams and rivers downstream. Resident populations of westslope cutthroat trout are isolated in the headwaters of several of these streams.

Scenery

The Existing Conditions

Recommended scenic integrity levels are shown in figure 3-35. Terms used are defined in tables 3-3 and 3-4. The West landscape is divided into two subunits.

Perma to Lozeau Forested Areas

The overall scenic integrity level rating ranges from Moderately Altered (MA) to Heavily Altered (HA). Views of recent straight-edged clearcuts, roads, and the major transmission lines dominate the landscape's character. The forested areas above the town of Hot Springs are rated as Heavily Altered. Deviations borrow little, if any, from naturally established, line, form, color, or texture. The variety class is common, and the sensitivity level is 1.

Camas and Hot Springs Valley Corridors

The overall scenic integrity level is rated as Slightly Altered (SA). The character of these valley areas is rural farmland, similar to that of Eastern Montana. Deviations blend for the most part with the character with the exception of the large BPA transmission lines and substations. These deviations dominate the landscape from foreground viewpoints. The variety class is common, and the sensitivity level is 1.

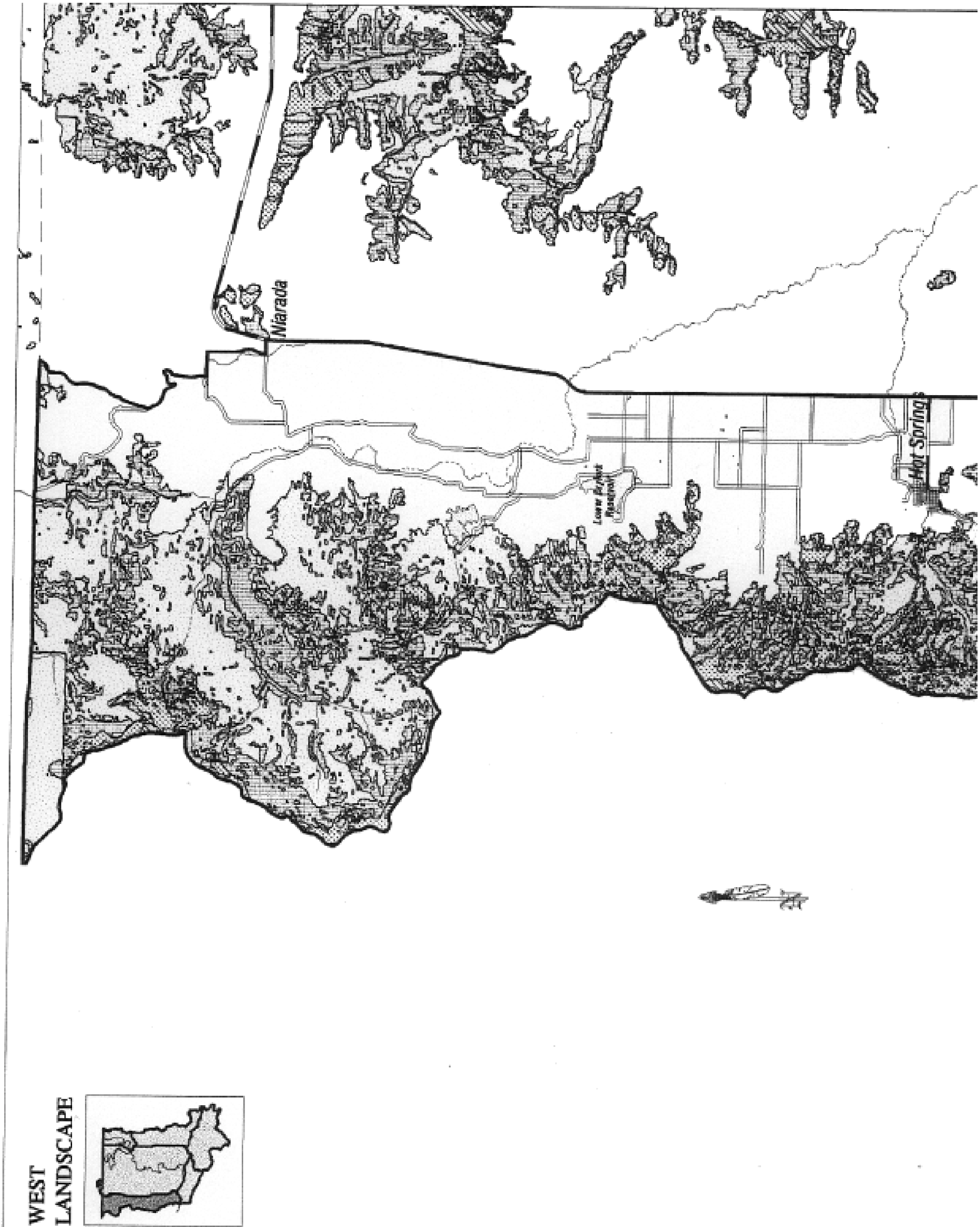
For viewpoints used to analyze this landscape and other methods used see Appendix M.

Scenery Under the Forest Plan: A Computer Simulation

Figure 3-34 shows the West Landscape as it appears today (top) and as it might appear in the future (bottom). The bottom picture, a simulation, shows one possible rehabilitation scenario, which is an attempt to make old clearcuts appear more natural. This simulation also assumes about ten years of regrowth.

Figure 3-34. Southwest Landscape in 1995 and as it might appear in the future based on a computer simulation.

West LS


Wiarada
Hot Springs
WEST
LANDSCAPE

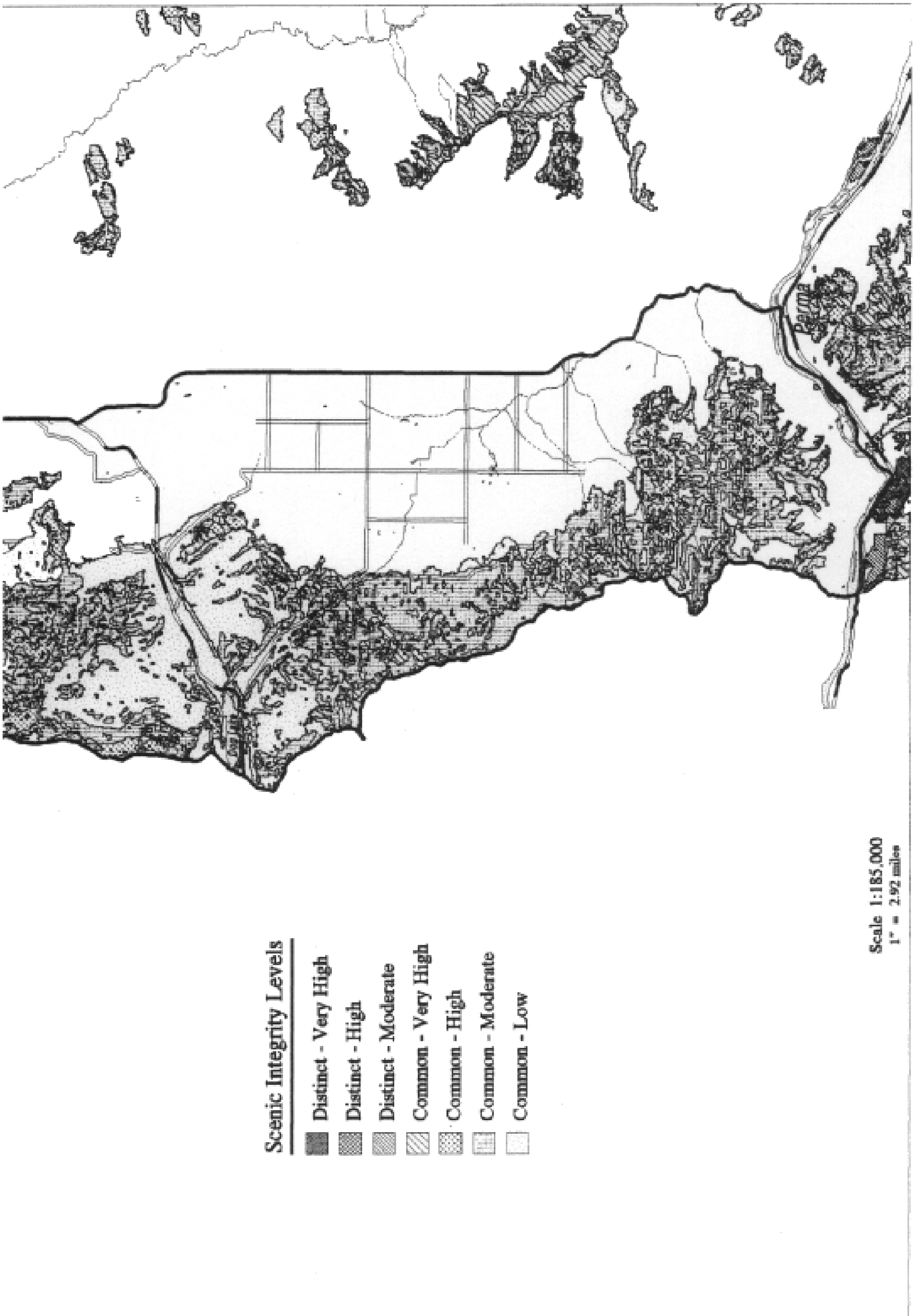


Figure 3-35. Recommended scenic integrity for the West Landscape.

West LS

Scenery and Recreation Objectives

1. Rehabilitate the visual quality of the area above Hot Springs by 2002 and the Garden Creek area by 2006.

2. Implement the objectives of the Lower Flathead River Corridor Plan.

3. Enhance annual maintenance and development funding for following developed recreation sites: Dog Lake Campground, Lonepine Reservoir, Dry Fork Creek Campsite, Buckskin Flats Campsite, Pikes Camp, and Lozeau Flats Campsite.

West Landscape Roadless and Wilderness Area Objectives

1. Designate the Little Money Roadless Complex and the Thompson Peak Wilderness Area within two years of Forest Plan approval. Develop Management plans for these areas within four years of Forest Plan approval.

Transportation

Existing road densities as of 1999 are shown in figure 3-36.

West Landscape Transportation Objectives

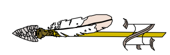
1. Develop specific landscape level transportation objectives within one year of the Final FMP adoption and be included within the Forest-wide Transportation Plan.

Grazing

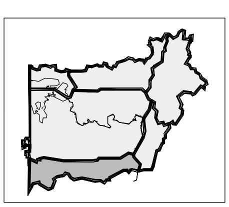
Grazing objectives

1. **Acquire State grazing leases in the Hot Springs area.**

   State of Montana grazing leases in the Hot Springs area present a continuing trespass situation. Range management would be dramatically improved if the State grazing leases were acquired by the Tribes.



WEST
LANDSCAPE



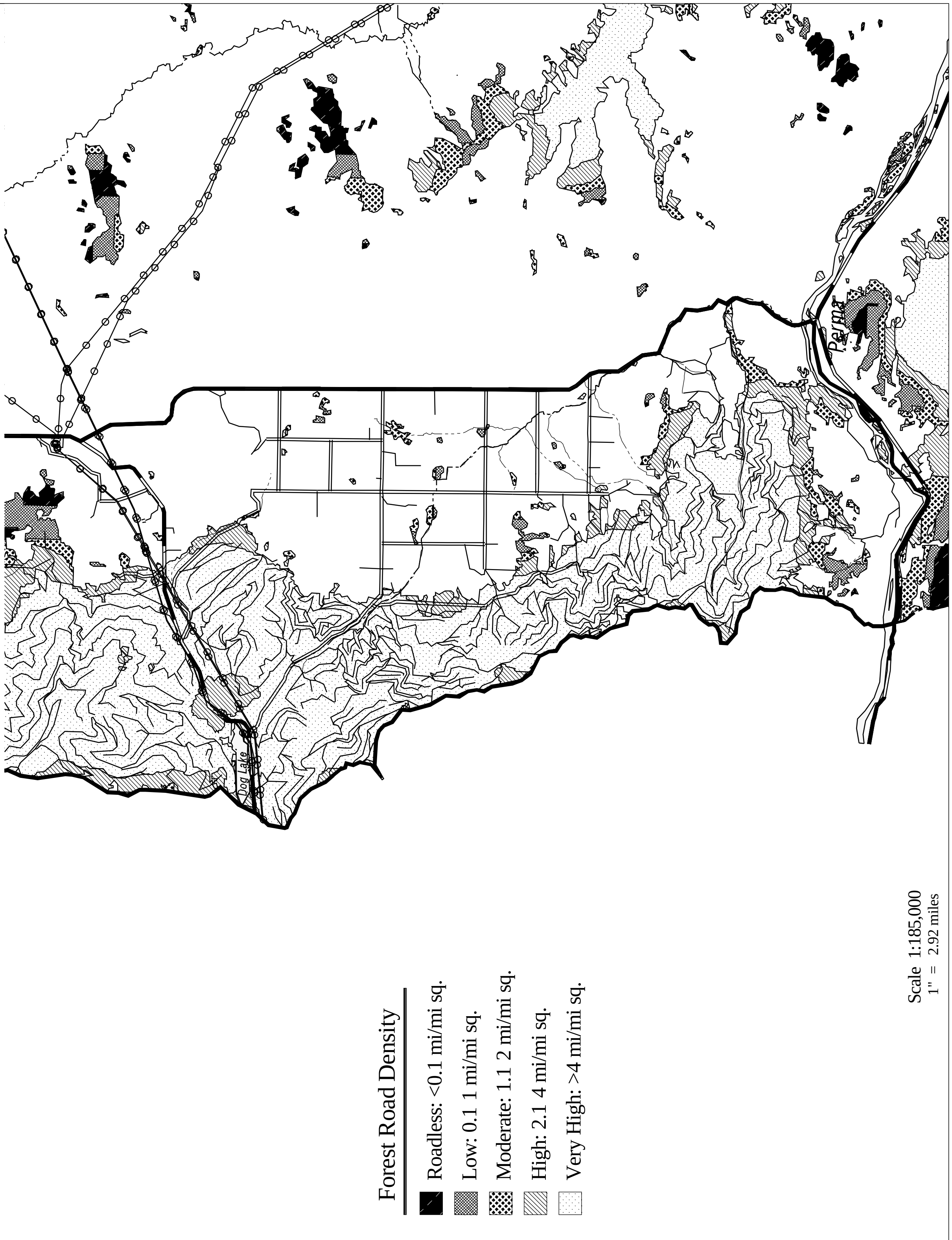


Figure 3-36. West Landscape road densities as of 1999.

Salish Mtns. LS

Salish Mountains Landscape

General Description

This landscape is the largest of the six Reservation landscapes. It covers the central portion of the Reservation and is bounded by Highways 93, 200, 382, and 28. The Hot Springs cutoff road (Sloan Road) and Round Butte Highway bisect it and Highway 212 cuts across its southeast corner. The Salish Mountains stretch from Ferry Basin to Hog Heaven are the dominant feature, although the National Bison Range and Wildhorse Island are also prominent.

The western half of Flathead Lake and Ninepipe, Pablo, and South Crow reservoirs provide important flatwater recreation opportunities in the area. The Lower Flathead River Corridor, running north to south through the landscape, is nationally significant as an undeveloped river. The landscape includes the communities of Polson, Pablo, Ronan, Charlo, Dixon Agency, Elmo, Dayton, and Big Arm.

Disturbance and Vegetation

Fire: The Existing Condition

Fire regimes are shown in figure 3-37.

The Salish Mountains Landscape has had more fires than any of the other Reservation landscapes. Steep slopes, dry habitat types and fuels build ups from fire exclusion policies have created high to extreme fire risk conditions on timberlands and in urban-intermix areas.

The River Corridor

This area is characterized by a rangeland matrix with scattered patches of dry Douglas-fir and ponderosa pine habitat types on steep slopes. Forested and grassland areas have excellent potential for ecosystem restoration and wildlife habitat enhancement from an aggressive prescribed burning program. Flathead River islands are also in critical need of prescribed fires to restore local ecosystems.

Ferry Basin

Fire has had an active role in establishing vegetation types in the Ferry Basin Subunit. The forest matrix is characterized by multi-storied, mixed-seral and single-storied Douglas-fir types of Nonlethal or Mixed Fire Regimes. Fire exclusion has produced an extensive, closed-canopy forest matrix with highly altered fuel loadings. Fire risk is high to extreme due to steep slopes, high wind exposure, and continuous fuelbeds. Wildland-residential intermix areas are widely scattered and at only low to moderate fire risk.

The balance of the landscape

The rest of the landscape is dominated by the Nonlethal and Mixed Fire Regimes. Typically, these are on dry sites on moderate to steep slopes. The Timberline Fire Regime is not present in this landscape. The forest matrix is composed of mature to old multi-storied seral types with few riparian corridors and moderate to large-sized patches of logging, sod, and wetlands. Overall, the fire risk is moderate to high due to fair fire detection, good road access, moderate response times, and extensive selective logging. Wildland-residential intermix fire risk is high to extreme, especially in the Big Arm and Jette Lake areas because of high homesite densities, poor fuels management, fuels build-ups, and Douglas-fir encroachment on nonlethal fire regime types, as well as poor road access.

Smoke and Air Quality

Air quality in the landscape is typically good to excellent during most spring and summer situations, but poor smoke dispersion could occur from large wildfires. Sensitive areas include the communities that are within or east of the Salish Mountains landscape and scenery along the Flathead River, Flathead Lake, and the Mission Mountains Tribal Wilderness.

Air Quality is fair to excellent under normal burning conditions, but extra care should be taken when broadcast and pile burning under late summer and fall conditions. Ronan and Polson, which are both non-attainment areas as classified by the Environmental Protection Agency, would be impacted by smoke from fires in this area. Federal law allows no degradation of local air quality in these communities.

Fire Management Objectives

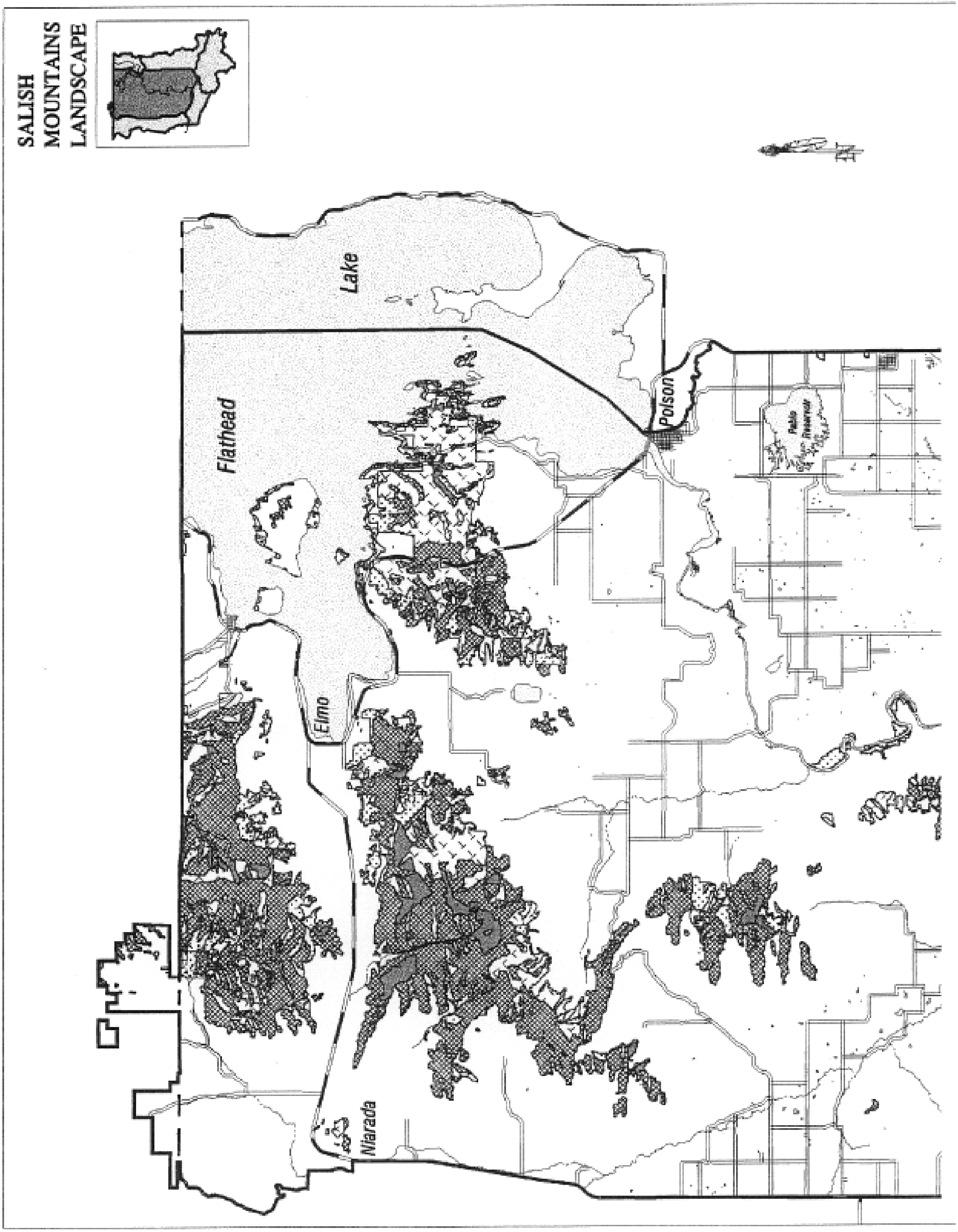
1. **Maintain strategic fire suppression access on the following Tribal and BIA roads to protect wildland-residential intermix areas: H-2110, I-2004/2002/2010, J-1100/2004, J-3000/3002/3100/3200/3500/3600/4000.**

Vegetation

Table 3-13 presents the acres found in each administrative category of the forest. The location of restricted and unavailable areas (excluding streamside management zones SMZs) are shown in figure 3-38.

Table 3-13. Acre Distributions in the Salish Mtns Landscape by Administrative Category

Salish Mountains Landscape Fire Regime	Available Acres	Restricted Acres	Unavailable Acres	Total
Nonlethal Fire Regime	11,901	821	1,688	14,410
Encroached Timber	2,531	222	670	3,423
Encroached Woodland/Sod	3,552	290	359	4,201
Encroached Woodland/Parks	622	58	69	749
Non-lethal Fire Regime with Encroached Acres	18,606	1,390	2,785	22,781
Mixed Fire Regime	27,696	3,693	783	32,172
Lethal Fire Regime	2,524	657	21	3,202
Timberline Fire Regime	0	0	0	0
Total	48,826	5,740	3,589	58,155


SALISH
MOUNTAINS
LANDSCAPE
Flathead
Lake
Polson
Elmo
Niarada

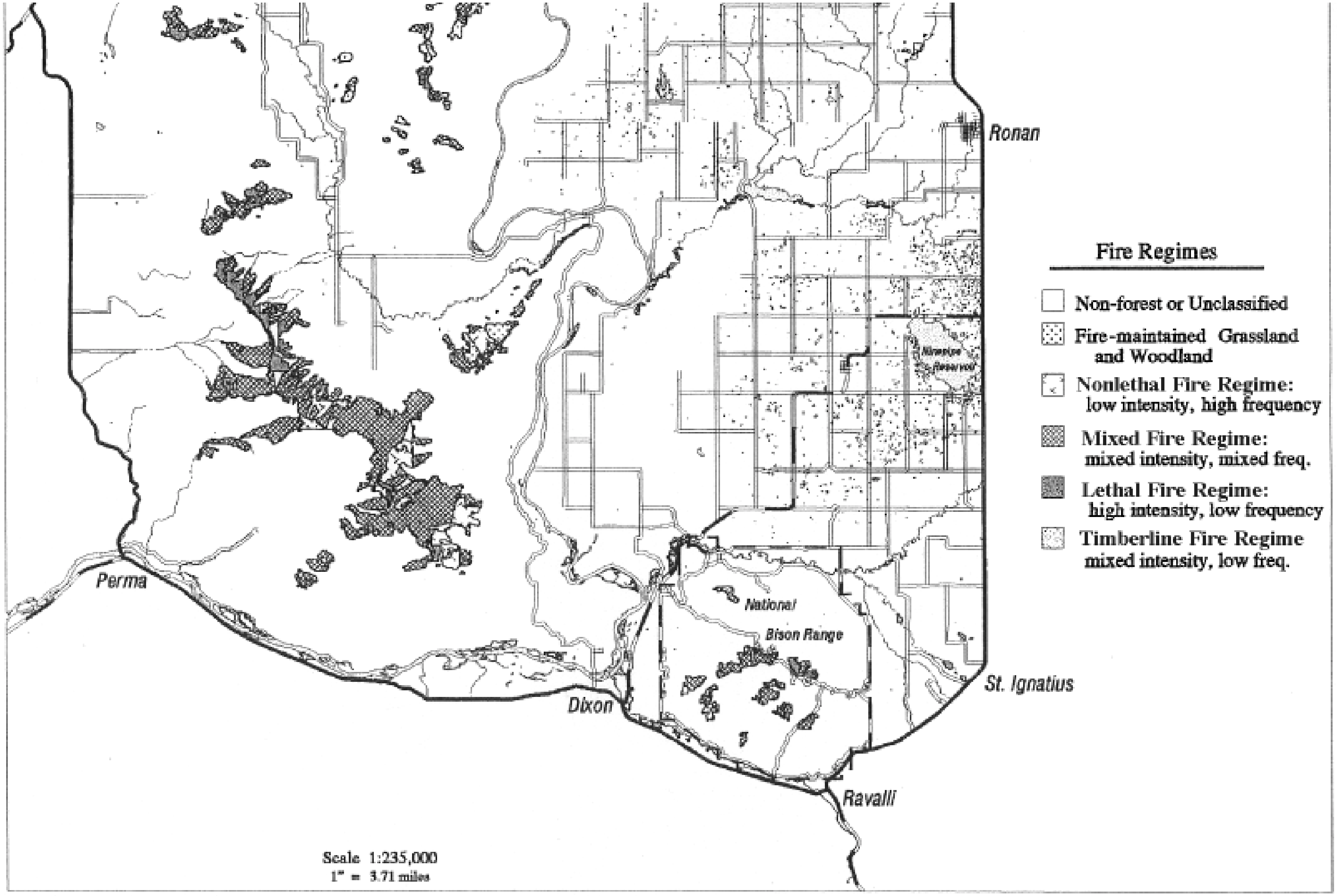
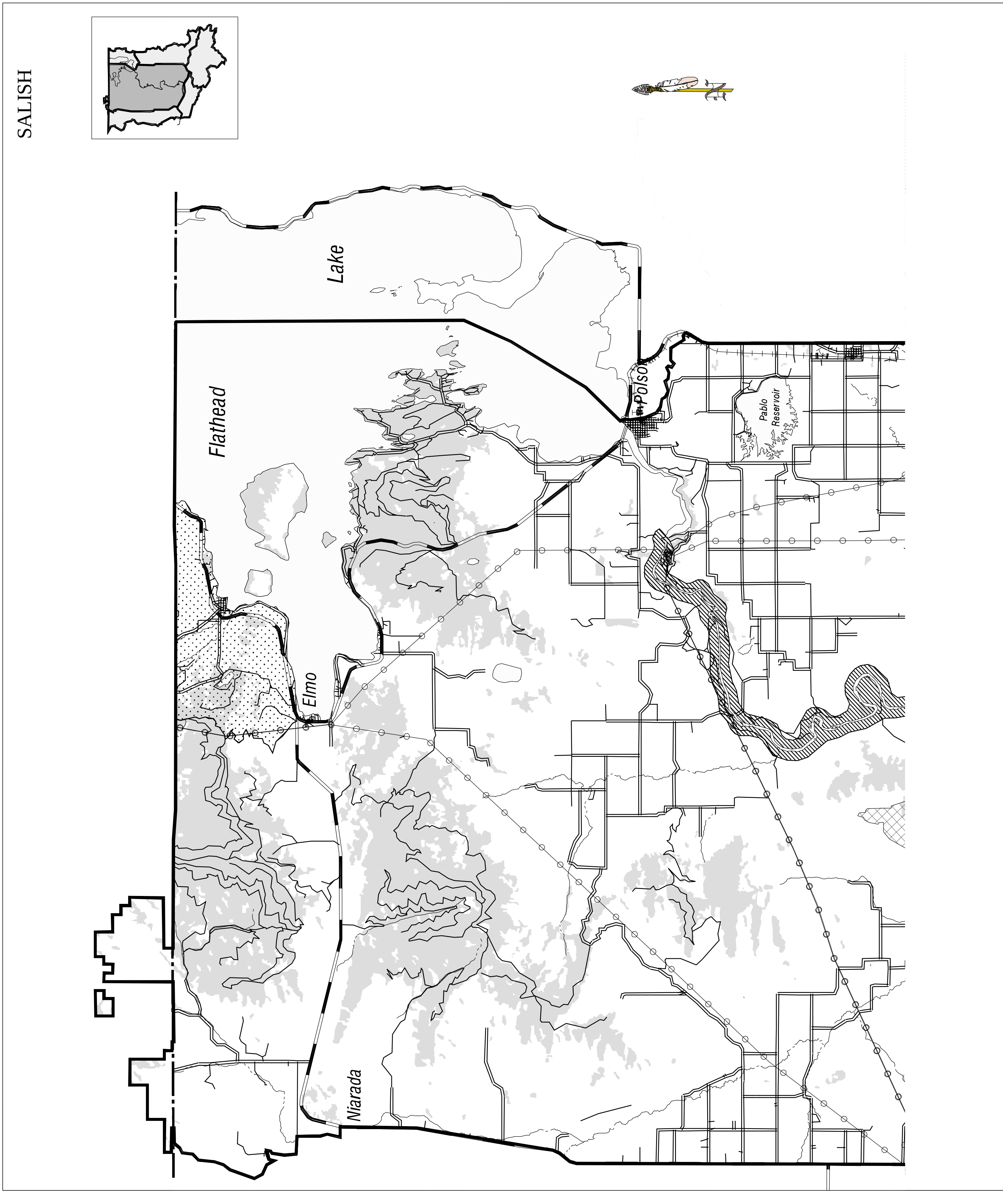


Figure 3-37. Distribution of fire regimes within the Salish Landscape.


Lake
Flathead
Polson
Pablo Reservoir
Elmo
Niarada

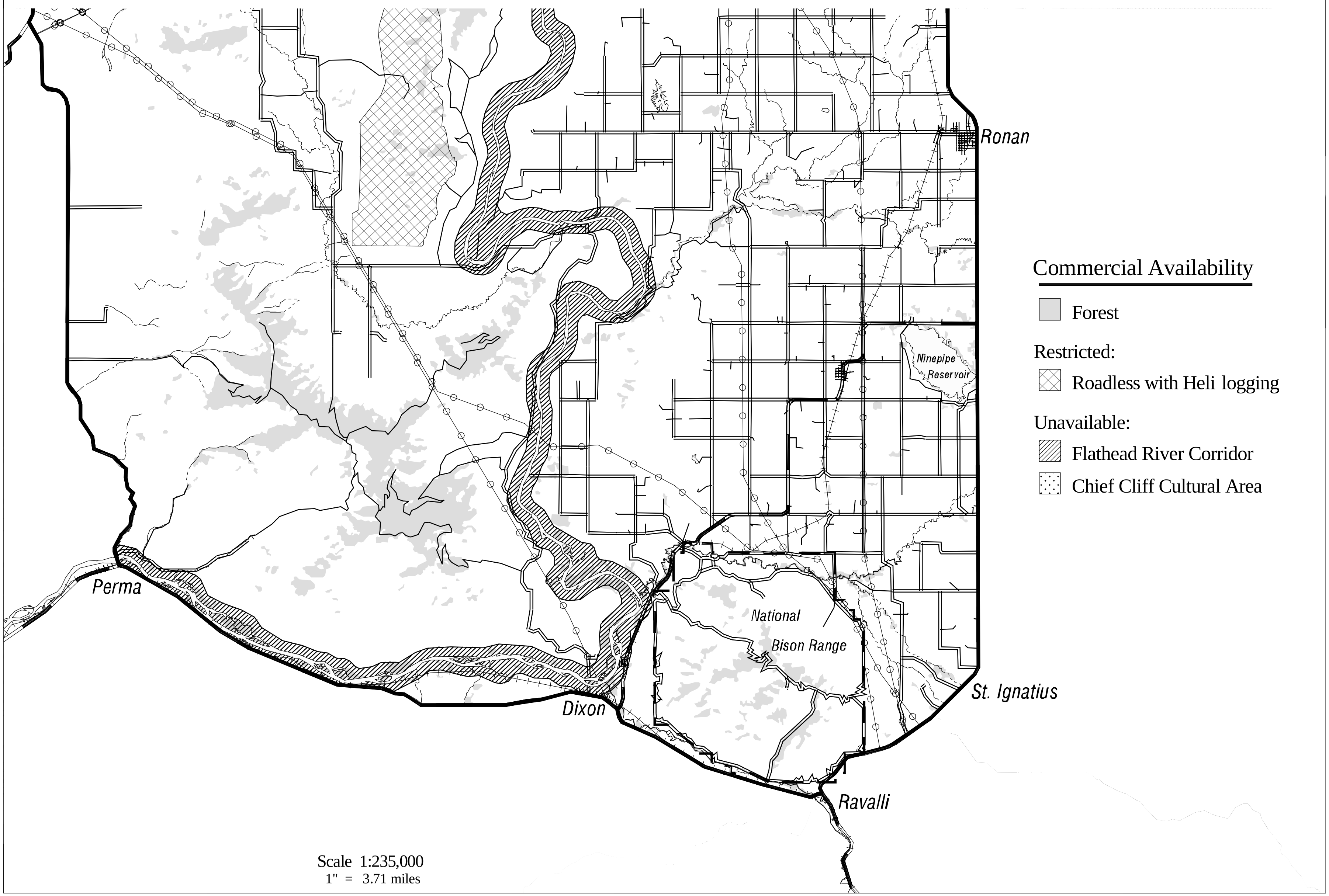


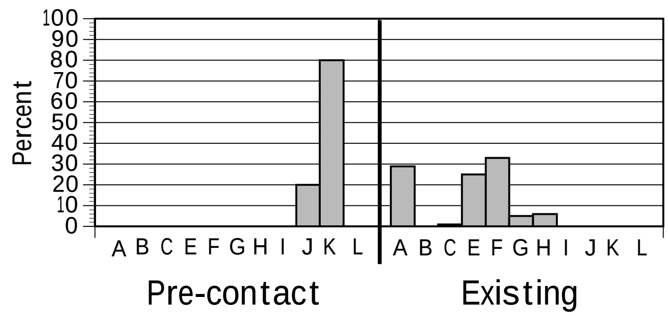
Figure 3-38. Unavailable and restricted areas in the Salish Landscape (not including streamside management zones (SMZs) and inaccessible and noncommercial (I&N) ground).

Pre-European and existing seral cluster distributions

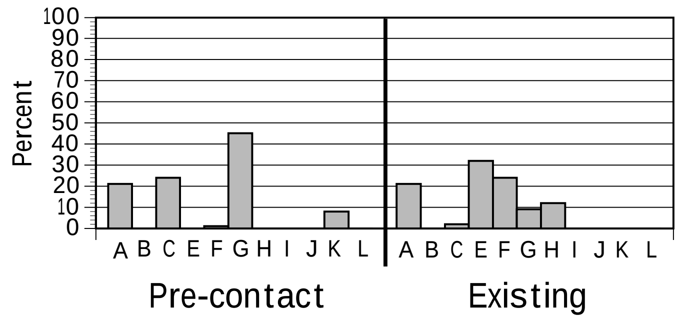
The pre-European and existing seral cluster distributions for the Nonlethal, Mixed, and Lethal Fire Regimes are shown in figure 3-39. Figure 3-40 shows the existing distribution of seral clusters.

Figure 3-39 a, b, and c. Pre-European and existing seral cluster distributions

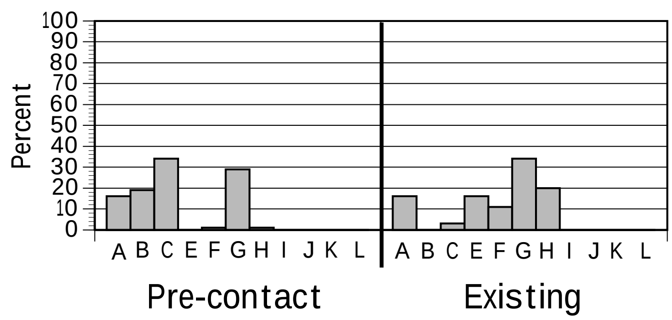
Nonlethal Fire Regime



Mixed Fire Regime



Lethal Fire Regime



Seral cluster distributions

We will achieve the following seral cluster distributions by 2089 (table 3-14).

Table 3-14 a and b. Desired Conditions for Seral Clusters.

	Seral Clusters						
Fire Regime	A/A1	A2	B	C	D	E	F
Nonlethal	10-30%	10-30%	0-10%	0-10%	0-5%	0-5%	5-15%
Mixed	0-25%	N/A	5-15%	10-20%	3-7%	0-5%	0-24%
Lethal	10-20%	N/A	0-5%	5-15%	15-25%	0-5%	5-20%

	Seral Clusters					
Fire Regime	G	H	I	J	K	L
Nonlethal	5-15%	0-5%	0-5%	10-40%	5-15%	0-5%
Mixed	25-32%	0-5%	0-5%	0-5%	5-15%	0-5%
Lethal	30-35%	5-10%	0-5%	0-5%	10-20%	5-10%

Wildlife and Diversity

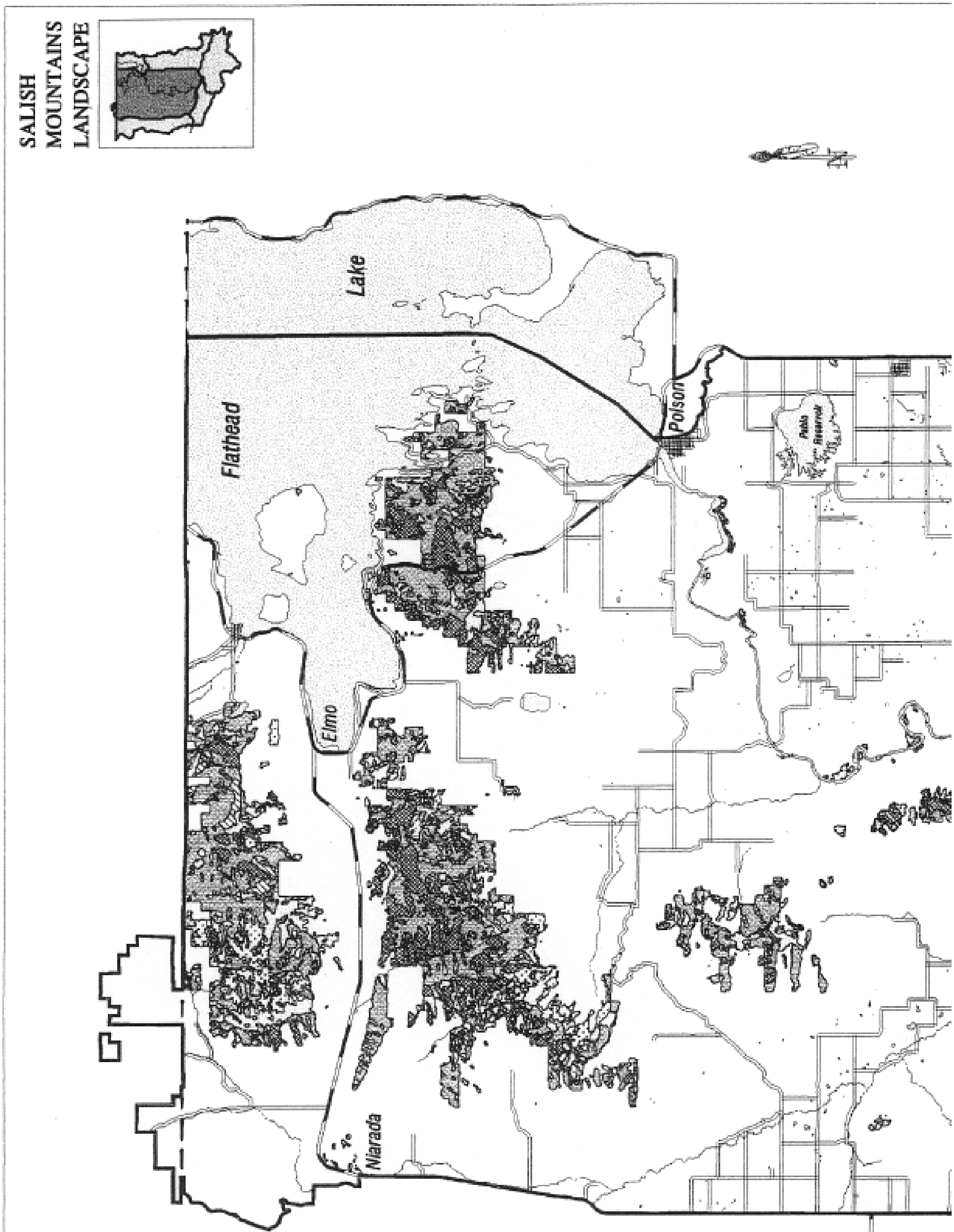
Wildlife Habitat by Fire Regime

The Nonlethal Fire Regime

Habitat types in this regime include ponderosa pine and drier Douglas-fir types with ponderosa pine as the seral dominant. The majority of stands are in a mid-seral condition and have open to moderately closed canopies. The rest of the stands are in an early seral condition. The Salish Landscape is naturally fragmented with islands of forests similar to the forests of eastern Montana. The main forested areas include Hog Heaven, Irvine, Jette, Garceau, and Ferry Basin. The Nonlethal Fire Regime occurs in all these areas. It is potential winter range for big game even though most of it has been degraded due to human population growth (Jette), competition with livestock (Jette, Hog Heaven), and high road densities (Jette, Hog Heaven, Irvine). The pre-European old-growth ponderosa pine has been replaced by denser, younger stands of Douglas-fir. While this has improved big game hiding cover, it has come at the expense of winter forage. The old-growth stands also provided habitat for many bird species, including common flicker, merlin, flammulated owl, and western screech owl.

The Mixed Fire Regime

This regime is dominated by Douglas-fir types. All are in early to mid-seral condition and have a wide range of canopy closure conditions. During pre-European times this regime would have had a high level of diversity due to the mix of stand replacement and nonlethal fires. The mosaic would have resulted in many small patches of cover in various size and age classes interspersed with small openings of seral grasses and mixed grasses and shrubs. This in turn would have supported a diverse assemblage of birds and big game species. Existing conditions and impacts are similar to those in the Nonlethal Fire Regime.


SALISH
MOUNTAINS
LANDSCAPE
Lake
Flathead
Polson
Pablo Reservoir
Elmo
Niarada

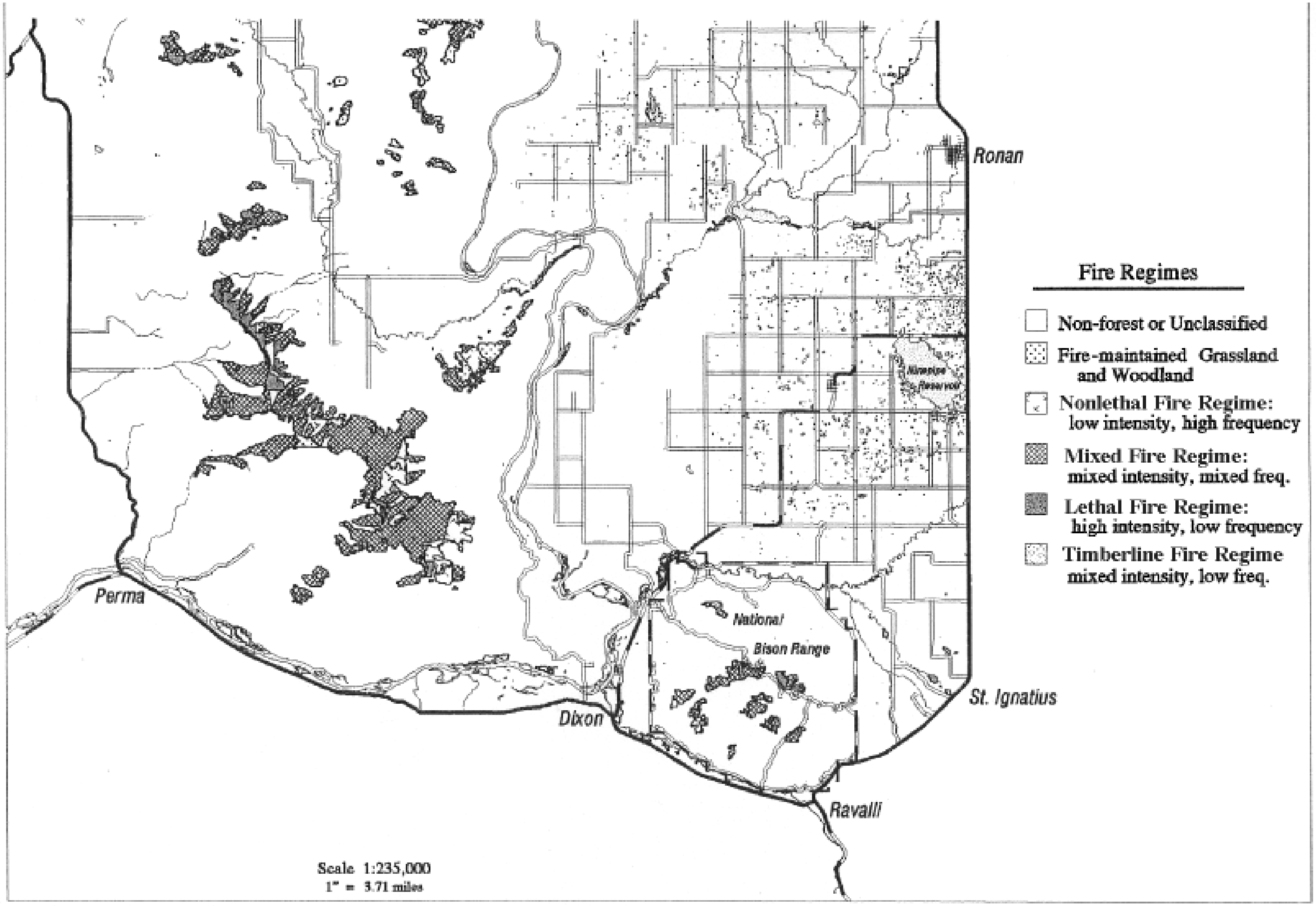


Figure 3-40. Seral cluster distributions in the Salish Landscape. Seral clusters represent patches of trees with similar ages (or sizes), canopy closures, and layering.

Salish Mtns. LS

The Lethal Fire Regime

This fire regime includes grand fir, spruce, and subalpine fir habitat types. It makes up only a small percentage of the landscape, however it contributes greatly to the overall diversity. Found mostly in the Irvine area, the majority of stands are in a mid-seral condition and have moderate and closed canopies. These areas are valuable as summer thermal cover and hiding cover for big game and winter cover for blue grouse and forest owls. The limited distribution of these cover patches makes them extremely valuable to the landscape.

The Timberline Fire Regime

The Timberline Fire Regime does not exist in the landscape.

Wildlife and Diversity Objectives

1. **Manage grazing better to reduce competition with wildlife on critical big game winter ranges.**

   These areas include but are not limited to Hog Heaven and the southern portions of Irvine and Jette.

2. **Reduce weed infestations in critical big game winter range.**

   These areas include but are not limited to Hog Heaven, Irvine, Oliver Point, and Ferry Basin.

3. **Reintroduce fire into the Nonlethal Fire Regime and manage forest-savannah types so they more closely resemble pre-European conditions.**

4. **Maintain summer thermal cover in the Lethal Fire Regime to provide for year-round use by wildlife.**

5. **Restore critical riparian areas important for wildlife, livestock, recreation, and cultural activities.**

   Use cost-sharing and cooperative agreements for restoration projects. Key areas for restoration include Black Lake (Chief Cliff), Jette Pond, Cromwell Creek, Sullivan Creek, Crow Creek, Mission Creek, and the Little Bitterroot River.

6. **Follow established guidelines for threatened and endangered species.**

Water and Fish

The Existing Conditions

The Salish Mountains Landscape contains ephemeral to intermittent drainages which are tributaries to the Little Bitterroot River on the west and the Flathead River on the east. Precipitation is low across the entire landscape and does not support perennial stream flows or a fisheries. Consequently, there is little interconnection between watersheds and the Little Bitterroot and Flathead rivers.

The area is underlain by Revett and Burke formation sediments, which are resistant to erosion and produce thin soil horizons. The Salish Mountains area is unglaciated. Unconsolidated Tertiary sediments and glacio-lacustrine sediments from Glacial lake Missoula are exposed to an elevation of approximately 4,200 feet. Generally, at these elevations and with these materials, the tree canopy is thin or nonexistent. There are several spring areas and draws that support patches of riparian communities.

Scenery

The Existing Conditions

Recommended scenic integrity levels are shown in figure 3-41. The Salish Mountains landscape is divided into six subunits.

Salish Mountains Forested Area

The overall scenic integrity level is rated as Moderately Altered (MA), with the exception of areas in Ferry Basin and Big Draw where large geometric clearcuts dominate the landscape. Those areas are rated Heavily Altered (HA). The communities of Elmo and Dayton are located in the northern portion of this unit, along with residential development near Flathead Lake. Major transmission lines are evident but are located so they do not dominate the viewshed (with the exception of the Highway 93 corridor near Elmo and Big Arm where transmission lines and substations dominate the foreground viewing). Vegetation types are predominantly open grassland, ponderosa pine, and mixed stands of larch and fir. The variety class is common, and the sensitivity level is 1.

Hot Springs Valley

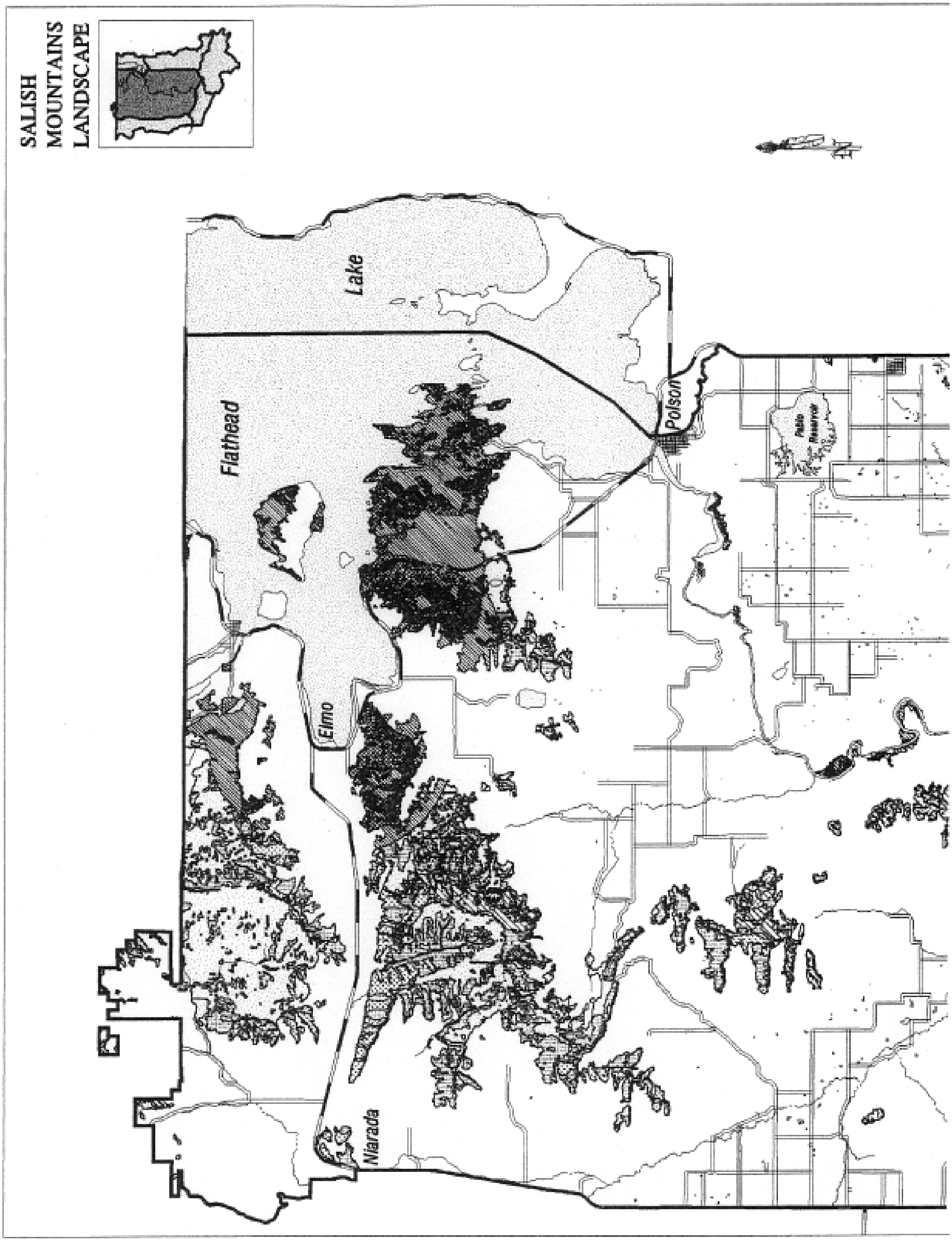
The overall scenic integrity level is rated as Slightly Altered (SA). Viewers would consider this area as rural farmland with few deviations. Transmission lines and residential developments do occur but they do not detract from the overall character. The variety class is minimal, and the sensitivity level is 1.

The River Corridor

The overall scenic integrity is rated as Appears Unaltered (AU). This area consists of the Lower Flathead River Corridor (a one half mile strip on both sides of the river). Development in the corridor consists of three vehicle bridges, one train trestle and rail line, one petroleum pipeline, and some homes near Agency and Dixon. The vast majority of the river corridor is used only for range, agriculture, wildlife, and recreation. The variety class is common, and the sensitivity level is 1.

Bison Range

The overall scenic integrity is rated as Slightly Altered (SA). Developments (roads, campgrounds, and buildings) are visually subordinate to the overall landscape. Vegetation types are open grasslands with large and small patches of ponderosa pine and fir. The variety class is common, and the sensitivity level is 1.


SALISH
MOUNTAINS
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Flathead
Lake
Polson
Pablo Reservoir
Elmo
Niarada

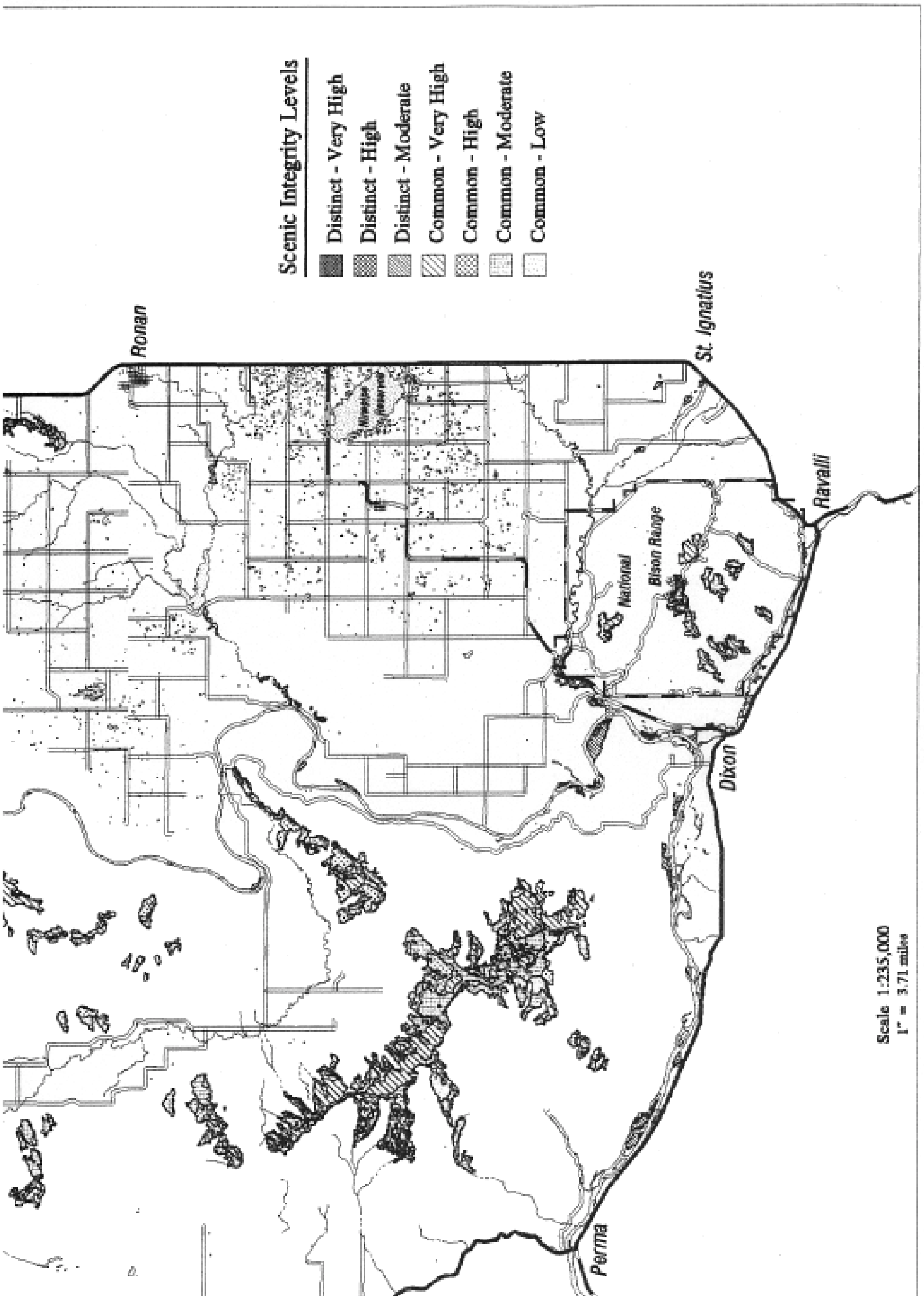


Figure 3-41. Recommended scenic integrity for the Salish Mountains Landscape.

Salish Mtns. LS

The Mission Valley

The overall scenic integrity level is rated as Moderately Altered (MA). This area includes numerous highway developments and towns, transmission lines and substations, and a railroad, as well as many water bodies, reservoirs, and riparian areas. The vegetative pattern is made up of open farmland with riparian pockets and corridors. Viewers would consider this unit rural and agricultural in character. The variety class is common, and the sensitivity level is 1.

Wild Horse Island

The overall scenic integrity level is rated as Appears Unaltered (AU). The development on this island (shoreline residential structures) has been done in a manner that is visually subordinate to the overall landscape. The variety class is distinctive, and the sensitivity level is 1.

For viewpoints used to analyze this landscape and other methods used see Appendix M.

Scenery and Recreation Objectives

1. **Rehabilitate the visual quality of the Big Draw area by 2001 or during the next sale entry.**

2. **Implement the objectives of the Lower Flathead River Corridor Plan.**

3. **Enhance fishing opportunities at Crow, Post, and Mission Creeks by securing funding for access development by 2006.**

4. **Improve recreation access at Lower Crow Reservoir by 2002.**

5. **Enhance wildlife viewing opportunities at Ninepipe Reservoir by completing the handicap interpretive site. Enhance wildlife viewing opportunities along the Lower Flathead River corridor by developing an interpretive float guide by 2005.**

6. **Increase concessions and outfitting opportunities for Tribal Members by assisting with their business plan development for watchable wildlife viewing, river floating, fishing, and bird hunting concession and guiding opportunities.**

7. **Designate specific areas for mountain biking, horseback riding, wagon train rides, and off-road (4x4) vehicle use by 2005.**

8. **Define and implement as needed Limited Public Access Area for the landscape by 2002**

Salish Mtns. Roadless and Wilderness Area Objectives

1. **Designate the Oliver Point Roadless Area within two years of Forest Plan approval. Develop Management plans for these areas within four years of Forest Plan approval.**

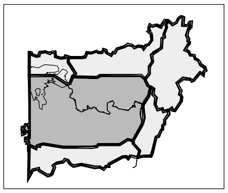
Transportation

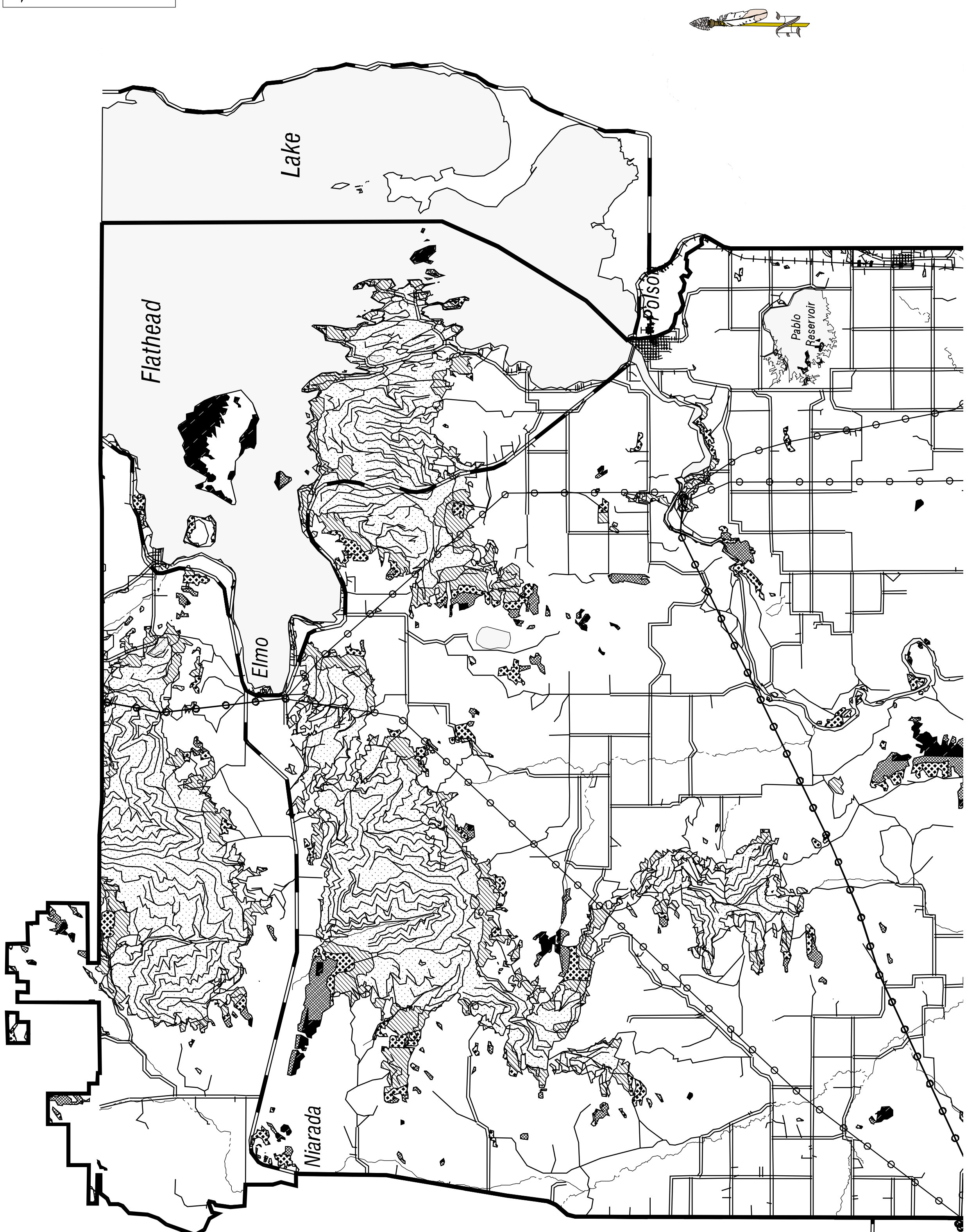
Existing road densities as of 2000 are shown in figure 3-42.

Salish Mountains Transportation Objectives

1. **Develop specific landscape level transportation objectives within one year of the Final FMP adoption and be included within the Forest-wide Transportation Plan.**

SALISH MOUNTAINS LANDSCAPE





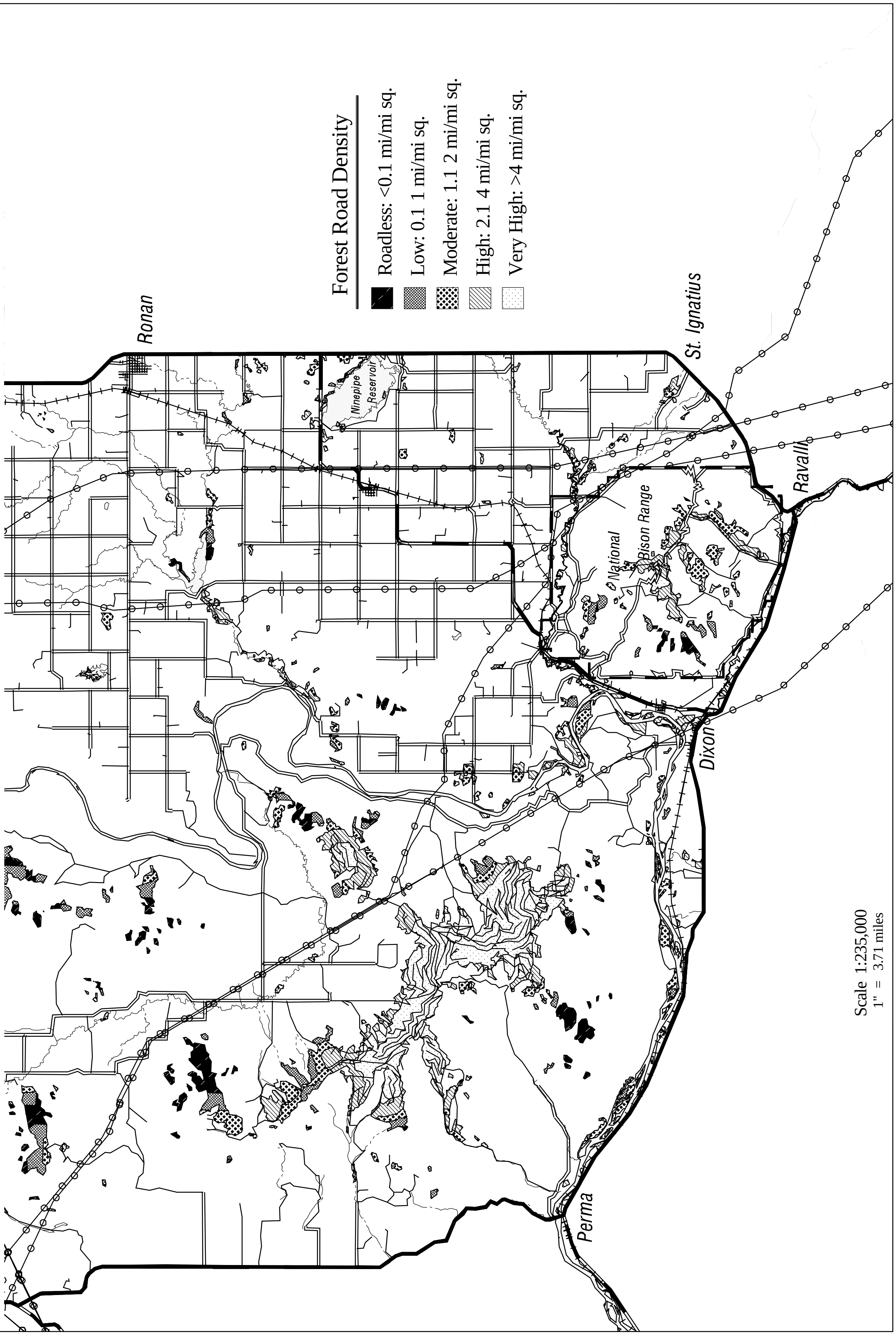


Figure 3-42. Salish Landscape road densities (1990).

Standards - Fire Mgt

Chapter 4: Standards

Forest-wide Standards

Standards represent general guidelines that address most situations or circumstances of resource management on the Flathead Reservation. They will be superseded in circumstances where rigid implementation would result in unacceptable negative effects on resources such as threatened and endangered species. They tend to be general in nature and may, at times, need to be modified to suit site-specific situations, although in the majority of instances, they will be followed. Reasons for site-specific exceptions or changes to the standards should be approved by the interdisciplinary team and documented in the NEPA process for that project.

Forest-wide Standards for Fire Management

Natural Processes

1. **The principal reason for using prescribed and wildland fire will be to restore fire to its historic role as an ecological factor in local fire regime types.**

2. **Prescribed burning will be implemented in a way that approximates natural fire regimes through Appropriate Fire Management Responses and planned ignitions. Areas known to have the greatest potential for restoration will receive priority.**

Fire effect and site protection

3. **A prescribed fire burn plan will be written for each individual prescribed fire. All Prescribed Fire prescriptions will be compatible with approved land or resource management objectives, including silvicultural, wildlife, hazard reduction, soil protection, and water quality concerns.**

4. **Prescribed burn plans will be prepared according to: (1) BIA Prescribed Fire Systems Handbook and (2) Wildland and Prescribed Fire Management Policy and Implementation Procedures Reference Guide.**

5. **Prescribed burns will not be conducted in areas that are sensitive to soil erosion and excessive water runoff without special considerations and mitigating measures.**

6. **The fuels management program will monitor and document the immediate post-fire effects of prescribed burns using methods and techniques included in the *Western Region Fire Monitoring Handbook, 1990.***

7. **Wildland fire and prescribe burn fire lines should be designed to provide a drainage system to control the dispersal of water and to prevent sediment from entering streams. Install necessary waterbars in firelines with spacing determined by soil type and slope. To the extent possible, avoid intense fires unless needed to meet vegetation goals.**

Fuels management and prescribed fire

8. **The use of prescribed fire will be considered in all ecosystems, with special emphasis on those determined to be partially or totally fire dependent. Table 4-1 shows the priority of the underburning prescription relative to other prescriptions.**

Table 4-1. Priority of the underburning prescription relative to other prescriptions

Short Term	Short Term (Acres per Year)	Long Term (Acres per Year)
Pile Burn	285	259
Broadcast Burn	924	366
Underburn	2,831	3,118
Total	4,040	3,743

9. **Fuels management and prescribed fire activities will be guided by the *Flathead Indian Reservation Fire Management Plan, the FIR Fuels Management Plans,* and *CSKT Forestry Best Management Practices.***

10. **All prescribed burn operations will be conducted with fully qualified and certified personnel as defined in *Bureau of Indian Affairs Prescribed Fire Systems Handbook*, 1990.**

11. **Fuels management treatment priorities will be based on the location, values at risk, distribution, fire hazard potential of fuels, and potential smoke management problems.**

12. **Fuels management and prescribed fire projects will not be conducted until proper cultural resource inventories are completed and cultural committee clearance is obtained. Known, significant cultural resource sites on the reservation will be protected from inadvertent or intentional damage or destruction.**

Standards - Fire Mgt

Firewood gathering

13. **Fuels management will provide for slash disposal and site preparation treatments that give the Tribal public a reasonable opportunity to utilize residue as firewood. Where appropriate, timber sales contracts will require the timber purchaser to yard firewood material so that it is accessible to Tribal woodcutters.**

Wildfire suppression

14. **On all Confederated Salish and Kootenai lands, appropriate fire suppression response strategies will be full suppression, modified suppression, and full wildland fire use. These initial attack strategies will be determined on the basis of economics, resource values, threat to life and property, smoke management considerations, current and projected weather conditions, and the availability of fire suppression resources.**

15. **A Tribal resource coordinator will be assigned to all project-level wildfires in order to evaluate all existing and potential resource impacts.**

Air quality

16. **Wildland fire for resource benefit and prescribed fire activities will be conducted under the standards and constraints of the Tribal Air Quality Department and in full cooperation with the Montana Airshed Group's Memorandum of Understanding. Air quality will be maintained at adequate levels as described by Tribal, State, and Federal direction.**

17. **Alternative slash disposal treatments other than fire will be encouraged and used where environmentally acceptable, technologically feasible, and economically reasonable.**

18. **Visibility impacts from smoke in smoke-sensitive and important viewshed areas will be minimized, especially during times of significant visitor use (July 1 - Sept. 15) and/or Tribal cultural activities.**

Wildland-residential intermix

19. **Fire management will develop and maintain viable fuels management strategies, methods, techniques, and procedures for homeowner awareness, fire prevention, and suppression response on Confederated Salish and Kootenai lands. Public education and fuel modification will be the primary mitigation measures.**

20. **A Fire Prevention Plan will be updated each year in order to: (a) assess facts on person-caused fires, (b) prioritize strategies and actions so problems can be corrected, and (c) develop action plans to reduce person-caused fire starts.**

Standards - Timber

Forest-wide Standards for Timber Management

General Forest Practices

1. **A primary objective of all silvicultural prescriptions will be the maintenance and development of the stated desired conditions (DCs) for seral clusters, which are based on recommended management variabilities (RMVs).**

2. **At times, in order to address forest health issues, seral cluster distributions within the analysis areas may be outside RMV's provided that natural resource thresholds are not exceeded and the project-level interdisciplinary team approves the action.**

3. **Silvicultural systems will be compatible with the fire regimes in which treatments are planned, except to meet special needs developed by interdisciplinary teams.**

   Interdisciplinary teams will attempt to match fire regime mosaics, structures, and compositions; however, endangered species, watershed concerns, and other issues may require deviations from these goals.

4. **Seral Clusters A1 and A2 will be maintained within the following ranges:**

Fire Regime	Percent of Fire Regime
Non-lethal Fire Regime	20 to 80%
Mixed Fire Regime	15 to 60%
Lethal Fire Regime	15 to 40%

   The combined percentages of the Mixed and Lethal Fire Regimes will equal less than 30 percent.

5. **Reservation-wide desired condition ranges of seral clusters for each fire regime, will be used as a guide in determining the types and amounts of silvicultural practices on a project basis. Natural events that deplete a critical cluster in a landscape may preclude some silvicultural treatments until recovery has occurred.**

6. **Harvest and site preparation treatments will be planned to minimize damage to, or enhance, long term soil productivity through the use of appropriate treatment methods, guidelines, equipment and timing as detailed in the *Timber Sales Operations Handbook*, *Fuels Management Plan*, and *Forest Development Operations Plan* and future fire management plans.**

Standards - Timber

7. Intensive forestry practices, including mechanical site preparation and the restricted use of herbicides, fertilizers, and pruning; timely reforestation; stocking control; and the use of genetically improved tree stock will be used on available acres where such practices will not adversely affect other identified forest uses or resources.

8. A silvicultural prescription will be prepared for all harvest activities and will specify the methods to assure timely regeneration of desired tree species and the data to be collected necessary for monitoring purposes.

9. Unless other specific objectives have been identified, individual *stand* treatments will be designed to maintain vigor and minimize loss to insects and disease agents.

10. All silvicultural treatments in the Nonlethal Fire Regime will consider the use of underburning to augment vegetation structural restoration, nutrient cycling, and site preparation goals.

11. Cutting unit prescriptions will consider an array of techniques so as to blend with adjacent terrain features. The range of disturbance sizes of the fire regime on which they occur will be a factor in determining the scale or size of the cutting unit.

12. The 2+2 snag rule (leave 2 snags and 2 recruits) will be retained as an average within timber sale boundaries.

13. Herbicides and other toxicants and chemicals will be used in a manner that allows for the protection and maintenance of water quality standards, assures protection of the ecological integrity of the environment, and avoids public health and safety problems.

Management Systems

14. Management systems will mimic the processes of the fire regime on which they occur (table 4-2). Where even-aged and uneven-aged silvicultural practices are both ecologically feasible, uneven-aged practices will be preferred.

Table 4-2. Priority of silvicultural prescriptions by fire regime

Fire Regime	Priority of Silvicultural Prescriptions
Nonlethal Fire Regime	Uneven-aged Management > Underburning and Thinning > Uneven-aged Restoration
Mixed Fire Regime	Uneven-aged Management = Even-aged Management > Uneven-aged Restoration = Underburning and Thining
Lethal Fire Regime	Even-aged Management (Uneven-aged Management – minor application)

15. Where individual tree selection and group selection are equally feasible (based on ecological principles), individual tree selection will be the preferred regeneration system.

16. Uneven-aged restoration management will be used primarily to correct serious forest health or decadence problems, and will be applied where pre-European fire regimes indicate that uneven-aged structures existed.

Species Diversity

17. Generally treatments will favor those seral tree species that are non-host to common Reservation pathogens in order to maintain long-term forest health and species diversity.

18. Blister-rust-free western white pine and whitebark pine will be protected from harvest whenever possible.

Stocking

19. In the available and restricted acreage bases, tree stocking standards will be met within 10 years wherever timber harvest occurs or wherever openings occur as a result of planned and unplanned ignitions or natural disturbances. In the unavailable acreage base, natural processes will restock the site with tree seedlings wherever openings occur as a result of planned or unplanned ignitions or other natural disturbances.

Salvage

20. Within the available forest base, no more than 50 percent of commercial forest products damaged by planned or unplanned ignitions or insects and disease outbreaks will be salvaged. In the case of windthrow, the percentage harvested may be higher; however, in all cases (windthrow and otherwise) the salvage guidelines set forth in the *Canada Lynx Conservation Assessment* and Strategy shall apply.

21. Salvage operations will occur within 6 months of detection of the damage. Within the restricted forest base, the same guideline applies, except that salvage operations will be permitted only where they will not compromise other resource values.

22. High valued, commercial sawlog trees that have been killed recently or that are facing imminent mortality from insect, disease, or abiotic agents within the commercial forest base will be salvaged as long as the project is economically viable and enough snags and recruitment trees remain to provide cavity nesting habitat, and the proposed salvage will not adversely affect other resources.

Standards - Timber

23. **Salvage will not occur within old-growth or target old-growth stands, or in the unavailable portion of the forest unless it will maintain or benefit the ecological goals of the salvage area.**

24. **The forest will be monitored annually for potential salvage opportunities.**

25. **Utilize mechanical and planned ignition treatments to mitigate extreme fuel-loading hazards within one to three years after blowdown or bug kill events that cover 25 acres or more.**

26. **Salvage of prescribed or wildfire mortality will not be considered when the value of retaining vegetative structures for other resource value is determined to be equal to or greater than the value of the salvage timber.**

Tribal Preference - Applicable to Tribal-owned timber

27. **All non-complex sales of timber with volumes less than five million board feet will be advertised as Bona Fide Indian Logger (BIL) preference sales and will be restricted to BIL preference bidding rules.**

28. **All sales of timber will be subject to Tribal member employment goals as outlined in Operating Agreements signed by both the Tribes and the purchaser.**

    The targets are 25 percent Tribal member employment on all contract sales of timber and 50 percent Tribal member employment on paid permits.

29. **Distribution of free use permits for harvest and sale or use of forest products will conform to Tribal Ordinance 61C and other applicable Tribal ordinances.**

30. **Paid permits with sale volumes less that 500,000 board feet will be advertised to Bona Fide Indian Loggers only.**

31. **Planting and thinning contracts or employment will be awarded to Tribal members as directed by the Tribal Council.**

32. **Two to three million board feet of timber per year will be provided as small-business set-asides for Tribal members, subject to market conditions and available Tribal labor.**

Post and Pole

33. Approximately 5,000 acres will be managed for lodgepole pine post, pole, and other small products on an 40-year rotation.

Economic Return

34. Yearly sale offerings may fluctuate to take advantage of market conditions or to capture revenue lost due to fire and insect and disease outbreaks. However, the total indicated annual regulated harvest for the current ten-year planning period shall not be exceeded.

35. Annual sale offerings will not be less than 50 percent of the Preferred Annual Harvest level in order to maintain a stable employment opportunity base and consumer base.

Standards - Wildlife

Forest-wide Standards for Wildlife Management

Big Game

1. Emphasis will be placed on maintaining the integrity of traditional calving areas and providing security areas on spring-summer ranges and winter ranges.

2. Road densities for roads will not exceed 4 miles of open road per section. This requirement will be part of every action alternative for all reservation timber sales.

Where security cover is deemed a limiting factor, the Tribal Wildlife Management Program will recommend a lower density.

3. A ratio of 40 percent cover to 60 percent forage for elk and deer is the standard. For moose a ratio of 60 percent cover to 40 percent forage is the standard. With respect to elk habitat, cover is subdivided into two types of cover: thermal cover and hiding cover.

Thermal cover: 10 percent of the project area/landscape. Hiding cover: 20 percent of the project area/landscape. Remainder: 10 percent assigned to thermal or hiding, whichever is most limiting. Total cover: 40 *percent*

4. Forestlands on prime elk and deer ranges and northern gray wolf habitat will be managed according to the findings, methods, and scales outlined in the USFS *Elk-Logging Guidelines*.

5. Hiding cover along highways at Evaro, Hog Heaven, Ferry Basin, and the Ravalli Corridor will be retained and managed to provide movement corridors between ecosystems.

6. Fire will be utilized to rejuvenate big game winter range.

Threatened and endangered species

7. Land management activities that deal with the presence or potential presence of endangered or threatened species and their habitats within the landscape will require Biological Assessments and formal or informal consultation with the US Fish and Wildlife Service.

8. Standards and guidelines for grizzly bear management and habitat protection are given in the *Grizzly Bear Compendium*, Interagency Grizzly Bear Committee 1987, Servheen 1993.

In general, these standards emphasize providing security areas with minimal or no roads, minimizing the potential for human-bear conflicts, maintaining travel corridors and linkage zones, and maintaining bear habitat.

9. Standards for gray wolf management and habitat protection are given in the *Northern Rocky Mountain Wolf Recovery Plan*, 1987.

Although the Flathead Indian Reservation is not part of a wolf recovery zone, there are known wolf packs near the reservation. Therefore, wolf management efforts will focus primarily on managing the prey base, especially on winter and spring ranges; riparian areas for travel corridors and rendezvous sites; and providing isolation areas.

10. Standards for bald eagle management and habitat protection are given in the *Montana Bald Eagle Management Plan*, 1994.

These standards limit the amount and kinds of land management activities within zones around nest sites, primary use areas, and home ranges. Population and nest monitoring will be done annually to provide recovery information.

11. For peregrine falcons the emphasis will be to maintain isolation around reintroduction sites and areas where natural nesting occurs and to protect habitats such as cliffs and riparian areas.

Land management activities will be limited or prohibited within .5 mile radius around hack sites during the nesting season. Monitoring of existing falcons and reestablishing falcons in other areas through hacking efforts will occur on a regular basis.

12. Standards for lynx management and habitat protection are set forth in the *Canada Lynx Conservation Assessment and Strategy*, 1999.

This strategy guides land management activity in lynx foraging and denning habitat. Lynx occurrence and populations will continue to be monitored on the Reservation.

Nongame Wildlife

The vast majority of the wildlife species on the Reservation fall under this category. Standards for protection of riparian and old-growth forests and general seral cluster distributions will benefit many non-game species.

13. All existing snags will be retained in management units where they do not pose a clear and present danger to human safety. At a minimum, 2 snags per acre and 2 replacement snags per acre (the 2+2 rule) will be retained, if available, as an average within the timber sale boundary. An average of two live green trees per acre will be retained in harvest units to serve as future snags. Trees which currently are weak-topped, internally rotting or which otherwise appear to be in a state of real decline should be favored for retention.

Some forest stands within the sale boundary or throughout the entire timber sale area may require more snag retention due to slow snag recruitment, fire, or other factors.

14. Recruitment trees should be no closer than 200' from the nearest road downhill or 100' from the nearest road uphill.

Standards - Wildlife

15. The amount and size of dead and downed woody material will be maintained at levels consistent with pre-European conditions, hazardous fuels guidelines, and urban-interface concerns.

Old Growth

16. Old-growth characteristics will be those outlined in the *July 1994 Interim Flathead Reservation Old Growth Characteristics* and future amendments.

Wetlands

17. Management practices in wetlands and riparian areas will adhere to the *CSKT Forestry Best Management Practices* policy.

Forest-wide Standards for Water and Fish

1. The percent of fine particles (<6mm) in stream substrates should not exceed 35 percent of the total of all particle sizes.

Additions of fine sediment to stream channels reduce the reproductive success of trout.

2. Riparian condition scores should never be below 60 as scored by the method of the Montana Riparian and Wetland Association.

Riparian vegetation contributes greatly to the processes that maintain the quality of stream channels, water quality, and fish habitat. For example, riparian forests restrict increases in water temperature, provide woody and other organic debris, and filter the overland delivery of sediment.

3. Old growth prescriptions (as outlined in the BMPs) should never be exceeded in the streamside management zone, except when deviations are proposed by an Interdisciplinary Team to achieve Ecosystem Management objectives. All such proposals must receive approval from the Tribal Fisheries, Wildlife, and Water Quality Programs.

Old growth riparian areas provide numerous critical benefits to stream channels and water quality. These conditions should be maintained except when overridden by ecosystem demands for early seral stages.

4. The Confederated Salish and Kootenai Tribes' water quality standards should not be violated.

Applicable standards for forestry activities include those for dissolved oxygen, temperature, turbidity, nutrients, and pH. The standards are specific to each water body and should be referenced for more detail.

5. The chemical, physical, and biological integrity of Reservation streams will be restored and maintained in order to ensure compliance with applicable water quality standards and maintenance of beneficial uses of Tribal waters.

6. Allowable peak flow increases as determined by the equivalent clearcut acreage method shall not exceed 18 percent.

7. Management practices in wetlands will adhere to CSKT Forestry Best Management Practices (BMPs).

Sale Analysis Procedure

8. For all timber sales greater than 1 mmbf, a sediment source survey will be completed for the entire sale area. Sediment source surveys will be completed by a water resources representative or designated lead Natural Resources Department staff member. Surveys will be documented in the NEPA process for the sale.

Standards - Water

9. **A list of recommended BMP and road abandonment implementation sites will be developed for all timber sales greater than 1 mmbf. BMP and road abandonment implementation site lists will be prepared by a water resources representative or designated Natural Resources or Forestry Department staff member. Surveys will be documented in the NEPA record for the sale.**

10. **A water yield or other cumulative effects model will be developed to assess potential impacts from proposed sale activities for all timber sales greater than 1 mmbf containing a perennial stream or potential cumulative riparian impact concern as identified by a water resources or fisheries resources representative. Cumulative effects models will be developed by a water resources representative or designated Natural Resources Department staff member and documented in the NEPA record for the sale.**

11. **A stream inventory will be completed for all timber sales greater than 1 mmbf containing a perennial stream or potential riparian impact concern as identified by a water resources or fisheries resources representative. The content of the inventory will be determined by implementing resource staff, but should include habitat assessments and large woody debris surveys. Stream surveys will be completed by water resources and fishery resources staff and documented in the NEPA record for the sale.**

12. **For sales of less than 1 mmbf which have specific sale analysis concerns, the above procedures will apply.**

BMPs

13. **All timber with specific BMP or road concerns will be reviewed by an interdisciplinary team to insure full compliance with BMPs prior to the conclusion of the sale.**
    - **The review team will consist of the sale administrator, the pre-sale forester, a water resources and fishery resources representative, other specifically involved resource representatives, and the logging contractor(s).**
    - **The review will be coordinated by Tribal forestry staff and will consist of the following steps designed to facilitate all the necessary coordination for full BMP compliance:**
        - **A pre-construction meeting to clarify proper procedures, contract requirements, construction standards, and measures committed to in the NEPA process.**

- – **One or more on-site reviews during the sale to evaluate BMP compliance before unnecessary physical or financial commitments are made.**
- – **An on-site review to determine final BMP compliance.**
- – **A final review, if necessary, to approve corrections to problems identified in the previous review.**

- **The review must be completed before the sale contract is closed, and before equipment capable of completing corrective measures is removed from the sale or site area.**
- **The requirement for corrective action and corrective action measures to achieve BMP compliance will be determined by the review group.**
- **A water resources representative, or designated Natural Resources Department staff member, will document the review process. This record will be used as a tool to track BMP and road abandonment success.**

14. **Implementation of field review prior to harvest activity and during harvest activity (as defined in the BMP objectives) will be achieved 100 percent of the time.**

15. **All corrective actions that the field review team identifies as necessary to achieve BMP compliance will be correctly implemented when the violation is located adjacent to a waterbody or when it has the potential to impact directly on a waterbody.**

Standards - Culture

Forest-wide Standards for Culture

1. **Identified and discovered cultural, traditional, archaeological, and historical sites will be preserved and protected as directed by the Tribal Preservation Office in coordination with Salish and Kootenai Culture Committees and Elder Advisory Councils. Unmarked burial sites will fall under the provisions of the Tribal Unmarked Burial Protection Draft Ordinance.**

   Sites will not be disturbed and will be protected by a reasonable buffer. The size of the buffer will be determined by the Tribal Preservation Office in consultation with the Culture Committees. This standard applies to sites receiving historic as well as present day or ongoing cultural use.

Forest-wide Standards for Scenery

Introduction

Landscapes are dynamic. Vegetation patterns change over time with or without management activities. People are sensitive to changes especially in areas that are special to them. The following guidelines apply to forest activities:

Sensitivity: Activities should be planned and designed to fit the character of a particular landscape. Incorporate features found in that landscape as part of a project. When planning timber sales, look for patterns in the landscape and design proposed openings to repeat and borrow from natural contours and openings.

Public scoping and consultation: Communicate to the concerned public that landscape patterns will change and demonstrate the changes both graphically and through a narrative.

V*egetation patterns and change: Changes*, caused by humans or nature do not necessarily mean a reduction in the Scenic Integrity Level (SIL). Each SIL will have a spectrum of activities that could occur within each level.

Scenic Integrity Levels are defined as follows:

Very High (Unaltered) scenic integrity refers to landscapes where the landscape character being viewed is intact with only minor deviations. The visual harmony of the area is expressed at the highest possible level.

High (Appears Unaltered) scenic integrity: landscape character being viewed appears intact. Deviations may be present but must repeat the form, line, color, texture, and pattern common to the landscape character so completely and at such a scale that they are not evident.

Moderate (Slightly altered) scenic integrity: landscape character being viewed appears slightly fragmented. Noticeable deviations must remain visually subordinate to the landscape character being viewed. The area's visual harmony has been slightly reduced.

Low (Moderately Altered) scenic integrity: landscape character being viewed appears moderately fragmented. Deviations begin to dominate the landscape, but they must borrow from valued attributes such as size, shape, edge effect, and the pattern of natural openings.

Very Low (Heavily Altered) scenic integrity: landscape character being viewed appears extremely fragmented. Harmony is not evident. Deviations are extremely dominant and borrow little if any form, line, color, texture, pattern, or scale from the landscape character. Landscapes at this level of integrity are in need of rehabilitation. This level must not be used as a management standard.

Standards - Scenery

The following standards apply for scenery

1. **In each management area, meet or exceed the recommended Scenic Integrity Level (SIL) as shown on the landscape scenic integrity maps in Chapter 3.**

   Where management area goals and objectives can be fully achieved and a higher SIL met without increased costs or reduced future option, a higher SIL should be achieved.

2. **Through the use of proper design and scheduling of management activities, the potential changes to scenery will be dispersed and not concentrated within an area or travel corridor within a 20 year time frame.**

   High and Very High SIL areas especially need to have these time and space principles applied.

3. **Special concerns due to catastrophic events will be handled on a case-by-case basis.**

4. **Annual monitoring will be conducted by a scenery interdisciplinary team.**

Forest-wide Standards for Recreation

Recreation

1. **All recreation activities and management will be based on the Diversified Recreation Opportunity Levels (DROL) inventories or site-specific management area plans.**

2. **All public recreational activities will be regulated by the Tribal Conservation Ordinance (Ordinance 44-D).**

3. **All recreational maintenance and enhancement projects will be based upon the Wildland Recreation Program's annual work plan goals and objectives and funding base.**

4. **Commercial timber harvest activities within recreation sites or within 132 feet (2 chains) of a recreation site are prohibited, unless for purposes of hazard tree removal, site enhancement or expansion.**

5. **The interdisciplinary team review process will be used for new site developments, site enhancement, or site expansion projects.**

6. **Future recreation sites and facilities will consider accessibility by the handicapped/disabled.**

7. **Recreational use will be considered secondary to environmental and cultural concerns.**

Recreation safety

8. **Developed campgrounds and other developed recreational use areas designated for overnight use will be inspected annually for hazardous tree removal.**

9. **Large group permits and outfitting proposals will be reviewed interdepartmentally to minimize human health and safety problems and other use conflicts.**

10. **All developed recreation areas will be signed to notify users of hazardous conditions, i.e., predators, hazardous roads, fire danger, pesticide use, etc.**

Forest-wide Standards for Transportation

1. Total road miles will remain at or below the number existing in 1999.

2. Forest roads must conform to BMP standards and guidelines.

3. Forest roads will meet minimum guidelines that allow for the economical removal of timber, minimize environmental damage, and provide for safety.

Generally, main haul roads in the lower elevations have the highest standards, while spur roads have the lowest standards. Table 4-3 depicts the current minimum and maximum standards allowable for forest system roads. Non-system and pioneer roads will be targeted for full abandonment and restoration.

Table 4-3. Forest Road Standards

	High Standard	Intermediate Standard	Low Standard
General Road Type	Main Haul lower elev	Main Haul higher elev	Major and Minor Spurs
Minimum Road Surface Width	16 ft.	14 ft.	12 ft.
Maximum Sustained Grade	5%	6%	8%
Maximum Sustained Grade Length	NA	500 ft.	1000 ft.
Maximum Grade/Pitches	8%	10%	12%
Minimum Curve Radius	100 ft.	75 ft.	65 ft.
Surface Type	Graded/Drained	Graded/Drained	Graded
Turnouts	One per .25 miles and intervisible	One per .25 miles	One per .25 miles
Turnarounds	NA	NA	One at end of each road
Maintenance Activity	Regularly	Intermittently	During Logging Operations

4. Transportation alternatives developed for forested areas in each management area considered for a timber sale will work toward forest-wide, landscape-level, and landscape subunit goals and objectives.

Only those roads agreed upon by an Interdisciplinary Team (IDT) and approved by the Tribal Council will be constructed or allowed to remain open. Access to an isolated commercial stand will not be developed if the long-term benefits do not warrant it. The road system will be planned so it is confined to a major watershed drainage. Existing roads will be used wherever possible if they meet the criteria for road spacing and standards.

Standards - Roads

5. **Tribal Fish, Wildlife, Recreation and Water Quality programs and both Culture Committees will be consulted regarding all proposed forest sales that could affect those resources.**

   Cooperation, negotiation, avoidance, and lastly mitigation are necessary to protect other valuable resources besides the economic value of timber.

6. **All culverts in fish-bearing streams will be installed on the grade of the original stream and have resting pools at the outlet unless stated otherwise by Tribal Fisheries.**

   Culverts will also be installed on intermittent streams to prevent damage to the road surface or roadbed from spring runoff. A Forest Officer or representative will be present at all culvert installations or removals. Bridges will be constructed where they are deemed necessary to protect fisheries and aquatic habitat. Steel and pre-stressed concrete bridges must meet Federal standards set forth in *Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects*.

7. **Clearing of trees from forest road right-of-ways should not exceed the width necessary to accommodate actual construction, including cut and fill slopes. The normal clearing width will be less than or equal to 40 feet, but may range up to 60 feet to accommodate steeper slopes, switchbacks, and similar situations. Clearings wider than this should be approved by the Officer-in-Charge.**

8. **Timber sale road closure plans will consider adequate access for normal fire suppression activities.**

9. **Open road densities will not exceed 4 miles of open road per section. This requirement will be part of every action alternative for all reservation timber sales.**

   Where security cover is deemed a limiting factor, the Tribal Wildlife Management Program will recommend a lower density.

10. **Increase minimum total road spacing to 800 feet on slopes greater than 35 percent and to 1200 feet on slopes less than 35 percent.**

11. **Achieve a total road density of less than 6.5 miles of road per square mile by removing 15 percent of road spurs in currently roaded areas.**

12. **Improve the condition of 100 percent of the road segments that are severely degrading stream channels.**

Standards - Roads

13. Use full road rip, some recontouring and/or the installation of cross drains, and the removal of all culverts and bridges when removing roads.

14. No roads will be abandoned without first removing culverts and installing cross-road drainage features.

15. Landscape subunit transportation objectives will be developed for all forest areas in the subunit concurrently with any proposed timber harvest activities within that subunit and prior to development of NEPA alternative for a commercial timber sale within the subunit.

16. Forest-wide and landscape objectives for transportation will be considered for all forest activities that will require use of forest roads, including projects not currently covered by the NEPA process.

BMP Summary for Roads

17. Minimize number of roads, use existing roads where practical, and minimize stream crossings.

18. Fit roads to topography and avoid grades over 8 percent, drainage bottoms, and large cut slopes.

19. Locate roads on stable materials and outside of streamside management zones.

20. Minimize number of stream crossings; locate crossings perpendicular to channel; use minimum design on culverts and crossings for 100-year peak discharge and passage of fish; reconstruct abandoned stream crossings to stable configurations.

21. Avoid intercepting shallow groundwater.

22. Provide adequate road surface drainage; keep road surface drainage from entering streams; avoid berming material on road perimeter; construct rolling dips; install water bars; and crown road/outslope road.

23. Construct stable cut and fill slopes, stabilize erodible soils, and minimize road construction in areas with unstable soils.

24. Minimize activity during wet periods.

25. Reseed road prism.

Standards - Grazing

Forest-wide Standards for Grazing

1. **Tribal member preference for Tribal grazing permits and leases will be given in accordance with Tribal and Federal regulations.**

2. **Forage inventories will be conducted periodically in each landscape where grazing occurs.**

3. **Interdisciplinary teams, in cooperation with permittees or lessees, will use information from forage inventories, livestock utilization and professional judgment to plan grazing management, establish or modify stocking rates and seasons of use, and stipulate classes of livestock.**

4. **Permittees and lessees will have primary responsibility for developing and maintaining range improvements. The Tribes will support improvements through technical and financial management (as workload and budget allow). The permittees or lessees will also be responsible for managing livestock grazing and utilization in a manner that will produce a stable or improving trend of the existing range condition.**

5. **Range permits and grazing leases will be routinely monitored to evaluate trends in range condition and to check for compliance with stocking rates, seasons of use and other management stipulations. Land users will be responsible for compliance monitoring and range management.**

6. **Grazing Best Management Practices will be developed to help prevent unacceptable loss of streambank vegetation and structural damage to streambanks.**

7. **When a timber sale planning team identifies grazing impacts that could contribute to the cumulative impairment of a waterbody, a review team consisting of a water resources representative, a fisheries resource representative, a range representative, and other affected interests will convene to eliminate the grazing impacts on the waterbody.**

   The objective for the review team will be to develop implementation steps to eliminate livestock grazing impacts to waterbodies in the sale planning area. The results from this review process will be documented in the NEPA planning record for the sale area.

Forest-wide Standards for Weeds

1. **Noxious weed management will be consistent with the USDI Bureau of Indian Affairs, Flathead Agency *Integrated Noxious Weed Management Plan* and *Final Environmental Assessment*.**

2. **Control measures which include, at a minimum, the following will be used prior to, during, and after disturbance activities:**

   Limiting ground disturbance and prompt reclamation of disturbed areas; annual monitoring of reclaimed sites over a three year period; reseeding or treating as needed to establish desirable perennial cover; cleaning equipment of soil and plant parts prior to moving equipment into and out of the project area; mowing, spraying, or otherwise treating seed-bearing noxious weeds along transportation corridors and at the disturbance site; use of preventative techniques to reduce the spread of weeds such as grading into, not out of, infested sites; and the inspection of vehicles and cleaning, if necessary, prior to leaving an infested area.

Forest-wide Standards for Minerals

1. **Management of minerals (metallic, nonmetallic, aggregate, and hydrocarbon), including information gathering, development, and extraction will be carried out in an environmentally sound manner and will not adversely affect other Tribal resources.**

Chapter 5: Monitoring

Monitoring

Adaptive Management

Adaptive management requires monitoring the implementation of plan objectives to ensure that they in fact are being met and that projects are being implemented as planned and are effective in achieving the desired condition. Monitoring will also serve as a check on the data values used for RVs, RMVs, and Desired Conditions. Feedback from monitoring efforts will be used to evaluate activities, procedures, RVs, RMVs, DCs, objectives, and long range goals. Environmental indicators and data gathering measures that will be used to monitor plan implementation follow.

FIRE MANAGEMENT

The following is a list of environmental indicators that the Tribal Division of Fire will monitor in association with fire use, fuels management, and wildland fire activities. Most are first order fire effects and are listed on individual burn plan prescriptions. Project and individual unit environmental indicators will be monitored and documented with established methods in the *Western Region Fire Monitoring Handbook*, 1990; the *Flathead Agency Fuels Management Plan*, 1986; and the *Flathead Indian Reservation Fire Management Plan*, 2000. Computer models, information systems, and aides used in predicting and documenting smoke emissions and fuel consumption will include: BEHAVE FIRE1 and FIRE2; DEBMOD (Debris Model); FOFEM (First Order Fire Effects Model); FEIS (Fire Effects Information System); Fuels Management Analysis; and prediction charts for duff and woody fuel consumption.

1. Smoke Emissions

Use FOFEM computer model to determine total, PM10, and PM25 particulate emissions for a yearly calculation of all planned and actual emissions for prescribed burns and wildland fires.

2. Consumption

Use downed woody fuel inventory data to monitor achievement of fuel consumption recommendations in the *Flathead Agency Fuels Management Plan* and specific consumption objectives in individual burn plan prescriptions.

3. Mortality

Use vegetation plot inventory data to monitor and document levels of acceptable or desired plant mortality established on a project basis in the objectives of individual burn plans.

4. Fire Return Intervals

Maintain a data base that will track fire return intervals for all prescribed burn projects and wildland fires to monitor existing conditions and changes in the future.

5. Wildland-residential intermix Fire Risk

Conduct a comprehensive inventory and analysis of agency wildland/residential intermix zone and subunit risk levels every five years to track existing conditions, changes in the future, and to measure whether landscape objectives are being met.

Vegetation

1. **Trends in forest growth, including increment, ingrowth, mortality, changes in forest health, etc. will be monitored every 10 years with the Continuous Forest Inventory system by the Tribal Forestry Department.**

2. **Changes in forest health will be monitored yearly and assessed for possible remedial actions by the Tribal Forestry Department.**

3. **Aerial or satellite photography will be updated every ten years to develop vegetation classification and maps. The condition of the vegetation will be compared to DC goals to assess how well management actions are meeting those goals and to determine if any changes in management are necessary.**

4. **Photo points will be retaken every five to ten years by Tribal Forestry.**

5. **The following special studies will be conducted by Tribal Forestry and used for monitoring purposes:**

   Earl Wilcox Demonstration Study: Remeasure every 5 years for the next 10 years, then on ten year intervals thereafter.

   Frog and Jette Stocking Plots: Remeasure every 5 years for two complete cutting cycles, then on a 10 year basis.

6. **Silvicultural practices will be monitored at the rate of 2 to 4 sales per year to assess whether written prescriptions are being applied to the ground. This will be accomplished by the Division of Project Planning. Other resource specialists or outside experts may assist.**

7. **Special or unusual events like 100 year storms, massive beetle occurrences, etc. will be monitored by Tribal Forestry as they occur.**

Wildlife and Diversity

1. **Patch size and distribution of forest vegetation types by fire regime.**

   Use current remote sensing and forest inventory data to monitor patch size, seral condition, fragmentation, patch dispersion, and interior forest patches.

Monitoring

2. **Percent habitat change for threatened, endangered, and sensitive species.**
   Use habitat suitability indices (HSI) and habitat evaluation procedures (HEP) to monitor existing conditions and changes in the future.

3. **Recovery of endangered and threatened species.**
   Continue monitoring populations in coordination with other State and Federal agencies.

4. **Trends in the presence of exotic species (abundance and distribution).**
   Continue monitoring populations and distributions of nonnative species.

5. **Trends in forage condition.**
   Use current range inventory data to detect trends in forage quantity and quality.

6. **Big game habitat effectiveness**
   Monitor road densities, cover-forage ratios, hiding cover, and riparian health on big game summer range.

7. **Wildlife Populations**
   Monitor trends in the population status of big game, forest carnivores, birds, and other wildlife by annual or periodical field surveys and check stations (as funding permits).

8. **Big Game Winter Range**
   Monitor the effects of fire on appropriate indicator plants on big game winter range.

Water and Fisheries

1. **Sample all native fish populations on a 10-year cycle to evaluate long-term viability based on the BayVam or similar model by measuring abundance, available habitat, and year-class distribution.**

2. **Measure substrate condition by McNeil coring or substrate embeddedness in all streams on a 15-year cycle.**

3. **Measure channel complexity in all streams on a 15-year cycle.**

4. **Maintain and intermittently report results for the Reservation-wide Stream Assessment and Reference-reach Assessment Monitoring Program. The monitoring program will be maintained by the Water Management Program and documented in intermittent monitoring reports.**

5. Complete all monitoring activities to achieve forest wide objectives for water and fisheries. This includes the following set of monitoring activities which should occur for each timber sale planning area.

A. Sale analysis monitoring— before a sale

- **Complete sediment source surveys.**
- **Complete a list of recommended BMP implementation and road abandonment sites.**
- **Collect information to complete a cumulative effects model.**
- **Complete stream inventory.**
- **Complete a wetlands inventory.**

B. BMP and road abandonment implementation—during the life of the sale

- **Complete interdisciplinary reviews to evaluate BMP and road abandonment implementation success and identify corrective actions.**
- **Complete interdisciplinary reviews to evaluate corrective action success.**

C. Forest-wide stream reach assessment surveys—

The intent for the forest-wide stream reach assessment program is to maintain the existing reaches, and establish new assessment and reference reaches which will be monitored for geomorphic parameters on a recurrent basis over a long period of time. Water resources staff will maintain and expand the monitoring network and will provide intermittent reports related to the monitoring program.

Assessment reaches are segments of stream where management activities may influence the magnitude or distribution of a geomorphic parameter. Reference reaches are segments of stream where management activities have either been excluded from the reference area, or in the judgment of the monitoring team, management activities have not influenced the magnitude or distribution of a geomorphic parameter. Initial assessment results for 16 stream reaches are described in CSKT Water Management Program (1998). *(CSKT Water Management Program, 1998. Channel Morphology at Reference Reaches in Forested Drainages: Flathead Indian Reservation, Montana. 86 p.)*

Key objectives for the stream reach assessment program follow:

- **To determine the spatial range in variability in stream channel geomorphic characteristics across the Reservation.**

Monitoring

- **To evaluate the response of stream reaches to flood events or major perturbations using a sequence of measurements. This information will help users evaluate the response of channel characteristics to management activities versus natural activities.**

Existing assessment reaches are identified in table 5-1.

Table 5-1. Existing assessment reaches

Reach	Reach Type
Big Knife Creek at USGS Gage	Assessment Reach
Blue Bay Creek nr Headwaters	Reference Reach
E. Fork Finley Creek ab N Canal	Assessment Reach
Revais Creek ab E. Fork Revais Creek	Assessment Reach
Hellroaring Creek ab Reservoir	Reference Reach
Mill Creek at USGS Gage	Assessment Reach
North Crow Creek ab CSKT Gage	Reference Reach
N. Fork Jocko River bl Tabor Feeder Canal	Assessment Reach
Post Creek ab Reservoir at Gage	Reference Reach
Seepay Creek bl West Fork Seepay Creek	Reference Reach
Seepay Creek bl 2000 Road	Reference Reach
S. Fork Valley Creek at USGS Gage	Reference Reach
S. Fork Valley Creek ab 2000 road	Assessment Reach
Skiddoo Creek ab 2660 Road	Reference Reach
Valley Creek at CSKT Gage	Assessment Reach
Yellow Bay Creek ab CSKT Gage	Assessment Reach

Target monitoring dates:

Revisit existing reach assessment network in 2000.

By the end of 2001, expand network to include the following reaches:

- **Mission Landscape - 2 reference reaches;**
- **Jocko Landscape - 2 reference reaches and 1 assessment reach;**
- **West Landscape - 1 reference reach and 2 assessment reaches.**

Culture

1. **Monitor cultural site integrity through periodic inspections.**

2. **Measure and track Tribal Cultural involvement and education in forest planning and forest management through user surveys.**

3. Determine trends in culturally important plants

Trends in plant species determined to be culturally important will be evaluated through a cultural plant survey and inventory. A monitoring plan has been developed and initiated using plots and field survey methodology. Photo points will be established and monitored on a biannual frequency. Monitoring will include harvest history, harvest frequency, plant physiology, plant community associations, plant distribution, and impacts (potential and actual) of human activities.

4. Determine trends in the populations of big game animals that are used by Tribal members for subsistence

This will be done using the Wildlife Program's big game population surveys, public opinion surveys, and hunter check station results to analyze trends in availability of subsistence big game and by utilizing Conservation Officer's field data from observations and interviews about big game harvest and habitat utilization. The surveys and check station protocols will be reviewed by the Tribal Preservation Office and Culture Committees before and after they are conducted.

5. Determine trends in Tribal Member cultural and recreational satisfaction

The Fish, Wildlife, Recreation and Conservation Program will conduct, at a minimum of one method per year, periodic surveys using: campground users surveys, South Fork Primitive Area entrance log data, Lower Flathead River and Mission Mountain Tribal Wilderness registration cards, management area recreational use surveys, mail or phone surveys, Conservation Officer's observations and interviews, culture committees' and elders' groups' comments. The surveys and protocols will be reviewed by the Tribal Preservation Office and Culture Committees before and after they are conducted.

Scenery and Recreation

1. An interdisciplinary review team will monitor activities to determine if developments or alterations meet the Forest Management Plan Scenic Integrity Levels.

2. The Wildland Recreation Program will monitor impacts and gather baseline data for developed sites on an annual basis.

3. The Wildland Recreation Program will monitor impacts and gather baseline data for impromptu use sites on one or more landscapes annually.

4. The Wildland Recreation Program will monitor annual trends in Tribal revenue for recreational activities on Tribal lands utilizing 44-D income annual reports, Blue Bay Campground income reports, and outfitter and guide income reports.

5. **Wildland Recreation Program will annually monitor trends of Reservation visitor use (tourism and recreation use) on Tribal lands by utilizing 44-D annual licensing reports, outfitter and guide income reports, Travel Montana, Montana Dept. of Commerce's publications on visitor use, and the University of Montana's Tourism Institute.**

6. **Wildland Recreation Program will monitor diversified recreation opportunities levels by annually field checking DROL, inventorying use sites, field observations, and 44-D annual licensing reports.**

Transportation

1. **The NEPA Coordinator and Monitoring Forester will coordinate with the Project Leader for Sale Preparation, Sale Administrator, and staff from the Wildlife, Recreation, and Fisheries Programs to monitor forest transportation and access objectives. With the aid of Tribal GIS staff persons, a periodic report will be prepared by the Monitoring Forester of total road density, open road density, road spacing, stream crossings, and estimates of the effectiveness of seasonal and permanent closures. Tribal Fish and Game will report administrative use of gated roads from access permits and road access violations and vandalism.**

2. **The Project Leader for Sale Preparation and Sale Administrator will provide pre- and post-sale road locations and status to Tribal GIS staff for NEPA planning and monitoring purposes.**

3. **The Forestry Department will provide yearly reports to the Tribal GIS staff of all transportation activities completed by the Tribal Forestry Department that are tracked by the GIS transportation database (i.e. location, type, status, structures, etc.).**

4. **The BIA Roads Program Manager will provide yearly reports to the Tribal GIS staff of all transportation activities completed on BIA roads within the forest by the BIA Roads Program that are tracked by the GIS transportation database.**

5. **Staff from all Tribal programs will monitor roadless area boundaries and report road encroachment. The monitoring forester will coordinate with other staff to remove, restore, or mitigate roads and recommend prevention methods.**

Air Quality

1. **Air quality complaints (smoke and health related) will be documented at Tribal Air Quality Department and Fire Dispatch.**

2. **Visibility and haze complaints will be documented at Tribal Air Quality Department and Fire Dispatch.**

3. **Trends in smoke concentration will be monitored and documented.**

4. **Trends in particulate concentrations will be monitored and documented.**

Grazing

1. **Permanent riparian monitoring sites with photo points in livestock-grazed areas will be established and monitored at least biennially (once every 2 years) using the Stream Channel and Riparian-Area Monitoring Guide.**

   Short- and long-term trends will be observed and documented. Characteristics measured will include: type of stream channel, width between high water marks, quantity of unvegetated streambars, eroding banks, overhanging shrubs, desirable and undesirable plants, bank disturbance, stratification of vegetation, grazing intensity, and degree of riparian shrub browsing.

2. **Permanent range monitoring sites with photo points will be established and monitored at least biennially.**

   The sites will be used to evaluate grazing management on an ongoing basis and to build a long-term database. Interdisciplinary teams will incorporate this information to develop livestock grazing plans that are compatible with the seral-stage goals for a landscape and the comprehensive range inventory.

3. **Trends in forage (range) condition will be monitored.**

   Monitor and document short- and long-term trends in rangeland condition. Permanent monitoring sites with photo points in livestock grazed areas will be monitored at least biennially. Characteristics observed will include: ecological site description; grazing history, including class and number of livestock; plant association with key indicator species; degree of livestock use; and estimated forage trends.

4. **A comprehensive range condition inventory, using standard and accepted methodology, will be conducted in livestock-grazed landscapes at least once every twenty years.**