# CHAPTER TWO

# DESCRIPTION AND COMPARISON OF ALTERNATIVES

## INTRODUCTION

This chapter contains the following:

1. An explanation of how the alternatives were developed.

2. A description of the alternatives, including a "no-action" alternative that would continue current management direction.

3. A discussion of how alternatives conform to national and regional direction.

4. A description of alternatives that were considered and eliminated from detailed study.

5. A comparison of the alternatives and their major features, including a review of how they respond to the *revision topics*. The review compares the alternatives at both full and experienced budget levels.

## DEVELOPMENT OF ALTERNATIVES

As described in Chapter One, the revised *Forest Plan* is a response to needed changes in the 1984 *Plan.* After identifying the eight revision topics, discussed in Chapter One, the interdisciplinary team (IDT) analyzed how well the 1984 *Plan* had responded to those topics and then began considering necessary changes. An initial description of possible changes was included in the *Analysis of the Management Situation (AMS)*, June 1993.

Next the IDT developed a set of options or alternatives, for addressing each revision topic, using appropriate analytic tools and its interdisciplinary knowledge of the Forests and Grassland, their ecosystems, and their resources. In addition to developing alternatives that directly addressed the revision topics, the IDT identified other reasonably associated changes that would mitigate the effects of the alternatives on other resources, production outcomes, environmental conditions and ecosystems.

A tentative list of alternatives was presented to the public at a series of open meetings in March and April of 1994. Comments from the public were solicited. After reviewing the comments, the IDT further refined the alternatives into the set of six that appears in this *Forest Plan* and *FEIS*. Four additional alternatives were considered but eliminated from further detailed study. Each of the six alternatives has portions that are identical to the others, and certain portions of the

revised *Forest Plan* are the same for all alternatives. The alternatives differ, however, in the way each addresses the revision topics. Each alternative is, in effect, a separate and new *Forest Plan.*

The major components of the *Forest Plan* are goals, objectives, standards and guidelines; geographic areas; management areas; monitoring and evaluation strategies; allowable sale quantity for timber; management indicator species selection; oil and gas leasing decisions; recommendations for new wilderness; and recommendations for additions to the National Wild and Scenic Rivers System. Modifying the components of the 1984 *Forest Plan* to respond to the revision topics in varying ways and in varying degrees at last produced the different alternatives. All of the alternatives were designed to be fully implementable and achievable and to meet the purposes and need of the *Forest Plan* revision. They all address significant issues related to the *Forest Plan* revision topics. They all represent the philosophies of multiple use and ecosystem management, maintain the resources of the Forests and Grassland, and comply fully with environmental laws; however, each alternative does these things in a slightly different way. While all alternatives provide a wide range of multiple uses, goods and services, some alternatives give slightly greater emphasis to particular ones.

The final phase in the development of alternatives started when draft copies of the revised *Forest Plan* and *EIS* were sent to the public in January 1996 for review and comment. Many people responded with comments and suggestions for improving both documents. In view of this comprehensive public response, the IDT considered changes to the goals, standards, guidelines, management and geographic area direction and management area locations. Alternative B received most of the comments and had more changes than the other five alternatives.

## IMPORTANT POINTS CONCERNING ALL ALTERNATIVES

As noted above, all six alternatives meet common standards for responsiveness to the revision topics, practical achievability and compliance with numerous scientific, agency and legal mandates. In addition, all the alternatives address, each in its way, another and related group of goals and objectives outlined in the May 1992 *Rocky Mountain Regional Guide.* The *Guide* sets the management emphasis for Forest Service programs and budgets, outlines goals to help implement them and draws upon goals and principles established by the 1990 *Resources Planning Act (RPA)* discussed in Chapter One. As directed by the *Regional Guide,* the alternatives will all:

- maintain basic soil, air, water and land resources.

- provide a variety of life through management of biologically diverse ecosystems, though they may differ in how they emphasize wildlife habitat. All conserve habitat for threatened, endangered, and sensitive species and protect riparian habitat. All protect late successional forests to varying degrees.

- provide recreational opportunities and maintain scenic quality in response to the needs of Forest and Grassland users and local communities. All protect heritage resources

in accordance with applicable laws and regulations, while also providing recreational and educational opportunities.

- sustain multiple uses, products and services in an environmentally acceptable manner. This includes timber harvest, livestock grazing, and locatable and leasable mineral extraction.

- through cooperation with other landowners, place emphasis on improved landownership and access patterns that will benefit both private landowners and the public.

- improve financial efficiency for all programs and projects by minimizing expenses, recognizing, however, that not all programs and projects are "in the black," because not all of the programs and projects generate revenue.

- emphasize cooperation with individuals, organizations, and other agencies to coordinate the planning and implementation of projects.

- promote rural development opportunities to enrich rural cultural life, to enhance the environment, to provide employment and to improve rural living conditions.

All alternatives use a new number and name scheme for management areas to be consistent with other National Forests in Forest Service Regions 1, 2, 3, and 4. Management areas are areas with similar management objectives and a common management prescription. They are described in Chapter Three of the revised *Forest Plan* and cover larger areas than they did in the 1984 *Plan.* All alternatives meet the management requirements of 36 CFR 219.27.

Budgets prepared for each alternative at two funding levels helped to project actual outcomes and practical results. Historically, the Forest Service has not received the funds necessary to fully implement its forest plans. The budgets were allocated between programs based on the theme of each alternative, the expected goods and services provided, and the necessary actions and expenditures required to deliver those goods and services. The first budget level for each alternative is based on the funds necessary to most fully implement the proposed revised *Forest Plan*, and totals approximately 19.5 million dollars. The second is a reduced budget based on the experienced level of funding the Forest received to implement the 1984 *Forest Plan* between 1992-1994 and totals approximately 13.5 million dollars.

## THE PREFERRED ALTERNATIVE

The responsible official, in this case the Regional Forester, has identified Alternative B as the preferred alternative in this *Final Environmental Impact Statement.* However, this identification does not represent a decision. The detailed decision and the basis for the decision are described in the Record of Decision (ROD).

## GENERAL DESCRIPTION OF EACH ALTERNATIVE

The following discusses the six alternatives that were studied in detail. Four additional alternatives, including a second "no action" alternative, were initially considered but then dropped from detailed analysis; those four are discussed later in this chapter.

### ALTERNATIVE A (NO ACTION)

#### Background

The "No Action" alternative provides a baseline for estimating the effects of other alternatives. Forest Service direction for implementing the *National Environmental Policy Act (NEPA)* states that a no-action alternative should be considered in detail in each environmental analysis (*FSH 1909.15*). "No action" means that the management allocations, activities, and management direction found in the 1984 *Forest Plan* (as amended) would continue. All alternatives, including Alternative A, have some modifications to existing direction, updating to new technology, new definitions, and new standards and guidelines. Alternative A is the updated "no action" alternative and differs from the second no action alternative which would have maintained current timber harvest levels but was eliminated from further study. (Refer to the section titled Alternatives Considered and Eliminated from Further Study.) The 1984 *Forest Plan* allowed an annual timber sale rate of 30 million board feet. Using new data and information the IDT determined that this level was not biologically sustainable. To make Alternative A implementable and fully achievable, the IDT reduced timber harvest levels to a sustainable level consistent with the other components of the alternative.

#### Theme

Alternative A represents a continuation of current management of the Forests' and Grassland's resource production potential for human use. The multiple-use nature of this alternative is one of its key features. This alternative emphasizes human use, including motorized and nonmotorized forms of recreation, timber, and oil and gas production.

Since biological diversity became an issue after the 1984 *Forest Plan* was completed, that *Plan* focused on the "parts" rather than on the "whole" of the ecosystem. While those "parts," consisting of diversity standards for the entire Forest were the focus of that time, they have now been expanded to include additional "parts" that recognize diversity standards for the Forest at landscape, community, and species levels. Expanding to the different levels helps both users and managers to see and understand the complete ecosystem picture. Forestwide goals, standards, and guidelines have been updated to accomplish this.

Alternative A does not allocate any land to National Forest/Residential Intermix because there was no management prescription in the 1984 *Forest Plan.*

### Desired Condition

Alternative A is an expression of past management philosophy which focused mainly on the components of biodiversity that are economically important. The natural succession of ecosystems is encouraged to proceed in all designated wilderness and other protected areas. Outside these areas, all vegetation types are managed to provide diversity, to yield resource benefits, and to replace natural processes where fire and insect and disease outbreaks have been eliminated or controlled through human activity. Vegetation treatments, which include any human activity that modifies the condition of the vegetation, are scheduled to accomplish the greatest number of recreation, wildlife, range, water, and timber goals as well as to improve the vigor of all vegetation types. Ecosystems, whether roaded or not, are used to meet as many resource demands (including oil and gas leasing) as possible within the multiple-use constraints. There will be no loss of species as a result of Forests and Grassland management; however, elements of the ecosystem may be impacted to the limits of the standards and guidelines.

This alternative provides for existing levels of recreation use and mixes of recreation activities. A limited number of substandard facilities (campgrounds and picnic units, trails and trailheads) are reconstructed. Where recreation occurs outside of developed recreation sites (campgrounds, picnic areas, and downhill ski areas), a limited number of new support facilities such as trails and trailhead parking are developed to address critical shortages for dispersed recreation. Management of the intermix will continue to be challenging because each management area has its own objectives which vary in emphasis from motorized to nonmotorized travel, timber production in some areas, wildlife winter range in others, and so forth.

## ALTERNATIVE B (PREFERRED ALTERNATIVE)

### Background

This alternative was developed to address the concern that the 1984 *Forest Plan* focused too strongly on Forest and Grassland uses and required more emphasis on maintaining ecosystems. The most significant difference between this alternative and the 1984 *Plan* is a reduction in the amount of area allocated to forest products. Allocations for intermix, scenic areas, Research Natural Areas, and wilderness recommendations leave less area in Alternative B to be managed for forest products.

### Theme

Many people believe that the best way to manage the ARNF-PNG is through an even distribution of multiple resource uses—all managed within the capabilities of the Forest and Grassland ecosystems. Therefore, no elements of the ecosystem, including human use, receive a distinctly greater emphasis than any others.

### Desired Condition

Alternative B moves the Forests and Grassland toward a diverse ecosystem, but does so while balancing other resource objectives, including a sustained supply of Forest and Grassland products. Wherever feasible, ecosystems are maintained through a combination of natural ecological processes. Large blocks of the forest remain undeveloped and unroaded, providing areas where most ecosystem components function naturally. These blocks are surrounded by areas of heavy public concentration and resource uses such as timber harvesting, oil and gas leasing, and motorized recreation. Management activities substitute where natural components are missing. There will be no loss of species as a result of Forests and Grassland management.

This alternative provides for both current and most estimated future levels of recreation use. It maintains the current mix of recreation opportunities, and, through interpretive activities, makes users more aware of recreation user ethics and resource values. Most substandard facilities (campground and picnic units, trails and trailheads) are reconstructed. Management of the intermix allows for both multiple use and longterm biological diversity.

## ALTERNATIVE C

### Background

This alternative was developed in response to concerns for the economic stability of communities in and around the Forests and Grassland. Program focus is similar to the 1984 *Forest Plan* but allocates more area to forest products and permits a higher allowable sale quantity for timber harvesting.

### Theme

Some people feel that the best way to ensure economic stability is by increasing levels of timber harvest and perpetuating other programs that provide monetary returns at the local and national level. This alternative emphasizes the highest levels of timber production while still adhering to the principles of ecosystem management.

### Desired Condition

Alternative C attempts to maximize commodity production (transportable resources with commercial value). It achieves the highest level of sustained timber harvest legally possible and is the least restrictive for oil and gas leasing. Management activities that improve the economic environment also maintain ecosystems naturally or artificially. A sustainable flow of economically viable products and services is provided within the biological capability of the resources. There will be no loss of species as a result of Forests and Grassland management; however, some elements of the ecosystem may be impacted to the limits of the standards and guidelines.

This alternative provides for current levels and combinations of recreation activities but with less emphasis on dispersed recreation. Reconstruction of facilities emphasizes additional off-highway vehicle miles, trailhead parking, and campground units to meet projected increases in use. Management of the intermix allows for multiple use with an emphasis on fuels reduction.

## ALTERNATIVE E

### Background

This alternative was developed to address the recreation concerns of the urbanized Front Range. The most significant difference between this alternative and the 1984 *Forest Plan* is an increase in the number of areas allocated to motorized backcountry recreation and dispersed recreation.

### Theme

Many people feel that recreation is becoming increasingly important along the Front Range. Recognizing that the Forests and Grassland will continue to be popular for a wide variety of uses, this alternative provides facilities for the activities with the most use (camping, auto travel, and skiing); traditional use (hiking, hunting, and fishing); and rapidly growing new uses (mountain biking and off-highway vehicles).

### Desired Condition

The emphasis in this alternative is on providing recreational opportunities to people along the Front Range. A relatively high level of acceptable change to resilient ecosystems is allowed. Ecosystems are maintained through a combination of management activities to provide for human uses and natural ecological processes where feasible. Some sensitive ecosystems outside wilderness areas are developed to provide opportunities such as water recreation. Wilderness offers the majority of opportunities for nonmotorized recreation. Only low demands are made on ecosystems to produce marketable commodities such as timber, grazing, and oil and gas. There will be no loss of species as a result of Forests and Grassland management; however, some elements of the ecosystem may be impacted to the limits of the standards and guidelines.

Recreation management emphasizes multi-season, multi-use programs. This alternative provides for both current and estimated future levels of recreation use. It maintains the current mix of recreation opportunities and through extensive interpretive and marketing activities makes users more aware of both recreation opportunities and resource values. All substandard facilities (such as campground and picnic units, trails and trailheads) are reconstructed. The majority of the intermix area is managed for dispersed recreation and backcountry motorized activities.

## ALTERNATIVE H

### Background

This alternative was originally proposed by a number of people with varied interests. It was coordinated by the Colorado Environmental Coalition and then developed by the Forest Service in response to public concern that native ecosystems are best restored and maintained through landscape ecology and conservation biology practices.

### Theme

This alternative emphasizes recovery of native ecosystems as its means of maintaining biodiversity. Natural processes are the dominating forces; human uses are allowed when and where they are compatible. A system of core reserves and corridors maintains and restores representative native habitats. Multiple use occurs outside these areas and serves primarily to provide buffer zones and supplemental habitat.

### Desired Condition

Alternative H emphasizes preserving large tracts of land in a series of core reserve allocations and recommended wilderness areas. Connecting corridors are provided for wildlife dispersal between various core reserve areas. Ecosystems are maintained by allowing natural ecological processes to proceed primarily through natural means. The only artificial changes allowed are those that improve the ecosystem. There will be no loss of species as a result of Forests and Grassland management.

This alternative limits recreation use and minimizes recreation development. Only substandard trails are reconstructed. Wildlife disturbance is reduced by an overall net loss of travelways, including off-highway vehicle miles, on the Forests and Grassland. Interpretive programs emphasize minimum-impact behavior.

The availability of ecosystems to produce marketable commodities such as timber, grazing, and oil and gas is low.

This alternative maximizes use of the intermix prescription in areas with existing high human occupation. In areas of intermixed ownership, priorities for acquiring inholdings are areas containing sensitive habitats and areas that supplement the system of cores and corridors. Acquisition can be through purchase, donation, or exchange.

## ALTERNATIVE I

### Background

This alternative was proposed by the Ecosystem Council for Multiple Use and was developed by the Forest Service to respond to the concerns that employment and improved living conditions of

rural areas should come first and that local officials should have more authority to make land-use decisions within their jurisdictions. Program focus is similar to the 1984 *Forest Plan*, but it allocates more area to motorized backcountry recreation. Alternative I emphasizes resource production, motorized backcountry recreation, developed recreation complexes, intermix, and scenic areas.

### Theme

This alternative emphasizes human use, including commodity production, over all other elements of the ecosystem. It emphasizes higher levels of timber production, less restrictive oil and gas leasing, and motorized recreation activities, while incorporating the principles of ecosystem management. Recognizing that the Forests and Grassland will continue to be popular for a wide variety of uses, this alternative maintains activities that support recreation and tourism-related industries.

### Desired Condition

Alternative I emphasizes a sustainable flow of products, services, and ecosystem values which are socially acceptable, economically viable, and within the biological capability of the resource. A high level of demand is placed on ecosystems to produce marketable commodities, such as timber, oil and gas, and motorized recreation. There will be no loss of species as a result of Forests and Grassland management; however, some elements of the ecosystem may be impacted to the limits of the standards and guidelines.

This alternative provides for current levels of recreation use, but with less emphasis on dispersed recreation. Reconstruction of facilities emphasizes additional off-highway vehicle miles, trailhead parking, and campground units to meet projected increases in use. Management of the intermix allows for multiple use with an emphasis on reducing wildfire threat in forested areas.

## CONFORMANCE WITH THE *FOREST AND RANGELAND RENEWABLE RESOURCES PLANNING ACT (RPA)*

The NFMA regulations at 36 CFR 219.12(f)(6) require at least one alternative to be developed that responds to and incorporates the *Resources Planning Act (RPA)* Program's tentative resource objectives for each Forest displayed in the 1995 *Regional Guide*. However, the 1990 RPA Program establishes national guidance for the National Forests and the National Grasslands through 1995 by stating program emphasis and trends rather than specific, quantified output targets for individual Forest Service programs. As a result, no quantified resource objectives are available for each Region to display in regional guide documents and to pass on to individual Forests. The RPA Program is updated every five years and has three components: (1) roles in natural resource management for Forest Service management, (2) Forest Service program responses to contemporary issues, and (3) longterm strategies to guide the program development and budgetary process. It emphasizes four high-priority themes: (1) recreation, wildlife and fisheries resource enhancement, (2) environmentally acceptable commodity production,

(3) improved scientific knowledge about natural resources, and (4) response to global resource issues. RPA Program guidance was used in the amended (1995) *Rocky Mountain Regional Guide* to shape National Forest System, Research, State and Private Forestry programs (the three branches of the U.S. Forest Service). The same kind of guidance was brought to bear on the revision of the 1984 Forest Plan.

## ALTERNATIVES CONSIDERED AND ELIMINATED FROM FURTHER STUDY

Four alternatives were considered and eliminated from further detailed study during the planning process because (1) they duplicated other alternatives; (2) they were found to be unrealistic; (3) the public brought convincing arguments to delete them; and/or (4) another alternative better addressed a revision topic.

### 1. EXISTING (1984) *FOREST PLAN*

*National Forest Management Act* regulations (36 CFR 219.12(f)(7)) state, "At least one alternative shall reflect the current level of goods and services provided by the unit and the most likely amounts of goods and services expected to be provided in the future if current management direction continues." Under NEPA procedures, this alternative is called the "no action" alternative. The IDT tried to produce a no-action alternative that matched both the *management direction* and the *estimated levels of goods and services* in the 1984 *Forest Plan.* However, it was not possible, mostly because the 1984 Allowable [Timber] Sale Quantity (ASQ) could not be met with the amount of suitable and available land in the 1984 *Plan.* The 1993 *"Analysis of the Management Situation"* documents some of the reasons.

Two no-action alternatives were considered since a single alternative could not both reflect current management direction and match the levels of goods and services in the 1984 *Plan.* Alternative A (described already) was developed to match the management direction of the 1984 *Plan* using current terminology and descriptions of management areas. The second no-action alternative, to match the 1984 goods and services levels, was considered but dropped before being fully developed because other alternatives demonstrated or other analyses were available to understand the consequences of achieving the goods and services such as timber, recreation, water yield or others.

For example, a large amount of analysis was conducted to determine what was needed to meet the 1984 ASQ. Two alternatives, A and C, are very close to the 1984 *Plan* in terms of land allocation for suitable and available timberland but are not close in ASQ estimates (see Table 2.1). The difference in harvest volume is due mostly to updated timber growth and yield information in the models used to estimate harvest levels (See *FEIS* Appendix B, "The Forest Planning Model-Development of Yield Coefficients"). Because Alternative C emphasizes producing the highest amount of commodities possible, it provides a way to evaluate and compare environmental and other consequences of commodity production among all the alternatives. Other timber harvest analysis work showed that approximately 700,000 acres would

need to be classified as suitable and available to obtain a harvest volume of 30.6 million board feet per year. (*FEIS* Appendix B, cited above, also describes the timber modeling process.)

**Table 2.1 Comparison of Suitable and Available Lands and ASQ**

| | 1984 *Forest Plan* | Alternative A | Alternative C |
|---|---|---|---|
| Suited and Available Acres | 351,739 | 365,301 | 334,357 |
| ASQ (Million Board Feet Per Year) | 29.9 | 16.8 | 18.4 |

Because similar information is available for other goods and services such as recreation and water yield, it did not seem necessary to fully develop a second no-action alternative to match 1984 output levels for each of them. The current range of alternatives plus other analysis work provide the necessary information to assess the impacts of meeting the 1984 *Forest Plan* output levels.

### 2. ALTERNATIVE D

This alternative emphasized maintaining biological diversity over all other elements of the ecosystem with little interference from humans; it was similar to Alternative H but it had fewer undeveloped areas. According to public comments, Alternative H better addressed the retention of ecosystems in their natural state.

### 3. ALTERNATIVE F

This alternative sought to maintain natural or only slightly modified ecosystems by limiting uses and activities to those having low impact or by restricting activities to ecosystems with high tolerance and flexibility. This alternative was similar to Alternative B in allocation of management prescriptions but used the residential intermix prescription less often. Alternative B better addresses the intermix issue.

### 4. ALTERNATIVE G

This alternative specified minimum management at minimum budget levels. Because the IDT analyzed the effect budget has on each alternative, it was not necessary to analyze a minimum budget alternative.

## COMPARISON OF THE ALTERNATIVES CONSIDERED IN DETAIL

### MANAGEMENT AREAS IN THE ALTERNATIVES

Each alternative divides the Forests and Grassland into management areas. Management areas describe where different kinds of resource opportunities are available and where different kinds of management activities can occur. Chapter Three of the revised *Forest Plan* describes the emphasis for each management area and lists the applicable standards and guidelines. The acres associated with each management area are shown by alternative in Tables 2.2 and 2.3.

**Table 2.2 Management Area Allocations (Acres) for the Revised *Forest Plan*, ARNF, 1995**

| Management Area [a] | Alternatives | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | E | H | I |
| 1.1 Wilderness | 295,733 | 295,773 | 295,733 | 295,733 | 295,733 | 295,733 |
| 1.2 Recom. Wilderness | 0 | 8,810 | 0 | 0 | 259,363 | 0 |
| 1.3 Backcountry Rec. | 136,376 | 131,184 | 58,353 | 120,773 | 23,850 | 0 |
| 1.41 Core Areas-existing | 0 | 9,065 | 0 | 0 | 152,762 | 0 |
| 1.42 Core Areas-restor. | 0 | 0 | 0 | 0 | 31,338 | 0 |
| 1.5 Wild Rivers | 151 | 3,272 | 151 | 12,026 | 3,272 | 151 |
| 2.2 Research Natural Areas[b] | 154 | 11,285 | 154 | 154 | 0 | 0 |
| 3.1 Special Interest Areas | 46,463 | 74,828 | 46,942 | 47,451 | 0 | 6,285 |
| 3.21 Limited Use Areas | 0 | 0 | 0 | 0 | 114,512 | 0 |
| 3.3 Backcountry Rec.-motorized | 36,428 | 29,911 | 23,293 | 210,827 | 47,112 | 114,296 |
| 3.5 Flora and Fauna | 311,734 | 332,554 | 171,316 | 68,373 | 50,627 | 171,876 |
| 3.55 Corridors | 0 | 0 | 0 | 0 | 57,741 | 0 |
| 4.2 Scenery | 0 | 30,129 | 29,457 | 29,590 | 0 | 28,204 |
| 4.3 Dispersed Rec. | 175,918 | 107,478 | 62,868 | 318,011 | 90,208 | 56,489 |
| 4.4 Recreation Rivers | 17,076 | 18,912 | 17,076 | 18,913 | 18,913 | 17,075 |
| 5.11 General Forest And Range | 70,272 | 21,511 | 212,670 | 0 | 25,898 | 246,708 |

| Management Area [a] | Alternatives | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | E | H | I |
| 5.13 Forest Products | 152,600 | 9,227 | 234,569 | 0 | 0 | 243,658 |
| 5.31 Fraser Exp. Forest | 22,501 | 22,501 | 22,501 | 22,501 | 22,501 | 22,501 |
| 5.5 Dispersed Rec.-Forest Products | 0 | 135,038 | 62,003 | 94,312 | 0 | 21,177 |
| 7.1 Intermix | 0 | 27,032 | 25,766 | 25,766 | 70,706 | 24,046 |
| 8.21 Developed Rec. Complexes | 1,958 | 3,213 | 3,653 | 4,271 | 15,415 | 18,708 |
| 8.22 Ski-based Resorts | 21,685 | 16,527 | 21,544 | 20,349 | 9,101 | 22,142 |
| TOTAL | 1,289,050 | 1,289,050 | 1,289,050 | 1,289,050 | 1,289,050 | 1,289,050 |

[a] Management Area 8.3 (Designated Utility Corridors) is shown in Figure 3.26 in Chapter Three of this *FEIS* but is not included in this table because corridors are linear features crossing other management areas.
[b] Alternatives B and H also have 37,764 and 73,231 acres, respectively, within other management areas.

**Table 2.3 Management Area Allocations (Acres) for the Revised *Forest Plan*, PNG, 1995**

| Management Area[a] | Alternatives | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | E | H | I |
| 2.2 Research Natural Areas[b] | 0 | 2,578 | 644 | 788 | 13,870 | 256 |
| 3.1 Special Interest Area | 763 | 9,526 | 2,150 | 2,150 | 2,150 | 2,150 |
| 3.21 Limited Use Areas | 0 | 0 | 0 | 0 | 73,177 | 0 |
| 3.61 Prairie Woodland | 863 | 1,339 | 0 | 1,339 | 1,339 | 0 |
| 4.2 Scenery | 4,862 | 4,920 | 4,920 | 4,920 | 4,920 | 4,920 |
| 4.3 Dispersed Rec. | 0 | 345 | 600 | 15,171 | 0 | 600 |

| Management Area[a] | Alternatives | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | E | H | I |
| 6.4 Mid-Comp. High Structure, Native Short-grass Prairie | 0 | 51,209 | 0 | 0 | 35,365 | 0 |
| 6.6 Mid-Comp. Low Structure, Grassland Resource Production | 185,941 | 122,511 | 184,113 | 168,060 | 61,608 | 184,501 |
| 8.21 Dev. Rec. Complex | 121 | 121 | 121 | 121 | 121 | 121 |
| TOTAL | 192,548 | 192,548 | 192,548 | 192,548 | 192,548 | 192,548 |

[a] Management Area 8.3 (Designated Utility Corridors) is shown in Figure 3.27 in Chapter Three of this *FEIS* but is not included in this table because corridors are linear features crossing other management areas.

[b] Alternatives B and H also have 37,764 and 73,231 acres, respectively, within their management areas.

## COMPARISON OF HOW THE ALTERNATIVES ADDRESS REVISION TOPICS

This section compares the ways in which the six alternatives address the *revision topics*, based on the information and analysis presented in each section of Chapter Three, under the headings Affected Environment and Environmental Consequences. Although the *revision topics* are the principal focus of analysis, many of the other physical, biological, and social elements of the environment discussed in Chapter Three interlink with the *revision topics* or with one another. For example, biological diversity is linked to nearly every environmental and ecological issue as well as to issues concerning commodity production.

### REVISION TOPIC: BIOLOGICAL DIVERSITY

Biological diversity is an exceedingly complex subject. Most people agree that maintaining biological diversity and providing for sustainable ecosystems is important. However, there is little agreement on how that should be done. Biological diversity has been analyzed using six main elements: composition, pattern, disturbances, processes, function, and structure. This section summarizes the effects these elements have on terrestrial habitat and wildlife in relationship to forage and cover, forested and open corridors, habitat effectiveness, interior forests, management indicator species, and endangered, threatened, and sensitive plants and animals. The first part of this section focuses on ARNF ecosystems (Mountain Ecological Section), and the second on PNG ecosystems (Plains Ecological Section). Following those is a discussion of the effects of fire, insects, and disease on biological diversity. Chapter Three of this *FEIS* treats all of these subjects in greater detail.

## Arapaho and Roosevelt National Forests

*Composition of Vegetation*

The following table shows the current vegetation composition on the Arapaho and Roosevelt National Forests.

**Table 2.4 Existing Land Cover of the ARNF**

| Major Vegetation and Nonvegetation Cover | Acres (Approximate) | Percent |
|---|---|---|
| **FORESTED** | | |
| Lodgepole pine | 501,000 | 39 |
| Engelmann spruce and subalpine fir | 248,000 | 19 |
| Ponderosa pine | 137,000 | 11 |
| Douglas-fir | 57,000 | 4 |
| Aspen | 44,000 | 3 |
| Limber, bristlecone, pinyon pine, juniper | 8,000 | 1 |
| Narrowleaf cottonwood and blue spruce | 1,000 | <1 |
| **SUBTOTAL** | 996,000 | ≈78 |
| **NONFORESTED** | | |
| Grasses and forbs | 144,000 | 11 |
| Shrubs | 68,000 | 5 |
| Rock, ice, and other nonvegetation | 67,000 | 5 |
| Lakes and ponds | 14,000 | 1 |
| **SUBTOTAL** | 293,000 | 22 |
| **TOTAL** | 1,289,000 | ≈100 |

The existing acreages shown above are expected to change little over time with any alternative. No permanent conversions of one vegetation type to another will occur; however, shifts in seral (a community that is in a developmental, transitory stage) and climax (highly stable stage of plant development) species within habitats will vary among alternatives.

*Pattern of Vegetation*

The arrangement and distribution of vegetation varies considerably across the ARNF. Patterns of vegetation vary within and between forest types. High elevation spruce-fir forests comprise the most uniform and connected pattern except where logging has occurred and trees are reestablishing themselves. Medium elevation lodgepole pine forests vary from highly uniform and connected where undisturbed to generally patchy and broken where recent logging or fires have occurred and trees are reestablishing themselves. Low elevation ponderosa pine and

Douglas-fir forests are mostly patchy and broken due to human development, logging and insect epidemics.

Patterns associated with vegetation composition are expected to change little with any alternative. Vegetation treatments will, however, change structure, as discussed in the next section, creating different structural patterns. Treated areas vary by alternative and occur most often within areas suitable and available for timber management. Prescribed fire and wildfire will also change current patterns. Existing structural patterns are expected to change the most in accessible areas where timber management has occurred in the past.

*Disturbances, Processes, and Functions*

Disturbances that cause change, processes that link organisms, including humans, to their environment, and functions through which living and nonliving elements of ecosystems change and interact (Kaufmann et al. 1994) are described for forested ecosystems. Any discussion of disturbances, processes, and functions must center on the topics of vegetation, terrestrial and aquatic habitats, timber production, fire, insects, diseases and livestock grazing. Each of these topics, along with the Biological section of Chapter Three evaluates the effects of disturbances on ecosystems and biological diversity and the relative impacts of the six alternatives.

*Structure of Vegetation*

The key element in evaluating vegetation structure (any of several developmental stages of plants) across the range of alternatives is to determine how management will affect the overall structure of the forest and how those changes will affect plant and animal communities. The two structural components of greatest concern are the late successional old-growth stage (trees), and the grass-forb stage (plants in the grass, sedge, and rush families, and any nongrass-like plant that has little or no woody material). Forested corridors and habitat effectiveness are also important elements in evaluating structure.

Major agents of change to structure, including forest growth, timber management, prescribed fire and wildfire, are displayed in Table 2.5. The table shows estimated changes in forest structural stages by decade and alternative. Only the major conifer types—lodgepole pine, spruce-fir, ponderosa pine and Douglas-fir—are estimated since they account for 95 percent of the forested types. It is here that most change is expected. Forest growth is the primary agent of change, followed next by fire, and last by timber management.

Table 2.5 represents expected changes to forest structural stages at the full budget level. At the experienced budget level, up to a third fewer acres will be treated and changed by timber management and prescribed fire, but the ranking of alternatives remains the same for relative changes. Looking at the extremes of structural stages (early and late) and at the earliest and latest decades (1 and 5), most grass-forb acres would occur in Alternatives B and I and the fewest would occur in Alternative E. Most old growth would occur in Alternative E and the least would occur in Alternative C. All alternatives would have more grass-forb acres than currently exist.

Old growth increases over time in all alternatives except for Alternatives C and I where total old growth of all types drops slightly.

**Table 2.5 Existing Vegetation Structure and Vegetation Structure at the End of the First and Fifth Decade at Full Budget Level, ARNF**

| Alternative | Late Successional | | Sapling-Pole | Shrub-Seedling | Grass-Forb |
|---|---|---|---|---|---|
| | Old Growth | Mature | | | |
| Existing | 108,900 | 470,600 | 344,300 | 10,600 | 9,000 |
| **Alternative A** | | | | | |
| First Decade | 109,000 | 475,000 | 318,000 | 16,000 | 25,000 |
| Fifth Decade | 123,000 | 504,000 | 242,000 | 57,000 | 17,000 |
| **Alternative B** | | | | | |
| First Decade | 113,000 | 471,000 | 314,000 | 16,000 | 29,000 |
| Fifth Decade | 130,000 | 471,000 | 223,000 | 91,000 | 28,000 |
| **Alternative C** | | | | | |
| First Decade | 107,000 | 474,000 | 318,000 | 16,000 | 28,000 |
| Fifth Decade | 107,000 | 488,000 | 245,000 | 77,000 | 26,000 |
| **Alternative E** | | | | | |
| First Decade | 115,000 | 483,000 | 318,000 | 16,000 | 11,000 |
| Fifth Decade | 139,000 | 531,000 | 228,000 | 34,000 | 11,000 |
| **Alternative H** | | | | | |
| First Decade | 113,000 | 474,000 | 313,000 | 16,000 | 27,000 |
| Fifth Decade | 131,000 | 489,000 | 215,000 | 81,000 | 27,000 |
| **Alternative I** | | | | | |
| First Decade | 108,000 | 472,000 | 318,000 | 16,000 | 29,000 |
| Fifth Decade | 108,000 | 480,000 | 247,000 | 80,000 | 28,000 |

*Terrestrial Habitat and Wildlife*

Changes in vegetation structure affect habitats and wildlife. Indications are that early seral forest habitat will generally increase and favor associated terrestrial wildlife with every alternative. Given that early successional stages of conifers are currently quite limited (2 percent), increases

in seral forest habitat are expected to be beneficial for many species. Increases will assure that early stages are less limiting and better dispersed throughout the Forest.

Travel and vegetation management are the major influences on terrestrial wildlife. In order to estimate effects to wildlife and compare alternatives, the predicted impacts of vegetation change and human disturbance must be considered. The influence of management in the different alternatives is considered for different habitats that are important to wildlife.

The important forest wildlife habitat components are forage and cover, forested corridors, open corridors, effective habitat, interior forests (old growth, summarized in Table 2.5) and their effects on endangered, threatened, and sensitive species. The definitions of these existing habitats and projections of how each will change are based on the conditions of open roads and trails, vegetation, and structural stages.

*Forage and Cover*. The preceding tables for cover types and vegetation structure indicate that some of every cover type and vegetation structure combination will be provided by all alternatives through five decades. While certain alternatives increase limited habitats (i.e., ponderosa pine old growth and grass-forb stages) and other alternatives reduce habitats to limited amounts (i.e., lodgepole pine old growth), all alternatives will provide some forage and cover for existing species.

*Forested Corridors*. Forested corridors reflect the connectedness of relatively dense conifers. These are important to many forest dwelling wildlife species such as marten, pine and Abert's squirrels, lynx and southern red-backed vole. Forested corridors exist on 60 percent of the entire Arapaho and Roosevelt National Forests and forested areas are generally well connected. The status of forested corridors is not known for many of the non-National Forest System lands within the boundaries of the ARNF; however, Rocky Mountain National Park, which is mostly surrounded by the ARNF, appears to be similarly well supplied with corridors.

Based on the amount of timber harvest and thinning, the following table shows the change from existing conditions by each alternative at the end of the first decade. The effect on wildlife that tend to travel and live in medium to dense overstory conifers would vary by placement, size and shape of treatment areas. However in all alternatives, the maintenance of functioning corridors is required even though total amount may be reduced.

**Table 2.6 Forested Corridors (Percent) at Full Budget Level, ARNF**

| Existing | Alternative A | Alternative B | Alternative C | Alternative E | Alternative H | Alternative I |
|---|---|---|---|---|---|---|
| 60 | 58 | 58 | 58 | 59 | 58 | 58 |

*Open Forested Corridors*. Open corridors reflect the connectedness of open areas that are nonforest vegetation or nonvegetation, excluding water. This is important to species that require openness, generally away from forested vegetation, such as bighorn sheep. Open corridors exist

on 21 percent of the entire ARNF. Well-connected and abundant openings occur in relatively few areas throughout the Forest. The following table shows the resulting open corridors after the first decade.

**Table 2.7 Open Corridors (Percent) at Full Budget Level, ARNF**

| Existing | Alternative A | Alternative B | Alternative C | Alternative E | Alternative H | Alternative I |
|---|---|---|---|---|---|---|
| 21 | 22 | 23 | 23 | 21 | 22 | 23 |

*Habitat Effectiveness*. Effective habitat is largely undisturbed habitat buffered from regularly used roads and trails (both motorized and nonmotorized travel). Numerous species can be easily disturbed by human activities, at least during certain times of the year. As a result they cannot effectively use otherwise available habitat (Knight and Gutzwiller 1995).

Effective habitat is estimated to exist on about 67 percent of the Arapaho and Roosevelt National Forests. The 33 percent of NFS lands that are not effective habitat are primarily the result of the use of travelways by motorized vehicles (26 percent) and, to a lesser degree, by nonmotorized users (8 percent). Therefore, almost one-third of the Forests' area is relatively disturbed by human influence.

Changes in the numbers and locations of open roads and trails will influence habitat effectiveness and these changes vary by alternative. Management of existing roads and trails, new nonmotorized trails, new motorized OHV routes and new timber management roads to be left open during decade 1 will determine habitat effectiveness among alternatives, as displayed in Table 2.8. Alternative H provides the highest amount of habitat effectiveness, Alternatives A, B and E are about the same, and Alternatives C and I provide the least.

**Table 2.8 Comparison of Forestwide Changes in Open Roads and Trails on National Forest System Lands and Habitat Effectiveness in Decade 1 at Full and Experienced Budget Levels, ARNF.**

| | Alternatives | | | | | | |
|---|---|---|---|---|---|---|---|
| | Now | A | B | C | E | H | I |
| Travelway (Miles) | | | | | | | |
| Full | 3,165 | 2,882 | 2,755 | 2,803 | 2,901 | 2,519 | 2,842 |
| Experienced | 3,165 | 3,079 | 2,875 | 3,022 | 3,040 | 2,735 | 3,026 |
| Habitat Effectiveness (Percent) | | | | | | | |
| Full | 67 | 71 | 72 | 71 | 70 | 74 | 71 |
| Experienced | 67 | 69 | 71 | 69 | 69 | 72 | 69 |

*Interior Forests*. Interior forests are contiguous areas of relatively dense, large trees that are buffered from the temperature, light and humidity differences of sizable forest openings and also from human disturbance along regularly used roads and trails. Interior forests are estimated to exist on 15 percent of the ARNF.

Humans influence interior forests in several ways. Fire suppression has probably decreased the number of openings in certain areas and increased interior forests by increasing or extending the existence of stands of large, dense trees, especially in lodgepole pine areas. Timber harvest has somewhat counterbalanced the effects of fire suppression in lodgepole pine and contributed to decreased amounts of interior forest in Douglas-fir, ponderosa pine and spruce-fir. Human presence and activities have fragmented and reduced interior forests, especially where recent timber harvests have been concentrated and in the intermix areas along the eastern edge of the Forests. However, it is estimated that the number of interior forests in the ARNF is near or below the low end of the range of what naturally occurred.

Considering the amounts of late successional forests (Table 2.5), amounts of trees cut and burned, habitat effectiveness (Table 2.8), and interior forest within suitable and available timber areas, the alternatives that are estimated to best provide interior forest are B, E or H, with least provided in A, C or I in decade 1. Within these two groups, the alternatives are not ranked in any order, since the overall effect to wildlife that tend to dwell and migrate in medium to dense late successional conifers would vary locally by placement, size and shape of treatment areas.

*Management Indicator Species*. Expected effects on management indicator species and their habitats vary somewhat by alternative, but are best described and mitigated at the project scale. Risks to management indicator species can also be attributed to activities or conditions beyond jurisdiction of the Forest Service. Each alternative analyzed will maintain the viability of MIS habitats across the Forests, and no species will be lost as a result of Forest management activities.

*Endangered, Threatened, and Sensitive Plants and Animals*. Issues concerning biodiversity are often focused on fine-scale habitats, species and communities since these elements typically are limited in abundance and are susceptible to change. It is estimated that each alternative will at a minimum maintain the viability of species and existence of habitats and communities.

**Pawnee National Grassland**

*Composition of Ground Cover*

The Pawnee National Grassland is part of the true shortgrass of the northern and central plains. The moderately dense, shortgrass cover is dominated by two grasses, blue grama and buffalo grass. Forbs on the other hand, predominate where prairie dogs or badgers have burrowed. Plants in breaks and on road rights-of-way generally are nonnative. The major shrub is fourwing saltbush. Trees, while present, do not make up a major component of the Grassland. Bluffs, buttes, and rock outcrops are interspersed throughout the Grassland.

The existing acreages of vegetation shown in Table 2.9 are expected to change little over time in any of the alternatives—as are the amounts of nonvegetation cover. No conversions of one vegetation type to another will occur; however, shifts in seral and climax species within habitats will vary among the alternatives at both budget levels.

**Table 2.9 Existing Land Cover, PNG**

| | Acres (Approximate) | Percent |
|---|---|---|
| Grasses and Forbs | 181,400 | 94 |
| Shrubs | 10,000 | 5 |
| Woody Draws | 1,000 | <1 |
| Trees | <100 | <1 |
| **TOTAL** | 192,500 | 100 |

*Pattern of Vegetation*

Patterns associated with vegetation composition are expected to change little with any alternative. The shortgrass prairie predominates throughout the Grassland. Private lands within and around the Grassland are dominated by cultivated wheat and native shortgrass prairie. Much of the northern boundary of the Grassland is contiguous with the shortgrass prairie of southern Wyoming. On the southwest edge, most of the adjacent land has been plowed into wheat, and the western boundaries are separated from the foothills of the Forests by small communities and farming. The eastern boundaries contain a mixture of plowed and native prairie sections that lead to the mixed-grass prairies and wooded draws of Nebraska. Within the Grassland's administrative boundary, the ecosystems are dissected by roads and fences as a result of checkerboard landownership patterns. The vegetation reflects this with visible contrasts between summer and winter livestock ranges, different stocking levels, and plowed versus native prairie.

*Disturbances, Processes, and Function*

The Grassland is an altered, seminatural landscape whose structure, processes and functions have been changed during the past 150 years by livestock grazing, fire suppression, agriculture, invasion of nonnative plants, animal control and hunting. Fire was probably a key factor in the rotation of historical animal use on the prairies. The existing biological diversity is a result of the interplay of these factors.

*Structure of Vegetation on the Grassland*

The shortgrass prairie is the result of a complex set of interacting processes and attributes, including grazing, insect infestation, arid climate cycles and local relief. As mentioned, structure

has been changed from presettlement conditions by pervasive livestock grazing, fire suppression, and agricultural use. Within the past 80 years homesteading has had the greatest effect on successional structure stage.

The existing acreages of vegetation type shown in Table 2.9 are expected to change little over time under any alternative. Structural changes may occur within the grass-forb vegetation type as shown in Table 2.10.

Alternatives A, C, E, and I will emphasize managing the Grassland for mid-grasses with low structure. Livestock grazing will remain generally the same as it has been for the past 30 years, and vegetation structure will remain similar to current conditions. There may be a shift from high structure to medium structure in the mid-grass areas of the Grassland. Under Alternatives B and H the emphasis on structure is to manage for approximately 10 to 15 percent more medium and high structure in mid-grasses over the 50 years. Changes in livestock management would occur to achieve the shift in structure.

**Table 2.10 Structure of Vegetation on the PNG**

| Grass-Forb Type and Structure | Acres | Percent of Vegetation Total |
|---|---|---|
| Short-grass High Structure | 0 | 0 |
| Short-grass Medium Structure | 12,400 | 6 |
| Short-grass Low Structure | 141,100 | 73 |
| **Subtotal** | 153,500 | 79 |
| Mid-grass High Structure | 3,300 | 2 |
| Mid-grass Medium Structure | 5,000 | 3 |
| Mid-grass Low Structure | 19,200 | 10 |
| **Subtotal** | 27,500 | 15 |
| **GRASS-FORB TOTAL** | 181,000 | 94 |

*Terrestrial Habitat and Wildlife*

Vegetation and travel management are the major influences on terrestrial wildlife. In attempting to estimate their effect on wildlife, the impacts of vegetation change and human disturbance should be the primary considerations.

The important issues in Grassland wildlife habitat that can be quantified and compared by alternative are forage and cover, effective habitat, and endangered, threatened, and sensitive

species. The definition of existing habitats and the projection of how each habitat will change is based on vegetation, structural stages, and open roads and trails.

Vegetation structural stages in Alternatives A, C, E, and I, would be most beneficial to those animal species that respond well to low profile vegetation—species such as McCown's longspur, mountain plover, and deer mice. Vegetation structural stages in Alternatives B and H would increase habitat for animals oriented to high-profile vegetation, such as Baird's sparrow, Cassin's sparrow, lark bunting, Sprague's pipit, cottontail rabbits, black-tailed jack rabbits, and western harvest mouse. Alternatives B and H would also provide the most structurally diverse habitats for wildlife. Alternatives A, C, E, and I provide the least habitat, remaining similar to current conditions.

*Habitat Effectiveness*. About 60 percent of the Pawnee National Grassland is estimated to be effective habitat. On NFS lands, the 40 percent considered noneffective habitat is due largely to the use of travelways by motorized vehicles. More than one-third of the Grassland's area is thus relatively disturbed by human influence.

*Management Indicator Species*. Expected effects on management indicator species and their habitats vary somewhat by alternative, but are best described and mitigated at the project scale. Risks to management indicator species can also be attributed to activities or conditions beyond jurisdiction of the Forest Service. Each alternative analyzed will maintain the viability of MIS habitats across the Forests, and no species will be lost as a result of Grassland management activities.

*Endangered, Threatened, and Sensitive Plants and Animals*. It is estimated that each alternative will, at a minimum, maintain the viability of species and the existence of habitats and communities.

**Other Influences on Biological Diversity on Both the ARNF and PNG**

*Fire*

Fire can positively affect biological composition, structure and function. The elimination of fire from an ecosystem can affect health and diversity since both are directly related to a properly functioning system. Current plant and animal communities and forest and grassland landscapes are a result of several widespread disturbance factors, one of which is fire. The effects of fire disturbance are very complex and highly variable and are influenced by the past and current landscape, the amount and distribution of fuels, weather, and other elements.

Past fire suppression and vegetation management practices have changed the fuel profile (the pattern of combustible plant material as it occurs in an area), resulting in a net increase in vegetation flammability. A decrease in fire frequency has led to an increase in both surface and tree-crown fuels and a modification of forest structure. For example, ponderosa pine forests have become overstocked with younger vegetation, providing a ladder for fire to spread into the tree tops, or crowns. Higher-elevation forests are also becoming more susceptible to fire as they

become older and merge with surrounding stands, thus increasing their size. Therefore, when dry conditions occur, the possibility of burning more acres per fire and having a catastrophic wildfire increase.

Fuels will continue to accumulate if fire as a natural process and timber harvesting are minimized. Overstocked ponderosa pine stands will lead to stressed trees, susceptible to insects and disease and eventual mortality. The undergrowth and fuel buildup will cause higher fire intensities than normal, and fires that are both difficult and dangerous to suppress and harmful to the ecosystem.

Given the current and projected future conditions, no alternative maintains fuel profiles within their range of natural variation. At both experienced and full budget levels, the acres treated annually (4,000 to 7,000 acres) will not be enough to prevent severe and large-scale fires from occurring. Ecosystems will experience atypical fire characteristics and harmful ecological effects. Risks to firefighter safety and suppression costs will increase.

*Insects and Diseases*

There are over one million acres of forested lands on the ARNF. Inventories show that the lodgepole pine forest type is the most common, followed by Engelmann spruce/subalpine fir, ponderosa pine, Douglas-fir and aspen. Most of these stands of trees have been shaped by natural events, including fire, insects, and disease. In more recent history, the Forest has been impacted by mining, timber harvesting, and settlement.

More than half of the tree stands on the Forest are in a mature to overmature condition. Growth loss and mortality will continue to occur, particularly where access, topography or other restraints prohibit silvicultural treatment of tree stands.

The current and projected future conditions of the Forest ensure that insects and diseases will continue to play significant roles in forest growth, development and disturbance processes, despite the presence of humans. Two activities that are likely to have some, although limited, effect on insects and disease are timber and fire management.

Timber harvesting and other activities affecting the growth and development of trees have the potential to change the conditions that are conducive to outbreaks of insects and disease. However, it is unlikely that the number of acres treated annually under any alternative will significantly influence these agents of change in the near future. Alternatives C, A, I, and B, in that order, would have the most positive effect in maintaining insects and disease at endemic levels because they treat the most acres under both budget levels. Alternatives E and H have little, if any, effect in altering the natural course of action of insects and disease.

Wildfire and prescribed fire are likely to have an effect on insect and disease by changing the forest structural stages. The acres burned annually from wildfire will remain relatively the same in all alternatives, although it may be somewhat higher in Alternative H due to limited access and human intervention. Modern research has made a convincing case for the desirability of using

prescribed fire as a tool to reintroduce fire into the ecosystem, particularly in the ponderosa pine and Douglas-fir forest types. By altering structural stages, fire will reduce the potential of major insect and disease outbreaks. The acres treated will be similar in each alternative. The budget limitations for applying prescribed fire noted above will, however, limit its effectiveness as a tool in maintaining forest health.

## REVISION TOPIC: NATIONAL FOREST-RESIDENTIAL INTERMIX

Intermix is a term used to describe areas where private land is adjacent to or intermingled with NFS lands. The presence of these private lands strongly influences the use and management of the surrounding NFS lands, often to the extent that it is difficult to implement management area prescriptions effectively or efficiently. Private landowners and Forest visitors do not always agree on how these lands should be managed, or on the uses that should occur. Currently, all intermix lands are allocated to a variety of management area prescriptions, each with a different emphasis.

The Forest received many comments and concerns about the management of the intermix regarding wildfire, safety, trespass, and aesthetics. The *Forest Plan* revision adopted a management area prescription called Intermix (7.1) to concentrate on addressing these issues. Lands allocated to Management Area 7.1 are managed to protect natural resources, provide compatible multiple uses, reduce the potential for catastrophic wildfire, and maintain the relationships between the landowners and other governments with jurisdiction.
The intermix prescription was allocated mostly on the southern half of the Forest in areas where the National Forest has areas consisting of heavy amounts of mineral survey fractions adjacent to and intermingled with private lands which have developed into subdivisions. The north and west parts of the Forest have intermixed landownership patterns that are not addressed as intermix under any alternative. These landownership patterns are not as intensely developed as the southern half of the Forest but do experience many conflicts such as access, trespass and conflict with Forest recreation activities.

**Table 2.11 Intermix Allocation Acres by Alternative on the Arapaho and Roosevelt National Forests**

| MA | Alt. A | Alt. B | Alt. C | Alt. E | Alt. H | Alt. I |
|---|---|---|---|---|---|---|
| 7.1 Intermix | 0 | 26,562 | 25,766 | 25,766 | 70,684 | 24,045 |

Alternative H allocates the most acres to the Intermix Management Area Prescription. Next is Alternative B which concentrates on the areas of most intense conflict and development. Alternatives C and E have the third largest number of acres followed by Alternative I. Alternative A does not allocate any acres to the intermix prescription and therefore does not specifically acknowledge or address the public concerns about the intermix, or put any special emphasis on intermix issues such as fuel reduction and landownership consolidation.

## REVISION TOPIC: OIL AND GAS LEASING

For oil and gas leasing and development, the revision analysis studied the entire Pawnee National Grassland, high potential areas on the Sulphur Ranger District, and a previously leased parcel in the Redfeather District. The remainder of the Forest that is not withdrawn from leasing has low or no known potential for oil and gas deposits, and no past industry interest. The *reasonably foreseeable development* (RFD) predictions for future activity do not forecast any activities for these lands, and no analysis of leasing effects was necessary. Lease applications from industry for parcels in eligible areas will be evaluated with the appropriate environmental analysis on a case by case basis.

The Forest Service and the Bureau of Land Management (BLM) together determined the RFD for the Forest and Grassland. Based on known geology, technology, economic feasibility, and history of development, an estimate of the expected activity for the 10 to 15 year life of the *Forest Plan* was determined for exploratory drilling and successful wells. On the Sulphur Ranger District, one field is projected, with an anticipated yield of three dry holes and five producing wells. On the Redfeather District, two producing wells are predicted. On the PNG, 25 wells may be drilled, and 10 are likely to be successful.

Alternative H does not lease areas on the Sulphur or Redfeather Ranger Districts and prohibits surface occupancy on large areas of the Grassland. These decisions reduce the RFD on the Grassland to 11 dryholes and seven producing wells.

Two related oil and gas decisions have been incorporated into the alternatives in accordance with the 1987 *Leasing Reform Act* and Forest Service policy. First, lands that are available for leasing are identified, along with any stipulations that may apply to them. Second, lands that the BLM will be authorized to lease are identified, subject to verification by the Forest Service when an application for a particular lease is actually made. The BLM is responsible for managing the subsurface activities related to all federally owned leasable minerals. The BLM actually issues leases and permits to drill.

### Lands Available for Leasing

Tables 3.35 and 3.36 in Chapter Three summarize the acres available for oil and gas leasing and the needed supplementary stipulations, comparing them by alternative in accordance with 36 CFR 228.102(d). Available areas are also shown for each alternative on a map in the packet accompanying this *FEIS*. The leasing decisions are being made on that portion of the Forest with high oil and gas development potential and areas of interest. Leasing decisions are being made on the entire Grassland where the potential is uniformly high. These areas total 103,039 acres on the Sulphur and Redfeather Ranger Districts, and 192,542 acres on the Grassland. 58,113 acres have a deeded private mineral estate and the Forest Service will negotiate mitigations with the estate owner or operator. As this is a deeded right, the Forest Service cannot prohibit development. Leasing decisions will be made for the remaining 134,429 acres of federal

minerals. The BLM also manages leasing and development for 21,522 acres of federal minerals under private surface within the Grassland's administrative boundary. The Forest Service is consulted on leasing these areas where the adjacent Grassland may be affected by development.

### Lands Authorized for Lease

Acres authorized for leasing (in accordance with 36 CFR 228.102(e)) in the alternatives are summarized in Table 2.12.

**Table 2.12 Lands BLM is Authorized to Lease, at Both Budget Levels, ARNF and PNG**

| Alternative | Acres Authorized, ARNF | Acres Authorized, PNG[a] |
|---|---|---|
| A | 103, 039 | 134,308 |
| B | 103,039 | 131,569 |
| C | 103,039 | 131,569 |
| E | 103,039 | 131,569 |
| H | 0 | 121,620 |
| I | 103,039 | 134,308 |

[a] The PNG has 58,113 acres not included in this table because they have privately owned subsurface minerals which the BLM has no authority to lease.

The lands authorized for leasing on the ARNF are the same for Alternatives A, B, C, E, and I. However, the mitigation measures are more restrictive in Alternative B, less restrictive in Alternatives A and E, and least restrictive in Alternatives C and I. Alternative H does not authorize leasing for the ARNF.

For the PNG, Alternatives I and A offer the most land for leasing, followed by Alternatives B, C, and E. Alternative H offers the least and is the most restrictive in its mitigation requirements. Alternatives E and B are less restrictive and Alternatives A, C, and I are the least restrictive. Chapter Three gives full details.

## REVISION TOPIC: RECREATION-RELATED TOPICS

### Developed Recreation

Developed recreation includes all recreational activities that take place on a developed recreation site. These are usually small, distinctly defined areas where facilities such as campgrounds, picnic areas, and visitor information centers are provided for concentrated public use. Many of these facilities in the Forests and Grassland are in substandard condition from years of use

beyond their capacities and from cutbacks in staffing and maintenance. The developed recreation program includes operation and maintenance activities (such as law enforcement, collection of recreation use fees, and providing information), repair or reconstruction of existing sites, construction of new sites, and facilities or programs for public interpretation of all resources.

Developed recreation use on the Forests and Grassland is expected to increase 31.4 percent through the year 2005. Facilities are filled to capacity on most weekends from Memorial Day to Labor Day. At developed sites within areas of national significance such as the Arapaho National Recreation Area, facilities are filled to capacity on many summer weekdays as well. The following displays existing capacity and projected use needs on the Forests and Grassland.

**Table 2.13 Present Facility Capacity and Estimated Needs to Meet Future Use, ARNF-PNG**

| Type of Development | 1993 Use MRVD[a] | Est. 2005 Use MRVD[a] | Deficit or Need to Reconstruct Units | Deficit or Need for New Units |
|---|---|---|---|---|
| Campground | 558 | 677 | 550-700 | 150-250 |
| Picnic Ground | 135 | 180 | 75-150 | 75-150 |
| Information and Education Activities | 162 | 266 | | |

[a] Thousand recreation visitor days

Tables 2.14 and 2.15 show how each alternative meets estimated developed recreation needs based on reconstruction of existing facilities and construction of new facilities. The number of units constructed or reconstructed is based on the budget level and the emphasis of each alternative on recreation.

**Table 2.14 Developed Recreation Facilities Reconstructed at Full and Experienced Budget Levels**

| Type of Development | Alternative | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | E | H | I |
| | (Full/experienced budget) | | | | | |
| Camp Sites | 449/449 | 600/480 | 89/89 | 806/806 | -4/-4 | 89/89 |
| Picnic Sites | 59/59 | 135/108 | 24/24 | 170/47 | 31/31 | 24/24 |
| Interp. Sites | 6/6 | 15/12 | 1/1 | 20/0 | 4/4 | 1/1 |

**Table 2.15 Developed Recreation Facilities Constructed at Full and Experienced Budget Levels**

| Type of Development | Alternative | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | E | H | I |
| | (Full/experienced budget) | | | | | |
| Camp Sites | 0/0 | 178/0 | 200/200 | 0/0 | 9/9 | 200/200 |
| Picnic Sites | 0/0 | 68/0 | 0/0 | 0/0 | 2/2 | 0/0 |
| Interp. Sites | 5/5 | 5/0 | 5/5 | 0/0 | 5/5 | 5/5 |

### Dispersed Recreation

Dispersed recreation includes all recreational activities that occur anywhere on the Forests and Grassland outside developed recreation sites. Visitors may travel on horseback, foot, skis, snowshoes, mountain bikes, snowmobiles, motorcycles, automobiles and four-wheel or all-terrain vehicles. They engage in recreational activities such as backpacking, hiking, camping, fishing, hunting, four-wheeling, or just enjoying the unique Forest and Grassland scenery. The dispersed recreation program includes maintaining trails, trailheads, and backcountry campsites (called "designated dispersed campsites"); enforcing the law; and providing information to users.

Dispersed recreation use is expected to increase 42.4 percent through the year 2005. The key limitation to dispersed recreation lies primarily in access (roads, trails, and how they are administered), and the availability of trailhead parking, dispersed campsites, and specific information.

Tables 2.16 and 2.17 show how each alternative meets estimated dispersed recreation needs based on reconstruction or new construction of support facilities. The Recreation Section of Chapter Three gives further details.

**Table 2.16 Dispersed Recreation Facilities Reconstructed at Full and Experienced Budget Levels**

| Type of Development | Alternative | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | E | H | I |
| | (Full/experienced budget) | | | | | |
| Dispersed Site Designation | 0/0 | 600/0 | 1/1 | 1/0 | 0/0 | 1/1 |
| Trailhead Vehicle Capacity | 316/316 | 750/0 | 0/0 | 750/0 | 70/70 | 50/50 |

In Alternatives B and E, budget constraints at experienced budget levels do not allow the Forest to reconstruct trailheads for additional parking or reconstruct designated dispersed campsites. New units or trailhead parking facilities are reconstructed in Alternatives A, C, H and I.

**Table 2.17 Dispersed Recreation Facilities Constructed at Full and Experienced Budget Levels**

| Type of Development | Alternative | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | E | H | I |
| | (Full/experienced budget) | | | | | |
| Dispersed Site Designation | 154/154 | 300/0 | 17/17 | 705/0 | 685/685 | 3/3 |
| Trailhead Vehicle Capacity | 350/350 | 380/0 | 350/350 | 390/0 | 350/350 | 350/350 |

In Alternatives B and E, the budget constraints at experienced budget levels do not allow the Forest any new construction unless priorities change; new construction is provided for in Alternatives A, C, H and I.

### Wild and Scenic Rivers

Four streams are eligible for inclusion in the National Wild and Scenic River System (NWSRS). Suitability evaluation reports were prepared to determine whether eligible segments would be appropriate additions to the NWSRS. The suitability evaluation compared several options for managing each river. These options were then carried forward into the revision process and applied to the six revision alternatives. The following table displays the miles of recreational and wild river recommended by each alternative.

**Table 2.18 Miles of River Recommended for Inclusion in the National Wild and Scenic River System**

| Classification | Alternative | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | E | H | I |
| **North Fork of the Cache la Poudre River** | | | | | | |
| Recreational | 0 | 12 | 0 | 12 | 12 | 0 |
| Scenic | 0 | 0 | 0 | 0 | 0 | 0 |
| Wild | 0 | 18 | 0 | 18 | 18 | 0 |

| North St. Vrain, Rock and Cabin Creeks | | | | | | |
|---|---|---|---|---|---|---|
| Recreational | 0 | 0 | 0 | 0 | 0 | 0 |
| Scenic | 0 | 0 | 0 | 0 | 0 | 0 |
| Wild | 0 | 0 | 0 | 14.4 | 0 | 0 |

### REVISION TOPIC: INVENTORIED ROADLESS AREAS

In 1983 the regulations for the *National Forest Management Act of 1976 (NFMA)* were revised. They required roadless and undeveloped areas to be evaluated for wilderness designation by Congress as part of the forest plan revision process. The Forest Service makes recommendations to Congress, then Congress has the option of designating an area as wilderness through the legislative process. These recommendations and designations are often controversial, and actual designation may take several years or may never happen at all.

Varied interpretations of the criteria in the *Wilderness Act* have led to controversy over the management of designated wilderness. Some people believe management should emphasize the natural processes and ecosystems in wilderness. Others believe in management that provides for public use and enjoyment, sometimes at the expense of the natural environment. Wilderness areas on the Forest differ in their naturalness. Some places are wild and not easily accessible. Others—for example, the Indian Peaks Wilderness west of Boulder—have trails where several hundred visitors can be encountered on a single summer afternoon. Forest Service management strategy in wilderness areas will focus on ecological integrity while providing acceptable levels of use.

The Forest evaluated 330,230 acres in 38 Roadless Areas (RA) for possible recommendations to Congress for designation. The areas and their acreages are shown in the following table, and evaluations of each are given in Appendix C. Geographic Information System (GIS) programs used for the roadless area analyses and for forestwide management area analyses yielded a small but not significant discrepancy in acres, as noted in Chapter Three.

**Table 2.19 Roadless Areas Evaluated in the Revision**

| **Areas Adjacent to Existing Wildernesses** | |
|---|---|
| Area Name | Total NFS Acres |
| Cache la Poudre Adjacent Area (1 unit) | 3,194 |
| Comanche Peak Adjacent Area (8 units) | 44,722 |
| Indian Peaks Adjacent Area (4 units) | 34,700 |
| Mount Evans Adjacent Area (4 units) | 10,280 |
| Neota Adjacent Area (1 unit) | 2,169 |
| Never Summer Adjacent Area (1 unit) | 20,082 |
| Rawah Adjacent Area (1 unit) | 2,779 |
| Vasquez Adjacent Area (1 unit) | 6,132 |
| Subtotal | 124,058 |
| **Areas Independent of Existing Wildernesses** | |
| Area Name | Total NFS Acres |
| Bard Creek | 25,382 |
| Cherokee Park | 7,787 |
| Crosier Mountain | 7,204 |
| Gold Run | 6,596 |
| Green Ridge East | 26,692 |
| Green Ridge West | 13,639 |
| Grey Rock | 12,150 |
| Hell Canyon | 5,924 |
| James Peak | 26,044 |
| Kelly Creek | 8,193 |
| Lion Gulch | 6,575 |
| Mount Sniktau | 8,316 |
| North Lone Pine | 9,469 |
| North Saint Vrain | 11,718 |
| Square Top Mountain | 6,443 |
| Troublesome | 13,832 |
| White Pine Mountain | 10,208 |
| Subtotal | 206,172 |
| Total for both categories | 330,230 |

No wilderness has been designated on the Pawnee National Grassland. Roads and two-track routes exist throughout the Grassland and Weld County holds a public road right-of-way on all section lines. Additionally, 30 percent of the Grassland has private mineral estates where surface occupancy for mineral development cannot be prohibited.

The six alternatives vary widely in their recommendations for the Roadless Areas. As shown in Table 2.20 a great variety of allocations has been recommended, according to management area criteria defined in Chapter Three of the *Forest Plan.* Reasons for the selections shown here are presented in *FEIS* Appendix C.

**Table 2.20 Management Area Allocations for All Roadless Areas by Alternative**

| Management Area Allocations | Alternatives | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | E | H | I |
| 1.2 Wilderness Recom. | 0 | 8,551 | 0 | 0 | 226,154[a] | 0 |
| 1.3 Backcountry Rec. | 101,817 | 100,968 | 52,072 | 94,742 | 6,445 | 0 |
| 1.41 Core Habitats | 0 | 2,461 | 0 | 0 | 50,051 | 0 |
| 1.42 Core Restoration | 0 | 0 | 0 | 0 | 7,265 | 0 |
| 1.5 Wild Rivers | 76 | 76 | 76 | 6,446 | 76 | 76 |
| 2.2 Research Nat. Area | 154 | 9,230 | 154 | 154 | 0 | 0 |
| 3.1 Special Interest Area | 21,536 | 44,291 | 21,536 | 21,536 | 0 | 2,794 |
| 3.21 Limited Use | 0 | 0 | 0 | 0 | 7,615 | 0 |
| 3.3 Backcountry Motor | 6,955 | 18,723 | 16,664 | 96,345 | 3,912 | 83,393 |
| 3.5 Flora and Fauna | 88,079 | 83,804 | 62,587 | 19,737 | 500 | 55,918 |
| 3.55 Corridors | 0 | 0 | 0 | 0 | 9,886 | 0 |
| 4.2 Scenery | 0 | 8,354 | 8,115 | 8,115 | 0 | 8,102 |
| 4.3 Disp. Recreation | 25,098 | 19,869 | 17,982 | 63,609 | 5,386 | 17,890 |
| 4.4 Recreation Rivers | 10,468 | 10,468 | 10,468 | 10,468 | 10,468 | 10,468 |
| 5.11 Forest, Int. Range | 7,580 | 8,504 | 47,489 | 0 | 374 | 86,433 |
| 5.13 Forest Products | 61,451 | 266 | 68,822 | 0 | 0 | 52,774 |
| 5.5 Dispersed Rec. Forest Products | 0 | 9,128 | 17,852 | 2,580 | 0 | 1,230 |

| Management Area Allocations | Alternatives | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | E | H | I |
| 7.1 Intermix | 0 | 14 | 14 | 14 | 859 | 0 |
| 8.21 Dev. Rec. Complex | 426 | 1,141 | 1,563 | 1,648 | 1,208 | 5,991 |
| 8.22 Ski-based resorts | 6,624 | 4,414 | 4,867 | 4,867 | 62 | 5,193 |
| **TOTAL**[b] | 330,264 | 330,262 | 330,261 | 330,261 | 330,261 | 330,262 |

[a] Alternative H recommended an additional 33,209 acres for designation that were not located in the analyzed RAs. The total acreage recommended is 259,363.
[b] Acres vary due to rounding of numbers.

These allocations affect primarily the number of acres suitable for timber harvest and mineral development. The Allowable Sale Quantity (ASQ) of timber that would be lost to wilderness designation is shown in Table 2.21. For further discussion of ASQ, see the Timber sections immediately following this section and in Chapter Three.

**Table 2.21 ASQ Lost in Roadless Areas Recommended for Wilderness**

| Alternative | Acres of Suitable Timber in Areas Recommended for Wilderness | ASQ Lost/year (MMBF)[a] |
|---|---|---|
| A | 0 | 0 |
| B | 6,435 | .353 |
| C | 0 | 0 |
| E | 0 | 0 |
| H | 145,323 | 7.416 |
| I | 0 | 0 |

[a] Millions of board feet

Opportunities for mineral development in the roadless areas are shown in Table 2.22. Wilderness, wild river corridors, and other management areas in Alternative H are withdrawn from mineral entry and leasing. Research Natural Areas may be withdrawn. The oil and gas leasing decisions in roadless areas are discussed in the Minerals and Geology section of Chapter Three.

**Table 2.22 Acres Not Available and Acres Available for Mineral Development in Roadless Areas by Alternative**

| Alt. | Not Available (Recommended for Wilderness) | Not Available in Other Management Areas | Total Not Available for Mineral Development | Total Available for Mineral Development |
|---|---|---|---|---|
| A | 0 | 21,766 [a] | 21,766 | 308,496 |
| B | 8,551 | 53,597 | 62,148 | 268,114 |
| C | 0 | 21,766 [a] | 21,766 | 308,496 |
| E | 0 | 28,136 [a] | 28,136 | 302,126 |
| H | 226,154 | 62,278 [b] | 293,432 | 36,830 |
| I | 0 | 2,870 | 2,870 | 327,392 |

[a] Management Areas 1.5 (Wild Rivers), 2.2 (RNAs), and 3.1 (SIAs), (See *Forest Plan*, Chapter Three).
[b] Management Areas 1.41 (Existing Core Habitats), 1.42 (Core Habitats - Restoration), 1.5 (Wild 2.2 (RNAs) Rivers), and 3.55 (Corridors Connecting Core Areas), (See *Forest Plan*, Chapter Three.)

Alternative H has the most acreage withdrawn from mineral development, 293,432 of the 330,262 acres in roadless areas. Alternative B withdraws 62,148 acres.

### REVISION TOPIC: TIMBER RELATED TOPICS

Timber management and harvesting are important tools for managing biological diversity and ecosystems, forest insect and disease populations, tree growth and yields, recreation settings, wildlife habitat, and potential wildfire hazard. Timber harvesting also provides forest products which help support local wood-processing industries and communities. It also helps meet the demands of the local public for products such as fuelwood, transplants, Christmas trees, post and poles. Public interest in timber management on the Arapaho and Roosevelt National Forests is high.

The major concerns with timber management are determining where timber harvesting should occur, how much should be harvested, and by what methods. The location of suitable lands generally defines where timber harvesting will occur. The number of inventoried roadless area acres that are suitable and available for timber harvest bears directly on total harvest yield. Information on roadless areas is contained in the section just preceding this and in Chapter Three and Appendix C of this *FEIS*.

The quantity of timber that may be harvested is represented by the Allowable Sale Quantity (ASQ), a calculation of the maximum amount of timber harvest which can occur in a planning period. The ASQ is formulated by considering the suitable timber land base, management area objectives, desired conditions, the management requirements in NFMA regulations (36CFR 219.27) and forestwide standard and guidelines. Tables 2.23 and 2.24 show the amount of suitable land by forest cover type and the ASQ for each alternative. All effects described assume a full-implementation budget level.

**Table 2.23 Suitable and Available Acres by Forest Cover Type**

| Forest Cover Type | Alternatives | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | E | H | I |
| Lodgepole pine | 233,569 | 140,206 | 247,510 | 33,174 | 17,179 | 212,846 |
| Spruce/fir | 57,745 | 35,429 | 72,173 | 9,939 | 3,996 | 69,012 |
| Ponderosa pine | 56,625 | 9,894 | 59,729 | 0 | 178 | 23,215 |
| Douglas-fir | 17,362 | 3,378 | 19,905 | 0 | 0 | 6,501 |
| **TOTAL** | 365,301 | 188,907 | 334,357 | 43,113 | 21,353 | 310,574 |

**Table 2.24 Sawtimber Volume (Thousand Board Feet) Harvested per Year (First Five Decades) at Full Budget Level**

| | Alternatives | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | E | H | I |
| Volume MBF (ASQ) | 16,800 | 6,668 | 18,400 | 1,900 | 900 | 14,200 |

Alternative A will have the greatest longterm impact from timber harvesting of any of the alternatives because it allocates the largest area of suitable land. Alternative C has a similar overall impact but allocates more acres for harvest the first fifty years and will have the highest ASQ for the same period. Alternative I is slightly lower in ASQ while Alternative B is considerably less and Alternatives E and H are the lowest.

Methods of timber harvesting and the resultant reestablishment of trees in the harvested areas are another concern of timber management. There are two major regeneration methods: even-aged, where the trees in the harvest area are generally the same size and age, and uneven-aged or all-aged, where the trees in the harvest area are all sizes and ages. Most concern centers on the amount of clearcutting (an even-aged method) that the Forest should use. Some people believe that clearcutting is an acceptable practice that fits the way many tree species grow in the Forest.

Others believe that clearcutting is unacceptable because of the resulting appearance and associated environmental effects. They would prefer that the forest use either uneven-aged methods or other even-aged methods such as shelterwoods. Fuller discussion is given in the Timber Section of Chapter Three. Table 2.25 displays the projected annual average harvest acres for the first five decades (50 years) by alternative.

**Table 2.25 Average Acres Harvested by Silvicultural System per Year (First Five Decades) at Full Budget Level**

| Silvicultural Method | Alternatives | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | E | H | I |
| Clearcut | 745 | 479 | 878 | 189 | 75 | 1216 |
| Shelterwood | 2,342 | 474 | 2,085 | 39 | 70 | 70 |
| Group Selection | 132.00 | 1 | 345 | 4 | 0 | 251 |
| Special[a] | 0 | 239 | 0 | 0 | 0 | 0 |
| **TOTAL ACRES** | 3,219 | 1,193 | 3,308 | 232 | 145 | 1,537 |

[a] Conventional silvicultural methods applied in special situations, primarily in Management Areas 3.5 and 4.3. The anticipated result is reduced volume removed per harvest entry.

In all alternatives harvesting will be dominated by an even-aged management system, with either a clearcut or shelterwood harvest method. All of the clearcutting will be in lodgepole pine stands. These stands respond best to this harvest method in areas that are prone to windthrow, infested with dwarf mistletoe, and unsuited to a shelterwood harvest. Alternative C treats the most acres under an uneven-aged system through group selection in spruce/fir and ponderosa pine/Douglas-fir forests.

### Revision Topic: Travel Management

The road and trail system on the Forests and Grassland provides most of the access for both management and recreational activities. The diversity of Forest users who expect and demand recreational travel experiences throughout the Forests and Grassland is increasing. Conflicts from increased use are becoming more noticeable to users and impacts on resources are becoming more apparent. In a multiple use forest, it is not appropriate to provide for all uses on every acre. The correct guiding principle is to allocate the land base to the best combination of uses each area can support, while still looking "holistically" at all uses. Successful travel management planning achieves a balance of uses on a landscape basis.

A Forest Development Road (FDR) or Trail (FDT) is defined as a road or trail under jurisdiction of the Forest Service. Additional roads and trails under state, county and private jurisdiction

within the Forest boundary provide access to and through the Forest. Most of these roads were examined more closely in regard to resource analysis than to forest travel management analysis.

Development and management of the Forest's road and trail system is governed by management area prescriptions defined in Chapter Three of the *Forest Plan.* These prescriptions specify the design standard, type of use and season of use for roads and trails. Geographic area descriptions (Chapter Two of the *Forest Plan*) focus on a few key priorities in order to provide effective guidance to project-level decisions, including decisions related to travel management.

**Table 2.26 Miles of Travelways Expected at the End of the First Decade at Experienced Budget Level, ARNF-PNG**

| System | Existing | Alternative | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | B | C | E | H | I |
| FDR | 2,546 | 2,595 | 2,691 | 2,628 | 2,594 | 2,322 | 2,634 |
| FDT | 722 | 759 | 775 | 739 | 739 | 745 | 740 |

The table reflects the rate of travel management implementation and shows that Alternative B gives travel management the highest priority. Other alternatives carry a proportionally larger amount of implementation into the second decade.

## Roads

All major access roads, known as arterial and collector roads, comprise about 12 percemt of the FDR system. They are already in place on the Forests and Grassland with little or no new construction anticipated. Approximately one mile is reconstructed per year in all alternatives.

Local roads provide access from arterial and collector roads to specific areas of the Forests and Grassland. These roads range from light-duty dirt and gravel roads for trucks or passenger cars to roads that are a challenge to drive and are managed for high-clearance four-wheel-drive vehicles. Local roads comprise about 88 percent of the FDR system and are the roads most influenced by each alternative's travel management strategy.

All alternatives provide the necessary road access for resource development, utilization, and any other activities undertaken to change the existing condition of the vegetation. The minimal construction required for new timber roads will be of three kinds. One kind of road would become an addition to the FDR system. At this level of planning about 30 percent of new road miles would be managed for motorized use after timber harvests are completed. The second category of new roads is "replacement" roads located strategically to replace existing FDRs that are in bad locations. For every new replacement mile built, a mile of existing FDR will be

obliterated, and the category results in no net FDR system increase. The last category of new roads is temporary roads built specifically for timber removal and obliterated after timber activity has taken place. Specific travel management strategies for FDRs will be determined at the project-level planning stage. Construction of new roads and reconstruction of existing roads to support experienced and full budget levels of timber extraction during the first decade would vary by alternative as shown in Table 2.27.

**Table 2.27 Miles of Timber Road Construction and Reconstruction at Experienced and Full Budget Levels, ARNF-PNG, First Decade**

| Timber Related | Alternative | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | E | H | I |
| FDR Construction | 17/22 | 12/16 | 27/34 | 3/5 | 0.3/0.4 | 25/32 |
| FDR Replacement | 23/30 | 17/22 | 11/14 | 2/3 | 3/4 | 15/19 |
| Temporary | 17/22 | 12/16 | 16/21 | 1/2 | 0/0.1 | 10/13 |
| FDR Reconstruction | 180/230 | 100/130 | 170/200 | 20/30 | 10/10 | 150/190 |

## Trails

Proactive management of the trail system is planned and may incorporate some change of user mix to eliminate conflicts or mitigate resource damage. There will be emphasis on creating more opportunities for mountain bicycles and motorized users. Like the road system, the existing trail system will be analyzed at the geographic area level for type and volume of use, whether trails should remain open year-long or only seasonally and be relocated or obliterated because of wildlife and resource impacts. All alternatives provide reconstruction and maintenance of trails to maintain soil and water quality.

As displayed in Table 2.28 below, the Forest is planning an aggressive trail management program with emphasis on responding to geographic area direction. This program will manage the motorized and nonmotorized trail system that has suffered from a lack of proper signing, maintenance and enforcement. Aggressive funding and partnerships will be sought to meet funding needs. Demands, capacities, and existing opportunities will be considered when finalizing the trail management program to emphasize the highest priority needs and the widest range of the users' desires.

**Table 2.28 Miles of Trail Construction and Reconstruction at Experienced and Full Budget Levels, ARNF-PNG, First Decade**

| | Alternative | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | E | H | I |
| FDT Construction | 25/50 | 20/20 | 0/0 | 0/47 | 10/20 | 0/0 |
| FDT Reconstruction | 144/288 | 30/90 | 154/308 | 574/574 | 213/426 | 154/308 |
| FDT Maintenance[a] | 349/759 | 430/895 | 366/776 | 372/782 | 390/799 | 397/806 |

[a] Includes approximately 200 miles by volunteer groups

## OHV Routes

OHVs are currently permitted on all "level-2" roads open to motorized use. Level-2 roads are primarily light-duty dirt, unimproved and four-wheel-drive roads. The ARNF has opted to require all OHV routes to be designated (signed) as open to OHV use. The Forest believes that this signing policy will clearly communicate intended uses, enable management of the OHV system by concentrating appropriate maintenance procedures before resource damage occurs and enforce inappropriate use. This will also allow user groups to apply for and obtain grant money to participate in OHV route management. At this level of planning, it is difficult to identify specific FDRs and FDTs that would contribute to the designated OHV system mileage projected to be available by the end of the planning period. Currently OHV use occurs on 984 miles of FDRs, 65 miles of FDTs and 221 miles of nonsystem "ways" created informally over time by motor recreationists. Each geographic area has been analyzed for the combination of uses each can support. Decisions were made from both a holistic and a geographic area perspective by considering existing travel modes, expected demand, potential higher-end challenge-level opportunities and critical resource concerns.

The majority of potential OHV mileage consists of "designation" of roads and trails that are currently being used as OHV routes. Conversion of "ways" which have the greatest potential for a designated OHV system will contribute some additional mileage. Final determination of specific OHV opportunities is subject to guidance of the *Forest Plan* as travel management plans, budgets and partnerships with user groups are developed. Emphasis on creation of connecting OHV routes and loop-route opportunities will be considered for year-round and seasonal use and will conform to *Forest Plan* direction. Several candidates for key "connector" and "high challenge" routes have been identified.

**Table 2.29 Percentage of Total Travel System Miles Open to OHV Travel by Alternative, Experienced Budget Level, ARNF**

| Travel Opportunities | Unit | Existing System | Alternatives | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | A | B | C | E | H | I |
| Designated OHV Travelways (includes potential OHV routes) | Total System Miles | 1049 | 1,070 | 1,263 | 1,135 | 1,135 | 751 | 1,152 |
| | Percent of Travelways Open to OHV Use | 39 | 38 | 43 | 40 | 40 | 29 | 40 |

### Nonsystem "Way" Inventory

Table 2.30 shows how nonsystem travelways are likely to be managed under each alternative in the first decade. In all alternatives, "ways" converted to a road or trail will have closures either year-round (for some uses) or seasonally. Alternative B has the least remaining miles at the end of the decade because it provides more funding for travel management implementation to progress rapidly. The other alternatives give higher priorities to other activities, resulting in a less aggressive travel management program. In all alternatives, "way" miles not converted to the transportation system will be scheduled for obliteration as funding allows. All "ways" scheduled for obliteration will be closed to public motorized use by signing, education and enforcement until they have been obliterated.

**Table 2.30 "Way" Miles at Experienced and Full Budget Levels, ARNF-PNG, First Decade**

| Class[a] | Alternative | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | E | H | I |
| Inventoried Way Miles | 690 | 690 | 690 | 690 | 690 | 690 |
| Way Conversion to Roads | 89/120 | 190/190 | 112/160 | 104/260 | 0/0 | 128/160 |
| Way Conversion to Trails | 11/11 | 30/60 | 17/22 | 17/22 | 10/10 | 18/23 |
| Way Obliteration | 150/210 | 360/440 | 170/250 | 170/250 | 233/334 | 170/250 |
| Remaining Way Miles | 440/349 | 110/0 | 391/258 | 399/158 | 447/346 | 374/257 |

[a] Miles are *approximate*, based on preliminary analysis at the geographic area level. Decisions on specific "ways" will be made as Ranger District travel management plans are developed.

## REVISION TOPIC: WATER YIELD AND INSTREAM FLOWS

Waters originating on the Forest provide for many and often conflicting uses. Many people depend on the Forest to supply water for municipal and agricultural use. Streams and riparian areas provide favored recreation sites for anglers, campers, rafters, and other recreationists. The same streams and riparian areas also provide habitat for a variety of aquatic and terrestrial plants and animals.

### Water Yield

Water yield increases from vegetation management are of great interest to many of those who depend upon water originating from the Forest. The current demand for water is greater than the supply. The Forest provides water not only for municipal and agricultural use but also contributes flow for endangered species as far downstream as the Platte River in Nebraska.

Removal of trees can increase water available for streamflow by reducing evapotranspiration and increasing snowpack accumulation into the openings (Alexander et al. 1985). Consequently, the two major forest management activities which influence water yield are timber harvest and fire.

The increase in water yield caused by timber harvest or fire is determined largely by the amount of precipitation that occurs on a site. Treatment in spruce-fir forest yields the greatest water increases per unit area because spruce-fir typically occupy the wetter sites. Increases are smaller for treatment of lodgepole pine and smallest for ponderosa pine. Increases in streamflow from vegetation management are not permanent. As an area is restocked and the trees grow, water that was available for streamflow is slowly redirected back to evapotranspiration. Research at the Fraser Experimental Forest indicates that water yield increases from timber harvest persist at declining levels for approximately 80 years (Troendle and King 1985).

Both wildland and prescribed fire can have a considerable effect on water yield. It is estimated that wildland fires will burn approximately 1,100 acres per year for each alternative except Alternative H, where 2,200 burned acres are expected. An additional 6,000 acres of forested land will be treated through prescribed fire, as discussed in the Fire Section of Chapter 3. For Alternatives B, E, and H, the water yield increase caused by fire will exceed that caused by timber harvest.

**Table 2.31 Estimated Water Yield Increase by Alternative (Acre Feet per Year) at the Experienced Budget Level**

| | Alternatives | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | E | H | I |
| Harvest Volume (MBF) | 17,576 | 6,668 | 19,369 | 2,036 | 1,017 | 14,855 |
| Water Yield from Timber Harvest | 2,048 | 777 | 2,256 | 237 | 118 | 1,731 |
| Water Yield from Fire | 1,614 | 1,614 | 1,614 | 1,614 | 2,190 | 1,614 |
| Total Water Yield Increase (AF/yr) | 3,662 | 2,391 | 3,870 | 1,851 | 2,308 | 3,345 |

The total annual water yield from the Forests is approximately two million acre feet, so the expected water yield increases range from 0.1 to 0.2 percent of the annual yield. It should be noted that the present water yield of the Forests includes water yield increases from past and current vegetation management. While timber harvest declined under the 1984 *Forest Plan* to a low of 2,244 MBF in 1995, the average annual harvest volume for the period 1976-1994 was 14,647 MBF. This volume is greater than the projected volume for all alternatives except A, C, and I. As the water yield from past harvest diminishes, water yield increases from planned harvests in Alternatives B, E, and H will be insufficient to make up the difference, and total water yield from the Forest will decline slightly. However, as just noted, water yield increases from vegetation management make up only a small fraction of the total water yield from the Forest.

### Instream Flows

All streams on the Arapaho and Roosevelt National Forests are over-appropriated; that is, water users hold more water rights on paper than water flowing in the streams can satisfy. Growth of communities and the demand for water along the Front Range have reached the point where there may be insufficient water flow left in stream channels to maintain the physical, biological and chemical elements of habitat necessary for many aquatic species, or even to maintain channel stability. Habitat for aquatic management indictor species is affected by insufficient flows.

The 1984 *Forest Plan* recognized the need to provide for water resource development for people's needs while maintaining at least minimum standards to protect fish and stream channels. Since 1991, the Forest has reviewed water-use permits to ensure that aquatic habitats and stream channels are maintained and to assess whether the uses are meeting *Forest Plan* standards. Some users have agreed to the concept of resource protection flows. The revised *Forest Plan* contains new standards to maintain flow in perennial streams and to restore flow in some impacted streams. The new standard and design criteria for instream or bypass flows are discussed in the Aquatic and Riparian section of Chapter Three and apply to all alternatives.