



# Final Environmental Impact Statement

## White River National Forest Travel Management Plan



Eagle, Garfield, Gunnison, Mesa, Moffat, Pitkin, Rio Blanco, Routt,  
and Summit Counties, Colorado

United States  
Department of  
Agriculture

**Forest Service**

White River  
National Forest

March 2011

## Mission

---

The mission of the USDA Forest Service is to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations.

**Motto: Caring for the Land and Serving People**



The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14<sup>th</sup> and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.

**White River National Forest  
Travel Management Plan  
Final Environmental Impact Statement**

Eagle, Garfield, Gunnison, Mesa, Moffat, Pitkin, Rio Blanco, Routt, Summit Counties  
**Colorado**

**Lead Agency:** **USDA Forest Service**  
**Responsible Official:** **Scott G. Fitzwilliams, Forest Supervisor**  
White River National Forest  
P.O. Box 948  
Glenwood Springs, CO 81602  
(970) 945-2521

**For information, contact:** **Wendy Haskins, Transportation Planner**  
White River National Forest  
P.O. Box 948  
Glenwood Springs, CO 81602  
(970) 945-3303

**Abstract:** The action proposed by the U.S. Department of Agriculture (USDA), Forest Service, in this document, is to present a comprehensive travel management plan for the White River National Forest. The travel management plan and supporting environmental impact statement (EIS) present ways to accommodate and balance the transportation needs of the public and provide adequate access for forest and resource management, while still allowing for protection of natural resources.

This EIS was written to address the need to:

- Identify an official designated travel system on the White River National Forest;
- Identify what is not on the official designated travel system on the White River National Forest and be able to restore lands back to their natural state; and
- Designate a travel system that is aligned with the Forest Service mission, including the need to manage the land by providing a system that attempts to balance social and resource demands.

The objectives of the travel management plan are to:

- Bring summer and winter transportation systems into compliance with laws, regulations, agency or national direction, and the forest plan;
- Designate the forest road and trail system and eliminate through rehabilitating those that are not part of the system;
- Provide a travel plan that defines modes of travel across the forest by area and by route; and
- Identify resource solutions to impacts due to the transportation system, including routes identified for rehabilitation.

The deciding official will be making the following decision:

- 1) Designation of the summer road and trail system:
  - a) Defining the designated forest roads and trails;

- b) Defining what modes of travel are accepted on each road and trail;
  - c) Deciding whether to incorporate or rehabilitate user-created routes; and
  - d) Determining if certain forest routes are no longer needed as part of the system and identifying those for rehabilitation.
- 2) Designation of winter uses:
- a) Designating open areas and routes for motorized use by vehicles made for over-snow travel.

This environmental impact statement, maps, and all associated documents are available on CD from the White River National Forest Supervisor's Office or online at:  
<http://www.fs.usda.gov/whiteriver>.

## Table of Contents

<b>Table of Contents .....</b>	<b>i</b>
<b>Summary .....</b>	<b>1</b>
<b>Chapter 1: Purpose of and Need for Action .....</b>	<b>4</b>
Introduction.....	4
Background .....	5
Legal and Administrative Framework .....	7
Purpose and Need for Action .....	8
Proposed Action.....	10
Decision Framework.....	10
Decisions to be Made.....	19
Public Involvement .....	20
Issues.....	22
Valid Outstanding Rights.....	23
<b>Chapter 2: Alternatives .....</b>	<b>25</b>
Introduction.....	25
Development of Alternatives .....	25
Important Points Shared By All Alternatives .....	25
The Alternative Development Process.....	30
Alternatives Considered but Eliminated from Detailed Study.....	33
Alternatives Considered in Detail.....	36
Comparison of Alternatives .....	39
Monitoring .....	43
<b>Chapter 3: Affected Environment and Environmental Consequences .....</b>	<b>46</b>
Air Resources.....	47
Domestic Livestock Grazing.....	50
Fire Management .....	53
Heritage Resource Management/Tribal Interests.....	55
Minerals .....	60
Noxious Weeds .....	63
Recreation Management .....	66
Roadless Areas.....	98
Scenery Management.....	101
Soils and Geology .....	107
Timberland Vegetation Management .....	111
Transportation and Infrastructure .....	115
Watershed Resources .....	136
Wilderness .....	154
Wildlife, Aquatic Species, and Rare Plants .....	160
Short-term Uses and Long-term Productivity .....	223
Irreversible and Irretrievable Commitments of Resources .....	223
Cumulative Effects .....	223
<b>Chapter 4: Consultation and Coordination .....</b>	<b>226</b>
Preparers and Contributors .....	226
Distribution of the Final Environmental Impact Statement .....	227

<b>Index</b> .....	228
<b>Appendix A: Acronyms and Glossary</b> .....	A1
Acronyms.....	A1
Glossary .....	A2
<b>Appendix B: Relevant Federal and State Statutes and Other Regulations</b> .....	B1
Statutes.....	B1
Regulations .....	B3
Executive Orders.....	B3
State and Local Laws .....	B3
Forest Service Directives .....	B3
Agreements .....	B4
<b>Appendix C: Literature Cited and Other References</b> .....	C1

## Index of Figures

Figure 1.1—Location of White River National Forest .....	5
Figure 3.1—Forest visitor use by activity, 2002.....	71
Figure 3.2—Allocation of recreation visitor days (RVD) in top ten recreation activities on the White River National Forest, 2002 .....	72
Figure 3.3—Acres in each ROS class: Summer, White River National Forest.....	76
Figure 3.4—Acres in each ROS class: Winter, White River National Forest. ....	76
Figure 3.5— Number of hunting recreation days on the White River National Forest .....	80
Figure 3.6— Number of hunters by hunting season on the White River National Forest .....	80
Figure 3.7—Total miles of all level 2 and 3 roads and trails by alternative .....	86
Figure 3.8—Opportunities available for quality recreation experiences by activity by alternative.....	88
Figure 3.9—Recreation trail opportunities by alternative.....	90
Figure 3.10—Quality Recreation Opportunity Capacity, in PAOTs, on roads and trails by user type. Not including capacity on Level 4 and 5 roadways.....	91
Figure 3.11—Demand by user type .....	92
Figure 3.12—Supply balance among types by alternative.....	94
Figure 3.13—Motorized winter strategy by acres.....	96
Figure 3.15—Existing wilderness areas on the White River National Forest .....	155

## Index of Tables

Table 2.1—Summary of summer opportunity (roads and trails) in miles on the White River National Forest.....	39
Table 2.2—Summary of winter opportunities on the White River National Forest .....	40
Table 2.3—Summary of summer roads and trails under special use in miles on the White River National Forest .....	40
Table 2.4—Summary of road and trail decommissioning in miles on the White River National Forest.....	40
Table 2.5—Summary of road and trail in miles on the White River National Forest .....	40
Table 2.6—Comparison of key issues by alternative.....	41

Table 3.1—Miles of road by alternative (includes roads open to the public and special use roads) .....	48
Table 3.2—Miles of roads and trails open to the public within active grazing allotments on the White River National Forest .....	51
Table 3.3—Miles of roads and trails to be decommissioned within active grazing allotments on the White River National Forest .....	51
Table 3.4—Miles of roads and trails where a change in use is proposed on the White River National Forest.....	56
Table 3.5—Sites directly affected on the White River National Forest .....	57
Table 3.6—Measures for comparing potential for the spread of noxious weeds due to roads and trails.....	64
Table 3.7—Roads remaining in inventoried roadless areas.....	99
Table 3.8—Travel system in inventoried roadless areas .....	99
Table 3.9—Acres and percentage of forest at Existing Scenic Integrity (ESI) and Scenic Integrity Objective (SIO) .....	103
Table 3.10—Acres of unacceptably low existing scenic integrity needing rehabilitation to meet scenic integrity objectives .....	103
Table 3.11—Range of Soil Types found by Alternative by Smallest (Alternative GM) and Largest (Alternative NA) Footprint .....	108
Table 3.12—Range of Geology Types found by Alternative by Smallest (Alternative GM) and Largest (Alternative NA) Footprint .....	108
Table 3.13—Landscape stability ratings for travel routes on the system left as a footprint by acre.....	109
Table 3.14—Landscape stability ratings for travel routes on the system by mile .....	109
Table 3.15—ASQ Acreage within ¼ and ½ mile of roads .....	112
Table 3.16—Current miles of National Forest System roads by maintenance level* .....	117
Table 3.17—Miles of roads, by use, on the White River National Forest* .....	125
Table 3.18—Miles of trails available, by use, on the White River National Forest* .....	125
Table 3.19—White River National Forest road work accomplishments, in miles, for the past five years (2005 – 2009) .....	125
Table 3.20—Funding allocated to White River National Forest for roads (CMRD).....	126
Table 3.21—White River National Forest trail maintenance accomplishments, in miles, for the past four years (2006 – 2009) .....	128
Table 3.22—Funding allocated to White River National Forest for trails (CMTL).....	128
Table 3.23—Expected maintenance cycle of National Forest System roads on White River National Forest.....	131
Table 3.24—Expected maintenance cycle of National Forest System trails .....	132
Table 3.25—Relative cost rating for each alternative for transportation system activities ...	133
Table 3.26—Public Supply Watersheds on the White River National Forest .....	138
Table 3.27—Miles of National Forest roads and trails .....	143
Table 3.28—Number of watersheds under each density risk rating .....	145
Table 3.29—High and moderate risk road densities for selected watersheds, in miles per square mile (High risk densities are italicized in bold font) .....	145
Table 3.30—Miles of roads and trails within 300 feet of a stream channel .....	150
Table 3.31—Number of stream crossings by Level 1 and 2 roads and trails .....	151
Table 3.32—Acres of existing wilderness on the White River National Forest .....	156
Table 3.33—Miles of trail in each wilderness area on the White River National Forest .....	156
Table 3.34—Miles of system trails in wilderness areas, by alternative.....	158
Table 3.35—Miles of unauthorized (non-system) trails decommissioned or added to the system by alternative and wilderness area .....	158
Table 3.36—Dominant Vegetation Cover Types of the White River National Forest .....	161

Table 3.37—Structural Stages of Forest Habitats on the White River National Forest.....	162
Table 3.38—Species evaluated and their associated habitat types .....	165
Table 3.39—Key Indicators and Evaluation Measures for Wildlife, Fish, and Rare Plant Issues.....	170
Table 3.40—Habitat Security Area Blocks on the White River National Forest .....	180
Table 3.41—Density of Summer Roads, Trails, and User Created Routes by Use Type Across All Wildlife Habitats on the White River National Forest* (in miles per square mile)	181
Table 3.42—Winter Travelway Densities Across All Wildlife Habitats on the White River National Forest* (in miles per square mile).....	181
Table 3.43—Winter Snow Play Areas Across All Wildlife Habitats on the White River National Forest* (in percent of total habitat) .....	182
Table 3.44—Winter Management Strategy Areas Across All Wildlife Habitats on the White River National Forest* (in percent of total habitat) .....	183
Table 3.45—Density of Summer Roads, Trails, and User Created Routes by Use Type in Alpine Habitats on the White River National Forest* (in miles per square mile) .....	185
Table 3.46—Winter Travelway Densities in Alpine Habitats on the White River National Forest* (in miles per square mile).....	185
Table 3.47—Winter Snow Play Areas in Alpine Habitats on the White River National Forest* (in percent of total habitat).....	186
Table 3.48—Winter Management Strategy Areas Across Alpine Habitats on the White River National Forest* (in percent of total habitat) .....	186
Table 3.49—Density of Summer Roads, Trails, and User Created Routes by Use Type in Forest Habitats on the White River National Forest* (in miles per square mile) .....	188
Table 3.50—Winter Travelway Densities in Forest Habitats on the White River National Forest* (in miles per square mile).....	189
Table 3.51—Winter Snow Play Areas in Forest Habitats on the White River National Forest* (in percent of total habitat).....	189
Table 3.52—Winter Management Strategy Areas Across Forest Habitats on the White River National Forest* (in percent of total habitat) .....	190
Table 3.53—Density of Summer Roads, Trails, and User Created Routes by Use Type in Mixed Mountain Shrubland Habitats on the White River National Forest* (in miles per square mile).....	191
Table 3.54—Winter Travelway Densities in Mixed Mountain Shrubland Habitats on the White River National Forest* (in miles per square mile) .....	193
Table 3.55—Winter Snow Play Areas in Mixed Mountain Shrubland Habitats on the White River National Forest* (in percent of total habitat) .....	193
Table 3.56—Winter Management Strategy Areas Across Mixed Mountain Shrubland Habitats on the White River National Forest* (in percent of total habitat) .....	194
Table 3.57—Density of Summer Roads, Trails, and User Created Routes by Use Type in Grass/Forb Meadow Habitats on the White River National Forest* (in miles per square mile) .....	195
Table 3.58—Winter Travelway Densities in Grass/Forb Meadow Habitats on the White River National Forest* (in miles per square mile).....	196
Table 3.59—Winter Snow Play Areas in Grass/Forb Meadow Habitats on the White River National Forest* (in percent of total habitat) .....	196
Table 3.60—Winter Management Strategy Areas Across Grass/Forb Meadow Habitats on the White River National Forest* (in percent of total habitat) .....	197
Table 3.61—Density of Summer Roads, Trails, and User Created Routes by Use Type in Riparian Habitats on the White River National Forest* (in miles per square mile) .....	198
Table 3.62—Winter Travelway Densities in Riparian Habitats on the White River National Forest* (in miles per square mile).....	199

Table 3.63—Winter Snow Play Areas in Riparian Habitats on the White River National Forest* (in percent of total habitat).....	199
Table 3.64—Winter Management Strategy Areas Across Riparian Habitats on the White River National Forest* (in percent of total habitat) .....	200
Table 3.65—Miles of road and road density by alternative.....	203
Table 3.66—Miles of maintenance level 1 and 2 roads within 300 feet of streams and rivers, and the proportion of open roads and road closures within this area.....	203
Table 3.67—Subwatersheds on the White River National Forest with at least 5 miles of maintenance level 1 and 2 road within 300 feet* of a stream or river .....	204
Table 3.68—Number of maintenance level 1 and 2 road crossings by type of stream for each alternative.....	204
Table 3.69—Total road miles and road density (in miles per square mile) for all 6th level watersheds containing a conservation population of Colorado River cutthroat trout .....	206
Table 3.70—Comparison of roads and motorized trails in each alternative in watersheds containing a cutthroat trout population believed to be greenback cutthroat trout.....	206
Table 3.71—Allowed use by alternative that intersects potential Penland alpine fen mustard habitat.....	210
Table 3.72—Summary of environmental consequences to Penland alpine fen mustard by alternative.....	210
Table 3.73—Allowed use by alternative that intersects potential DeBeque phacelia habitat.....	211
Table 3.74—Summary of environmental consequences to DeBeque phacelia by alternative .....	212
Table 3.75—Allowed use by alternative that intersects potential Colorado hookless cactus habitat.....	213
Table 3.76—Summary of environmental consequences to Colorado hookless cactus by alternative.....	213
Table 3.77—Allowed use by alternative intersecting potential Ute ladies' tresses orchid habitat.....	214
Table 3.78—Summary of environmental consequences to Ute ladies' tresses orchid by alternative.....	215
Table 3.79—Travelway densities by alternative for lands within the Alpine Habitats on the White River National Forest .....	<b>Error! Bookmark not defined.</b>
Table 3.80—Travelway densities by alternative for lands within the Forested Habitats on the White River National Forest .....	<b>Error! Bookmark not defined.</b>
Table 3.81—Travelway densities by alternative for lands within the Mixed Mountain Shrub Habitats on the White River National Forest.....	<b>Error! Bookmark not defined.</b>
Table 3.82—Travelway densities by alternative for lands within the Grass/Forb Meadow habitats on the White River National Forest.....	<b>Error! Bookmark not defined.</b>
Table 3.83—Travelway densities by alternative for lands within the riparian habitats on the White River National Forest .....	<b>Error! Bookmark not defined.</b>

## SUMMARY

This travel management plan (TMP) and supporting environmental impact statement (EIS) will develop a travel system across the entire White River National Forest to accommodate and balance the transportation needs of the public and to provide adequate access for forest and resource management, while still allowing for protection of natural resources.

Based on public scoping, key issues were identified as:

- Volume and type of recreation access;
- Resolution of recreation conflict; and
- Protection of natural resources.

These issues led the agency to develop alternatives to address these concerns while meeting the purpose and need.

The purpose of this initiative is to identify the transportation system with the goal of balancing the physical, biological, and social values of the forest and its users. It responds to several needs noted below.

This action is needed to:

- Identify an official designated travel system on the White River National Forest;
- Identify what is not on the official designated travel system on the White River National Forest and be able to restore lands back to their natural state; and
- Designate a travel system that is aligned with the Forest Service mission, including the need to manage the land by providing a system that attempts to balance social and resource demands.

The objectives of the travel management plan are to:

- Bring summer and winter transportation systems into compliance with laws, regulations, agency or national direction, and the White River National Forest Land and Resource Management Plan, 2002 Revision, as amended (forest plan);
- Designate the forest road and trail system and eliminate through rehabilitating those that are not part of the system;
- Provide a travel plan that defines modes of travel across the forest by area and by route; and
- Identify resource solutions to impacts due to the transportation system, including routes identified for rehabilitation.

The decisions to be made are the:

3) Designation of the summer road and trail system:

- a) Defining the designated forest roads and trails;
- b) Defining what modes of travel are accepted on each road and trail;
- c) Deciding whether to incorporate or rehabilitate user-created routes; and

- e) Determining if certain forest routes are no longer needed as part of the system and identifying those for rehabilitation.
- 4) Designation of winter uses:
  - f) Designating open areas and routes for motorized use by vehicles made for over-snow travel.

This effort is an extension of earlier planning processes to update travel management direction along with revision of the forest plan. The draft forest plan, released for public comment in August 1999, contained a detailed travel management plan. The deciding official decided to separate the two planning processes and decisions due to the difficulty in reviewing both the travel management plan and forest plan decisions simultaneously and the desire for more time to review travel management. Planning information from the initial effort, including site-specific comments received during the comment period on the draft forest plan, was brought forward for consideration in this travel management plan.

The Notice of Intent (NOI) to prepare an environmental impact statement for the travel management plan was published in the *Federal Register* on August 27, 2002. The NOI asked for public comment on the proposal from August 27, 2002 to October 31, 2002.

The White River National Forest prepared and released for comment a draft environmental impact statement (DEIS) with alternatives for the proposed travel management plan in June 2006 for a 90-day comment period. The DEIS examined three action alternatives along with the no-action alternative, based on the key issues raised during scoping. The comments were considered and responses were prepared and presented. Although the DEIS did incorporate direction from the 2005 Final Rule for Travel Management: Designated Routes and Areas for Motor Vehicle Use (travel rule), clarification on implementation of the travel rule has now been more formalized both nationally and regionally.

Based on the original range of alternatives in the DEIS, the ability to better incorporate travel rule direction, and all the public comments received, the deciding official felt it was important to present a preferred alternative in a supplemental DEIS (SDEIS) for a 60-day public comment period. The preferred alternative in the SDEIS – Alternative G, was a reflection of a blend of the previously presented alternatives, public comment, and management implication due to the travel rule. The SDEIS provided an opportunity for the public to comment on a blended alternative that represented the Forest Service's preferred alternative based on the response to the DEIS. The SDEIS was an important planning step between the DEIS and this Final EIS in moving towards a final travel management plan.

The White River National Forest has now been able to incorporate the entire planning effort into this Final Environmental Impact Statement (FEIS) and travel management plan.

The FEIS contains an alternative designed to incorporate the minimal action required to be compliant with laws, regulations and the forest plan. In the FEIS, this is labeled Alternative F (in the DEIS this was Alternative B, and in the SDEIS this was Alternative F). This alternative has incorporated corrections to the baseline system that were presented by internal and external parties.

The no-action alternative, Alternative A, represents current conditions. Although this alternative would not meet the purpose and need or forest plan direction, it is being presented as the required no-action alternative to provide a basis for comparison of the effects of the action alternatives.

The FEIS includes Alternative G from the SDEIS with some corrections. The FEIS presents Alternative G-Modified (GM) as the current and final preferred alternative. Alternative GM is a culmination of the travel management planning process. It incorporates the latest direction for travel management, components of all the alternatives presented in the DEIS and SDEIS, and reflects public input.

The FEIS presents a travel management plan that attempts to solve the key issues that have surfaced throughout the planning process. It is recognized, however, that these issues can off-set one another and no one alternative can perfectly resolve all travel management desires. Striving for a balance between the desires and needs, along with responsible resource management has been, and continues to be, the goal of this travel management planning process.

# CHAPTER 1:

## PURPOSE OF AND NEED FOR ACTION

### Introduction

---

The Forest Service has prepared this final environmental impact statement (FEIS) to present the travel management plan. The White River National Forest has employed the National Environmental Policy Act (NEPA) process to establish the travel management system and uses on that system on White River National Forest System lands.

#### The Final Environmental Impact Statement

This FEIS is an extension of earlier work to update travel management guidance in compliance with the White River National Forest Land and Resource Management Plan, 2002 Revision, as amended (forest plan). The draft forest plan, released for public comment in August 1999, contained a detailed travel management plan. Planners decided to separate the two decisions based on public comment about the difficulty in reviewing both the travel management plan and forest plan decisions simultaneously and the desire for more time to review travel management. Planning information from the initial effort, including site-specific comments received during the comment period on the draft forest plan, was brought forward for consideration in this travel management plan.

The notice of intent (NOI) for the travel management plan was published in the *Federal Register* on August 27, 2002. The NOI asked for public comment on the proposed plan from August 27, 2002 to October 31, 2002. The White River National Forest prepared and released a draft environmental impact statement (DEIS) with alternatives for the proposed travel management plan in June 2006 for a 90-day comment period.

Based on the original DEIS range of alternatives, the ability to further incorporate the travel rule, and all the public comments received, the White River National Forest developed a preferred alternative for the travel management plan. The decision-maker felt it was important to present the preferred alternative in a supplemental DEIS (SDEIS) for a 60-day public comment period.

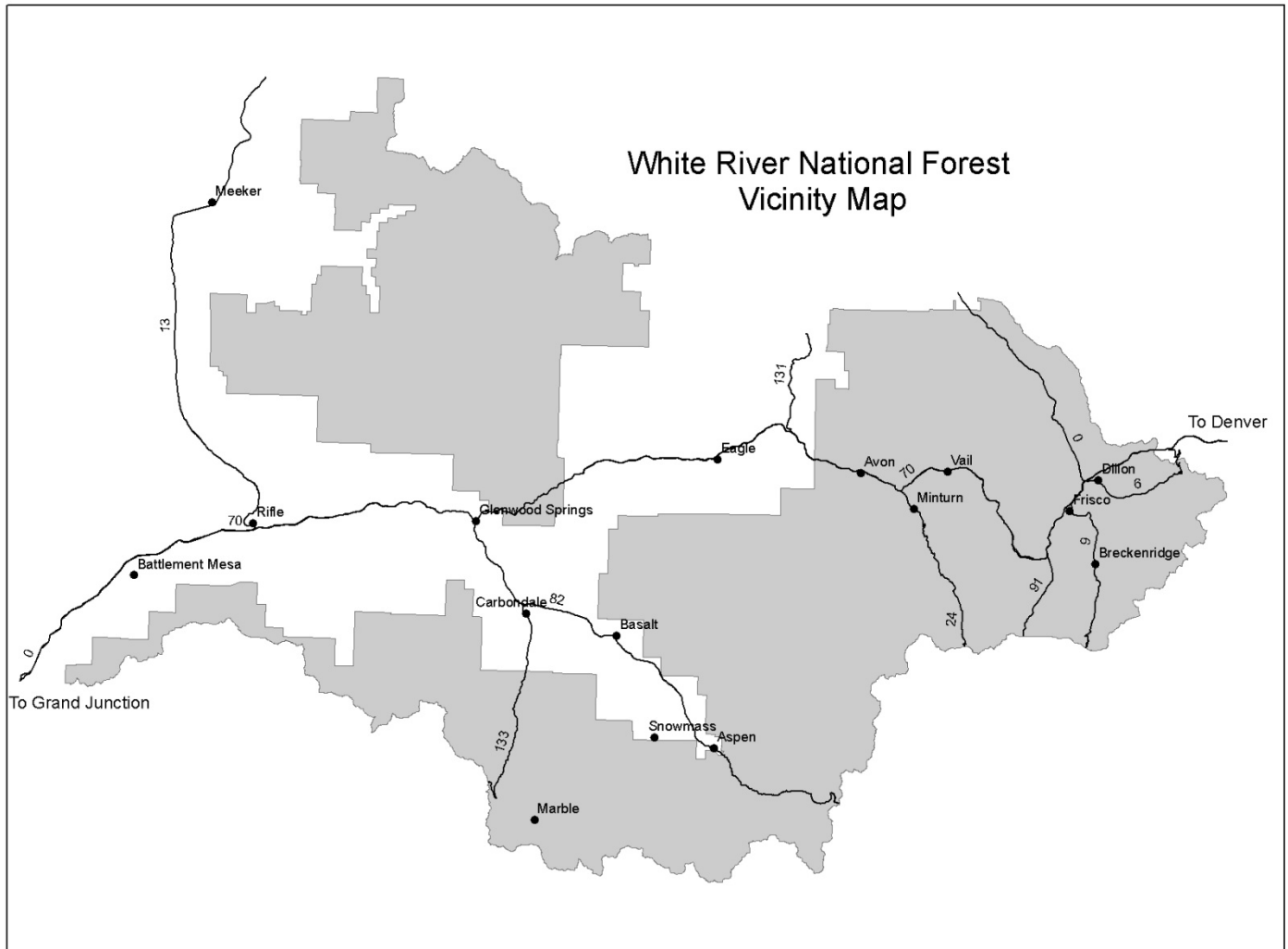
The FEIS is the result of the effort described above with the consideration of comments submitted throughout the process including those submitting during SDEIS. The analysis describes the final preferred alternative. The record of decision (ROD) is the decision that describes the selected alternative.

This FEIS has been prepared as required by NEPA, the Council on Environmental Quality regulations for implementing NEPA provisions (40 CFR 1500), the National Forest Management Act (NFMA), and applicable Forest Service manuals, handbooks, and other higher-level direction.

## Background

### Location

The White River National Forest is located in the west central part of Colorado and ranges in elevation from 5,000 feet to more than 14,000 feet, with most of its lands lying between 8,500 and 11,800 feet. There are approximately 2,482,000 acres within the current forest boundary, and approximately 198,300 of those acres are of other ownership.



**Figure 1.1—Location of White River National Forest**

The White River National Forest occupies parts of nine counties, with the majority acreage in Eagle, Garfield, Pitkin, and Summit counties and small parcels in Gunnison, Mesa, Moffat, Rio Blanco, and Routt counties. The forest is administratively divided into five ranger districts: Aspen/Sopris, Blanco, Dillon, Eagle/Holy Cross, and Rifle.

## **History**

The transportation system on and around the forest has evolved over time. From as early as 10,000 B.C.E., Paleo-Indians moved through the region seasonally following big game and the trails they created. The Ute Nation occupied the area for several centuries. The Utes were skillful nomadic hunters who followed herds of bison and elk on their seasonal migrations. They developed an extensive network of foot and horse trails throughout the region. Fur traders traveled through the area in the 1820s, trapping beaver and establishing trading posts in the area. Roads and trails were developed to access these posts and were expanded with the mining boom of the 1870s. Roads and trails were also created to access timber needed to support the mines and new towns. Railroads soon followed, along with ranching and farming, to provide for the growing population. Roads, trails, and rail lines were created to access the mines and timber and to move livestock. Historic roads and trails were built as needed without much forethought into planning for future access, maintenance requirements, or environmental impact.

As resource extraction continued, conservation measures became necessary to protect future uses of these natural resources. President Benjamin Harrison signed a proclamation on October 16, 1891 establishing the White River Plateau Timberland Reserve, encompassing 1,198,180 acres. Additional lands were added over time, including the Battlement Reserve and the Holy Cross National Forest, to form today's White River National Forest. At first the land was managed primarily for livestock grazing and timber production. Conflict resolution, conservation of use, and land protection were the early rangers' primary responsibilities. Trails and roads were created as needed to accommodate any immediate transportation needs. With the Great Depression came the establishment of the Civilian Conservation Corps (CCC). From 1933 to 1942 the CCC built roads, trails, recreation facilities, and buildings. These were perhaps the first engineered facilities on the forest, and the works enhanced user recreation opportunities.

During World War II, Camp Hale was established to train soldiers in winter mountaineering techniques. Some of these men later returned to create resort alpine skiing in the area. During this time period (1937-1951) outbreaks of mountain pine beetle and spruce beetle attacked thousands of acres of forest. This led to an increase in timber production in an attempt stop the spread of the beetles. With this increase in timber harvesting came more roads, generally native surface roads with limited engineering. Recreation use increased on the forest after the war, and in 1951 the White River National Forest began to receive new budget allotments for clean-up, maintenance, and restoration of the forest's campgrounds and hiking trails. The Flat Tops Primitive Area was established in the 1950s and later was designated as wilderness. Alpine ski resorts were developed on the forest in the 1960s, which brought more people to the area. Highways were improved to meet access needs to these newly established resort towns. The Wilderness Act was passed in 1964, and between 1964 and 1993 eight wilderness areas were designated on the White River National Forest. Any roads that had been developed in these areas were either closed or converted to trails to meet the management objectives for wilderness areas.

The Forest Service developed road design standards and construction practices in the early 1950s with an emphasis on direct alignments with specific road grades and curves. Although economic considerations were, and continue to be, a major driving force in road construction, the impacts of such design standards were recognized in the 1970s, when road alignments and grades were designed to follow topographic contours in order to minimize ground disturbance and other impacts.

Timber production on the White River National Forest increased from 1984 to 1997, mostly as a result of the demand for beetle-killed timber. This led to the planning and construction of engineered transportation system roads to access the acres that required treatment. The Forest Service established road standards in 1985 to minimize resource impacts from roads and provide guidance over route location, construction, operation, and maintenance. The forest continues to incorporate more advanced techniques for water and erosion control to preserve water quality and watershed health.

Today the emphasis is to minimize additional road construction, and, instead, to reconstruct, maintain, or rehabilitate roads in the transportation system.

For recreation, the future emphasis will be to design and utilize trails and networks that meet the needs of users while protecting the natural resources. This new emphasis requires designing systems for that use, not necessarily accepting systems designed from the past. This also means providing networks in certain particular areas that are best suited for the intended use.

## **Travel Management**

Travel management is the integrated planning of, and providing for, movement of people and products to and through National Forest System lands. A travel management plan provides clear, specific direction on the appropriate levels of land, water, and air access opportunities to be made available.

Travel is an important part of virtually every activity that occurs on the forest. Motorized modes of travel on the forest include large commercial trucks, automobiles, high clearance vehicles, four-wheel-drive vehicles, all-terrain vehicles (ATVs), motorcycles, snowcats, snowmobiles, and bicycles with motors. Non-motorized modes of travel include cross-country skiing, downhill skiing and snowboarding, dog sledding, snowshoeing, horseback riding, pack animal driving, hiking, and bicycling (including mountain biking). Boating can be motorized with gas driven or electric motors, or non-motorized as in paddle-driven canoes, kayaks, rafts, and rowboats. Air travel also can be both motorized (helicopters, planes, and ultralights) and non-motorized (ballooning, hang gliding and paragliding).

Travel management on the White River National Forest seeks to incorporate planning for appropriate movement of people and products across the forest. An efficient transportation network is essential for forest resource management, outdoor recreation use, and access. To balance the diverse needs of all those who use the system, the transportation network and the manner in which it is used must be effective in providing access, be properly maintained, and be ecologically sound.

## **Legal and Administrative Framework**

---

Travel management on the White River National Forest must adhere to management direction on many levels including statutes, regulations, laws, executive orders, and national forest directives. Travel management on National Forest System lands must follow both federal and appropriate state level laws and regulations.

Management must be consistent with the overall direction in the White River National Forest Land and Resource Management Plan, 2002 Revision, as amended (forest plan). No amendments to the forest plan will be proposed through this travel management planning process. The travel management plan adheres to all direction provided for in the forest plan, which is incorporated into this document by reference.

## Purpose of and Need for Action

---

### Purpose

The purpose of this initiative is to identify the transportation system with the goal of balancing the physical, biological, and social values associated with the White River National Forest. It responds to several needs noted below.

### Needs

#### **Need: To Update the Official Designated Transportation System on the White River National Forest.**

National direction requires national forests to clearly designate travel systems and opportunities. The existing travel plan was developed in conjunction with the 1984 forest plan. It is recorded in the 1985 White River National Forest Travel Map (USDA Forest Service/White River National Forest 1985). Map corrections are needed for route locations, changes in ownership, changes in area travel management due to the 2002 forest plan, and inventory updates. Improved technology in mapping and information exchange has allowed for considerable refinement of the forest road and trail data.

The forest supervisor expressed the need to revise the forest-wide 1985 forest travel management strategy described in the travel map of 1985 and to align the travel strategy on the forest with the forest plan, including any changes in laws and regulations. Travel strategies focus on what uses are going to be allowed on specific routes. These uses include motorized, mechanized, and non-motorized modes of transportation.

This action responds to the goals, objectives, standards, and guidelines outlined in the forest plan, and it helps move the forest toward desired conditions described in that plan. The White River National Forest Travel Management Plan will be developed in accordance with the forest plan and the laws and regulations that govern forest management.

By providing a designated travel system for the White River National Forest, the public will be able to clearly identify where and what modes of travel are allowed and not allowed across the forest.

#### **Need: To Identify What Is Not Part of the Official Designated Travel System on the White River National Forest and be Able to Restore Lands Back to Their Natural State.**

Sometimes referred to as “ways,” “non-system,” “unauthorized,” or “user-created,” these roads and trails on National Forest System lands are routes that are not created, recognized, or managed as part of the designated, authorized transportation system. Many of these routes are older timber, range, mining, or oil and gas exploration roads that no longer serve their intended purpose; other routes have been created by off-road/trail recreation use.

The designated travel system is the official road and trail system on the forest. The designated system identifies what roads and trails are allowed to be used for various modes of travel. In so doing, unauthorized roads and trails will be examined for designation or elimination. This is a one-time consideration of these travelways as specified in the forest plan EIS (USDA Forest Service 2002b, p. 385-386).

Since 1985, the WRNF has recognized that several changes made to the travel system warrant examining and decisions made in response to unauthorized routes. One significant change in resource use lies in the modes of travel that have become popular since the adoption of the 1985 travel management plan. For example, ATV and mountain bikes use has become popular among recreationists. Such expanded uses place additional demands on the travel management system. Also, when preparing for the new travel management plan, it became apparent that the inventory contained roads and trails that were not officially on the system but nevertheless were being used. The process outlined for managing unauthorized routes in the travel management plan was to consider those routes that could possibly serve as designated roads or trails. These routes were nominated by both internal and external parties, and some were carried forward from old inventories. Routes to be added were considered by personnel examining the need, resource conditions, and public input.

Upon conclusion of the travel management process, all unauthorized roads and trails on the landscape will be designated for elimination through landscape rehabilitation. This includes any unauthorized route, whether or not it is considered in this process. All newly discovered unauthorized routes will also be designated for rehabilitation.

Also included in the travel management plan will be the identification of designated roads and trails no longer needed, which will be rehabilitated.

This process will clarify the designated travel system for the forest. The end result of the travel management plan process will be a clear description of the travel system necessary for administrative and recreational use on the White River National Forest.

Additional routes can be added to the designated system after the completion of the ROD through project identification, determination of purpose and need, examination through the NEPA process, and proper design and execution.

**Need: Designate a Travel System That Is Aligned With the Forest Service Mission, Including the Need to Manage the Land By Providing a System That Attempts to Balance Social and Resource Demands.**

Population growth and demand on the forest resources has prompted the need to evaluate and designate a travel system to accommodate supply and demand placed on Forest Service lands while still protecting those same lands for the conditions that enhance water quality, natural landscapes, and wildlife habitat.

Travel management, which plays an important role in every forest resource program, remains one of the most controversial elements in forest management. Since the 1985 plan was developed, motorized and non-motorized forms of travel have both increased and become more diversified. Use of mountain bikes, ATVs, four-wheel-drive vehicles, snowmobiles, and trails for hiking, horseback riding, and backcountry skiing all are competing over the same land base. Local communities near the forest have seen rapid growth in their populations, and tourism is on the rise.

Travel for recreation is not limited to activities that occur only on the routes but also includes use of those routes to access other recreation activities, such as camping, hunting, site-seeing, picnicking, and fishing. Finally, route networks are needed for access to trails in order to participate in a particular activity, such as hiking, mountain biking, or horseback riding.

Access is also needed for other land management activities such as timber and habitat improvements, forest product gathering, range allotment maintenance, vegetation

treatments, power lines, radio and cell phone relay towers, natural gas development, private land in-holdings, and administrative activities.

While there is a need to provide access for people across the landscape, there is also a need to protect the landscape from the impacts that travel and people can cause. The footprint of a travel system can cause changes to the natural landscape that can cause additional sedimentation and fragmentation as it allows more people into an area.

Forest managers need to determine the proper balance in the type, extent, and levels of forest transportation facilities and uses in order to address user conflicts and adequately protect resources.

## **Proposed Action**

---

The action proposed by the Forest Service to meet the purpose and need is to present a comprehensive travel management plan for the White River National Forest. The travel management plan and supporting environmental impact statement (EIS) will present options to accommodate the transportation needs of the public and to provide adequate access for forest and resource management while still allowing for protection of natural resources.

This document looks at the impacts of the travel system on recreation, administrative access needs, wildlife, and natural resources, among other considerations. The intent is to have a clear and concise plan for a transportation system that addresses the needs for forest management, public access, and recreation use.

The objectives of the travel management plan are to:

- Bring summer and winter transportation routes into compliance with laws, regulations, agency or national direction, and the forest plan;
- Designate the forest road and trail systems and eliminate routes that are not part of the system through decommissioning and rehabilitation;
- Provide a travel plan that defines modes of travel across the forest by area and by route; and
- Identify resource solutions to impacts resulting from the transportation system, including routes identified for rehabilitation.

To create appropriate strategies, travel will be defined by both summer and winter seasons. For summer travel, the travel management plan will define the designated roads and trails system along with allowable uses on these routes. For winter travel, the travel management plan will specify where motorized uses are allowed by area and designate motorized routes in the restricted motorized areas. The travel management plan carries forward forest plan direction for determination of travel opportunities.

## **Decision Framework**

---

### **Geographic and Physical Scope**

The Travel Management Plan for the White River National Forest will only make travel management decisions on White River National Forest lands. The White River National Forest travel management plan for summer travel will only make decisions on roads and trails that are under national forest jurisdiction. Only roads and trails that currently exist

will be considered in this document. No new road or trail construction or reconstruction is part of the proposed action or decision.

### **White River National Forest Land and Resource Management Plan – 2002 Revision, as Amended (Forest Plan)**

This travel management planning process began as a component of the forest plan. The travel management plan will adhere to the forest plan. As established since its inception, this travel management plan will not amend the forest plan; it will comply with the forest plan. The forest plan went through an intensive NEPA process, resulting in a final plan and record of decision. This travel management plan is not the mechanism to change that decision, but a mechanism to help meet the forest plan's desired conditions. Therefore, the action alternatives do not vary in forest-wide direction as established in the forest plan; however, they do vary in mileage and acreages allocated to each type of use. The forest plan defines a set of goals, objectives, strategies, standards, and guidelines that provide the forest-wide direction for managing the White River National Forest and its resources.

Forest **goals** are broad statements that describe overall conditions managers will strive to achieve. They are not directly measurable and there are no timeframes for achieving them. In other words, goals describe the ends to be achieved rather than the means to these ends; they serve as vision statements. **Objectives** describe the means taken to accomplish goals in the form of measurable steps, often referred to as **strategies**. Objectives generally are achieved by implementing projects or activities. However, objectives are not targets, which are a measure of annual outputs dependent on budgets.

The travel management plan will strive to realize the goals and objectives established in the forest plan.

Chapter 1 of the forest plan outlines the goals, objectives and strategies. While all apply, there are particular goals that the travel management plan can help to meet:

Goal 1 – Ecosystem Health

Goal 2 – Multiple Benefits to People

Goal 4 – Effective Public Service

Also, the travel management plan honors Goal 6: to help protect American Indian rights and interests.

Some of the key forest plan objectives are to:

Protect the basic soil, air, and water resources;

Provide for multiple uses and sustainability in an environmentally acceptable manner;

Provide for a variety of species through management of ecosystems;

Provide for scenic quality and a range of recreation opportunities that respond to customers and local communities;

Emphasize cooperation with individuals, organizations, and other agencies in coordination with planning and project application; and

Improve the financial efficiency of programs and projects.

All action alternatives adhere to the concepts of multiple use and ecosystem management. They also share a set of basic forest-wide goals and objectives and a set of standards and guidelines to ensure protection of forest resources and comply with applicable laws.

Basic terms and conditions that the forest plan sets for land management include standards, guidelines, desired conditions, and designation of specific management areas.

A **standard** is defined as a course of action that must be followed or a level of attainment that must be reached to achieve forest goals. Adherence to standards is mandatory. Standards are used to assure that individual projects are in compliance with the forest plan and other legal mandates that govern the Forest Service.

A **guideline** is a preferred or advisable course of action or level of attainment. Guidelines are designed to achieve desired conditions (goals). Guidelines should be followed unless specific circumstances dictate otherwise.

A forest plan also establishes additional direction for individual **management areas**, such as dispersed recreation, deer and elk winter range, or ski areas. The management areas are where emphasis is placed on the certain desired conditions for an area. While other activities may exist, the emphasis is still guided by the overall objective of meeting the desired condition for the specific management area prescription. **Management area direction** includes a desired condition statement and defines what management activities may be carried out, with additional standards and guidelines needed to manage or protect specific resources.

Each management area prescription further defines what motorized and mechanized uses are allowed, restricted, or prohibited within each prescription. Some prescriptions also include restrictions on the density of roads within a management area. The travel management plan follows the guidance for each management area prescription to help meet desired conditions set forth in the forest plan.

For summer travel, the forest plan directed in a forest-wide standard that all motorized and mechanized travel must be kept to designated routes. All alternatives adhere to this standard. When applying management area prescriptions, the forest plan essentially creates three summer strategies by management area allocation. The strategies are non-motorized / non-mechanized; non-motorized; and motorized and mechanized use on designated routes. Some standards and guidelines dictate road density requirements and/or seasonal restrictions to meet desired conditions.

For winter travel, the forest plan contains standards and guidelines that dictate where motorized winter travel (machines manufactured for over-snow travel) is allowed, restricted, or prohibited by management area. The strategies for winter motorized travel address open terrain travel, travel restricted to designated routes, and designation of non-motorized travel areas.

Further clarification of these strategies for recreation incorporates the **recreation opportunity spectrum (ROS)** designations. These designations, found in the forest plan, are used to inform the public as to what types of recreational settings can be expected across the forest. The standards under *Travel System Infrastructure* (USDA Forest Service/ White River National Forest 2002a) refer to ROS classifications. These standards refer to the range of ROS classes found in each management area description. The guideline under *General Recreation*, forest plan, chapter 2, section 4, pages 1-31, refers to the ROS map. For recreation use, roads and trails should blend and reflect the overall recreational setting of an area as well as provide necessary access for those uses.

The forest plan reflects the need to provide travel systems while protecting resources and minimizing the environmental impacts of roads and trails where possible. There is also an emphasis on rehabilitating a road or trail when it is no longer needed for the purpose it was built or to protect resources. The goal is to have a system that meets user needs while being economically viable. For areas where a route is not longer necessary, the goal is to get that piece of ground back into production (that is, back into a natural state).

### **USDA Forest Service Rule; Travel Management–Designated Routes and Areas for Motor Vehicle Use; Revisions to 36 CFR Parts 212, 251, 261, and 295**

On November 9, 2005, the Forest Service published a new rule on providing motor vehicle access on all national forests. The rule, titled *Travel Management: Designated Routes and Areas for Motor Vehicle Use*, rewrote direction for motor vehicle use on National Forest System lands under 36 CFR 212, 251, and 261, eliminating 36 CFR 295 (travel rule). The travel rule was written to address, at least in part, the issue of unmanaged recreation. The rule provides guidance to the Forest Service on how to designate and manage motorized recreation on the forest. The travel rule requires each national forest and grassland to identify those roads, trails, and areas open to motor vehicular use.

The travel rule provides regulations governing use of motorized vehicles, including off-road vehicles, on Federal lands to protect natural resources, promote public safety, and minimize user conflicts as directed in Executive Order 11644–Use of Off-Road Vehicles on the Public Lands (February 8, 1972), as amended by Executive Order 11989 (May 24, 1977).

#### **Key Components of the Rule (36 CFR 212, 251, 261)**

Key components of the rule include roads system management: a) Traffic on roads is subject to state traffic laws where applicable, and b) roads or segments thereof may be restricted to use by certain classes of vehicles or types of traffic (§212.5). Motor vehicle use on National Forest System roads, on National Forest System trails, and in areas on National Forest System lands shall be designated by vehicle class and, if appropriate, by time of year (§212.51a).

Meeting the requirement to establish a designated system for motorized vehicle use, the White River National Forest began by incorporating the standard in the forest plan that states that all snow-free motorized (and mechanized) use would be on designated routes and not include any open areas (USDA 2002a, Travel System Infrastructure, Standard 4, p. 2-36). The travel management plan will designate the vehicles allowed on specific routes during, where appropriate, what time of year.

To meet sections a) and b) of the §212.5 regulations, the WRNF also considered the following guidance:

Colorado state traffic laws regulate licensing, registrations, safety, and allowable modes of travel on public roads. Colorado state law also addresses the use of off-highway vehicles under Title 33, Article 14.5. Section 33-14.5-108 of that article addresses off-highway vehicle operations prohibited on streets, roads, and highways. The section reads: (1) No off-highway vehicle may be operated on public streets, roads, or highways of this state except in the following cases:...(h) (I) When the United States or any agency thereof authorizes by any means such operation on lands units jurisdiction (II) no-action is required to be taken by the

United States pursuant to this paragraph (h) to authorize the use of off-highway vehicles on lands under the jurisdiction of the United States.

The agreement with the Forest Service and the Federal Highways Administration (FHWA) in a Memorandum of Understanding (Forest Service Roads subject to the Highway Safety Act 1976, 1982)

### **On the White River National Forest**

Under the travel management order of 1985, generally no distinction was made between vehicles allowed on motorized routes. The White River National Forest has been managing motorized travel under a hierarchical system. Basically stated, if a full-sized vehicle is allowed, so is a jeep, ATV, motorcycle, and bicycle. This concept was accepted based on road design: if a road is able to accommodate a full-sized vehicle, then conceptually, it could by design also accommodate other vehicles such as ATVs and motorcycles under most circumstances.

Exceptions were made for some roads and trails based on site-specific conditions. For example, a paved road is not necessarily considered safe for all motorized uses, such as ATV use. Another example is when a use may conflict with other recreational or resource objectives, such as ATV use in a campground where dust could disrupt others' camping experience. Other factors that restrict use include safety considerations and/or resource protection. Until recently, the amount of non-highway-legal vehicle use (e.g., ATVs, motor-cross) was low enough that mixed use was not an issue in most areas. However, use of non-highway-legal vehicles has greatly increased.

### **Obligations Under the Travel Rule**

Under the travel rule, it was recognized that, across the country, motorized uses have increased substantially, and the Forest Service must get a handle on managing these uses. Also, as stated in the above regulation, the Forest Service is to designate what motorized uses are allowed in what areas, and thus create a system that clearly defines what type of motorized use is allowed on which routes. This system is not hierarchical, but rather designates the appropriate use for each route. Several factors are considered when making determinations for use on roads and trails.

### ***Safety***

One major designation factor is whether a road that allows highway-legal vehicle use should or should not allow non-highway-legal vehicle use. A road that allows highway-legal and non-highway-legal vehicular use is referred to as mixed use. A major component of this issue is that in Colorado, ATVs cannot be licensed and therefore are not highway legal. Vehicles that are highway legal have features such as mirrors, lights, etc., that the state recognizes as being safe for highway and public road travel. The State makes the distinction by issuing licenses for vehicles that are highway legal.

Under the rule, the forest is required to make independent decisions on the safety of each motorized use for each route. On most of the forest's maintenance level 2 roadways, where the surface is rough enough to keep speeds down and use levels are lower, mixing highway-legal and non-highway-legal use in most cases is generally not as much of a safety issue as it is on the maintenance level 3, 4, and 5 roadways, which are constructed and maintained for the speed and volumes of passenger car travel.

The White River National Forest conducted mixed-use studies on national forest roads designed to handle passenger cars. These roads include the major arteries across the forest. These studies reflect which roads would be safer for allowing licensed and unlicensed vehicles to utilize the same route.

### **Recreation**

Often, users of the forest must rely on state, county, or local roadways to access forest roads and trails. State law prohibits non-highway-legal motorized vehicle use on public roadways unless the jurisdiction controlling the roadway has made a formal declaration to allow that use.

This limitation leads to the question as to what allowance makes sense from a recreation management standpoint. In order to provide a quality experience for motorized users, the network has to provide several miles of connected roadway. Another factor concerns what makes legal sense. For example, if a county road does not allow non-highway vehicle use and it directly leads to a Forest Service road or if a road goes back and forth in jurisdiction and therefore back and forth between highway-legal and non-highway-legal use, the Forest Service would likely not allow non-highway vehicular use. This action avoids encouraging illegal use on the sections of road that only allow highway-legal vehicle use. The forest will work with the various state, county, and local agencies to determine where non-highway-legal vehicles may be legally used on routes under the control of those entities. Decisions in the final travel management plan will reflect legality and practicality in allowing non-highway-legal motor vehicles to access areas of the forest. The practicality analysis will include factors such as the availability of adequate trailhead parking, need, and whether other legal constraints exist.

In addition to safety and access, the rule also requires the responsible official to consider the provision of recreation capabilities and system design. For example, it would not make sense to allow ATVs on a road that is part of or connected to a road that does not allow ATV use, especially if the portion that would allow ATVs is short (for example, only ¼ mile long) or does not lead to a destination area. Such conditions would not be considered to provide a quality experience to the ATV user. Rather, it makes sense to develop and design networks for ATV and other non-highway-legal vehicle users where they can access the quality and quantity of road and trail to have an enjoyable recreational experience.

### **Resource Considerations**

Provisions under §212.55 require consideration of the effects of the designation of motorized use on National Forest System natural and cultural resources, public safety, provision of recreational opportunities, access needs, conflicts among users of National Forest System lands, the need for maintenance and administration of uses on roads and trails; and the availability of resources for that maintenance and administration.

The White River National Forest proposes in the travel management plan areas where motorized use may or may not be allowed. Key aspects to this are:

- 1) Examination of unauthorized routes for rehabilitation or inclusion into the designated travel system. Examination of system routes also needs to be conducted to determine whether their purpose is still valid or whether they are not needed for the travel system. Based on inventory efforts that included public input and involvement, the travel management plan will provide the foundation for decisions on these routes. Decision factors include whether these routes serve a need and whether their use has any resource impacts; and if so, how these impacts should be mitigated. Also, the

forest has to consider whether it can afford the maintenance and administration of these routes. Although rehabilitation has initial costs, once a route is rehabilitated, any resource impacts or administrative costs should essentially be eliminated.

“[U]ser-created roads and trails may be identified through public involvement and considered in the designation process. After public consideration and appropriate site-specific environmental analysis, some user-created routes may be designated for motor vehicle use pursuant to § 212.51 of the final rule” (Federal Register /Vol. 70, No. 216; Wednesday, November 9, 2005; Rules and Regulations, p. 68277.

- 2) Examination of existing system routes and whether they are suitable for certain vehicle uses, especially mixed use. Because maintenance level 3, 4, and 5 roads are considered “open to public” roads, special considerations have to be made as to whether these roads are safe for mixed use.

Other aspects of the decision regarding mixed use include considerations of safety, effects to resources, potential impacts to wildlife, ability to administer and enforce openings and closures, maximizing recreation opportunities, and minimizing recreational conflicts. When making decisions for use across the forest, the decision-maker will take all these factors into account, including public input and comment.

### ***Winter Motorized Use***

Directives for use by over-snow vehicles are included in the rule under Subpart C, §212.80 and §212.81. An over-snow vehicle is defined as a motor vehicle that is designed for use over snow and that runs on a track or tracks and/or a ski or skis while in use over snow §212.1. The directives specify that over-snow vehicles may be allowed, restricted, or prohibited according to circumstance. The rule states that the responsible official may use the process outlined in §212 to establish where over-snow vehicles would be allowed, restricted, or prohibited. The difference between the summer motorized designations and winter motorized designations is that the Forest Service has to officially designate where summer motorized use is allowed; for winter, the Forest Service has the option to show only where winter motorized use is restricted or prohibited. The White River National Forest has chosen to follow the process outlined in the rule through the travel management plan and subsequently will produce winter motor vehicle use maps to show where motorized winter use is allowed, restricted, or prohibited.

During the winter season, motorized and mechanized vehicles other than those defined as motorized over-snow vehicles in 36 CFR 212 are prohibited unless designated as allowed in the winter motor vehicle use map.

### ***Parking Off of Designated Roadways and Trails***

The rule provides the responsible official with the opportunity to authorize the limited use of motor vehicles within a specified distance of certain motorized roads and trails and, if appropriate, within specified time periods solely for the purposes of dispersed camping or retrieval of a downed big game animal by an individual who has legally harvested that animal (§212.51).

The forest plan specifies that the forest will permit motor vehicle travel up to 300 feet from designated travel ways for direct access to campsites, parking, firewood cutting, or gathering forest products provided that minimal resource damage occurs and such access is not otherwise prohibited (USDA 2002a, p. 2-36). There are some routes that have

special orders restricting any off-road travel and only allow dispersed camping in designated sites.

Driving off the road for the purpose of game retrieval has never been authorized on the White River National Forest and the forest will not enter into any analysis to allow that use; a decision that is carried forward in the travel management plan.

Driving off of the road for the purpose of fuelwood cutting and gathering of forest products may still be allowed to continue through the permitting system. Permits have long been required for the removal of forest products such as firewood. The new regulation gives allowance for driving off of designated roadways for a specified distance under a written authorization issued under Federal law or regulation (§212.51(a)(7)).

Other special uses under permit that may allow off-road travel include administrative activities such as utility maintenance, range and livestock management, vegetation management, mining, residence maintenance, and outfitter-guide activities. All permits that allow off-road travel will be specific as to what type of use is allowed, for what purpose, when the use is authorized, and where the off-road use is allowed to occur.

Driving off of designated roadways and trails for any other purpose than those described above is inconsistent with the rule. There is a recognized need for persons to be able to pull off of the traveled portion of the roadway for a number of reasons, such as parking, picnicking, etc. On the White River National Forest, parking a motor vehicle up to 30 feet from the edge of the road surface on the side of the road when it is safe to do so without causing damage to NFS resources or facilities, unless prohibited by state law, a traffic sign, or an order (36 CFR 261.54), is allowed (FSM 7716.1).

### ***Unauthorized Roads and Trails***

Management decisions have to be made regarding the disposition of unauthorized routes across the forest. The routes either have to be added to the transportation system or rehabilitated. The forest is making a commitment in this document to evaluate unauthorized routes made known by the public and from within the agency, including routes that may be necessary to the transportation network. This action will also fulfill the obligation to look at unauthorized routes as stated in 36 CFR 212.52. All unauthorized routes considered were examined on the ground by ranger district personnel to determine whether they truly are necessary and are in satisfactory condition to be added to the system. All routes considered not necessary to the system or routes that would require construction or reconstruction work to be brought to an acceptable standard will be considered unauthorized and will be rehabilitated.

Some unauthorized routes are not part of the evaluation process because they were either not submitted, not found in good enough condition to be considered, or created subsequent to the inventory and therefore outside the original scope. Those created subsequent to the original inventory are unauthorized and subject to be rehabilitated.

Any route proposed after the signing of this document will be considered new. The process for designation of a new road or trail is quite extensive and includes examination of the purpose and need, travel analysis, NEPA documentation, survey, design, contract preparation, and estimation of all construction costs.

The treatment of these unauthorized roads and trails is consistent with the forest plan EIS: “Public scoping has shown that some of these unclassified roads and trails are of interest and value to forest users. For all, management objectives need to be developed. Decisions will be made in the travel management plan to designate these routes or eliminate them. In most cases, the objective will be to eliminate the routes by obliteration, along with all

subsequent routes created thereafter. Any new route, road, or trail that needs to be created will have to have a compelling need and will go through the proper process before construction” (USDA 2002b, p. 3-386).

### **Minimum Road System Needed for Safe, Efficient, Access, Utilization and Protection of National Forest System lands**

*36 CFR 212.5(b) states Identification of road system. For each national forest, national grassland, experimental forest, and any other units of the National Forest System (§ 212.1), the responsible official must identify the minimum road system needed for safe and efficient travel and for administration, utilization, and protection of National Forest System lands.*

The minimal road system is a system that is needed to access public lands. The intent is for the Forest Service to look at what access is needed for administration, utilization (including recreation) and the protection of NFS lands. This does not mean identifying the most non-motorized areas the forest can provide, rather it is identifying the system needed for accessing the variety of uses that occur on National Forest System lands.

The White River National Forest examined alternatives for the road system to address access needs. Alternative E in the Draft Environmental Impact Statement provided a minimal road and trail alternative for examination. Alternative G considered the elements needed to access the land. The preferred alternative also showed a reduction in miles of road from current conditions. The preferred alternative considered what is needed for access, what can be converted to needed trails, and what is no longer needed and thus can be rehabilitated.

### **Tie to Travel Management Plan and Beyond**

The White River National Forest travel management plan takes measures to meet the intent of the rule. The travel management plan, however, goes beyond the rule because travel systems and recreation use goes beyond motorized travel. The goal of the travel management plan is to lay the foundation for establishing the transportation network needed for forest management and all public use/access. The travel management plan specifies the designated system by all modes of travel and season to convey appropriate uses of the travel system. When tied together, these specific designations create a logical system of routes over which people can travel in order to enjoy the national forest.

So, why specify certain modes of travel for each route? One reason is because many people come to enjoy the particular experience that occurs on the route itself, be it to hike, mountain bike, horseback ride, ride an ATV or motorcycle, go 4-wheel-driving, or even go for a pleasure drive. Some routes are designed to accommodate only specific types and amounts of use. Conflicts can occur when traffic on a route exceeds what it can accommodate where certain types of uses disrupt the experience of others. Safety to the user is a key consideration that is factored into route design and types of use allowed. In addition, the Forest Service has a responsibility to minimize impacts on the land; resource considerations such as soils, wildlife, and water quality are factors that need to be considered when allowing certain types of use.

The travel management plan is a platform from which the White River National Forest will be able to present the designated system. Once completed, the designated system will be legally established by:

Creation and distribution of a Motor Vehicle Use Map as specified under the rule in §212.56. This map will display roads and trails where motor vehicle uses are allowed. It will specify seasons of use and identify routes of use for motorized over-land (not over-snow) vehicles. This map becomes the official legal documentation for routes for motorized use will be allowed and enforced.

Creation and distribution of a Motor Vehicle Use Map for over-snow vehicles. The creation and use of the rule to produce this map is allowed under §212.81. This map will display areas where motorized over-snow vehicle use is allowed, restricted, or prohibited.

Other allowances and restrictions will be reflected in order(s) based on the decisions made in the travel management plan record of decision.

It should be noted that travel management designations and decisions are not static, but are continually examined to provide the best recreational opportunities and reduce environmental impacts where and when necessary. In fact, §212.54 discusses the need for revision of designations. Designations of National Forest System roads, National Forest System trails, and areas on National Forest System lands may be revised as needed to meet changing conditions.

## **Decisions to be Made**

---

The deciding official—the forest supervisor—will review the purpose and need, the proposed action, the alternatives, and the environmental consequences to make the following decisions:

- 1) Designation of the summer roads and trails system:
  - a) Defining the designated forest roads and trails;
  - b) Defining what modes of travel are accepted on each road and trail;
  - c) Deciding whether to incorporate or rehabilitate unauthorized routes;
  - d) Determining if certain forest routes are no longer needed as part of the system and identifying those for rehabilitation.
- 2) Designation of winter uses:
  - a) Designating open areas and routes for motorized use by vehicles made for over-snow travel.

## Scope

The scope of the decision reflects the changes to be made to the existing system (described in the no-action alternative). “The responsible official may incorporate previous administrative decisions regarding travel management made under other authorities, including designations and prohibitions” (36 CFR 212.50(b)).

The result of the final decision is a complete account of summer and winter transportations systems across the entire White River National Forest. From this decision, maps, inventories, and descriptions of the travel uses allowed, restricted, or prohibited will be generated for the entire transportation system on the White River National Forest.

The decisions to be made are focused on the decisions that are legally necessary for travel planning. Foot, horse, cross-country skiing, and snowshoe travel is allowed on all National Forest System lands on the White River unless specifically restricted by an order. All routes on the summer map allow foot and horse travel unless specifically prohibited. There are some trails that, due to safety issues, do not allow horse use. The decision does not address non-motorized winter uses other than area closures currently in place (Avalanche Creek). All areas on the winter map are open for cross-country skiing, snowshoe, and foot travel unless specifically shown to be prohibited.

## Area Strategies

The travel management plan carries forward forest plan direction and establishes the baseline for travel across the forest. As this function is incorporated by design, it is unnecessary to create strategies for each area. Area strategies were basically maps that represented areas where motorized and non-motorized activity is allowed, restricted, or prohibited. As these are based on forest plan direction, it was determined that to create them for the travel management plan would be redundant. Any future amendments (outside of this process) to the forest plan will also be carried forward into the travel management plan if changes affect travel management.

## Future Decisions

Site-specific project level decisions will continue to be made over time. Some of these decisions can include changes and additions to the roads and trails system or changes to winter uses. No new construction of roads or trails is proposed in this document, but construction may be initiated through some future project-specific analyses. Some project proposals may also include changes in recreation, such as new routes to create loop opportunities. The travel management plan and associated maps will be updated to reflect any decisions that contain travel management changes.

## Public Involvement

---

The White River National Forest travel planning effort was initiated in response to a demonstrated need in the 1997 analysis of the management situation (AMS) and the public interest during the creation of the forest plan. The draft forest plan, released for public comment in August 1999, contained a detailed travel management plan. The decision-maker decided to separate the two decisions based on public comment about the difficulty in reviewing both the travel management and forest plan decisions simultaneously and the public’s desire for more time to review travel management.

Planning information from the initial effort, including site-specific comments received during the comment period on the draft forest plan, helped to formulate the platform and considerations to be made in this travel management plan.

The Notice of Intent (NOI) for the travel management plan was published in the *Federal Register* on August 27, 2002. The NOI asked for public comment on the proposal from August 27, 2002 to October 31, 2002. The agency held six public meetings in September 2002 to introduce the travel management plan process and solicit comments. Open houses were held at ranger districts, where many members of the public visited and provided input into the process.

Some of the comments provided specific information on the current inventory of non-system or user-created roads and trails and winter recreation areas. This information was used to update the computerized inventory base layers.

During the public scoping period, the White River National Forest received more than 580 letters. The USDA Forest Service Content Analysis Enterprise Team analyzed all the letters submitted during scoping. The team uses an established analytical process for transferring, sorting, disseminating, and categorizing letters into a database where individual comments were then evaluated. More than 2,000 comments were derived from public scoping letters. Using the comments from the public and other agencies (see Issues section), the interdisciplinary team developed a list of issues needing to be addressed in this document.

The White River National Forest released the Draft EIS for the White River National Forest Travel Management Plan on July 28, 2006, for comment. During the comment period, meetings were held with individuals, interest groups, and government representatives by numerous White River National Forest staff members. Over 600 CDs containing the DEIS were distributed, and the document was available on the White River National Forest website along with an interactive map. There were 1,447 comment letters, e-mails, and faxes received on the proposed White River National Forest travel management plan and DEIS during the public comment period, from July 28 to October 26, 2006. Of the 1,447 comment letters, 589 were organized response (form) letters and 858 were unique responses. These submissions contained a total of 3,958 identified comments or expressions of concern on specific topics. Of the 3,958 comments, 2,237 were site-specific and addressed particular routes or areas. Other comments addressed general or programmatic issues, concerns, support, ideas, or solutions.

White River National Forest staff responded to the DEIS comments and were able to use these comments to help formulate the SDEIS. On November 7, 2008, the White River National Forest released the SDEIS for the White River National Forest travel management plan. Over 900 CDs containing the SDEIS were distributed, and the document, with supporting information, was posted on the web site and the interactive map was updated. The national forest staff held several meetings with individuals, interest groups, and government representatives. There were 713 comment letters, e-mails, and faxes, received on the proposed White River National Forest travel management plan and SDEIS during the public comment period, from November 7, 2008, to January 6, 2009. Of the 713 comment letters, 155 were organized response (form) letters and 558 were unique responses. These submissions contained a total of 2,996 identified comments or expressions of concern on specific topics.

Forest Service responses to comments for both the DEIS and SDEIS are part of the project record and are available for review.

## Issues

---

Issue definition helps highlight those issues of public concern as well as those of internal concern relating to the initial proposal. Issues are derived during the initial environmental analysis process, generally during project scoping. Once a list of issues is identified, those issues are analyzed through interdisciplinary review and categorized.

The interdisciplinary team for travel management reviewed all comments in the database and categorized each comment into significant and non-significant issues. Council on Environmental Quality (CEQ) NEPA regulations, Sec. 1501.7, direct the team to “identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3).”

### Significant Issues

NEPA regulations define significant issues as matters that are bound up in the nature of the proposed action and in the choice among alternative courses of action. These are issues that are related to the proposed action or its implementation. Many of the significant issues that deal with effects are tracked through the analysis process but are not considered key issues. Key issues are those that have the ability to drive alternative formulation. Significant issues were grouped to create the key issues, and then alternatives were derived.

### Non-Significant Issues

Non-significant issues have a range of definitions. Generally these are identified as those issues that are:

- Outside the scope of the proposed action;
- Already decided by law, regulation, or other higher-level decision;
- Already decided by the forest plan; or
- Conjectural matters not supported by scientific or factual evidence; an opinion.

Non-significant issues identified through scoping or comments are generally not addressed by the alternatives described in this document as they fall outside the purpose and need or decisions to be made.

### Key Issues from Scoping

The Forest Service identified the following key issues during scoping:

- Volume and type of recreation access;
- Resolution of recreation conflict; and
- Protection of natural resources.

### Issues from DEIS and SDEIS Comment Periods

Issues raised during the DEIS comment period echoed those of the scoping period. WRNF staff received and responded to hundreds of separate concern statements. Most concerns fell within the key issues previously identified during scoping. The key issues

identified above continued to be the primary concerns. For more details, the reader is encouraged to review the responses to comments documents.

Other comments focused on the need for the agency to reflect on the costs of the transportation system, including maintaining, rehabilitating, and decommissioning routes. General concerns still center around the need to provide for certain uses. Users tend to emphasize a use they participate in on the national forest. Some who understand the effects of a growing user population and recognize that other uses occur as well, made suggestions as to how to accommodate them. Issues were also raised about how much infrastructure the forest could afford to add and what routes would be best to add related to condition or cost. While many requested separation from other users, most wanted their use to remain available close to their preferred recreation areas. Over 2,000 comments addressed site-specific roads, trails, and winter use areas. Some specific routes or areas had several comments that reflected a range of desired: e.g. to allow motorized use, restrict motorized use, add a route, not restrict a use of choice, etc. Some routes or areas prompted opposing views as well.

At that time, the preferred alternative was developed from the previous alternatives presented in the DEIS and was presented in a Supplemental Draft EIS (SDEIS) as Alternative G. As stated in the DEIS, blending the concepts and ideas from the previous alternatives presented the best solution to trying to meet the goals of the travel management plan. In total the “blend” is not evenly distributed; rather, each geographic area was examined and determinations were made as to how each would best serve the forest as a whole concerning travel. Further incorporation of the travel rule also influenced how networks were designed. Then, perhaps most importantly, was the consideration of the comments, which helped the forest to design, simplify, and incorporate the many thoughts presented to us.

The SDEIS presented a focused preferred alternative derived from the entire effort that preceded publication. This allowed the public an opportunity to comment, not only on the travel management plan up to the release of the SDEIS, but be able to see where the White River National Forest was heading with the travel system in the future. The comments therefore were by-and-large more site-specific. Most fell into specific geographical areas of concern. Opposing thoughts on how these areas should be managed were presented for consideration. General comments continued to fall into the three key issues identified early in the process. Comments are addressed in the response to comments reports. All comments were reviewed and were used to help the forest prepare the final preferred alternative described in this FEIS.

The White River National Forest staff appreciates the time people took to input their ideas and was able to utilize many of the informative and helpful suggestions. The comments were heavily considered in development of the SDEIS and FEIS. The staffs responsible for the site-specific recommendations for alternative development were also the same members who reviewed and responded to the site-specific comments. The staffs responsible for analysis were the same members who reviewed and responded to the programmatic comments. This effort involved most of the Forest Service personnel across the entire White River National Forest who incorporated their expertise into the travel management plan.

## **Valid Outstanding Rights**

---

The travel management plan was prepared with the understanding by the Forest Service that individuals and entities may have established valid rights unknown to the Forest Service at this time to occupy and use the National Forest System lands under laws and

authorities established by Congress. The courts have established that such valid outstanding rights may be subject to some federal regulation (*Sierra Club v. Hodel*, 848 F.2d 1068, 10<sup>th</sup> Circuit, 1988). This plan recognizes that such valid outstanding rights may exist and the Forest Service will certainly honor such valid outstanding rights when it is subsequently determined that the specific facts surrounding any claim to such rights meet the criteria set forth in any respective statute granting such occupancy and use (*Washington County v. The United States*, 903 F. Supp. 40, D. Utah, 1995). Upon discovery of such valid outstanding rights, amendment or modification of the travel management plan may be necessary.

Nothing in the following restrictions shall be construed as prohibiting the use of a wheelchair by a person whose disability requires use of a wheelchair in any area open to public foot travel. For the purposes of this statement, the term “wheelchair” means a device designed solely for use by a mobility-impaired person for locomotion suitable for use in an indoor pedestrian area (Title V Sec. 507(c) of the ADA).

# CHAPTER 2:

## ALTERNATIVES

### Introduction

---

This chapter describes and compares the alternatives considered for the travel management plan. This section also presents the alternatives in comparative form, defining the differences among the alternatives and providing a clear basis for choice among options by the decision-maker and the public. Chapter 3 will present the current condition and effects of the alternatives in detail.

Included in this chapter is a discussion of:

- How alternatives were developed;
- Features of each alternative, including the no-action alternative;
- Alternatives that were considered but eliminated from detailed study;
- How alternatives compare to one another; and
- Which criteria varied among alternatives.

### Development of Alternatives

---

The process begins when the decision-maker determines there is a need for action. A proposed action is developed to meet the purpose and need for change. In this case there is a need to update and establish the travel management system for the White River National Forest (see Chapter 1, Purpose and Need, Proposed Action). Once a proposed action is presented, comments are solicited to determine if there are issues and alternatives to the proposed action that can meet the purpose and need. This gives the decision-maker options to select from.

### Important Points Shared By All Alternatives

---

The travel management plan will:

- Provide for multiple uses and sustainability in an environmentally acceptable manner;
- Emphasize cooperation with individuals, organizations, and other agencies in coordination with planning and project application;
- Strive to improve the financial efficiency for travel management;
- Meet forest-wide goals and objectives and a set of standards and guidelines that ensure protection of forest resources;
- Comply with applicable laws; and
- Help meet the desired conditions established in the forest plan.

A number of designations and activities will not change in the travel management plan. These include:

- Existing permitted use, including ski resort developed areas and infrastructure;

Existing developed recreation sites, utility corridors, and electronic/utility sites;

Existing rights-of-way;

Current designated national scenic and recreational trails and byways;

Motorized and mechanized use is not allowed in designated wilderness areas; and

Any federal, state, tribal, or local official in the performance of official duty could receive permission to enter restricted areas or use restricted types of vehicles by Forest Service personnel.

Updated data and analytical procedures, as well as evolving scientific knowledge, have been incorporated into all alternatives.

## Elements Common to all Alternatives

### Terminology

The following are commonly used terms in the document that are listed here to help the reader understand their definition and how they are used. See the glossary in the appendices for the definitions of other words commonly used throughout the document.

System roads and trails are those that are under the jurisdiction of an individual or government entity. These are legally defined as to their existence, allowable uses upon them, and responsibility for maintenance. These make up the designated travel system.

Unauthorized roads and trails are roads or trails on National Forest System lands that are not managed as part of the forest transportation system, such as unplanned roads, abandoned travelways, and off-road vehicle tracks that have not been designated and managed as a road or trail; and those roads that were once under permit or other authorization and were not rehabilitated upon the termination of the authorization. Synonyms: *non-system road, non-system trail, user-created and way*.

Decommission is a term used to remove routes from the landscape and return them to a natural state. There is a suite of methods that can be used to accomplish this task. The activities range from blocking the entrance, scattering boughs on the roadbed, scarifying, seeding, and water barring, to removing fills and culverts, reestablishing drainage-ways, pulling back shoulders, and recontouring the slopes for full obliteration. Agency resource specialists also ensure that rehabilitation activities enhance and protect resources.

### Regulatory

The following statement of exemption will be stated in the final travel order and motor vehicle use maps (MVUM): Except in wilderness and other congressionally designated special areas, the following may be exempt from prohibitions when granted by the forest supervisor:

- a) Limited administrative use by the Forest Service;
- b) Use of any fire, military, or law enforcement vehicle for emergency purposes;
- c) Authorized use of any combat or combat support vehicle for national defense purposes;
- d) Law enforcement response to violations of law, including pursuit; and

- e) Use and occupancy of National Forest System lands and resources pursuant to a written authorization issued under federal law or regulations. Note: emergency access and law enforcement pursuit does not necessarily require permission from the Forest Supervisor.

In designated wilderness the following persons may be exempt from prohibitions:

- f) Persons with a Forest Service permit specifically authorizing the otherwise prohibited act or omission; and
- g) Any federal, state or local officer, member of an organized rescue or firefighting force, in the performance of an official duty.

The Forest Supervisor has the authority to issue special orders limiting or changing access for protection of the natural resource, wildlife, or safety.

Off road parking for dispersed camping is within 300 feet from any road open for motorized use or in designated sites as determined by the responsible official.

No off road travel will be allowed for game retrieval.

Off road parking for special uses such as forest product gathering will be specified and issued by special use permit.

Parking a motor vehicle on the side of the road is allowed up to 30 feet from the edge of the road surface for all uses other than dispersed camping or as specified by a permit.

Off road camping and parking must not damage the land, vegetation, or streams and no live trees may be cut (FSM 2355.30, 36 CFR 212).

Nothing in this plan precludes future project-specific environmental analysis from proposing the construction of new system roads and trails.

### Mode of Travel

**Air travel:** All aircraft including but not limited to airplanes, helicopters, hang gliders, paragliders, hovercraft, balloons, ultralights, and other similar equipment will require a special use permit for take-off and landing locations on White River National Forest lands or waterways (36 CFR 261.58).

**Boat travel:** Motor boats with gas or electric motors are allowed only on Dillon Reservoir, Green Mountain Reservoir, Ruedi Reservoir, Homestake Reservoir, and Shoshone Forebay. Boats with electric motors also are allowed on Heart Lake, Deep Lake, Meadow Lake, Sweetwater Lake, Chapman Reservoir, and Crescent Lake. All other bodies of water—lakes, streams, and reservoirs—are limited to non-motorized boating. Human contact (including swimming and wading) is prohibited in Dillon Reservoir. Human contact or boating of any kind is prohibited on Maroon Lake and Hanging Lake (36CFR 261.58).

### Travel Opportunities and Legend Categories

The travel management plan maps and subsequent orders are separated into two seasons. The summer and winter map do not overlap. When one ends the other begins. It is expected, therefore, that all summer motorized and mechanized uses end on the date specified and transition to allowable winter motorized uses, then reverse back on the date specified.

## Summer Season

Summer season is considered the snow-free season. Summer season begins May 21 (at 00:00) and ends November 22 (at 23:59).

During the summer season all motorized and mechanized travel is restricted to routes designated for each particular use type—full-sized vehicles, all-terrain vehicles, motorcycles, mountain bikes, and all other mechanized vehicles used for human transport. Other designations include pack and saddle, and foot.

Some roads and trails may remain closed beyond the end date or be closed prior to the opening date when ground conditions are not sufficient to allow traffic without causing resource damage. Some roads and trails may remain open prior to the opening date and after the closing date on a site-specific basis, only when the authorizing official determines there is a public need and ground conditions are sufficient to allow the activity. Any exceptions to the listed dates will be made through a line officer's special order and posted at the specific location.

## Legend

Roads open to **licensed motorized only** (highway legal)

Roads open to **licensed and unlicensed** (all vehicles)

Trails open to **motorized vehicles < 50 inches** in width (ATV)

Trails open to 2-wheeled motor vehicles (**motorcycles**)

Trails open to **mechanized** vehicles (**bicycles**)

Trails open to **animal (horse) and foot (hike)**

Roads and trails **managed under special use permit (SUP)**

Roads and trails **closed to the public** or **decommissioned**

## Note:

All motorized and mechanized modes of travel must be on designated routes.

Highway legal vehicles are considered motor vehicles licensed under State law for general operation on all public roads within the state.

All motorized categories allow mechanized (bike), animal (horse), and foot (hike) unless otherwise specified.

All mechanized will allow animal (horse) and foot (hike) unless otherwise specified.

Animal (horse) and foot (hike) are allowed to travel across country and generally on all routes. There are some routes that may limit animal (horse) or foot (hike) use for safety reasons.

Exceptions to the notes above will be specifically noted in the travel management plan tables.

## Winter Season

Winter season is considered the snow season. Over-snow motorized travel begins November 23 (at 00:00) and ends May 20 (at 23:59).

An over-snow vehicle is defined as a vehicle that is designed for use over snow and runs on a track or tracks and/or ski or skis while in use over snow (36 CFR 212.1). Any other

vehicle other than defined by 36 CFR 212 for winter use, including wheeled vehicles such as full-sized vehicles, all-terrain vehicles, motorcycles, mountain bikes, and mechanized vehicles, are prohibited, unless on a plowed or maintained road.

Under certain conditions over-snow vehicle use may remain open prior to the opening date and after the closing date on a site-specific basis, only when the authorizing official determines there is a public need and ground conditions are sufficient to allow the activity. Any exceptions to the listed dates will be made through a line officer's special order and posted at the specific location.

All grooming operations on winter trails require a permit or other authorization. On National Forest System lands where groomed motorized winter trails are provided by the Forest Service, or through other approved providers, travel is restricted to snowmobiles and non-motorized/non-mechanized uses only. Machines such as snowcats or other tracked vehicles designed specifically for over-snow winter travel are prohibited from these groomed trails unless equipped with and operating a grooming implement that is designed to groom the trail behind the machine. On groomed non-motorized winter trails, travel is restricted to non-motorized/non-mechanized uses only, unless granted through permit or other authorization. The intent of this provision is to maintain the integrity of the groomed snow surface and to protect the investment made in maintaining these winter routes for their intended purpose.

Categories used to depict allowed uses for summer and winter and the time of year these are in effect are listed below. (Note: this also represents the legends used on the summer and winter maps; these reflect what will become the site-specific regulatory travel management categories and decisions.)

### **Legend**

- Open motorized areas
- Restricted motorized areas with motorized routes only
- Prohibited motorized areas
- Total closure to all uses

### **Note:**

Motorized use is for winter motorized (tracked) vehicles only. No wheeled vehicles will be allowed off of plowed roads and parking lots unless under special use permit.

### **All Seasons**

At no time may any transportation use take place that will cause resource damage.

Additional site-specific closures and seasonal exceptions or restrictions may be implemented either annually or on a case-by-case basis for management, wildlife, and resource protection through authorized travel orders. These site-specific travel orders will override the base summer and winter travel maps.

### **Special Areas and Permits**

Access for permitted activities (such as livestock operations, mineral and oil/gas exploration and development, maintenance of water developments, utility maintenance, timber management, ski area management, outfitter and guide operations, and special events) on National Forest System lands is independent of general public access. Individuals or groups with special permits are allowed to conduct their business

according to conditions outlined in their permits. If a permit does not stipulate exemptions to the forest's general travel regulations, the general travel regulations will apply.

The Golden Horseshoe area on the Dillon Ranger District is designated Intermix 7.1 management area in the forest plan. These areas stress collaborative management with local governments and user groups. An inter-government cooperative task force along with public group participation has been created to work on the management direction for the recreation uses within this area. The DEIS travel management plan presented the maximum amount of roads and trails in the Golden Horseshoe area for analysis purposes and analyzed the maximum resource impacts this area would see. The SDEIS and FEIS reflect the roads and trails that are currently ready to be incorporated into the travel system. The task force will continue to design a system that projects future road and trail needs along with those that need to be rehabilitated. The public is encouraged to work with the task force to help the group design the final transportation system for this area.

Ski areas are treated as year-round special areas in the travel management plan. The roads and trails dedicated to the ski area operation will be considered designated permitted routes under the ski area permit. The ski areas will be responsible for the management, operation, and maintenance of these routes. Winter uses are controlled and managed by the ski areas as stated in their permits. Nordic centers are designated as special areas for winter operations. Any modifications to ski areas, Nordic centers, or any other special use area will be conducted under the respective permit, including initiating the NEPA process when appropriate and updating operating plans for implementation.

### ***Decommissioning***

The goal in decommissioning routes is to remove routes from the landscape and return them to a natural state. There is a suite of methods used to accomplish this task. The activities range from blocking the entrance, scattering boughs on the roadbed, scarifying, seeding, and water barring, to removing fills and culverts, reestablishing drainage-ways, pulling back shoulders, and recontouring the slopes for full obliteration.

One of the decisions to be made is determining which routes will be decommissioned and rehabilitated. Since the decision will be based upon analysis in this document, no further NEPA will be required for implementation. The suite of methods available will be considered in the decision. To meet travel management goals, the best rehabilitation methods for each route will be selected based on ground and hydrological conditions and desired vegetation. Decommissioning and rehabilitation methods include confirmation from specialists that activities enhance and protect resources. Once completed, forest staff will monitor for effectiveness.

## **The Alternative Development Process**

---

Development of a travel management plan is a large and complex process. The White River National Forest decided to undertake developing a plan for the entire 2.3 million acres so that a consistent updated plan could be implemented.

This plan revision process started with the determination that there is a need to change the 1984 forest management plan travel management strategy, described in the travel map of 1985, because of changes in circumstances, legal mandates, societal uses, and societal values. The White River National Forest presented a draft travel management plan in the forest plan DEIS. A decision was made to separate the two planning efforts and develop the travel management plan after the finalization of the forest plan.

The White River National Forest re-initiated the development of the travel management plan in August of 2002. By implementing the initial inventory and scoping process both internally and externally, the White River National Forest developed the DEIS for release in June of 2006.

The White River National Forest updated the inventory and presented alternatives for the travel management plan in the DEIS. When looking at the number of features and decisions to be made, there were an infinite number of permutations and combinations that could be developed into alternatives. The Forest Service developed a strategy to limit the number of alternatives to study in detail while obtaining a range of management options and providing a clear basis of choice. Significant issues and comments on preferences and general management direction were used to formulate alternative themes. Scoping comments were further categorized into concern areas such as: alpine protection, amount of decommissioning, maintenance costs, loop opportunities, access points, addition or elimination of unauthorized routes, social interaction of users, effects on watersheds and wildlife, spread of noxious weeds, separation of users, riparian and cultural resource protection, commodity access, special use access, and administrative access.

All of these were categorized into three key issues: volume and type of access, resolution of resource conflict, and protection of natural resources. These three issues were then used to form the action alternatives under consideration. The alternatives focused on optimizing recreation opportunities, providing for separation of recreation uses where possible, and emphasizing natural resources and habitat values while still providing for recreation. These focused themes allowed for the range of alternatives to be presented.

Once the alternative themes were established, the alternatives were fully developed by the ranger district staffs who examined and proposed a management strategy for each road, trail (whether system or non-system), and winter use area, based on site-specific comments, on the ground knowledge, and discussions with the public.

Alternatives C, D, and E resulted and were analyzed and presented in the DEIS.

The SDEIS was developed in response to the comments received on the DEIS, which examined these three action alternatives and the minimal action alternative in detail. Several people commented that they had difficulty in sorting through all the details that made up the three action alternatives presented in the DEIS. The DEIS also stated that “the final decision may result in the selection of any of the alternatives, a combination of alternatives, and /or from additional information and comments received.” In response, the SDEIS was developed and presented to the public. The SDEIS provided an opportunity for the public to comment on a new preferred alternative that was created by blending components of the previously presented alternatives while addressing public comments and management implications due to the travel rule.

This FEIS was developed based on all the information and comments from the entire planning process. Alternative G-Modified (Alternative GM), the preferred alternative for this FEIS, is largely the same as Alternative G, the preferred alternative in the SDEIS, but has been modified to respond to public and internal corrections and concerns.

## **Further Incorporation of the Travel Rule**

Within the parameters and scope of the purpose and need, the White River National Forest incorporated appropriate components from the travel rule into the travel management process.

## Motorized Mixed Use

In the travel rule, the agency acknowledges the need to mix highway-legal (licensed) and non-highway-legal (unlicensed) traffic on some National Forest System roads at maintenance levels 3, 4, and 5. These designation decisions will be advised by professional engineering study and analysis, as appropriate. Guidelines for Engineering Analysis of Motorized Mixed Use on National Forest System roads (USDA Forest Service 2005) outlines the procedures to be undertaken and factors to consider while analyzing the safety risks of authorizing highway legal vehicles and non-highway legal vehicles to operate on the same road (motorized mixed use). Safety and engineering considerations are to be evaluated while conducting the motorized mixed use analyses.

During 2006 and 2007, motorized mixed use analyses (professional engineering studies) were conducted on Maintenance Level (ML) 3 through 5 roads by the White River National Forest engineering department. These roads are the National Forest System arterials and collectors and the main access routes that the public uses to get to the forest. Studies include an evaluation of the potential for crashes as well as the severity of an accident should a crash occur. The crash potential rating is based on roadway factors such as traffic volume and type, surface type and condition, sight distances, driving speeds, and roadway alignment (horizontal and vertical curves). Crash severity ratings are based on roadside conditions (natural ground slopes, slope/height of embankments, and large unyielding features next to the road), speed, and traffic types (the larger the difference in size of vehicles, the greater the severity).

Motorized mixed use analyses were not conducted on ML 2 roads as these roads usually have rough uneven driving surfaces, slower driving speeds, and minimal use, and can safely accommodate the mixing of highway legal and non-highway legal vehicles. ML 3–5 roads usually have better driving surfaces, higher driving speeds, and greater volumes of traffic. ML 5 roads were excluded from the analysis as these roads, mostly paved, were determined to be unsafe for designation due to poor handling characteristics of OHVs on paved surfaces. ML 3–4 roads that access or move people around recreational facilities (campgrounds, picnic areas, scenic overlooks, boat docks, fishing areas, etc.) were also deemed unsuitable for OHV use in light of the recreational experiences users expect and the experiences the forest is trying to provide. Some ML 3–4 roads were excluded from analysis due to known heavy traffic volumes and unsafe road characteristics. Other ML 3–4 roads were excluded from the analysis as OHV use was inappropriate given forest plan direction for the area the road accesses.

Some roads with mixed use may have the designation temporarily suspended due to forest management activities such as timber sale and natural gas exploration and development, and will have the designation restored once the commercial activities have been completed.

The DEIS presented a list of maintenance level 3, 4, and 5 roads that would likely allow and not likely allow mixed motorized use (Appendix I, DEIS). The SDEIS considered all the engineering studies and their effects and incorporated the findings into Alternative G. Alternatives A and F present all ML 3, 4, and 5 routes as open mixed use, as they are currently managed.

Alternative GM in the FEIS also incorporates finding of the engineering studies for mixed-use designations. In response to public comments, forest staff looked for opportunities to allow mixed use on some of the roads originally recommended for license only. By applying additional on-the-ground measures such as signing and regulatory requirements such as requiring all operators (even on ATVs) to have a valid

state driver's license, safety concerns on certain roads were reduced sufficiently to allow for mixed use.

### Unauthorized Routes

Unauthorized routes are non-system roads and trails made up of user-created routes, routes once on the system that may not have been properly closed, routes that should have been on the inventory but were missed, historic routes, and even game and cattle trails that people use. System routes are roads and trails that are inventoried and designated as a road or trail under Forest Service ownership and jurisdiction. Other designated roads and trails may be on National Forest System lands, but their easement or jurisdiction belongs to another entity such as county, private individual, state, or other federal agency.

The travel rule recognized the need to address unauthorized routes during travel planning. *"Some poorly located, unauthorized routes causing considerable environmental damage may have to be closed to all uses. However, other routes are better suited to some uses than others. In some areas of high concentrations of use, maintaining separate trail networks for different uses may reduce conflict and enhance public safety and the recreational experience. In other areas, multiple-use trails work well. The Department believes these decisions are best made at the local level, with public participation."* (USDA, 2005)

One of the key decision points in the TMP is the declaration of which roads and trails should be designated in the system. In proposing routes for designation, the forest's effort was forward-looking and focused on a route's potential contribution to the overall transportation network, rather than focusing on each route's prior history and designation. This comprehensive look began with taking stock in the current road network in the forest; an effort that was significantly aided with public comments. Designation of routes was partially determined by the following criteria: need for the route, the route's importance in the overall network, the route's fit with the overall recreation management goals for an area, the route's fit with other management goals for an area, and the route's current condition.

Ranger district personnel who were the most familiar with local routes were responsible for mapping the site-specific route information, performing field verifications, working directly with the publics who had site-specific ideas or concerns, and reading and responding to site-specific comments and concerns. Throughout the planning process, meetings were held at all ranger districts to consider how the site-specific information fit within the big picture—the comprehensive look at the forest as a whole—and how this effort meets forest-wide goals and planning guidance.

Those routes not proposed to be part of the system will be decommissioned. Any newly discovered unauthorized routes will also be decommissioned.

## Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14).

The interdisciplinary team originally considered five different alternatives during scoping. The original alternatives—B, C, D, and E—were analyzed and disclosed in the DEIS. The action alternatives—C, D, and E—represented a reasonable range of

alternatives for consideration. The SDEIS considers the DEIS alternatives, public comment including corrections, and current regulations.

The following action alternatives were studied in detail in the DEIS.

## Action Alternative C

### Background

Alternative C responds to the issues of volume and type of recreation access.

### Theme

Alternative C focuses on accommodating recreation for more users where possible. It emphasizes shared use and optimization of available facilities, thus providing for a greater capacity for recreation across the forest.

Under Alternative C, key elements include:

- Optimization of road and trail opportunities;
- Mostly hierarchical<sup>1</sup> recreation use on roads and trails;
- Likely to have fewer exclusive use roads and trails;
- Creation of more opportunity for people to disperse;
- Creation of the most miles available for a particular use (non-exclusive);
- Likely to have the highest recreation capacity;
- Identification of more loop opportunities; and
- Likely to add more unauthorized routes and have less decommissioning of system roads and trails.

## Action Alternative D

### Background

Alternative D responds to recreation user conflict issues.

### Theme

Alternative D emphasizes reducing recreation conflicts among users and promoting a more sustainable recreation program in the long term.

Under Alternative D, key elements include:

- More separation of use, even consideration of some exclusive use;
- Does not necessarily follow hierarchal use of roads and trails;
- Individual decisions are made on the appropriateness of each type of use on each route;

---

<sup>1</sup> Hierarchical is a system in recreation describing allowable uses. The uses described are—from least restrictive to most—high-clearance vehicles, all-terrain vehicles, motorcycles, bicycles (mechanized), horse and pack animals, foot (hiking). Under the hierarchal system, the uses listed after the specified allowed use for a route would also be allowed on that route. For example, if high-clearance vehicles are allowed on a road, then so is every other use; if a trail is open to motorcycles it is also open to mountain bikes, animals, and foot traffic.

Main objectives are reduction of user conflict and long term recreation program sustainability;

Identification of loop opportunities;

Creation of more designated routes and play areas in winter;

Likely to have fewer total miles or areas available to a particular use, but more miles available for shared uses on routes; and

Likely to add more unauthorized routes and have less decommissioning of system roads and trails.

## **Action Alternative E**

### **Background**

Alternative E responds to the issues of managing recreation use to reduce the impacts on natural resources and wildlife caused by recreation.

### **Theme**

Alternative E emphasizes natural resource and habitat protection while still allowing recreation use.

Under Alternative E, key elements include:

Designate travel systems to reduce impacts on habitats (wildlife) and natural resources;

Mostly hierarchical recreation use on roads and trails;

Likely to have more shared recreation use on a limited system;

Likely to have fewer roads and trails to maintain and be more sustainable from an economic standpoint;

Likely to cluster recreation in some areas;

Allowance for more primitive, non-motorized recreation experiences;

Identification of fewer loop opportunities;

Likely to add the fewest unauthorized routes and have the most decommissioning of system roads and trails.

## **Rationale for Elimination from Detailed Study**

Several factors contribute to the reasons why Alternatives C, D, and E were not re-examined in detail in the SDEIS and FEIS.

The deciding official and Forest Service staff, were able to utilize the information presented in the DEIS to develop the alternatives presented in the SDEIS. The SDEIS was developed to show progression in the planning process and present management scenarios that reflected the forest's best options for travel management planning. The FEIS is the conclusion to that progression.

These alternatives were fully examined in the DEIS, and provided the foundation for the final alternative (Alternative GM) in the FEIS. The SDEIS incorporated elements of these alternatives, public comment, and updated resource information into a single comprehensive and more focused alternative (Alternative G). The FEIS presents an

update to Alternative G presented in the SDEIS. It has been further refined to address public comments and corrections presented in the SDEIS. The resulting alternative, Alternative GM, is the final preferred alternative and reflects consideration of the full range of options presented throughout the planning process.

Updating Alternatives C, D, E and presenting them in the FEIS is not required and would add to the complexity of reviewing the document. These alternatives have already been analyzed and presented to the public for comment. They have been improved upon in reaching the end goal for the travel management plan.

## Alternatives Considered in Detail

---

### Alternative A (No-Action)

#### Background

NEPA regulations at 40 CFR 1502.14 state that “agencies shall: (d) include the alternative of no action.” Guidance from the Council on Environmental Quality (CEQ) clarifies that the no-action alternative be based on no change from current management.

The DEIS included Alternative A, which reflects current conditions, as an alternative that was not considered in detail because it did not meet the purpose and need and current forest plan direction. The SDEIS and FEIS still recognize the flaws of this alternative; however this alternative will be examined under Alternatives Considered in Detail in the FEIS as the no-action alternative.

As current conditions were analyzed, it became clear that significant changes had occurred in the known inventory. A large number of additional unauthorized routes were brought to the attention of the interdisciplinary team during the scoping process. Alternative A, although infeasible to implement, serves as a context for current condition for environmental analyses. The current resource conditions on the forest described in the affected environment sections of each resource reflect that “snapshot” in time.

Alternative A does not address the purpose and need and is not fully compliant with forest plan direction.

#### Theme

Alternative A considers the current condition for travel management on the White River National Forest. Alternative A is the no-action alternative.

Under Alternative A, key elements include:

#### For summer:

- The current condition is the current designated system routes with their current legal uses; motorized and mechanized uses can only occur (legally) on these routes;

- Unauthorized routes are not legal to use by motorized or mechanized vehicles;

- Horse and hike use is allowed everywhere on the forest unless restricted by special order;

- Because it is current condition, unauthorized routes would not be decommissioned and rehabilitated (as rehabilitation is an action);

- No routes are adopted. No routes are decommissioned;

Changes are not made to consider motorized mixed use per the travel rule, so no National Forest System routes are changed to licensed motorized only; and

Changes to uses on routes are not changed to meet forest plan direction (as the forest plan did not address roads and trails site-specifically) or other regulations; rather they remain as is.

**For winter:**

The forest plan made area-wide decisions as to whether allow motorized and non-motorized use in a particular area. The current condition therefore is based on forest plan area decisions because the forest plan did, through standards and guidelines and management area prescriptions, dictate where open, restricted, and prohibited areas of winter motorized activity can occur. Some prescriptions allow open winter motorized use, some call for restricted winter motorized use (to routes and small “play areas”), and some prohibit winter motorized use.

The forest plan did not designate any specific routes or play areas in the restricted prescriptions. These need to be designated in the action alternative.

The forest is open to foot and other non-mechanized winter travel such as cross-country skiing and snowshoeing.

## **Alternative F**

### **Background**

Alternative F represents the original Alternative B in the DEIS, with corrections.

### **Theme**

Alternative F considers the minimum actions needed to bring the forest travel system into compliance with forest plan direction.

Under Alternative F, key elements include:

Standards and guidelines in the forest plan would guide management of the forest travel system.

There would be no consideration of user-created routes for system designation. No user-created routes are adopted. All user-created routes are decommissioned.

All designated Forest Service system routes are carried forward in this alternative. Any Forest Service system routes currently out of compliance with the direction in the forest plan would be brought into compliance or decommissioned.

All modes of travel will be compliant with forest plan direction.

Changes are not made to consider motorized mixed use per the travel rule, so no national forest system routes are changed to licensed motorized only.

Just as with Alternative A, winter motorized use is dictated by forest plan management area and recreation opportunity spectrum direction. Management area prescriptions that are restricted to routes and play areas under this alternative would be non-motorized. The forest plan did not designate any specific routes or play areas in the restricted prescriptions. These need to be designated in the action alternative. For winter, Alternative F is the same as Alternative A.

## Action Alternative G – SDEIS Preferred Alternative

### Background

This alternative incorporates elements of all the action alternatives presented in the DEIS, public input, and the latest regulations for travel management.

The alternative was not built arbitrarily, rather it was built by considering the key issues and how to best address them. Consideration was given to how much use can be provided, where to emphasize certain use types, and what improvements should be done to improve the landscape. Each comment was read and considered. Some requests were able to be met and some were not, as the forest cannot accommodate all uses everywhere and meet the goal of sound land management along with the need to provide for some separation of use.

The approach was to first look at the forest plan and regulations that guide travel management. Then, by looking at public input, forest needs, forest resources, and forest natural environment, design a system that is logical and manageable while serving access and recreation needs. The strategy included looking at the forest as a whole and identifying where certain uses could be best accommodated and provide quality experiences for publics. From there, site-specific systems were developed from past alternatives and site-specific comment input. This included adding user-created routes that enhance the system and removing those routes, either system or user-created, and that do not enhance the system or are not sustainable. Overall, the forest had to consider how much it would be able to provide and manage.

### Theme

Alternative G is was the preferred alternative for the SDEIS. This alternative strives to balance the public transportation needs, including recreation uses, with natural resource protection and enhancement. The alternative was designed to best meet the public desire to access and recreate on the national forest in a natural setting.

Under Alternative G, key elements include:

- Meeting forest plan and regulatory guidance for travel management;
- Consideration of the alternatives and information presented in the DEIS;
- Consideration of all public input from scoping and DEIS comments;
- Consideration of the mixed use safety studies and application of these into network planning;
- Presentation of the summer roads and trails system and uses for each route;
- Consideration of unauthorized routes for adoption or rehabilitation;
- Presentation of system routes no longer needed to be decommissioned; and
- Presentation of where motorized over-snow travel is authorized, restricted, and prohibited during the winter season. Includes presentation of over-snow motorized designated routes in restricted motorized areas.

## Action Alternative G Modified (GM) – FEIS Preferred Alternative

### Background

Alternative G Modified (GM) is largely the same as Alternative G, but has been modified to respond to public and internal concerns. Alternative GM is a culmination of the travel management planning process. This alternative utilizes all the alternatives presented in the DEIS, SDEIS, public input, and incorporation of the latest regulations for travel management.

Under Alternative GM, key elements include:

- Meeting forest plan and regulatory guidance for travel management;
- Consideration of the alternatives and information presented through-out the entire travel management planning process;
- Consideration of all public input from scoping and DEIS, SDEIS comments;
- Consideration of the mixed use safety studies and application of these into network planning;
- Presentation of the summer roads and trails system and uses for each route;
- Consideration of unauthorized routes for adoption or rehabilitation;
- Presentation of system routes no longer needed to be decommissioned; and
- Presentation of where motorized over-snow travel is authorized, restricted, and prohibited during the winter season. Includes presentation of over-snow motorized designated routes in restricted motorized areas.

## Comparison of Alternatives

This section provides a summary of each alternative and compares and contrasts the management actions included in all alternatives and the resulting environmental effects.

**Table 2.1—Summary of summer opportunity (roads and trails) in miles on the White River National Forest**

Legend	Alternative A	Alternative F	Alternative G	Alternative GM
Licensed motorized vehicle	1710	1708	1422	1420
Licensed and unlicensed full-size vehicle	1693	1691	847	872
Licensed motorized two-wheeled vehicle (licensed and unlicensed motorcycle)	1863	1862	1627	1613
Motorized vehicles < 50" in width (ATV)	1803	1802	990	1023
Motorized two-wheeled vehicles (unlicensed motorcycles)	1849	1845	1052	1066
Mechanized (bicycles)	2574	2569	2219	2172
Pack animal (horse)	3736	3736	3446	3373
Foot (hike)	3915	3915	3666	3592

**Table 2.2—Summary of winter opportunities on the White River National Forest**

<b>Legend</b>	<b>Alternative A</b>	<b>Alternative F</b>	<b>Alternative G</b>	<b>Alternative GM</b>
Open motorized areas (acres)	775,960	775,960	706,497	695,723
Restricted-motorized on routes only (acres)	437,627	437,627	507,092	517,963
Motorized prohibited areas (acres)	1,017,738	1,017,738	1,017,738	1,017,638
Special use permit (acres)	54,907	54,907	54,907	54,907
Designated motorized routes within restricted areas (miles)*	20	20	248	198

\*Does not include motorized routes in open areas

**Table 2.3—Summary of summer roads and trails under special use in miles on the White River National Forest**

<b>Legend</b>	<b>Alternative A</b>	<b>Alternative F</b>	<b>Alternative G</b>	<b>Alternative GM</b>
Managed under special use permit	211	207	242	247
Managed under ski area permit	210	210	210	210
Managed under administrative use	9	0	0	0
Historic roads	0	0	10	10

**Table 2.4—Summary of road and trail decommissioning in miles on the White River National Forest**

<b>Legend</b>	<b>Alternative A</b>	<b>Alternative F</b>	<b>Alternative G</b>	<b>Alternative GM</b>
System routes already decommissioned (but require additional treatment)	178	178	178	178
Non-system routes already decommissioned (but require additional treatment)	162	162	162	162
System routes to be decommissioned	1	14	481	519
Non-system routes remaining but not system	925	0	0	0
Non-system routes to be decommissioned	0	925	662	692
Non-system routes added to the system	0	0	251	225

**Table 2.5—Summary of road and trail in miles on the White River National Forest**

<b>Legend</b>	<b>Alternative A</b>	<b>Alternative F</b>	<b>Alternative G</b>	<b>Alternative GM</b>
<b>Sub-totals</b>				
Routes open to the public	3915	3915	3666	3592
Routes under special use, admin, historic	430	417	462	467
Routes to be or already decommissioned	341	1279	1482	1551

<b>Legend</b>	<b>Alternative A</b>	<b>Alternative F</b>	<b>Alternative G</b>	<b>Alternative GM</b>
Routes remaining but not part of the system	925	0	0	0
<b>Total</b>	<b>5611</b>	<b>5611</b>	<b>5611</b>	<b>5611</b>

Table 2.6—Comparison of key issues by alternative

<i>Indicator (key issue)</i>	<i>Alternative</i>	<i>Effect</i>
Meets laws, regulations, and forest plan	A	Does not meet
	F	Meets forest plan, does not meet the full intent of the travel rule
	G	Meets all laws, regulations, and forest plan
	GM	Meets all laws, regulations, and forest plan
Volume available for use	A	Total system routes are equal to Alternative F, however the percentage for motorized use is higher for summer; has the highest mixed use roads available in summer; does not add any unauthorized roads and does not decommission any roads or trails; provides the highest amount of open-motorized for winter but does not provide for routes in the restricted areas; winter Alt A is equal to winter Alt F as the Forest Plan set areas by prescription for open motorized travel—only allowed for winter over-snow travel.
	F	Total system routes are equal to Alternative A, however the percentage for non-motorized use is higher for summer; has the second highest mixed use roads available in summer; does not add any unauthorized roads but does not decommission non-system roads and trails; winter Alt F is equal to winter Alt A as the Forest Plan set areas by prescription for open motorized travel—only allowed for winter over-snow travel.
	G	Has the second to least number of designated routes in summer, but higher quality as some unauthorized routes (highly sought) are added, has the least amount of mixed-motorized use roads; provides the most designated motorcycle, horse, and hiking trails; provides less mountain biking but adds unauthorized routes highly recommended by users; has the second to least amount of open-motorized winter travel, but has the most motorized designated routes in restricted areas.

<b>Indicator (key issue)</b>	<b>Alternative</b>	<b>Effect</b>
Opportunities for separation of use	GM	Has the least amount of designated roads and trails overall but more is available for mixed-use and ATV use than Alt G; adds unauthorized routes where they enhance the system and decommissions those that do not; motorcycle single-track is similar to Alts A and F as the amount added to a network equaled the amount decommissioned or converted to non-motorized and lower than Alt G mostly due to Tenderfoot reduction; provides the least amount mountain biking but adds unauthorized routes highly recommended by users that are part of popular networks and most ready (resource-wise) for use; provides the least amount of open motorized areas for winter use due mostly to a reduction of small parcels that were open by prescription, but do not connect to large enough areas to provide a quality snowmobile experience; provides the second to highest amount of winter motorized routes in restricted areas.
	A	Provides the least, as it retains the hierarchy; does not consider non-motorized areas designated in the forest plan; does not add any unauthorized routes. See Alternative F for winter.
	F	Provides a little bit more than Alt A due to changing some routes in non-motorized management prescriptions. Does not change the system beyond that and therefore does not re-designate uses to provide networks that emphasize a particular use; winter is either open or closed to motorized, separated, but does not place motorized in desired locations (further out open areas) as there are no routes through restricted areas to get there, which may lead to more overlap of users closer to access points.
	G	The highest level of separation as it contains the highest number of routes open to uses that emphasize a particular use such as licensed motorized, motorcycle, bicycle, and foot only; it allows for changes in designation and adds user-created routes that were nominated by certain user groups; winter reduces some areas once open to motorized (generally smaller areas) and allows them to be non-motorized; winter does designated routes for motorized in restricted areas which concentrates mixed use on these routes however off the route is available for non-motorized..
	GM	Provides the second highest level of separation as this alternative returned some routes back to mixed-use to accommodate more users; it reduces the overall number of routes available, but concentrates on networks where users of a particular use can go and have ample opportunity and a higher level of quality for a particular use (networks with an emphasis for a particular use); winter reduces some areas once open to motorized (generally smaller) and allows them to be non-motorized; winter does designated routes for motorized in restricted areas which concentrates mixed use on these routes however off the route is available for non-motorized.
Land and resource protection	A	Provides the least amount of land improvement, as no routes, including unauthorized routes, are decommissioned; routes are neither added where needed nor taken away where not needed; contains the highest number of system routes and does not consider decommissioning those that may not be needed or that should be removed for resource protection.

<b>Indicator (key issue)</b>	<b>Alternative</b>	<b>Effect</b>
	F	Decommission all unauthorized routes; does not exchange routes or add/take away routes where necessary for resource protection needs.
	G	Selects a system that considers resource needs, including removing and decommissioning routes no longer needed, and adding some routes that may be better on the landscape and still provide an opportunity for travel; concentrates uses in networks and areas thus reducing the impact to wildlife (allows wildlife to not be impacted across the landscape); contains the second to least amount of routes on the landscape; winter motorized use is reduced in some areas removing some small parcels that collectively reduce use in some areas and in restricted areas that generally emphasize wildlife habitat, motorized use is concentrated on routes thus wildlife is less impacted.
	GM	Selects a system that considers resource needs, including removing and rehabilitating routes no longer needed, and adding some routes that may be better on the landscape and still provide an opportunity for travel; concentrates uses in networks and areas thus reducing the impact to wildlife (allows wildlife to not be impacted across the landscape); contains the least amount of routes on the landscape; decommissions the most and thus this alternative is considered the best for land and resource protection; winter motorized uses are reduced most in this alternative-removing some small parcels that collectively reduce use in some areas and in restricted areas that generally emphasize wildlife habitat, motorized use is concentrated on routes thus wildlife is less impacted.

## Monitoring

### Monitoring

The travel management plan was designed to meet forest plan desired conditions, goals, and objectives and follow all standards and guidelines. The forest plan monitoring strategy evaluates the desired conditions, goals, objectives, and effectiveness of standards and guidelines. Monitoring questions related to travel management and resource conditions are listed in the forest plan monitoring strategy. These questions link to monitoring items that answer whether travel management is being effectively managed on the forest. The forest plan monitoring report and the annual accomplishment report provide the information to determine if travel management goals are being met. Monitoring of motorized uses as part of the forest's land management plan is required in 36 CFR 212.57. The monitoring plan is not a decision to be made; rather it is a tool to assure that the travel plan decisions are carried out (40 CFR 1505.2(c) and 1505.3).

Under the monitoring protocols, the recreation department has been surveying and interviewing users across the forest. This study, national visitor use monitoring (NVUM), is conducted every five years, and has provided statistical information on the amount of use, type of use, and location of use across the forest. This effort is expected to continue.

Other tools to help the forest monitor the effectiveness of the travel management plan include field reconnaissance by ranger district and forest personnel including backcountry rangers, wilderness rangers, snow rangers, engineers, recreation managers, and any other

forest personnel that are in the field. Citizens who report findings also help to identify issues that need to be remedied. Law enforcement observations and database recordings will help identify problem issues and areas that need attention and/or corrective measures.

At the conclusion of this travel management planning process the White River National Forest will engage in completing a Travel Management Implementation Action Plan. The TMIAP will describe steps to be taken to effectively implement the Travel Management Plan Record of Decision. The emphasis will be on the “4Es:” Education, Engineering, Enforcement, and Evaluation (monitoring). The TMIAP will include monitoring elements to evaluate whether public needs are being met, whether use is compliant with the travel management decision, and whether implementation methods are effective. Included in the plan will be recommendations and design from archeologists, biologists, and other specialists to ensure impacts are minimized and in some cases conditions and habitats improved. Tools will be put in place to provide feedback to line officers so they can address any necessary changes.

On-going monitoring of dispersed camping sites and site-specific actions is being undertaken to address resource and safety concerns. The White River National Forest will continue to inventory and monitor dispersed camping across the landscape. For most of the forest dispersed camping with a motor vehicle can occur 300 feet from a designated road. There are some places on the forest where dispersed camping can only occur in designated sites. This direction is compliant with the forest plan and the travel rule.

## **Implementation**

The roads and trails that are to be part of the National Forest System will be designated through this plan. These roads and trails, including routes added to the system, will need to be maintained to standard. A plan for how, where, and when to implement work on the ground to reinforce the decision to decommission roads and trails will be established by the White River National Forest. The forest will dedicate funding toward accomplishing the goals set in this plan. Additional site-specific recommendations including biological and archeological clearances may be required to identify the best methods to be used for bringing roads and trails to standard or decommissioning and rehabilitation efforts. The additional examinations are not to revisit the decision as to whether the road or trail should exist or not, rather they will focus on the best methods meet resource needs.

The forest is updating its sign plan in concert with regional direction. The forest will continue to sign for travel management across the forest. The sign plan will help provide consistent sign usage across the forest. The forest is dedicating time and money to install educational, informational, and regulatory signing across the forest.

Motor vehicle use maps, as required by the travel rule, will be available for public distribution. Forest-wide travel order(s) and MVUM will be in place to provide the mechanism to enforce any strategies. Other maps will be developed and available through a variety of media to convey travel information and recreational opportunities.

Implementation of the travel management plan will include strategies for educating users, utilizing law enforcement efficiently, and developing tools for communication to inform visitors of the forest, including signs, kiosks, maps, web-sites, etc.

## **Law Enforcement**

The White River National Forest at full staff has three full time law enforcement officers. These officers are supervised by a zone special agent. The forest also trains several of its field staff to serve as protection officers. Protection officers mainly can observe and write tickets for minor violations. Any major violation must be handled by the law enforcement officer.

The current travel management restrictions that govern the use of roads and trails are a complex mix of regulations, special closures, and a large number of seasonal restrictions. These are not easily displayed on a map or written document. The travel management plan will attempt to simplify some of this confusion by limiting the variety of seasonal restrictions where possible, creating readable maps, utilizing the latest technology communication tools available on the web, posting information in key locations, and educating users.

Forest recreation professionals and law enforcement officers have noted enforcement hot spots and certain times of year where higher levels of violations occur. Law enforcement efforts will focus on areas of greatest concern or potential for resource damage.

The travel management plan final decision for site-specific use will consider ways to discourage illegal use. These considerations include developing networks that satisfy the intended use. This means that a road or trail that is too short or isolated to provide what the user is looking for or dead-ends where the use is not allowed, will likely not include that use on the route. This is just good network planning. The forest wants to provide what the user needs for a satisfying, quality experience. With a limited law enforcement staff, the ability to allow law enforcement to focus its efforts rather than spread the efforts on every acre makes their job more efficient and effective.

Also under the rule, driving off of designated routes for motorized use is considered a general prohibition. This means that the user is responsible for understanding and following the law, which also means knowing where he/she can or cannot ride or drive.

Implementation of the travel management plan will include a strategy for educating the user, utilizing law enforcement efficiently, and developing tools for communication to inform visitors of the forest.

## CHAPTER 3:

# AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter summarizes the physical, biological, social, and economic environments of the project area and the effects of implementing each alternative on that environment. It also presents the scientific and analytical basis for the comparison of alternatives presented in the alternatives chapter. This chapter presents the description of the affected environment, direct/indirect effects, and cumulative effects.

The Forest Service has inventoried and mapped all existing roads and trails for consideration under White River National Forest jurisdiction. These include forest system roads and trails as well as unauthorized roads and trails. Sources included previous inventories, Forest Service field managers, and information submitted by the public. Inventory of winter use was aided by public input as well.

This chapter presents the scientific and analytical basis for comparison of the alternatives presented. It is organized by individual environment or resource topic. The Affected Environment section for each resource topic describes the existing or baseline condition against which environmental effects are evaluated and from which progress toward the desired condition can be measured. The Environmental Consequences section for each resource topic discusses direct, indirect, and cumulative effects of implementing the alternatives and applicable mitigation measures. Effects can be neutral, beneficial, or adverse. Environmental consequences form the scientific and analytical basis for comparison of the alternatives. The cumulative effects analyses examine past, present and reasonably foreseeable future actions and their effects that overlap in both space and time with the effects of each alternative. It's important to note that not all actions that have previously occurred or will likely occur need to be part of a cumulative effects analysis. This would not be practical nor is it required. Instead, these analyses examine those effects from other actions that will cumulatively contribute to this action, in time and space, in a measurable manner toward a desired or undesirable threshold.

Analyses are conducted based on the purpose and need, proposed action and alternatives, and scope of this proposal as presented in Chapters 1 and 2. The following assumptions and limitations were applied in the effects analysis in each resource section:

1. No NEPA decision is necessary to continue use of the National Forest Transportation System as currently designated and managed.
2. Unauthorized or user-created roads, trails, and areas are not National Forest Transportation System facilities.
3. The Forest Service will continue to make changes to the National Forest Transportation System as needed. Changes can be initiated through public or government proposals. These changes will require consideration through the NEPA process.
4. Decisions made in the forest plan are incorporated into this analysis. This includes forest-wide and management area allowable use strategies for motorized, mechanized, and non-motorized travel.

5. Decommissioning will allow routes to return to a natural state similar to surrounding areas. It may take some time for complete reincorporation.

## Air Resources

### Introduction

No violations of ambient air quality standards have occurred on the forest, nor have any activities on the forest caused violations of these standards elsewhere. All areas of the White River National Forest currently meet air quality standards.

### Key Indicators

**Key indicator:** Concentrations of particulate matter.

**Measure:** This air quality analysis is qualitative and compares road and trail miles open to motorized use and their corresponding risk of creating adverse air quality.

### Affected Environment

Air quality within the White River National Forest is potentially affected by land management and development activities both on and off the forest. Air pollutants of concern include fine particulate matter, nitrogen oxides, sulfates, carbon monoxide and ozone. These pollutants can affect human health, reduce visibility, and lead to acidic deposition in sensitive, high-elevation lakes.

Sources of air pollutants include forest management activities such as wildland fires (both natural and management ignited), emissions related to oil and gas exploration and development, road dust, and vehicle emissions. These sources are also found outside Forest Service administered lands. In addition, sources from non-Forest Service lands include coal fired power plants and emissions from urban and resort developments such as gas stations, restaurants, and railroads.

The Eagles Nest, Flat Tops, and Maroon Bells-Snowmass Wilderness Areas are Class I areas, congressionally designated for protection of their pristine air quality. The remainder of the forest, including its other wilderness areas, is Class II which is generally managed for less stringent air quality goals than Class I areas.

### Air Quality Standards

The White River National Forest must comply with federal and state ambient air quality standards. These standards have been established for seven criteria air pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO<sub>2</sub>), PM<sub>10</sub>, PM<sub>2.5</sub>, ozone (O<sub>3</sub>), and sulfur dioxide (SO<sub>2</sub>). Currently the areas in and around the White River National Forest comply with each of the standards for ambient air quality. Ozone, a pollutant formed from the photochemical reactions of nitrogen oxides and volatile organic compounds, is a growing concern in Colorado. While the standards for ozone have not been exceeded within the counties occupied by the forest, studies are being conducted to understand potential contributors to ozone such as oil-gas production and highway vehicle exhaust.

### Class I Wilderness Air Quality Areas

Modeling indicates that visibility is impaired in the three Class I areas on the White River National Forest: Eagle's Nest, Flat Tops and Maroon Bells-Snowmass Wilderness areas (CDPHE 2007a, 2007b, 2007c). Visibility impairment is defined as any humanly perceptible change in visual air quality from that which would have existed under

natural conditions (in other words, absent anthropogenic influence). This change is caused by air pollutants: particles and gases in the atmosphere which either scatter or absorb light. The net effect is the creation of a hazy condition. Sources for visibility impairment in these Class 1 areas include large coal fired power plants, oil and gas exploration and development, on-road and off-road vehicle traffic, road dust, windblown dust, and wildland fire. The most significant sources are up-wind coal fired power plants (Buys and Associates 2008). Sources can be local or very distant.

## Environmental Consequences

### General, Direct, and Indirect Effects

Air pollutants related to travel management activities can include vehicle emissions and fine particulate matter created primarily by dust from vehicle travel over dry and unpaved road surfaces.

Quantitative analyses of road impacts to air emissions, visibility and fine particulate matter are more appropriately applied to site-specific projects on the forest. The following table provides a reference with which to compare alternatives with the assumption that the greater miles of road and trail would result in greater impacts from road dust and vehicle exhaust. There is a 15% difference in motorized miles from the alternative that has the most motorized miles compared to the alternative with the least. Alternative GM has the least amount of motorized miles and thus relatively would have less amount of air impact spatially compared to the other alternatives. Motorized recreation emission sources on the forest are localized, transient and not expected to result in any significant air quality impacts under any of the alternatives.

**Table 3.1—Miles of road by alternative (includes roads open to the public and special use roads)**

	Alternative A	Alternative F	Alternative G	Alternative GM
Level 2 roads (high clearance)	1,573	1,465	1,230	1,226
Level 3 and 4 roads (passenger cars)	368	368	364	365
Level 5 roads (paved surface)	14	14	14	14
Motorized trails	153	154	205	193
<b>Total</b>	<b>2,108</b>	<b>2,001</b>	<b>1,813</b>	<b>1,798</b>

### Road Dust

The impacts of road dust from unpaved roads are dependent on factors such as the amount of travel, size and speed of the vehicle, climatic conditions, and geology. On the forest, road dust typically becomes an issue related to management activities when there is concentrated travel by large vehicles on unpaved roads. Examples of these activities include timber management and oil and gas development, both of which require road access. These situations are remedied through project-specific mitigations such as requiring the operator to manage dust by watering or employing other dust abatement methods. Road dust is expected to be localized with short term impacts to particulate matter and visibility.

### **Vehicle Exhaust**

Impacts to air quality include vehicle emissions such as nitrogen oxides and carbon monoxide from all motorized vehicles. Diesel engines also emit sulfur oxides and particulates. Air quality impacts from vehicle emissions are influenced by the effectiveness of the smog control devices on cars, amount of traffic, and the duration of engine idling.

Winter motorized recreation use includes snowmobiles and snowcats. Emissions from these vehicles also include carbon monoxide, nitrogen oxides, and particulate matter. Overall air quality impacts of winter motorized recreation will not change by alternative. As more people venture into the forest during winter months, air quality may become a localized issue where concentrated motorized use conflicts with non-motorized uses.

Most of the effects of vehicle exhaust for both summer and winter motorized recreation are localized and temporary. Conflicts arise when motorized use occurs alongside non-motorized recreation pursuits, where clean-smelling air is desirable.

Implementation of any of the action alternatives is expected to maintain air quality conditions due to 1) good dispersion characteristics across the forest, 2) low inversion potential across the forest, 3) low emissions from vehicles relative to other potential sources, and 4) reduced or equivalent route miles open to motorized vehicles under all alternatives compared to the existing condition. Compliance with state and federal air quality standards would occur under all alternatives.

### **Cumulative Effects**

Air quality within the forest is potentially affected by land management and development activities both on and off the forest. Potential impacts to air quality within the forest include regional haze caused by transported pollutants from distant upwind sources, some of which are thousands of miles away (CDPHE, no date). Closer to the forest, other major air pollution sources include emissions from industrial activity (e.g. power plants and oil and gas development), highway vehicles, off-road vehicles (e.g. aircraft, locomotives, construction machinery), and wildland fires. Large scale dust storms, seen more frequently in spring months, can have significant impacts to visibility as they are occurring.

Air quality impacts are expected to grow with the growth of surrounding communities and the expansion of oil and gas development in and around the White River National Forest. Additionally, smoke from wildland fires both on or near the forest and in upwind states is expected to grow with increasing fire risks in those areas due to global climate change (Westerling et al. 2006). The impacts of this decision regarding travel management will not result in a significant contribution to the cumulative impacts of other local and regional air pollution sources, as these impacts are short-term and localized. There are no unavoidable adverse, irreversible or irretrievable effects to air quality as a result of any alternative.

## Domestic Livestock Grazing

---

### Introduction

Domestic livestock grazing is a historical use on the White River National Forest. Grazing is managed under the grazing permit system. Permits specify permittee responsibilities for the maintenance of range improvements and salting necessary for the management of livestock while on the forest. Improvements include fences, water developments, ponds, and corrals. Access to these improvements is critical for proper management of the allotment. Access by grazing permittees varies from motorized to non-motorized use. Periodic motorized access is needed. Access that is exclusive to the permittee should be authorized in the grazing permit, allotment management plan, or annual operating instructions. Numerous trails exist to facilitate proper distribution of livestock within allotments. These trails are maintained by the grazing permittee and are considered range features; therefore, they are not included as features in the transportation system.

### Key Indicators

**Key indicator:** Potential conflict between livestock and recreationists.

**Measure:** Miles of road and trail within active allotments.

**Key indicators:** Increase in forage production.

**Measure:** Miles of road proposed for decommissioning within active allotments.

### Affected Environment

The forest supports numerous viable livestock operations. Approximately 44 percent of the forest contains active allotments. Localized urbanization, increases in property values, and the complexities of managing livestock in areas with high recreation use have led to a decline in the desirability and feasibility of some allotments for livestock production. Many roads and trails that are used by people are also used to facilitate management of livestock and forage resources. Some roads and trails that cross allotments can lead to conflicts between livestock and recreation users. People's presence can disturb livestock, and livestock can make roads and trails rough.

### Environmental Consequences

#### General Effects

Impacts are allotment-specific and depend on the individual operation and the designation of roads within those allotments. Some allotments have extensive road systems, while some are more remote; some operations depend on motorized travel, while some use non-motorized methods, such as horses.

Management of the transportation system can have both positive and negative impacts on livestock grazing. While roads and trails facilitate the movement of livestock and provide access to range improvements for construction and maintenance, roads and trails also can remove natural barriers; create livestock drift problems; and increase the need for additional fences, gates, and cattle guards. Heavy recreational use of roads and trails, both motorized and non-motorized, can disrupt livestock distribution. Gates frequently are left open and cattle drift from desired locations. Conflicts between recreation use and

livestock cause livestock to move into areas that might not be the desired area for grazing, which can result in over-use of forage in some areas.

Acreage occupied by existing roads and trails is eliminated from forage production. The obliteration, recontouring, and revegetation of roads can return those areas to a forage-producing level.

### Direct and Indirect Effects

Direct and indirect effects on domestic livestock grazing were estimated by analyzing the miles of roads and trails open or closed to the public. Table 3.3 presents miles of roads and trails open to the public within active grazing allotments. Table 3.4 presents miles of roads and trails within active grazing allotments that are planned for decommissioning.

**Table 3.2—Miles of roads and trails open to the public within active grazing allotments on the White River National Forest**

	Alternative A	Alternative F	Alternative G	Alternative GM
Miles of open motorized roads and trails within active grazing allotments	1,254	1,254	1,059	1066
Miles of open mechanized trails	345	343	200	174
Miles of open foot/horse trails	553	556	646	631

**Table 3.3—Miles of roads and trails to be decommissioned within active grazing allotments on the White River National Forest**

	Alternative A	Alternative F	Alternative G	Alternative GM
Miles decommissioned routes within active grazing allotments	0	417	662	678

These tables demonstrate that Alternative G, followed closely by Alternative GM, will have less motorized and bicycle activity, but possibly more foot and horse activity, within active allotments. When comparing the effects of the alternatives with regard to road and trail decommissioning on forest-wide forage production, the differences among alternatives are insignificant in relation to the 1,300,000 acres within active allotments. Once a road or trail is decommissioned, motorized access by the grazing permittee, as well as the general public, on that road would be prohibited. Roads that are closed to the public but available for permittee operations under the authority of the grazing permit would have little to no impact on the grazing permittee's operation.

The more miles of roads and trails that exist on an allotment, the easier the access is for livestock management, yet the higher the potential for conflict with recreational users. The conflict between recreation and livestock management may even become more pronounced as an increasing number of recreation users visit the forest. Conflicts with other users or loss of accessibility due to road decommissioning usually result in increased labor cost in managing livestock.

### **Cumulative Effects**

The White River National Forest has one of the largest number of allotments in the region. The ability to graze on National Forest System lands helps to keep the livestock industry viable and contributes to the overall economy of the area. Tourism and recreation in the area are increasing in great numbers as well. Conflicts over the same land base can occur. The travel system can help not only to access the allotments, but also to direct people through or around allotments. Other conflicts may occur when timber production or natural gas production creates roads in allotment areas.

## Fire Management

---

### Introduction

Fire management on the forest includes response to wildland fire situations and a prescribed fire program. Each wildland fire ignition is managed with an appropriate suppression or management response. Decisions are made to provide the suppression strategy that results in the least risk to safety, least cost, and least loss of resources. Prescribed fire and fuels reduction are employed to reduce the potential risk of severe wildfires.

### Key Indicators

**Key indicator:** The ability to access land for fire management.

### Affected Environment

The forest plan permits the responsible line officer to select an appropriate suppression response to wildfire starts in many areas of the forest based on management considerations. Aggressive initial attack is commonly used where there is an imminent threat to public safety and/or improvements on private lands. The range of available alternatives for an appropriate suppression response is influenced by factors such as land management objectives and the proximity to the wildland-urban interface. The determination of the appropriate suppression response for a specific wildfire considers firefighter and public safety, the potential for resource damage, and projected suppression costs.

Many designated wilderness areas, as well as non-wilderness areas on the forest, have an option to manage natural ignitions (lightning) as wildland fire use incidents. Wildland fire use involves the management of a lightning-caused fire during a long period of time to mimic as closely as possible the role of fire in the ecosystem. The fire is managed using pre-determined prescriptive parameters; prescribed management actions are identified as the fire perimeter hits trigger points during the course of the incident.

### Environmental Consequences

#### General, Direct, and Indirect Effects

The road system on the forest can help determine the type of fire suppression resources mobilized for a wildfire. Where roads are present, suppression resources such as engines and hand squads are used. Conversely, helitack and smokejumper crews respond to backcountry wildfire incidents where roads are not present. In some cases, temporary roads can be built during response to a wildfire.

The presence or absence of roads can affect the range of strategies considered to treat hazardous fuel situations. The use of mechanized equipment to treat natural fuel accumulations generally requires road access to the project area. Similarly, road access improves the efficiency of holding resources during prescribed burning operations by permitting access for engines. There is not a direct correlation between project cost per unit area to accomplish fuels treatments and the presence or absence of roads.

Regardless of alternative, the number of acres available for fire management activities would remain constant. The alternatives may vary slightly in which resources are used for a particular wildfire, but those differences are too speculative to analyze.

None of the alternatives in the travel management plan would prevent the use of aviation assets, off-road vehicles, or the use of heavy equipment as necessary to initiate the appropriate suppression response for a wildfire. Therefore, no alternative would create inaccessible areas on the forest.

Alternatives G and GM propose fewer roads than existing conditions. The forest plan also calls for the decommissioning of roads across the forest over the life of the plan. While population is expected to grow in the wildland-urban interface zones across the forest, the effects on fire suppression activities cannot be predicted. Although the forest road system may influence the type of suppression activities, it will not affect the number of acres of forest available for fire suppression activity.

### **Cumulative Effects**

This cumulative analysis considers historical fire data on the forest and the influence of road access. It considers the likelihood of effects of the road system on future wildland fires. It also considers the likely increase in population of the surrounding communities.

Statistics show that lightning naturally causes most fire ignitions in this region. The second most common fire start is human-caused. As population increases in an area, it may be assumed that there would be a higher chance of wildland fire; however, several other factors must be taken into account. Fires that are started by humans are individual instances and cannot be predicted. Factors in these circumstances also include weather conditions and fuel conditions. Implementation of any of the alternatives would not have any cumulative effects on fire suppression.

## Heritage Resource Management/Tribal Interests

### Introduction

Road access can negatively affect heritage resources, because roads provide access to the discovery and unmanaged exploration of sites. This access is perceived as a link to potential vandalism or destruction of heritage resources and values. It has been stated with regard to vandalism that the “closing of trails and roads, and erection of physical barriers have proven to be the most effective deterrents to date” (Nickens 1992).

Conversely, ease of access can be viewed as a benefit and act as a means of educating the public about sites and providing interpretation where these uses are allowed or encouraged.

### Key Indicators

**Key indicator:** Ability to access sites and special use areas by Ute tribal members to practice traditional uses.

**Measure:** Routes decommissioned that were traditionally used to access sacred sites.

**Key indicator:** Ability to appropriately access interpretive sites for public use.

**Measure:** Number of interpretive sites available for public use.

**Key indicator:** Number of sites and special-use areas protected through management activities such as limiting, altering, or closing access.

**Measure:** Number of sites or special-use areas with increased or decreased access and type of access.

### Affected Environment

At present, there are more than 2,100 known heritage resources on the White River National Forest. These resources vary from small campsites and large habitation areas to special places that may include an entire landscape. They include the remains and records of the past that are at least 50 years old; as well as sites, places, and values of cultural, religious, or traditional importance.

These resources are important for their potential to provide an understanding of long-term human adaptation to the environment and their presence on the landscape. They also have the potential to yield information regarding patterns of history and culture. Such cultural resources are recorded as “historic properties” or “historic resources.” They include any prehistoric or historic district; cultural landscape; or traditional cultural property or value, site, building, structure, or object listed in or eligible for inclusion in the National Register of Historic Places (NRHP). Eligible properties are those formally determined as such in consultation with the Colorado State Historic Preservation Officer and those formally listed on the register by the Secretary of the Interior that meet NRHP listing criteria (36 CFR60.4).

These resources are non-renewable and tell of life-ways and life-styles that reflect thousands of years of unique and successful adaptation to the high elevations of the Rocky Mountains. Federal laws mandate, and the forest plan allows for, the management and use of heritage resources and special-use areas as well as the protection of these resources.

## Environmental Consequences

### General Effects

The ability to protect heritage resources and special-use areas within the forest is influenced by the road system. Thus, a reduction or increase in capacity could have a positive or negative effect.

A disadvantage of an extensive road and trail system with regard to heritage resource management and special-use areas is the increased chance of vandalism and destruction of heritage values by humans. Statistically, the more access humans have to an area, the greater the amount of irreversible and irretrievable damage that can occur to heritage resources, including tribal special-use areas.

### Direct and Indirect Effects

Road use and maintenance inevitably affect sites either directly or indirectly. Examples of direct effects are ground disturbance of surface and sub-surface deposits that would have otherwise remained intact. Indirect effects can be due to erosion from road surfaces that expose site deposits or buries them, preventing future discovery or management. Other indirect effects include increased visitation leading to vandalism, collection, destruction, and/or erosion. In addition, the dumping and intermixing of intrusive modern debris on sites due to maintenance and use is also considered an impact.

The heritage staff of the White River National Forest analyzed all alternatives proposed in this travel management plan within areas of concern that were known to contain a high density of heritage resources or traditional Ute special areas. The *Heritage Specialist Report* is the documentation of this analysis and is proprietary information kept in locked files under the provisions of the Archaeological Resources Protection Act.

For direct effects, the study focused on those roads and trails where an increase of use is proposed and where potential ground-disturbing closures are proposed. This is shown in the following table.

**Table 3.4—Miles of roads and trails where a change in use is proposed on the White River National Forest**

	Alternative A	Alternative F	Alternative G	Alternative GM
New routes planned for construction	None	None	None	None
Non-system routes that are to be authorized	None	None	251	225
Currently authorized routes planned for closure	None	None	512	519
Non-system routes planned for closure	None	925	662	692
Routes planned for upgrade to motorized use	None	None	290	148
Changes to current road prisms such as new bridges and reroutes	None	None	None	None

In general, most of the actions proposed in the alternatives examined in this analysis appear to have low potential for direct effects on the integrity of any known heritage resource. Potential direct effects on heritage resources will be mitigated at the site-

specific level. For example, if a road is proposed to be decommissioned, a heritage inventory will be conducted first and mitigation measures will be developed as needed based on the methods used for decommissioning.

Compared to existing conditions, Alternatives F, G and GM would present a better situation for the protection of heritage sites than the no-action alternative because of the overall reduction of roads and trails through decommissioning and the classification of system routes. Based on comparison of the number of miles of roads and trails, the types of use, and the locations thereof, Alternative GM would provide for the most protection of heritage resources. Alternative G was ranked second best in terms of historic property protection and Alternative F was ranked third. Alternative A is considered the least desirable from a heritage resource point of view.

**Table 3.5—Sites directly affected on the White River National Forest**

	Alternative A	Alternative F	Alternative G	Alternative GM
5GF3181 impacts by FSR 804.1	Currently open to high clearance vehicles	Open to licensed and unlicensed vehicles	Closed to the public	Closed to the public
5EA1519 impacts by FSR 734.1	Currently open to licensed and unlicensed vehicles	Same as A	Open to all uses but ATV, Motorcycle	Open to all uses but ATV, Motorcycle
5GF2844 impacts by way N7907.1	Way is closed	Way is closed	Way is authorized for motor vehicles < 50" wide	Way is closed
5GF2844 impacts by ways 822.1B, G, D	Ways are closed	Only way 822.1B is closed	Ways are closed	Ways are closed
5GF2844 impacts by 245.4x	Currently open to licensed and unlicensed vehicles	Same as A	Closed to the public	Open to all but full-sized vehicles; section to Clark Sp closed
5GF2844 impacts by 2293.1	Open to mtn bikes, animal, hiking	Same as A	Closed to the public	Closed to the public
5GF2874/5GF1523 impacts by way 601.4D	Way is closed	Way is closed	Way is closed	Way is adopted as motorized
5GF2874/5GF1523 impacts by way 2290.1	Open to mtn bikes, animal, hiking	Same as A	Open for motor vehicles < 50" wide	Same as G
Baylor Park area sites Pipeline road 300.1P	Mtn bikes	Mtn bikes	Animal, hiking only	Closed to the public; special use permit only
5GF2842 impacts by 1854.1	Open to Motorcycle, mtn bikes, animal and hiking	Open to Motorcycles, mtn bikes, animal and hiking	Animal, hiking only	Animal, hiking only
5GF2875	Currently	Same as A	Closed to	Closed to the

	Alternative A	Alternative F	Alternative G	Alternative GM
impacts by 634.1	open to licensed and unlicensed vehicles		the public	public
5RT2298 impacts by 2034.1	Currently open to mtn bikes, animal, hiking	Same as A	Animal, hiking only	Animal, hiking only
5EA197 Camp Hale	Currently open to licensed and unlicensed vehicles	Resolution Rd and E Fork Eagle Rds: Mtn bikes, animal, hiking, and full-sized vehicles. All other roads closed to the public	Same as F	Same as F
5ST335 Penn Mine Impacts by N333.1	Currently closed to the public	Same as A	Same as A	Way is managed under special use permit
5ST335 Penn Mine Upper Old Argentine Toll Road/Revenue Mtn	Currently open to mtn bikes, animal, hiking	Same as A	Closed to the public	Same as G
5ST335 Penn Mine Impacts by 262.1B	Currently open to mtn bikes, animal, hiking	Same as A	Open to all uses	Same as G

Alternative GM proposes to authorize a way through historic property 5GF2844. Currently, there exists a spider web network of ATV routes that are not authorized through this property. Establishing one route through the property and reducing the existing routes and access points will improve site protection.

Alternative GM proposes to reduce the motorized use of a route that bisects historic property 5EA1519. However, this may not adequately address the protection needs of this property. A site-specific protection plan would be developed for this property. Closure of the unauthorized ways will improve site protection.

Alternative GM proposes to upgrade the use of two trails that cross historic property 5GF2874 to allow ATVs. This has potential to adversely affect the property if the use is not restricted to existing trails. This proposed action would require a site-specific treatment plan.

Alternative GM adopts a way for motorized use to historic property 5ST335 and closes the historic Argentine Road. These proposed actions would require a site-specific treatment plan for this property.

All alternatives would maintain access to interpretive sites. The travel management plan provides the basis from which interpretive site plans can be developed, where access can be specified and controlled.

Many prehistoric Ute nation sites are found on the forest. These sites relate to their history and traditions. Some of these sites are sacred and carry a special meaning to the Ute tribe. Access to these sites by tribe members can be accommodated on open roads and trails or through special-use permits when necessary.

### **Cumulative Effects**

Trends during the past decade saw increased usage of National Forest System lands near urban centers or along transportation corridors such as I-70 that adversely affected sites and/or cultural landscapes. Designated roads or trails have taken visitors to formerly inaccessible areas. The result is that sites once protected by their very isolation have been damaged or vandalized because of increased access. Networks of trails adversely affect heritage resources by altering the cultural landscape through fragmentation of traditional cultural properties. Segmentation of historic routes (such as ancient Indian trails, wagon, and stage roads) causes loss of data and site integrity, and these effects multiply with increased use. Increasing use produces increasing damage with the ultimate effect being loss of educational and interpretive values.

The expected increase in population along the I-70 corridor will likely mean an increase in recreation use on the forest. New technologies allow extended human access into previously remote areas in increasing numbers. The designation of any alternative as the travel plan for the White River National Forest would reduce the number of access points from the existing condition. This reduction, the concentration of use into those available areas rather than dispersed use across the forest, and forest plan direction to continue to decommission unnecessary system roads mean that the alternatives would not create any measurable cumulative effects on heritage resources.

## Minerals

---

### Introduction

By virtue of their geology and geomorphology, national forests are a principal storehouse for the nation's mineral and energy resources. The search for and development of these resources are legally mandated uses of National Forest System lands, except for lands formally withdrawn by acts of Congress or by executive authority.

On a federal mineral lease, the lessee has a vested right to develop the mineral resource, subject to lease terms and any stipulations that may be attached to the lease. For oil and gas development, the Forest Service reviews, approves, and administers the surface use plan of operations (SUPO), a part of the application for a permit to drill (APD). The Bureau of Land Management (BLM) administers and approves the drilling operations.

The White River National Forest contains leasable, locatable, and salable minerals. The Forest Service cooperates with BLM to manage these resources. The forest plan provides goals, objectives, standards, and guidelines for management of these resources.

### Key Indicators

**Key indicator:** Land available for locatable mineral entry and/or minerals leasing.

### Affected Environment

#### *Leasable Minerals*

Federally owned leasable minerals include fossil fuels (such as coal, oil, gas, and oil shale), geothermal resources, phosphates, and sulfur. These minerals are subject to exploration and development under leases, permits, or licenses granted by the Secretary of the Interior, with Forest Service consent or consultation. The only leasable minerals presently leased on the White River National Forest are oil and gas.

In 1993, forest staff completed the Oil and Gas Leasing EIS/ROD (USDA Forest Service/WRNF 1993). This is a forest-wide decision and it is currently in effect. The forest plan incorporated the oil and gas leasing decision; however, a few adjustments were made as result of forest plan direction. Decisions based on that analysis include designation of lands available for leasing and stipulations on available lands. This information is incorporated by reference.

Mineral leasing activities will continue to comply with direction in the forest plan. At the time this document was prepared, the majority of available lands within the planning area with known high occurrence potential for oil and gas resources had already been leased.

#### *Locatable Minerals*

Locatable minerals are those valuable deposits subject to exploration and development under the General Mining Law of 1872 and its amendments. These resources are commonly referred to as “hardrock” minerals on the forest include gold, silver, molybdenum, iron, copper, zinc, lead, and alabaster, among others.

Lands open to operations under the General Mining Law include all areas of the national forests except those formally withdrawn from mineral entry either by Congress, Presidential proclamation or executive order. On the White River National Forest, approximately 80 percent (750,000 acres) of the existing withdrawals are in designated

wilderness areas. The remainder is associated with developed recreation and administrative sites. The Forest Service requests withdrawals through the BLM when necessary to protect capital investments, unique natural features, or management options.

The only ongoing locatable mineral operation on the forest is an alabaster and marble mine near Redstone. Each year, the forest authorizes six to eight small, short-term operations for various mineral resources.

Locatable mineral potential does exist on the forest. Assessment of its potential can be found in the following documents: Mineral Resource Potential and Geology of the White River National Forest and the Dillon Ranger District of the Arapaho National Forest, Colorado (Toth et al. 1993) and Regional Mineral Appraisal of the Leadville 2 Degree Quadrangle Colorado (USDI Bureau of Mines 1993). These reports identify levels of high, moderate, and low potential for locatable, leasable, and salable (other than building stone) minerals on the forest and include maps showing locations of this potential.

The forest plan included decisions by management area where locatable mineral exploration and development are allowed (USDA Forest Service/WRNF 2002a).

### ***Salable Minerals***

Salable minerals, or common varieties, generally are found as deposits of sand, clay, gravel, and stone that provide materials for construction and road surfacing. Disposal of these minerals is by mineral material permit or contract at the discretion of the Forest Service. Decisions to issue permits for salable mineral are made on a case-by-case basis.

## **Environmental Consequences**

### **General Effects**

Leasable mineral interests are entitled to reasonable access to and use of the surface under the forest plan and appropriate mineral development regulations, unless specifically limited by the terms of their lease, permit, or plan. Restrictions, designations and prohibitions developed through the travel management plan will not limit vehicular access for leasable mineral exploration and/or development conducted according to the terms of an approved permit, notice, plan, lease, contract, or other authorization.

The travel management plan will not affect the access to, quantity of, or quality of locatable minerals. Management areas are either available for mineral entry or not available for entry based on the forest plan. Leasable, locatable, and salable minerals project proposals will continue to be evaluated on a site-specific basis.

### **Direct and Indirect Effects**

There would be no direct or indirect effects on leasable, locatable, or salable mineral resources resulting from implementation of the travel management plan. Authorizations for access, development, and exploration for mineral resources would continue to occur in accordance with the forest plan, Oil and Gas Leasing EIS and ROD, applicable mineral exploration and development regulations, and any special terms and conditions attached to the lease or permit. By law, reasonable access to unpatented mining claims with approved plan of operations must be granted.

Because of the demand for clean-burning fuels, an increase in leasing exploration and development of oil and gas resources can be expected. During the years 2003 through 2008, the White River National Forest and adjacent BLM lands have seen a sharp increase in leasable minerals project proposals. Roads associated with the operations to

date are included in the travel management plan. Future projects that require new roads or upgrades to roads will be analyzed under the authorities that allow for gas production.

Locatable mineral uses on the forest are expected to remain at current levels. Generally, exploration and development will be associated with a dramatic increase in price. However, because of the potential reserves yet to be developed on the forest, we can expect that development will occur eventually in those areas of moderate to high potential. Access must be allowed for existing mining claims with approved plans of operation.

The public demand for sand and gravel can and will be met primarily on private lands. Sand and gravel deposits on the forest will primarily be used by the Forest Service and its contractors for surfacing National Forest System transportation routes and recreation areas. Access to any pit development will be analyzed under NEPA to allow the action. Most of these roads are short and tie in with the main system. Public demand for building stone and decorative rocks from the White River National Forest is high, and demand for topsoil is low to moderate. Access to these materials is generally on established roads.

The travel system to accommodate leasable, locatable, and salable minerals is not limited by any of the alternatives. All alternatives provide the base system for access to the forest that can also be used to access mineral extraction locations. To access actual extraction locations some roads are authorized under special use permit, surface use plans of operation, and mining plans of operation.

### **Cumulative Effects**

Energy and mineral resources have been numerous and accessible enough to provide a viable industry with opportunities for development for more than 100 years. Present reserves will continue to provide opportunities well beyond the next planning cycle. Lands currently leased or with active mineral claims will retain their rights based on the conditions that were made at the time of lease or permit.

While the travel management plan does not affect lands that may be leased or developed, the development of leases can affect travel management and associated experiences. In areas that have a high potential for development a network of specialized roads may be necessary. Current roads on the system may need to be upgraded for the type of traffic necessary for natural gas production. It is anticipated that the area south of Rifle will see the greatest impact from natural gas development. Lands that were leased that allow road building to access wells will likely see more development in the next ten years. These roads are strategically placed and built to withstand large amounts of truck traffic. They are built with road features to minimize resource impacts. Large amounts of traffic are associated with this development. As wells enter their production cycles, traffic would be reduced. The decisions for additional roads required for well development are made under the National Environmental Policy Act (NEPA) authorities. It is within these documents that the effects to the travel system and forest are analyzed.

## Noxious Weeds

---

### Introduction

Noxious weeds are defined as alien plants that aggressively invade or are detrimental to native plant communities. Exotic plants introduced from other parts of the world arrive without their natural enemies (insects and disease) to keep them in check. This helps give them a selective advantage in competition with native vegetation.

Once established, the spread of noxious weeds becomes responsible for the reduction of biodiversity by crowding out native plants; the displacement of wildlife that depend on these native plants; and the disruption of watershed function, soil chemistry, nutrient flow, and energy flow. Left unchecked, noxious weeds can pose a significant threat to ecosystem health.

Weed seed is transported on roads and trails by motorized and non-motorized means. Humans, vehicles, equipment, horses, livestock, wildlife, wind, and water spread noxious weed seed. Roads and trails provide corridors for the spread of noxious weeds from adjacent areas. Soil disturbances associated with the maintenance and decommissioning of roads and trails create potential habitat for their invasion. Evaluations are done at the site-specific project level to include appropriate prevention and mitigation measures for weed control. However, once established, weeds can spread to adjacent undisturbed habitat types.

### Key Indicators

**Key indicator:** Habitat available to noxious weed infestation.

**Measure:** Total miles of roads and trails by alternative.

**Key indicator:** Currently accessible weed habitat made unavailable to new infestations.

**Measure:** Total miles of road and trail by alternative to be decommissioned.

### Affected Environment

Presently it is estimated that 89,000 acres are infested with noxious weeds on the White River National Forest. Forty species of noxious weeds are known to occur on the forest and eight are known to be adjacent.

Noxious weeds can be expected to occur in higher densities along roadways, in areas disturbed by timber harvests, campgrounds, recreation trails, trailheads, livestock, utility corridors, gas lines, and ditches; however, they are also known to invade otherwise healthy, undisturbed plant communities.

Through risk assessment of noxious weed introduction and spread for proposed projects or activities, appropriate prevention and mitigation measures are implemented. Soil disturbances associated with the maintenance and decommissioning of roads and trails are actions that require evaluation and appropriate management practices implemented at the site-specific level.

## Environmental Consequences

### Direct and Indirect Effects

This analysis used road and trail information in each alternative to assess the relative risk of spreading noxious weeds (Table 3.6). For overall potential spread, this analysis based that risk on the extent of public use of roads and trails: the more roads and trails that are open for use, the greater the potential for noxious weed spread.

The decommissioning of roads reduces the potential for the dispersal of seed by motorized vehicles; however, earth disturbance associated with certain decommissioning methods can create habitat for noxious weeds to get established. The decommissioning of roads without revegetation reduces the movement of seed but does little to reduce the available habitat or prevent establishment once seed enters the area. The early treatment and revegetation of these roads and trails can reduce the risk of noxious weed establishment by stabilizing the site and providing competition.

**Table 3.6—Measures for comparing potential for the spread of noxious weeds due to roads and trails**

	Alternative A	Alternative F	Alternative G	Alternative GM
Miles of open public roads and trails	3,915	3,915	3,666	3,592
Miles of road and trail to be decommissioned	341	1,279	1,482	1,551
Miles of roads and trails remaining but not on the system	925	0	0	0

Alternatives A and F would have the most miles of road and trail open to the public and the highest levels of road and trail maintenance. Alternative A would also leave the most roads and trails, though not part of the system, still left untreated. Therefore, Alternative A has the greatest potential for spreading noxious weeds through earth-disturbing activities and dispersal of weed seed. When comparing open miles of roads and trails along with roads and trails to be decommissioned, on the whole, Alternative GM would have the least amount followed by alternative G. The no-action alternative would be the least effective alternative.

The selection of any alternative that would reduce available weed habitat, the concentration of use rather than dispersed use across the forest, and forest plan direction to continue to decommission unnecessary system roads would help reduce the spread of noxious weeds.

### Cumulative Effects

The transportation system provides a vector for dispersal of noxious weed seed. Increased population growth in adjoining communities and recreation use on the forest has the potential to increase weed infestation risk. This potential, in combination with other earth-disturbing activities, will continue to provide conditions that allow for an increase of noxious weed infestations on the forest.

Cooperation between the Forest Service, other federal land agencies, counties, towns, and private citizens to recognize and reduce the introduction and spread of weeds on both private and public lands is necessary and continues to be a key component to combat the spread of noxious weeds.

## Recreation Management

---

### Introduction

With well over 9.4 million annual visits to forest recreation facilities, the White River National Forest is the most visited national forest in the nation, by more than 50 percent above the next highest visited unit (2002 National Visitor Use Monitoring Survey [Kocis et al. 2003]) and receives more annual visitors than any national park. People who visit the forest for scenic drives account for an additional 11 million visits annually.

The eastern boundary of the White River National Forest is less than 60 miles from the Denver metropolitan area. Interstate 70 (I-70) bisects the forest and provides quick and easy access from the Denver area and for traffic movement within the forest itself. Traffic through the Eisenhower/Johnson tunnel increased 45 percent between 1991 and 2002 (CDPOR 2003). People visiting the forest may arrive by plane from any of four commercial airports, by train, by commercial tour bus, and by auto travel.

The White River National Forest has long been considered a primary recreation destination in the winter because of its world-class ski resorts. However, more recently, the primary recreation growth now occurs in the non-downhill skiing activities during the winter and in many of the summer activities (USDA Forest Service/WRNF 2002b).

Most visitor use originates from locations outside the forest. The demographic breakout shows 36 percent of forest visits are from communities within the forest, 30 percent are from Colorado Front Range communities, 3 percent are from other locations in Colorado, 8 percent are from Texas and southwestern United States, and 12 percent are from the Midwest. The remaining 11 percent of visitors come from other locations including 3 percent from international locations (Kocis et al. 2003).

Visitor use continues to grow in both the number of potential activities and the number of people participating in each activity. As visitor use growth occurs, personal expectations about the quality of experience can cause increased conflicts among user groups

If one generalization can be made from the body of knowledge about recreationists, it is that people vary enormously in what they desire from their recreational pursuits (ROS, p. III-8). Diversity represents an important characteristic of any recreation system.

Managing opportunities for recreation to promote a diversity of experiences is crucial for social equity (Watt 1972, from p. III-9 ROS). But diversity is only a means to an end. Quality recreation and producing desired satisfaction and benefits for participants, is the objective and concern of both managers and recreationists (ROS, p. III-9).

### Trail and Road System

While there are some exceptions, such as the Ute Trail and the adoption of old stock driveways, the forest's trail system was largely created for foot and horse use and access. Many trails were adoptions of user-created trails accessing popular areas and attractions. Likely, the most concentrated effort to actually construct recreational trails was during the Civilian Conservation Corps (CCC) era.

Trail design needs are different for mountain bikes, motorcycles, and ATVs. Where these uses are allowed, the users have tried to adapt to trails built for hikers and horses. In very few cases, the Forest Service has reconstructed and upgraded trails to accommodate these uses. More often, these users have created their own trail systems because the Forest Service system did not meet their desires.

Nearly all of the forest's road system was created either for timber removal, mining, or for transporting the public through the forest to another destination. Thus, this system is also less than ideal for the primary purpose of today's recreation needs. Trying to satisfy some motorized and mechanized users and keep them on the existing system has become a management challenge.

The ability for the visiting public to move around within the forest is key to the many recreation activities available. Most resource-based recreation occurring in the U.S. occurs within ½-mile of the transportation system (Cordell and Bergstrom 1989). For some activities, such as mountain biking and snowmobiling, both the travel capability of the vehicle and the activity itself are principal components of the recreational experience. Visitors are not only using vehicles for the traditional use of transportation from one point to another; the activity of operating the vehicle in a forested setting also becomes a part of the recreational experience. In many circumstances, the desired recreation experience itself may be the travel activity in a forest setting. In other circumstances, the forest is where people come to participate in an activity because the forest is a convenient venue for the activity or because the activity is not provided on private lands; in these cases the enjoyment of the activity is not dependent on a forest setting.

### ***Evolution of Recreational Travel Management***

Travel restrictions of varying degrees have been in place on the White River National Forest since the 1950s. In 1978, the forest published its first travel management map outlining area travel strategies. The map was typically updated annually.

In 1984, the forest completed its first forest plan as mandated by the National Forest Management Act. The following year the forest published what is the forest's most current travel management map to reflect decisions made in the 1984 forest plan. In 1985, a forest supervisor's order was signed to implement decisions in the 1984 plan. The primary focus of the 1985 supervisor's order was a designated routes policy for motorized use during the snow-free period. There were very few areas in summer where motorized use was allowed off designated routes. In the 1984 forest plan and subsequent 1985 travel management map, there were very few restrictions to mountain bike, horse, and foot travel other than a prohibition against mountain bicycles in designated wilderness.

The winter travel strategy differed from summer in that it was more of an open travel policy. Winter motorized users were allowed to go anywhere except in areas such as congressionally designated wilderness, on downhill ski areas, or in wildlife winter range. The large area of the forest that appeared to be open to winter motorized use was not usable, from a practical standpoint, due to topographic limitations, dense vegetation, and limited capabilities of the machines.

The 2002 forest plan revision made some programmatic changes to travel management. For summer uses, the changes primarily affected mountain bike use. A decision was made to restrict mountain bike and other mechanized uses to designated roads and trails only. Although this decision only affects a small proportion of the total mountain bike use, it addresses the issue of user-created mountain bike trails. The forest plan also requires all motorized use to stay on designated routes, which resulted in the elimination of a few areas of off-road and trail motorized travel that remained from the 1984 plan.

For winter travel uses, the forest plan allocated more of the non-wilderness land base into management areas that contain strategies focusing on wildlife concerns and non-motorized recreation. The forest plan also calls for designation of winter routes and play

areas for certain management area strategies. For example, in the areas designated 5.5 forested landscape linkages, which include a total of 83,500 acres across the forest, winter travel is now restricted to designated routes and play areas. Winter motorized travel in wildlife winter range, in particular management area prescriptions 5.41, 5.42 and some of 5.43, continues to be restricted to designated routes and play areas only. Some previously “open to motorized use” areas were changed to “non-motorized” because of physical resource limitations such as steep terrain and dense timber that prevented motorized use from occurring. The forest plan showed a drop in total available acreage for winter motorized use from 1,197,000 acres to 941,000 acres. Much of the change came about due to better mapping capability and removal of extremely steep slopes or locations inaccessible to motorized use from the motorized acreage inventory. A limited number of those areas that were changed to non-motorized use in the forest plan revision were actually being used for winter motorized use. A few of the changes remain controversial with some forest users.

### ***Incorporating 2005 National Motorized Travel Regulations***

In December of 2005, the Forest Service published a new national travel management rule, Travel Management: Designated Routes and Areas for Motor Vehicle Use (the travel rule) relating to designated routes and areas for motor vehicle use. This rule is part of a larger effort to get a handle on the detrimental effects of unmanaged recreational motorized use and to better focus on providing high quality recreational opportunities for the motorized users in appropriate locations. The direction in the travel rule focused primarily on summer motorized off-highway vehicle (OHV) use, with opportunities to apply principals to winter motorized travel. Much of the direction in the travel rule, such as requiring a system of designated roads, trails, and areas, has already been implemented by previous forest decisions.

There are, however, some requirements in the travel rule that necessitate changes on the part of the forest to come into compliance. The forest has updated this document to further incorporate direction in the travel rule into this environmental impact statement and travel management plan.

The travel management plan is one component to help achieve the objectives of the travel rule. Other components of the travel rule will be implemented by the forest as directed in the regulations provided in the rule. The travel management plan for the White River National Forest not only incorporates direction from the travel rule, but also sets direction for all travel to meet forest plan direction and management goals.

### **Motorized Mixed Use on Roadways**

The travel rule requires the forest to designate motor vehicle use by vehicle class, and if appropriate, time of year (CFR 212.51). It also requires the responsible official to consider effects on National Forest System natural and cultural resources; public safety; provision of recreational opportunities; access needs; conflicts among uses of National Forest System lands; the need for maintenance and administration of roads, trails, and areas that would arise if the uses under consideration are designated; and the availability of resources for that maintenance and administration (36 CFR 212.55). The forest plan already encourages the forest to emphasize public safety in the development and use of the travel system. (USDA Forest Service/WRNF 2002a, p. 2-37)

The forest is currently managing the transportation system based on decisions in the 1984 forest plan, the subsequent 1985 Forest Supervisor’s closure order, and addendums to the order based on more recent decisions. The 1985 order did not differentiate between the

types of motorized vehicles on roads. This distinction was not an issue at the time because there were still very few non-highway legal motorized vehicles and drivers using the forest. As the use of ATVs and similar vehicles began to grow, the Forest Service took a position that these were a legitimate use of some routes and locations on the national forests.

All motorized use was managed under a hierarchical system. In this system the forest maintained a roadway for the highest level of motorized use, such as passenger cars, and then, by default, all other motorized and non-motorized uses were automatically allowed on that roadway. No analysis of whether mixing all of these uses was safe or appropriate was done. Nor were any other factors considered, such as the quality of the recreational experience, potential for user conflicts, or whether the user could legally get to the road on other roads also legally open to that use. A route was simply open for use by all motorized travel. Only in cases where serious safety problems had been identified would the forest consider restricting certain uses.

This system placed a burden on all users of the roadways to understand they could encounter a variety of uses on the roads at any time. It was up to the user to know and obey state traffic laws pertaining to their use.

This system worked adequately when use levels were lower and almost all drivers were old enough to understand all of the implications of driving on public roadways. Circumstances have changed significantly since 1985. Since Colorado State Parks first began managing the OHV program in 1991, registrations have increased from nearly 12,000 to almost 131,000 in 2007, a 154% increase (SCORP 2008). Recreation use outside downhill skiing doubled between 1992 and 2002 on the forest.

The travel rule specifies many factors when considering whether to allow mixed use on a road. One key factor is safety. Mixed use is defined as authorizing highway legal and non-highway legal motorized vehicles to use the same road. For Colorado, that equates to licensed and unlicensed vehicles. Under the travel rule, the responsible official is required to make independent decisions on the safety of each motorized use on each of these routes. Several studies were conducted in the summers of 2006 and 2007 based on Forest Service manual direction to assist the responsible official in making informed decisions on vehicular use. Considerations in the studies included “(1) Speed, volume, composition, and distribution of traffic on roads; and (2) Compatibility of vehicle class with road geometry and road surfacing” (36 CFR 212.55(c)).

The initial focus for the White River National Forest was on the maintenance level 3, 4 and 5 roadways where forest staff had identified that there may be some safety concerns. Either all, or parts, of several roadways across the forest were determined to be unsafe for mixed motorized use. On routes that were determined not to be safe for mixed motorized vehicle use, and where the factors causing that determination could not be practically mitigated, the recommendation to the decision-maker was to close these routes to non-highway legal motorized vehicle use.

The closure of these routes to mixed motorized use also has a direct effect on routes which branch from these main arterials. These branch routes may not have been individually determined to be unsafe for mixed motorized use; however, the increased infrastructure needs, management controls, and monitoring likely required to keep them open to this use could greatly outweigh any public benefit. In travel system planning, the forest looked at entire transportation systems for the various types of uses in lieu of trying to keep several smaller, and more difficult to manage, opportunities scattered over the entire landscape.

### ***Access to Recreation Opportunities***

The forest considers public access to special attractions and general forest areas for highway legal motorized vehicles in this document. A second component of access, which involves whether the users of non-highway legal vehicles may also be authorized to drive to certain destinations, needs to be considered. Often, users of the forest must rely on state, county or local roadways to access forest roads and trails. State law prohibits non-highway legal motorized vehicle use on public roadways unless the jurisdiction controlling the roadway has made a formal declaration to allow that use (Colorado State Law, Title 33, Article 14.5).

The forest will work with the various federal, state, county and local agencies to determine where non-highway legal vehicles may be legally used on routes under the control of these entities. Decisions in the final travel management plan will reflect the legality and practicality of users of non-highway legal motor vehicles being able to access areas of the forest before being allowed in those areas. In determining the practicality of uses some of the following factors were considered such as; availability of adequate trailhead parking and whether the travel route most likely to be used is legal even though there may be other legal options that are unlikely to be used.

### ***Provision for Recreation Opportunities***

In addition to safety and access, the travel rule also requires the responsible official to consider the provision of recreation opportunities. Alternative C in the first draft looked at maximizing recreational opportunities as the top priority. Consideration of the appropriateness and quality of those opportunities was introduced as a component in Alternative D in the first draft as it related to reducing user conflict.

In April 2006 the forest developed a forest recreation strategy. In that document, the forest identified some general management goals for the recreation programs. The strategy comes under the framework laid out in the 2002 forest plan and is intended to assist the forest in focusing its limited resources. The strategy does not make site-specific decisions, which will continue to be made through NEPA analysis such as in this travel management plan.

The forest does not have sufficient resources to accommodate all visitors who would like to have their individual, and very specific, recreational experiences in the location they choose. Thus, a major component of the strategy was to identify what this forest can reasonably provide in terms of visitor experiences that are more unique to the White River's land base and capabilities.

No existing recreational opportunity is proposed to be eliminated from the forest. However, instead of trying to provide all opportunities in all locations possible, the forest will provide opportunities in appropriate locations and of sufficient quantity and quality to be sustainable, manageable, and remain as good visitor experiences.

### ***Forest Use Levels***

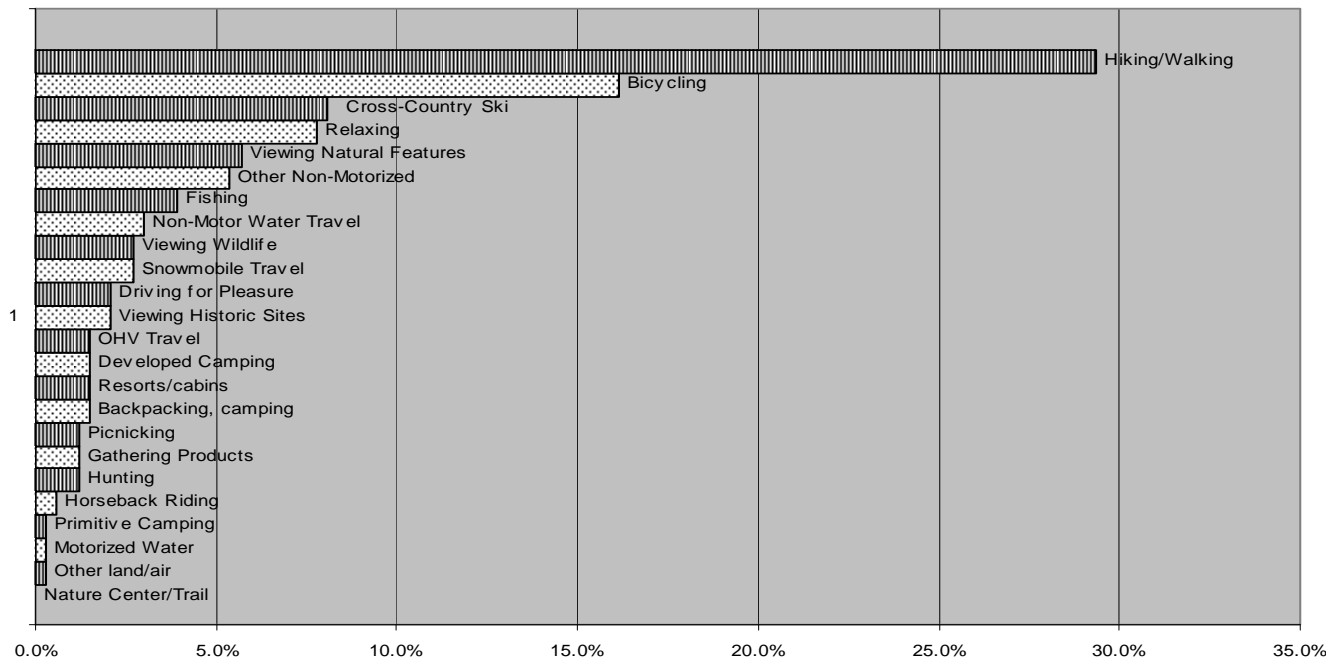
Recreational use and travel on the forest has changed dramatically in the last 25 years since the previous travel management decisions. These changes have primarily come about due to changes in technology and user numbers. Travel management strategies that may have worked previously need to be changed in order to have a sustainable transportation system and quality recreation opportunities into the future.

Recreation use on the forest in 1984 was estimated at 1.36 million recreation visitor days outside of developed sites (USDA Forest Service 1984). The National Visitor Use

Monitoring Survey (Kocis et al. 2003), was conducted on the White River National Forest between October 1, 2001 and September 30, 2002. This study showed the White River as the most visited forest and indicated almost 70 percent of this use takes place as downhill skiing. Even after subtracting out all of the forest's downhill skiing use visits, the White River still clearly ranks in the top 10 nationally in terms of total recreation use according to national visitor use monitoring (NVUM) figures.

Using a five year rotation, visitor use information was collected a second time in 2007 on the White River National Forest (National Visitor Use Monitoring Survey (Kocis et al. 2008)). However, due to data errors in the 2007 NVUM, assumptions on recreation trends and visitor use in this analysis will be based on the 2002 NVUM and other sources cited throughout the recreation section.

Figure 3.1 shows a chart of the major activities and percent participation rates based on single visits to the forest. Downhill skiing has been excluded because Forest Service routes are not necessary for access to the ski areas.



Note: Down Hill skiing equaled 70.8 % of total

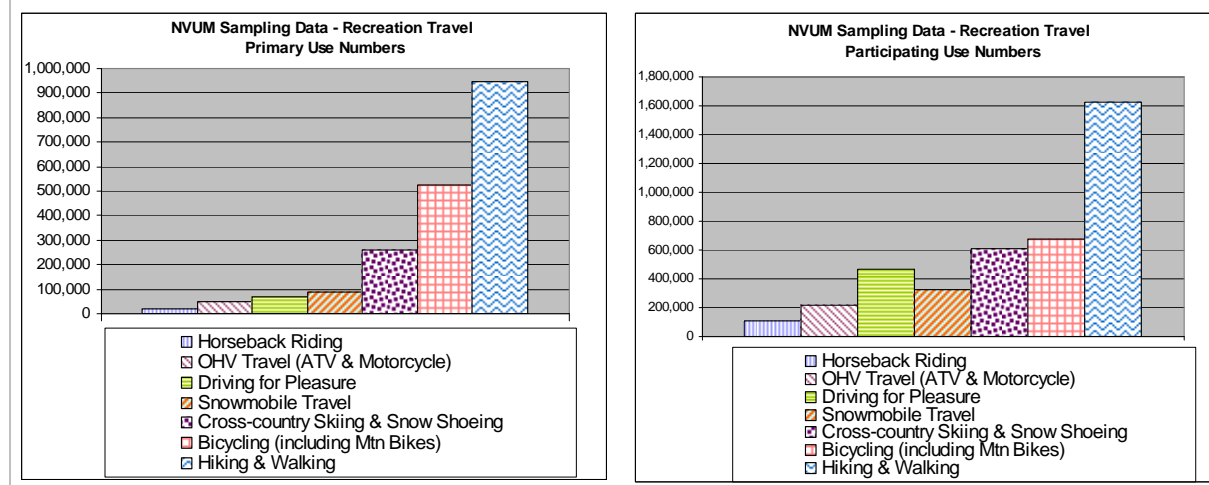
The remaining 30% of uses are identified above and percentages adjusted to exclude downhill skiing

Source: Kocis et al. 2003

**Figure 3.1—Forest visitor use by activity, 2002**

The primary purpose for a visit to the forest and the variety of activities a person engages in while on the forest provides a different perspective on demand. Figure 3.2 identifies recreation travel-related activities based on the forest's 2002 NVUM survey displayed graphically, as percentages of use, and as visit numbers. The primary activity figures only represent those individuals who identified the activity listed as their primary reason for their forest visit. In addition to including the primary activity numbers, the participation numbers also pick up those visitors who used this mode of travel in their visit, though the mode of travel wasn't the primary activity. Examples of participation without being a primary activity would include: visitors with a primary activity of camping or hunting who also brought along their ATV to ride, or a visitor who hiked to do a primary activity of fishing.

ACTIVITY	PERCENT WHO SAID IT WAS THEIR PRIMARY ACTIVITY - NVUM ACTUAL	ADJUSTED PERCENTS FOR LAND BASED RECREATION TRAVEL ACTIVITIES ONLY	NUMBER OF FOREST VISITORS WHO SAID IT WAS THEIR PRIMARY ACTIVITY	NUMBER OF FOREST VISITORS WHO PARTICIPATED IN ACTIVITY
Horseback Riding	0.2%	1.0%	19,349	106,420
OHV Travel (ATV's, dirt bikes, etc)	0.5%	2.5%	48,373	212,840
Driving for pleasure on roads	0.7%	3.5%	67,722	464,378
Snowmobile Travel	0.9%	4.5%	87,071	328,934
Cross-country skiing, snow shoeing	2.7%	13.4%	261,213	609,496
Bicycling, including mountain bikes	5.4%	26.7%	522,425	677,218
Hiking or Walking	9.8%	48.5%	948,105	1,625,323
<b>Totals</b>	<b>20.2%</b>	<b>100.0%</b>	<b>1,954,258</b>	<b>4,024,609</b>



Source: USDA Forest Service/WRNF 2002a

**Figure 3.2—Allocation of recreation visitor days (RVD) in top ten recreation activities on the White River National Forest, 2002**

Analysis for the forest plan showed that recreation levels on the WRNF will likely increase at a faster rate than national participation averages because of the above- average increase in populations of counties within the forest and Colorado front range (USDA Forest Service/WRNF 2002b).

### User Conflict

As more people and differing types of use continue to increase, it is inevitable that user conflicts will also continue to escalate. Conflict on multiple-use trails has been defined more succinctly as “goal interference attributed to another’s behavior” by the National Recreational Trails Advisory Committee of the Federal Highway Administration (USDOT/FHA 1994). Goal interference occurs when a user comes into direct or indirect (seeing the effects of another use) contact with another user type and is impeded from accomplishing the desired purpose of his or her recreation (Badaracco 1976). Conflict is more often characterized as one-sided than two-sided. For example, while backpackers may perceive OHV uses as disruptive to their experience, it is less likely that OHV users will find backpackers disruptive to their experience (Jackson and Wong 1982).

In winter, conflicts on the forest are more apparent as the motorized and non-motorized winter users vie for limited space for their individual pursuits. The limitations of realistically useable terrain available to each user group, the shortage of maintained winter access points, individual users’ incongruent expectations, and the unwillingness on the part of some members of each group to share their experience with the other group all can contribute to winter use conflicts.

From a practical standpoint, an average cross-country skier traveling away from an access point is generally within 3 miles of the access point (Cordell and Bergstrom 1989).

This makes much of the non-motorized winter area, such as wilderness, inaccessible to most users. Additional issues such as avalanche potential, dense vegetation, winter water crossings, and slope make additional areas unsuitable for skiing. In many cases, these same physical features can also make areas unavailable to motorized users even where motorized use is allowed.

The ski hut system has expanded the terrain available to cross country skiing, but only to the number of skiers limited by the hut system capacity. The ski huts were almost all constructed in winter motorized management area prescriptions because of the open nature of the previous winter travel management strategy forest-wide and the need for road access for maintenance. Decisions were made in the forest plan to restore a non-motorized experience around some of these ski huts.

Further complicating the user conflict problem in winter is the limited number of good, maintained access points. These points are traditionally located in motorized management prescriptions that allow motorized uses adjacent to plowed roads utilized to access the sites. Yet, at some of these locations, cross-country skiers are looking for a non-motorized experience and expect the motorized user group to give up space in favor of the skier's experience. The situation at Vail Pass is a good example of this issue. Additional winter access points and improved trailheads are needed in some locations. Analysis for new development of trailheads will be done through a future analysis process.

Perhaps the greatest conflict between cross-country skiers and snowmobilers on a trail is an inequity in responsibility (Cordell 1999). Generally, the snowmobiler has contributed in some manner to trail maintenance while the skier, on the other hand, may be seen as a trespasser using the trail without investment and, in some cases, expecting a non-motorized experience on routes created and maintained by the motorized users.

A more recent conflict has arisen with the increase in people wanting to use all-terrain vehicles year round. Generally unable to traverse unpacked snow, these machines are capable of travel on packed snow under the right conditions. When conditions are not optimal, they may get stuck frequently and can rapidly tear up the smoothly packed snow surface desired by snowmobilers and cross-country skiers. Additional issues occur as these wheeled vehicles make contact with and damage vegetation and land in an effort to get unstuck.

Conflicts also occur among various user groups in summer, most commonly between motorized and non-motorized uses as well as mountain bikers and horse riders. Conflict normally exists whenever incompatible activities occur, and normally include three elements that contribute to the incompatibility of activities: spatial and temporal proximity, dominance over the environment, and dependence upon technology (Bury et al. 1983).

Safety is a frequently cited reason when reports are received about an incident between the groups. Additionally, members of each group lay claim that the other is more harmful to the trail system. Depending on the soil type and/or the timing and volume of use, each user group could be correct.

Cordell (2004) states in chapter V of his outdoor recreation participation trends analysis that studies by Cordell and others on various forest users found that conflict related to mountain bike use was an important issue (Chase 1987, Chavez et al. 1993a, Jacoby 1990, Tilmant 1991, Viehman 1990, Watson et al. 1991). Often, mountain bike riders are seen as interlopers on trails that were previously used by others. Tilmant (1991, cited in Cordell 2004) found that hiker complaints about mountain bike riders included aesthetics,

personal beliefs, and the desire for solitude. Equestrian groups raised concerns related to safety (Chavez 1999, cited in Cordell 2004).

Several public comments received during the forest planning process were very critical of horse use on trails, related to trail damage and manure left by the horses, especially in easily accessible public areas with high horse and hiking use (USDA Forest Service/WRNF 2002b, appendix A).

Unmanaged off-road vehicle use is currently considered one of the four major threats to national forests because of impacts on resources and associated social conflict issues. A survey of Montana OHV users identified that while 76 percent of OHV users agreed that users should avoid riding cross-country, over 20 percent thought it was okay to “sometimes” ride cross-country and the remaining 3 percent stated that they should never avoid riding cross-country (Montana Fish, Wildlife & Parks 2006).

Groups such as the Rocky Mountain Recreation Initiative are advocating separation of motorized and non-motorized user groups on trails for the purpose of reducing user conflict and ensuring a satisfying experience for all trail users (Rocky Mountain Recreation Initiative 2002). Similarly, in support of their activities, the Colorado Off-Highway Vehicle Coalition sponsored an analysis to demonstrate the economic benefits derived from their participants (The Louis Berger Group 2009).

The potential for conflict exists among all user groups, and even among the different members within a user group, when personal expectations of the desired experience are not being met. Not all use conflicts on the forest are totally recreation-based. In addition to recreation, the National Forest System provides a wide array of resource-based opportunities such as timber harvest, livestock grazing, mining, and oil and gas exploration. Complaints about cow manure on hiking trails are common, as well as plowing of roads in winter for commodities such as timber and oil and gas production, which makes them impassible for cross country skiing and snowmobiling. Conflict arising from these non-recreation uses is considered within the analysis process for the decisions about managing these individual activities.

Conflict situations may be caused by management trying to allow too many options for users where the situation may be of marginal quality to meet the user expectations. By simply allowing activities to occur in an area, the visitor heads into that area expecting to fulfill their personal expectations. When the experience offered in that location fails to meet expectations, the user will sometimes create their own experience rather than going to another location. This can create conflict with other visitors because the one visitor is now infringing on the experience of others.

Lastly, conflict occurs when forest users knowingly partake in unauthorized uses. Fortunately, only a small percentage of the total forest visitors fall into this category. However, as forest use increases, the total number of visitors in this category also increases.

An associated problem created by unauthorized use occurs when visitors who normally would not violate will observe and follow the unauthorized behavior of others. As time passes and management does not commit resources to stop the problem, it becomes accepted and continues to expand and grow as an accepted activity. At some point the users begin to feel entitled to continue this activity even though it developed during circumstances under which it was not allowed. Often times, once a trail has been established by users, it is perceived to be “open for use” (Brooks and Champ, 2006).

In a time of flat budgets, increasingly more management resources are needed to deal with this problem, taking the management funds and support away from activities the

forest does want to provide. Management aimed at focusing some uses into more concentrated and better managed areas can isolate these individuals and reduce the complexity and resources needed to manage unauthorized use.

### Key Indicators

**Key indicator:** Opportunities available for quality recreation experiences by use

**Measure:** Total road and trail miles providing quality experiences by alternative and by use type.

**Key indicator:** Recreation capacity for each use by alternative.

**Measure:** Persons at one time (PAOTS) available for each use by alternative.

### Affected Environment

The forest currently has 2,181 miles of forest roads and 1,954 miles of forest trails officially open to recreational use in the summer. An additional 1,087 miles of unauthorized non-system roads and trails occur on the forest (labeled unauthorized routes) and are being used by recreationists. Some of these routes are left over from previous management activities that ended long ago; others originated from ongoing management activities; and still others were illegally created by users for various purposes. However created, these routes are almost all being used for some recreation activities at the present time.

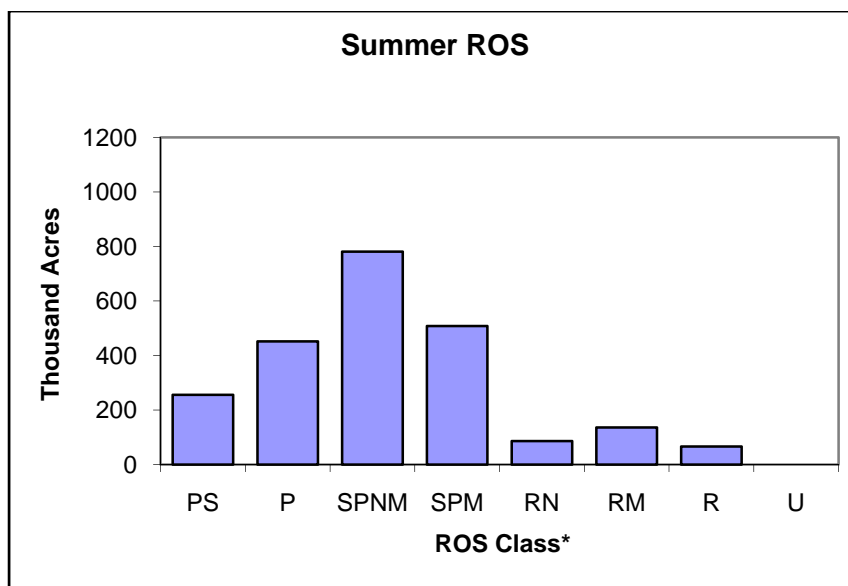
While site specific road and trail analysis was not completed in the forest plan, many of the decisions that were made set sideboards on the road and trail-specific decisions which will come from this analysis. Decisions made in the forest plan are not being revisited in this document.

### Recreation Setting

Visitors have different preferences for the recreation setting in which they like to recreate and for the activities in which they want to participate. For some forest visitors, traveling on a primitive road with other members of their club is ideal. Other visitors prefer traveling in an unroaded setting with few other visitors, if any, present.

With recognition of such differences in user preferences, the primary aim of managing outdoor recreation is to provide an environment in which visitors can enjoy a satisfying experience. By managing the natural resource setting and the activities that occur within it, forest managers provide for a range of recreation opportunities. These opportunities can be expressed in terms of three principal components: activities, setting, and experience. For the purposes of management, the range of possible combinations of activities, settings, and probable experience opportunities has been represented in terms of a spectrum or continuum. This continuum is called the recreation opportunity spectrum (ROS).

A more complete discussion of the decisions made on ROS condition classes is available in the forest plan (USDA Forest Service/WRNF 2002b). Figures 3.3 and 3.4 display summer and winter acreages assigned to each ROS class.



Abbreviations—

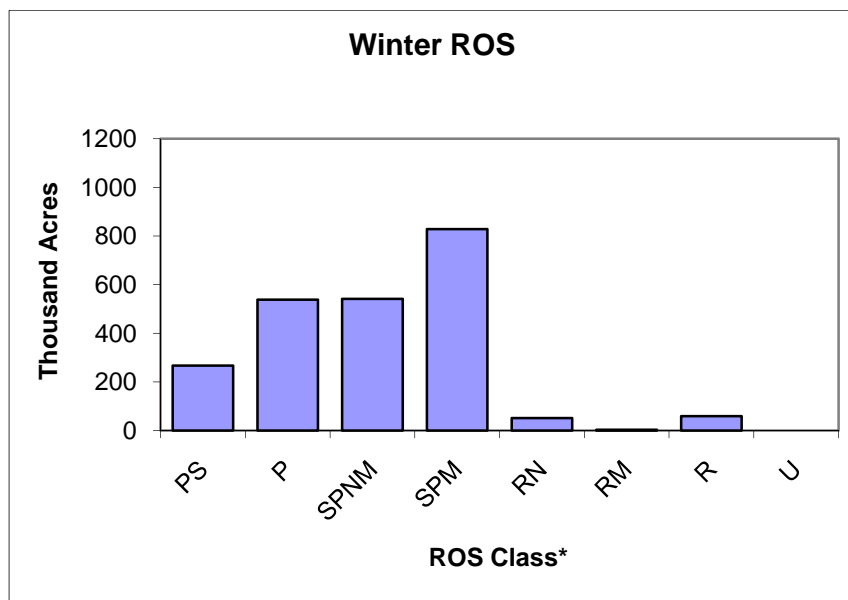
PS: pristine; P: primitive; SPNM: semi-primitive non-motorized; SPM: semi-primitive motorized; RN: roaded natural; RM: roaded modified; R: rural; U: urban

NOTE: Motorized use is excluded in the semi-primitive non-motorized, primitive and pristine ROS class

\*Few acres exist in the urban ROS class and do not show on the charts at this scale.

Source: USDA Forest Service/WRNF 2002a

**Figure 3.3—Acres in each ROS class: Summer, White River National Forest**



Abbreviations—

PS: pristine; P: primitive; SPNM: semi-primitive non-motorized; SPM: semi-primitive motorized; RN: roaded natural; RM: roaded modified; R: rural; U: urban

NOTE: Motorized use is excluded in the semi-primitive non-motorized, primitive and pristine ROS class

\*Few acres exist in the urban ROS class and do not show on the charts at this scale.

Source: USDA Forest Service/WRNF 2002a

**Figure 3.4—Acres in each ROS class: Winter, White River National Forest**

### **New and Changing Uses**

Technology has contributed to significant changes in the amount and types of uses placed on the national forest transportation system. Off-highway vehicles were just coming onto the scene when the first forest plan was completed in 1984. In 1991, when Colorado State Parks first began managing the OHV registration program, registrations increased from nearly 12,000 to approximately 131,000 in 2007, a 154% increase (CDPORA 2008). Colorado's snowmobile registration program registers approximately 34,000 snowmobiles each year (CDPORA 2008). The changes in technology for these machines allow them to travel in more areas, with less rider skill than was required in the past.

The mountain bike was barely more than a novelty in 1984. In 2003, 69 percent of Colorado households owned at least one bicycle, with 74 percent reporting they sometimes bicycle (CDPORA 2003). In 2002, an estimated 677,000 visits on bicycles occurred on the forest, with the use dominated by mountain biking (Kocis et al. 2003). The National Survey on Recreation and the Environment reported that 1,674,000 Colorado residents participated in bicycling in 2006 (CDPORA 2008).

Cycling downhill at Colorado ski areas is becoming a major recreation attraction and significant source of revenue. In 2002, over half of all summer visitors to the resorts biked at one of the ski areas in the state. Seventy percent of the bicyclists at ski areas were from out of state (CDPORA 2003). Extreme sports have become popular for several activities. Downhill (fall line) mountain biking is just one example of this trend.

Technological advancements in snowshoes, cross-country ski equipment, and hiking boots have allowed a greater range and number of individuals to more easily participate in these activities. Winter conflicts are occurring in some areas where skiers are more frequently using snowmobiles to access backcountry areas for a powder and downhill skiing experience. Conflicts also can occur when people use snowmobile trails for cross-country skiing and snowshoeing.

In addition to those uses mentioned above, privately owned snowcats and aircraft are becoming more common on the forest. Mountain boards, similar to skate boards but with larger wheels and altered suspensions, are being used on several roads and trails. Sailboards are being used over snow, and parachutes are being used for both over-the-snow and over-land travel in conjunction with skis or bikes, though the number of participant is low at this time. Hummer vehicles and all-terrain vehicles are being fitted with tracks to go over the snow. Available on the market are full-size OHVs capable of climbing over obstacles that would have easily stopped a Jeep just 10 years ago. It is unknown whether any of these uses will grow on the forest or what new methods of transportation may appear in the future.

Technological advances for travel are continually being made all the time. As these come on to the market users buy and use these new tools. Many become popular and introduce more people to the forest. All of these new and changing technologies and uses contribute to the challenges of travel management on the forest.

### **Hunting and Fishing**

Transportation to hunting opportunities presents controversial travel issues. Some hunters and other forest users seek a non-motorized experience. Some hunters would prefer motorized access for hunting. And still some hunters would like to retrieve game with off-road motorized travel. During the fall hunting seasons especially, the forest currently expends a significant percentage of time and maintenance resources toward managing hunting activities.

Hunting, fishing and wildlife watching are significant activities and economic necessities for many communities adjacent to the forest. Nationally, recent U.S. Fish and Wildlife surveys have indicated a downward trend in the total number of hunter and angler numbers. From 2001 to 2006 the number of anglers dropped 12 percent and the hunter count decreased by 4 percent (U.S. Fish and Wildlife, 2006). The same survey indicated an 8 percent increase in wildlife watching.

While it is unknown how those trends relate directly to the White River National Forest, there is reason to believe that existing extenuating circumstances on and adjacent to the forest may neglect or at least minimize the effects of these trends. Top angling professionals (Field and Stream 2008) have recently identified Glenwood Springs as the number one ranked fishing community in the nation. With an estimated population of over 40,000 animals, the White River Elk Herd has been proclaimed as the largest migratory elk herd in North America. Based on the above citations, the White River National Forest can expect to receive continued focus and visitation from both local as well as national hunters and anglers.

All areas of the forest (except private land in-holdings) are open to hunting and fishing. While angling use occurs throughout much of the year, the majority of hunting use is concentrated during the fall big game seasons. There are 16 game management units which encompass the forest. These units have been managed as both limited use units as well as general season units allowing unlimited licenses.

Three basic categories of hunters exist: backcountry, hiker, and vehicle/OHV supported hunter. The backcountry hunter usually hunts from horseback or is packed to a remote location. The hiker hunter will generally hike 1-4 miles from a road or roadside camp to access a hunting area. The vehicle hunter enjoys traveling to a hunting area by vehicle or OHV and often desires to be able to retrieve game with motorized vehicle support. During the past 15–20 years, the forest has witnessed a significant increase in ATV use during the hunting season. This increase has resulted in the creation of additional conflicts among hunters with differing philosophies. Over 40 percent of resident big game hunters and 30 percent of non-resident big game hunters indicate that the most frequent and negative access problem was finding areas that are not crowded. Seventy percent of hunters support the designation of more areas where the number of big game hunters is limited (Manfredo 1992). In a survey conducted of OHV users in Montana, over 78 percent of those surveyed stated that OHV users should access the area they intend to hunt on legal routes and then should hunt on foot. However, in the same survey, more than 58 percent of those surveyed admitted they at least sometimes travel off route to retrieve down game (Montana Fish, Wildlife & Parks 2006).

In 2003 the Congressional Sportsmen's Foundation sponsored a survey to specifically collect information related to access to federal hunting lands in Colorado. The following captures just some results from this study (Access to Federal Hunting Lands in Colorado 2003):

- Access to national forest/grassland lands had the highest rating for all types of lands for access (73 percent rated it excellent or good).
- Those respondents who have hunted on federal public land in the past 10 years in Colorado were asked to indicate whether more or less access, or the same level of access, should be provided to hunters on federal public lands in Colorado by various modes of transportation (e.g., by foot, horse, ATV). Access by foot had the highest percentage saying that more access should be provided (49 percent). Horse access also had a relatively high percentage

favoring more access (32 percent). All three motorized modes of access had the highest percentages saying that less access should be provided: 70 percent said that there should be less motorbike access, 56 percent said that there should be less ATV access, and 29 percent said that there should be less truck access.

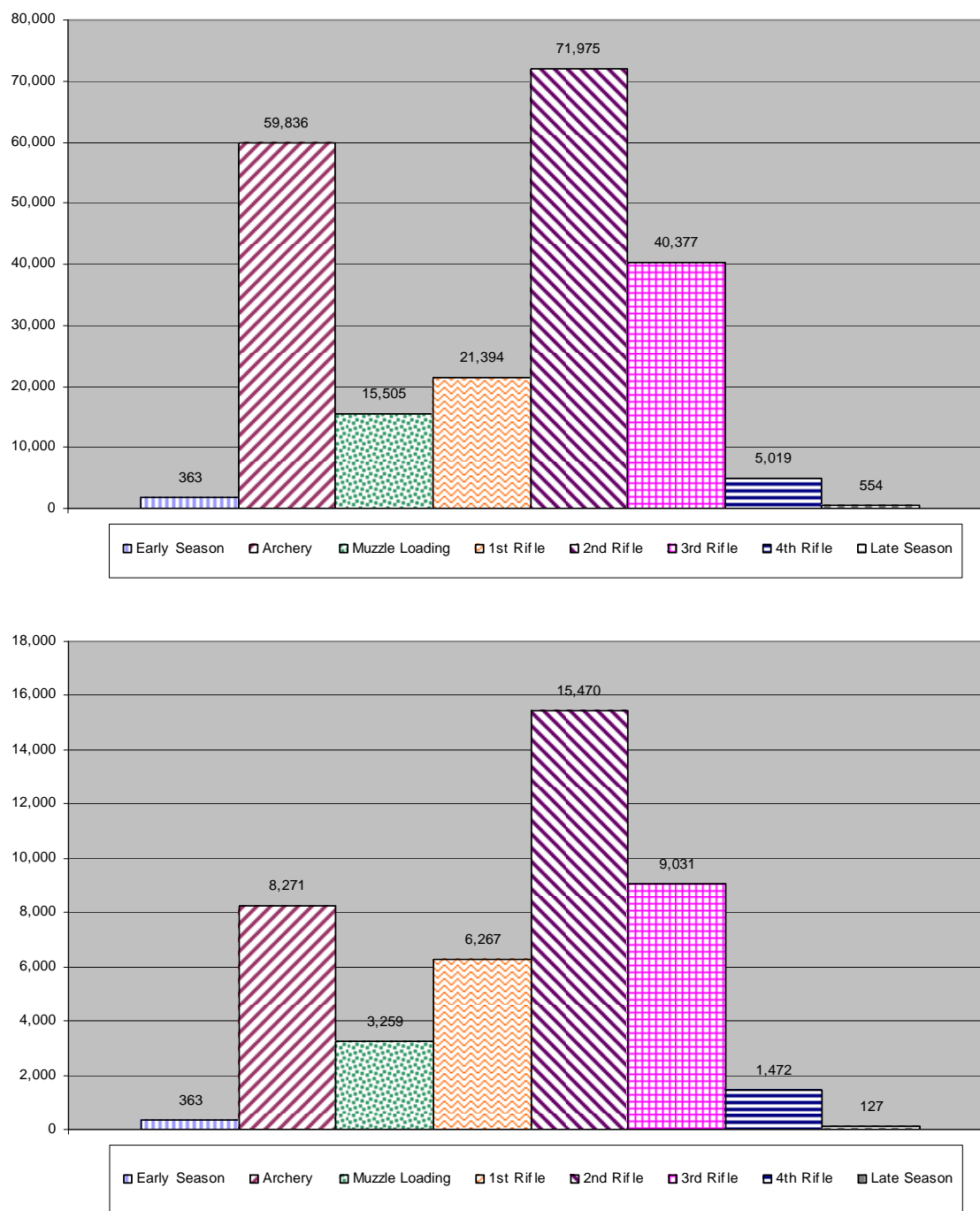
- The most common interference problem was with those on ATVs (18 percent of respondents reported interference by ATVs), with resident hunters being slightly more likely than nonresident hunters to have experienced a conflict with ATV users. The second highest conflict was with mountain bikes (10 percent).

### *Hunting*

While the White River National Forest receives use from a wide range of big and small game hunters, the majority of use occurs during the fall deer and elk seasons. National visitor use monitoring data collected in 2002 identified that only 0.4 percent (38,698 visitors) of the total visitors identified hunting as their primary activity (Kocis et al. 2003).

To further evaluate and quantify the timing and amount of hunting use on the forest, the forest has computed the total deer and elk hunter recreation days on the forest using numbers generated from the Colorado Division of Wildlife 2006 harvest surveys. The evaluation identified the number of hunters and hunter recreation days for each big game management unit located on the White River National Forest and multiplied these numbers by the estimated percent of forest use for each season. Percentages were based on historic use during normal weather conditions. Under normal conditions, the majority of hunters utilize National Forest System lands during the earlier seasons and, due to the movement of animals to lower lands as the seasons progress, a decrease in hunter percentages on the forest occur during each of the latter seasons. The following percentages were used to measure the recreation days on the forest for each season: early season = 98 percent, archery & muzzle loading = 93 percent, 1<sup>st</sup> rifle (elk only) = 85 percent, 2<sup>nd</sup> rifle (1<sup>st</sup> combined) = 80 percent, 3<sup>rd</sup> rifle = 65 percent, 4<sup>th</sup> rifle = 50 percent, and late season = 25 percent.

Figures 3.5 and 3.6 identify the results of these computations. Note that all private land, ranching for wildlife, and late season deer hunt numbers were excluded from these figures. While it may be expected that some hunters hunt both deer and elk during the combined seasons, the analysis did not separate those use numbers, thus resulting in the duplicate counting of those hunter and recreation days. Also, it is expected that many hunting camps include people, friends and family, who may not be hunting during the time but are accompanying other license holders. These accompanying visits are also not captured within this analysis.



**Figure 3.5— Number of hunting recreation days on the White River National Forest**  
**Figure 3.6— Number of hunters by hunting season on the White River National Forest**

While the above numbers are slightly different from the numbers generated through the 2002 NVUM sampling process, these analyses resulted in relatively comparable overall numbers (less than 14 percent difference) between the two. It should also be noted that the 2002 White River use estimates were actually performed in fall of 2001 immediately following the 9/11 disaster and a major fire season. All recreation use sampled nationally on National Forest System (NFS) lands in the year following 9/11 were down compared to surrounding years.

The quantity of hunters on the forest during this two month period, coupled with an increase in the percentage of hunters who use ATVs to access their hunting areas, fuels the existing philosophical differences between motorized and non-motorized hunters. The lack of clear travel route designations in some areas, resulting in the inability for each type of hunter to fully understand where motorized access is allowed versus areas where non-motorized hunters may go to avoid encounters with motorized equipment has led to many of the conflicts.

### **The Forest's Role in Meeting Future Demand**

The mission of the Forest Service is to provide multiple benefits and opportunities. However, the land-base on a single forest is not large enough, nor are managerial resources great enough, to provide all of the opportunities desired by recreationists. The greater the variety of unique opportunities a forest attempts to provide, the more diluted its capability for providing quality opportunities.

National forests need to provide visitors a focused, high quality outdoor recreation program based on prioritized needs within the capacity of existing human and financial resources. Coordination with other outdoor recreation provider agencies is necessary in order to identify respective roles and niches (Colorado Recreation Strategy, p. 11). If the opportunities the forest is providing are very similar to opportunities the same visitors are provided in adequate supply elsewhere, a non-essential duplication of effort is occurring.

Between 2004 and 2006 the White River National Forest analyzed who the visitors to the forest were, what some of their expectations were, and where the White River National Forest should be focusing recreation management efforts to best position the forest for the future. It was evident that the White River National Forest is best known for the attraction of visitors to the resort community areas and to the undeveloped wild lands, and that this is where forest efforts should be focused (Recreation Site Facility Master Plan 2005). Use on the White River National Forest is dominated by downhill skiing in the winter and non-motorized activities in the summer (NVUM 2002). A review of data indicated other entities, such as neighboring forests, serve far more visitors in motorized backcountry activities (NVUM 2002).

One of the goals stated in the forest plan is to emphasize providing a wide range of motorized, mechanized, and non-motorized recreation opportunities and difficulty levels spread across the forest (USDA Forest Service/WRNF 2002a, p. 2-37). Even though the focus for the forest may be on resort related (more structured) and primitive setting (generally non-motorized) related activities (recreation niches), the forest still needs to provide some high quality recreational experiences to backcountry (dispersed including motorized) related activities.

Over 800,000 acres of forest are currently available for designated motorized travel routes in the summer and approximately 772,000 acres are available for open motorized travel in the winter (USDA Forest Service/WRNF 2002b). This does not necessarily mean that all types of motorized use will be available in all areas. There may be large areas of the forest where one or more motorized use and visitor experience will be emphasized over others. The long-term quality, manageability, and sustainability of the activities will be considered when making these decisions.

National Forest System lands are finite. While it is the agency's goal to provide for public use, the agency also has a responsibility to manage the land resources. Given the limitations, it is not likely that each forest can be expected to meet all current and future demand for activities that are allowed in the national forests. As demand continues to increase, there will ultimately be limits on the amount of use that can be sustained.

Increased use requires additional expenditures, maintenance, management, and enforcement. With the reality of increasing pressures from use of primitive settings, regimentation and control of visitation may be necessary to protect the integrity of the opportunity and to ensure its use into the future. This is particularly true where management objectives call for the preservation of naturalness (Fazio and Gilbert 1974, Stankey 1979, from ROS, p. III-18).

A lack of active management of some uses in the past has resulted in a change in users and use patterns on the forest. More than 20 years ago, researchers documented how a change in circumstances, such as greatly increased use, affects the opportunities and experiences available (Forest Service ROS 1986, p. III-21–III-25). Clark describes this as a process of “invasion and succession” (Clark et al. 1971, from ROS, p. III-24). Quite often these changes occur more slowly over time. Existing users are displaced because they are no longer receiving their desired experience and the new users fill the void left by the departing users. These changes generally occur outside the agency making conscious management decisions. Although some users are vocal about their changes in experience, the loss of recreational opportunities largely goes unnoticed until well down the road when the new and sometimes less desirable use pattern is set.

### **Changing Recreation Management to a Visitor Focus**

Traditionally, the forest has managed the recreation program based on general physical features such as the miles of trail open to bicycles, the acres open to snowmobiling in the winter, and the number of campsites available for camping. Uses were generally allowed unless there were serious enough issues to force the forest to take management action to reduce the problems.

A common misperception is thinking that providing any opportunity equates to providing everything needed for a quality recreation experience. The designation of a physical road or trail as open for a given activity is only the beginning of providing a satisfying visitor experience. Decisions about what routes will be open to which uses will require consideration of the forest’s management ability to provide a complete experience.

Nationally, the Forest Service is committed to improving the capability of the national forests and grasslands to provide diverse, high quality recreation opportunities (USDA Forest Service/WRNF 2002a, p. 1-10). Not all visitor demands can be met on each individual forest. Difficult decisions need to be made regarding which visitors will have an opportunity for a quality recreational experience and which visitors may have to seek out alternative locations for their desired experiences.

In April 2006, the forest reaffirmed the 2002 decision to provide high quality recreation opportunities by creating a matrix of forest-wide recreation strategies based on forest niche and providing quality visitor experiences (Forest Management Matrix 2006). These strategies focus on providing sustainable high quality experiences in appropriate locations; however, that does not mean all current opportunities will be offered in the same quantities and locations.

### **Trail System Budget and Finance**

The forest currently has approximately 1,935 miles of identified summer system trails. For fiscal year 2010, the budget for the entire forest was \$462,500 to perform all management, maintenance and capital improvement on the trail system. The forest reported an accomplishment of approximately 500 miles of trail maintained to standard. The definition used for this reporting was only to meet critical safety and legal standards and did not include meeting standards for cleanliness or resource protection. By 2012, a

forest strategy in the forest plan is to have 30 percent of the trail mileage that is currently rated poor or critical receive appropriate maintenance or reconstruction (USDA Forest Service/WRNF 2002a, p. 1-10). Other strategies include improving the safety and economy of the roads, trails, facilities, and operations and providing greater security for the public and employees. This includes decommissioning 22 miles of roads each year and an emphasis on maintenance and reconstruction of the existing road and trail system to standard (USDA Forest Service/WRNF 2002a, p. 1-4, 2-37). These strategies are not requirements, but rather are methods listed to help attain goals and objectives. They help the forest to set priorities to meet the goals set forth in the forest plan.

The adoption of unauthorized routes into the official travel system will require the forest to maintain these routes and thus adds to budgetary costs. Newly acquired facilities (adopted unauthorized routes) will be open to appropriate motorized or mechanized use unless financing is not available for maintenance necessary to protect resources (USDA Forest Service/WRNF 2002a, pg 2-36). It is hoped all user groups will become more involved in trail maintenance and management on the trails they use for the forest to be able to sustain its current extensive trail system. Unauthorized routes not adopted in this decision will be decommissioned. While this too costs money, this expenditure is a onetime cost and helps to return the ground to a natural state, which can also enhance surrounding recreation experiences.

A shift in budget priorities and focus is expected over the next 5 years due to the bark beetle epidemic. With dramatic changes occurring in the forests overall condition, much of the recreation budget will be tied to addressing public safety and mitigating impacts around forest system roads, trails, trailheads, campgrounds, high use areas, and other infrastructure.

Forest Service trail budgets are not expected to significantly increase in the near future. The ability to maintain trails is limited and maintenance goals are hard to achieve. If the forest budget is the only contributor to trail maintenance, it will be difficult to maintain forest trails at a sustainable level. The annual cycle (the number of years between trail maintenance cycles) increases and therefore the work required can increase. Proponents for designated and new routes may be asked to assist the forest with planning, construction, reconstruction, and maintenance of routes. Partnerships, grants, and volunteers all greatly contribute to the sustainability of the trail system.

While economics of what it takes to maintain the trail system is a large factor in deciding what trails should be part of the designated system, it is not the only consideration when it comes to deciding what the final system needs to look like and what visitors it will serve. The economies of local communities are heavily dependent on revenues associated with visitors recreating on the forest. Total economic benefit of forest activities was analyzed in the forest plan. In 2000, it was estimated that the economic effects of monies spent by visitors in pursuit of recreation on the forest, excluding ski area use, was nearly \$91 million. Projections are that by 2010 it will be nearly \$114 million (USDA Forest Service/WRNF 2002b, appendix B, p. B-33). Nearly all recreational activities on the forest are dependent on the forest's transportation system in some manner.

The Forest Service will continue to concentrate resources on the more heavily used routes and those having the most safety and environmental issues including bark beetle mitigation efforts. Eventually, evaluations may have to be made as to how much to invest in a route and whether a route should be retained based on the amount of use and the ability to retain sound condition.

Maintenance of the travel routes is only one cost associated with providing road and trail opportunities. Additional costs are associated with general management of the system,

law enforcement, tracking of maintenance needs, managing user conflicts, signing, and public information and planning.

The costs of some management activities are set and cannot be reduced. Other costs can be reduced through proper transportation system planning and design by authorizing uses on routes that can be environmentally sustained. Such management can result in cost reductions by reducing time spent on managing user conflicts by decreasing the need for law enforcement, and by reducing trail maintenance. An estimated cost comparison for the implementation of the travel plan alternatives is included in the transportation section. The forest will continue to be proactive in building collaborative relationships to assist in overall trail management with local and regional communities.

### **Special Trails and Areas**

The Continental Divide National Scenic Trail (CDNST) extends for about 3,100 miles from Canada to Mexico and crosses the forest from Tennessee Pass to Loveland Pass (a distance of about 67 miles). Some of this route close to Loveland Pass is still being developed. On the western side of the forest, much of the CDNST route is coincident with two other trails: the Colorado Trail (CT) and the American Discovery Trail (ADT). These trails are discussed in detail in the forest plan (USDA Forest Service/WRNF 2002b).

The forest has 61 miles of national recreation trail: the Wheeler-Tenmile Trail (23 miles), the Tenmile-Vail Pass Trail (30 miles), and the Two Elk Trail (8 miles). The Wheeler-Tenmile Trail partially coincides with the CDNST, Two Elk, ADT, and Colorado Trail.

In addition to designated trails, other trails are crucial for access to special places. There are 10 peaks over 14,000 feet in elevation on or bordering the edge of the forest. “Peak bagging” Colorado’s 14,000-foot peaks has become very popular in the past several years. Ascents on the state’s “fourteeners” have roughly tripled since the early 1990’s. Estimates suggest that each year approximately 500,000 people climb these mountains across the state each year. It is estimated that one third of those visitors are visiting from other states (SCORP 2008). Many of the peaks that lie in wilderness have never had designated routes to the summits. Heavy use has resulted in multiple trails and resource impacts.

More than 150,000 visitors come annually from around the world to view the three 14,000 foot peaks surrounding Maroon Lake and to hike trails in this area. Because of the constant high number of summer visitors to the Maroon Valley, a mandatory bus system was set in place to serve this location. Hanging Lake receives an estimated 80,000 visitors annually on the mile-long trail to Hanging Lake in Glenwood Canyon.

## **Environmental Consequences**

### **General Effects**

Recreation use is expected to continue to increase in all alternatives. The increase in each type of use will likely vary by alternative and ultimately be limited by the quality of the recreational experience an individual user has.

Aside from downhill skiing, most of the recreational use that occurs on the forest in non-motorized activities would be as shown in figure 3.1. However, the non-motorized uses tend to require less area for a day’s use experience due to slower travel times associated with non-motorized travel. For instance, the average snowmobile rider in Colorado travels around 50 miles in a day (Hazen and Sawyer. 2001), (*Louis Berger Group, Inc.*

2009 study did not address nor change that 2001 assumption). In contrast, most cross-country skiers stay within 3 miles of a winter access point for their daily activity, although some may expand that distance to approximately 6 miles of travel per day, more or less, depending on the opportunity available for loop trails within that area (Cordell and Bergstrom 1989).

This does not necessarily mean that the snowmobiler needs eight times as much area as does the skier. Conversely, the fact that skier/snowshoe visit numbers are three times higher than snowmobiling use numbers and have a faster growth rate (USDA Forest Service/WRNF 2002b) does not mean skiers and snowshoers need three or more times as much area than snowmobilers. Other factors such as crowding, the willingness on the part of a user to recreate in the same area more frequently, and a willingness to share with other use types weigh in on the amount of resources allocated to a particular use. Expectations of crowding and the setting also play significant roles in the decisions. Users are generally willing to accept a greater number of visitor contacts in a more developed setting than is acceptable in remote backcountry. This makes the decision to assign specific uses to individual roads and trails a decision based on social factors as much as a decision based on raw numerical data.

### **Roads and Trails**

While the road and trail systems may be shared, different users have varying preferences on which transportation system they prefer to use for the quality of their experience. Although they can legally hike on roadways or motorized trails, most hikers seek a single-track trail experience away from roadways and motorized trail uses. Mountain bikers often prefer single-track experiences but generally accept sharing the more primitive road experiences with other users more than hikers do. All-terrain vehicle and motorcycle groups tend to be more tolerant of full-size vehicles on primitive roadways. However, they still look for trail experiences where the chances of encountering a variety of other user groups are reduced and where they can have a better backcountry experience than can on a highly developed roadway.

No single measure can provide conclusive direction on how to best allocate limited resources for all these diverse user groups. Even within a particular user group, the participants have differing expectations for their recreational experience. Ultimately, a variety of measures and professional judgment must be used in the allocation process.

### **Direct and Indirect Effects**

The analysis for recreation use on travel ways was completed in two distinct parts. The first of these parts involved identifying and performing a site-specific evaluation on each of the roads and trails under Forest Service jurisdiction on the forest.

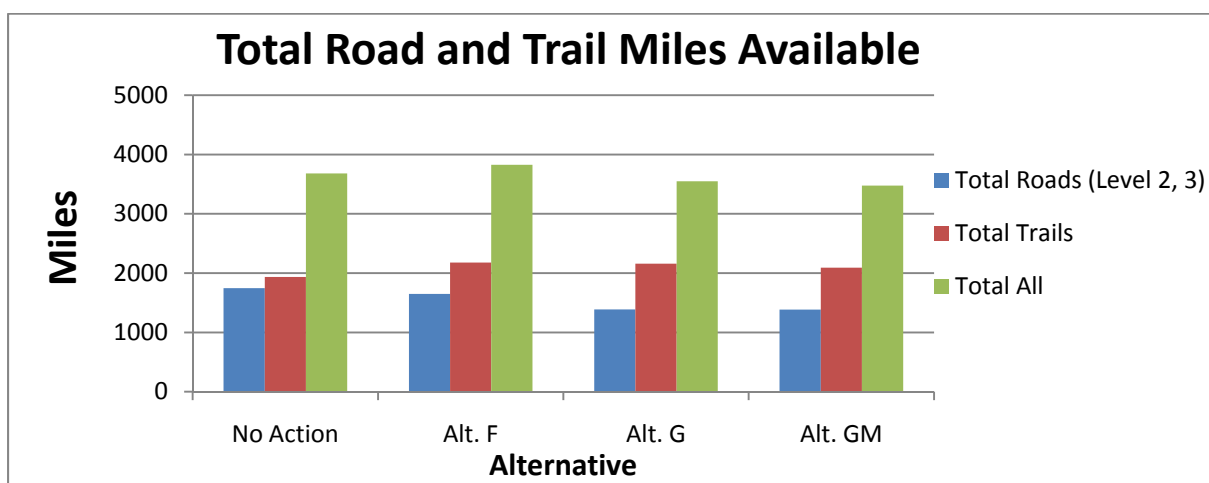
It included reviewing each road and trail as identified in Alternative A, the no-action alternative, to determine if it met the direction set in the forest plan for both the management area prescription and the ROS management goals. System roads and trails that were found to be consistent with forest plan direction are identified in Alternative F. The other alternatives took into consideration unauthorized routes identified. Once the cross-check on the no-action alternative was completed, a multi-disciplinary team from each of the ranger districts evaluated each road and trail on their district and proposed a management strategy consistent with the alternative themes for Alternatives C, D, and E for the first draft of this document. The same checks as were done for Alternatives C, D, and E in the first draft were also completed for Alternative G and finally for Alternative GM in this FEIS.

The second part of the recreation analysis involved compiling site-specific information for a forest-wide analysis as described in this FEIS.

### Summer Season

Most resource-based recreation use occurs within ½-mile of a road or trail (Cordell et al. 1990). When analyzing an overall forest program, it is logical to assume that the maximum number of miles of road and trail open to the most uses will provide the maximum overall volume of recreational opportunities on the forest. Such an assumption does not consider the quality of the individual user experience. A comparative analysis of total open road miles of all types is done in the transportation and infrastructure section of this analysis.

Figure 3.7 shows the total mileage of open and available routes (all level 2 and 3 roads and all trails) by alternative.



Source: White River National Forest GIS data

**Figure 3.7—Total miles of all level 2 and 3 roads and trails by alternative**

Alternative F would have the highest total miles open for travel, followed by Alternatives A, G, and GM, respectively. Although the total of level 2 and 3 road miles slightly drops across alternatives from Alternatives F to A to G and GM, the total trail miles increase from Alternative A. This is the result of converting level 2 and level 1 roads to trails and the adoption of new trails into the forest's system.

### Quality Recreation Experiences

Rather than just comparing general recreational access, some activities are transportation type activities where the travel route is a key part of the experience. These include hiking, horseback riding, mountain biking, ATV use, and motorcycling.

While some activities may legally take place on maintenance level 3 through level 5 routes, it is generally considered that the majority of the aforementioned users are only using these higher level routes as access to get to their desired activity rather than as a quality component of the activity itself. Therefore the following tables were done to show opportunities for a more "quality recreation experience."

Recognizing different users have different preference on which types of routes to use for a quality experience, the following assumptions were made to display by alternative the total numbers of miles of roads and trails that are available by use type for a quality

experience. All data used in the following tables included miles of routes that are under forest jurisdiction, which may include some segments outside forest lands. Maintenance level 1 road miles were not included as these system routes have been identified as closed to motorized uses and are only in the system to identify custodial maintenance that is needed to mitigate impacts to adjacent resources and to facilitate future management activities.

Maintenance level 2 roads are managed and maintained for use by high clearance vehicles and are native surface and often four wheel drive is recommended. Traffic is normally light and usually consists of a combination of recreation vehicles and/or other vehicles traveling for other uses. Level 2 roads make up the majority of the forests system roads.

Maintenance level 3 roads are single lane native surface sometimes gravel surfaced and are managed for low speeds but are open to passenger cars. However, on this forest many level 3 roads are double lane and gravel surfaced which can be dusty during the dry periods. Travel on some of these level 3 roads often exceeds state imposed speed limits.

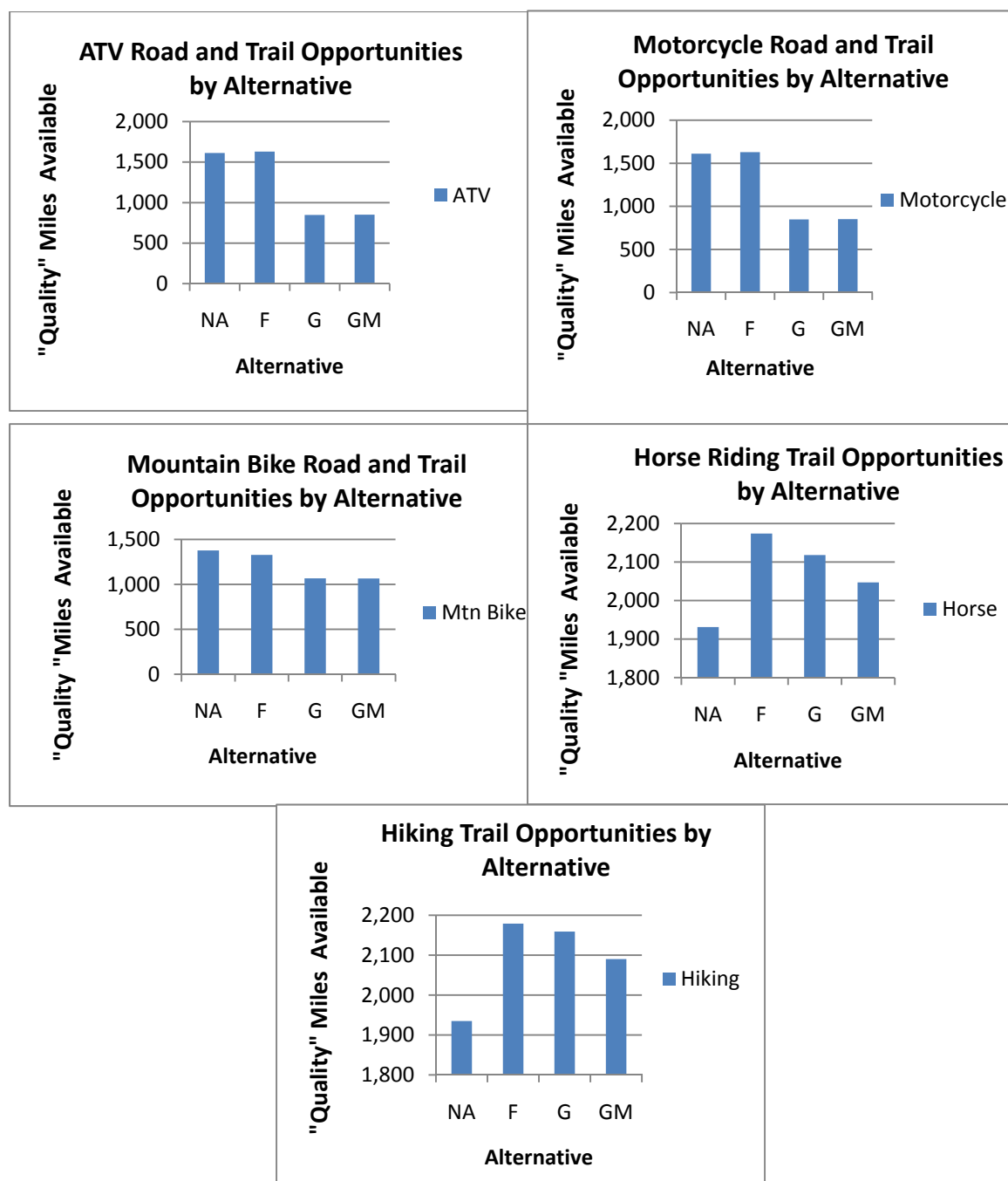
While hikers and horseback riders can legally hike on and off all roadways and trails, a quality experience for foot and horse was assumed to be related to only trails. Therefore, only the total miles of open trails for these uses by alternative will be displayed in the following tables.

As stated above, most mountain bikers prefer single-track trail experiences but also enjoy the more primitive level 2 roads. The tables below are based on the assumption that mountain bike riders will use the total number of available trail and level 2 road miles by alternative.

Public comments stated that ATV and motorcycle riders enjoy riding on trails designed for their use as well as native surface roads. Therefore, a quality experience for ATVs and motorcycles will include trails and level 2 and 3 roads open for this use by alternative. This also addresses public concerns relating to the inclusion and consideration of the connectivity of routes to enhance ATV and motorcycle riding experiences.

On the forest, scenic driving accounts for 11 million visits annually (Kocis et al. 2003) and is considered a recreation related experience however, many of these drives occur on roads that are not under Forest jurisdiction. While, visitors seeking opportunities for scenic driving and driving for pleasure stop frequently on Forest lands and use recreation facilities, analysis of opportunities or miles available for full size vehicles can be found in the transportation section.

Figure 3.8 shows opportunities for “Quality Recreation” experiences by activity. Quality experiences for ATVs and motorcycles is assumed to include level 2 and 3 roads and trails open to ATVs and unlicensed motorcycles. Quality experiences for mountain bikers is assumed to include level 2 roads and trails open to that use. Quality experiences for hiking and horse riding is assumed to include only trails.



Source: White River National Forest GIS data

**Figure 3.8—Opportunities available for quality recreation experiences by activity by alternative**

In Figure 3.8, Alternatives NA (Alternative A) and F would have the same amount of miles available (level 2 and 3 roads) for quality recreation experiences for ATV and motorcycle use followed by Alternatives G and GM. Alternatives NA and F are the same because both alternatives carry forward all current designated routes and no changes were made to reflect manageability. In Alternatives G and GM, some level 2 roads that were

spurs or short dead end routes off of level 3 roads which do not allow unlicensed use were dropped for ATV and unlicensed Motorcycle use for management reasons.

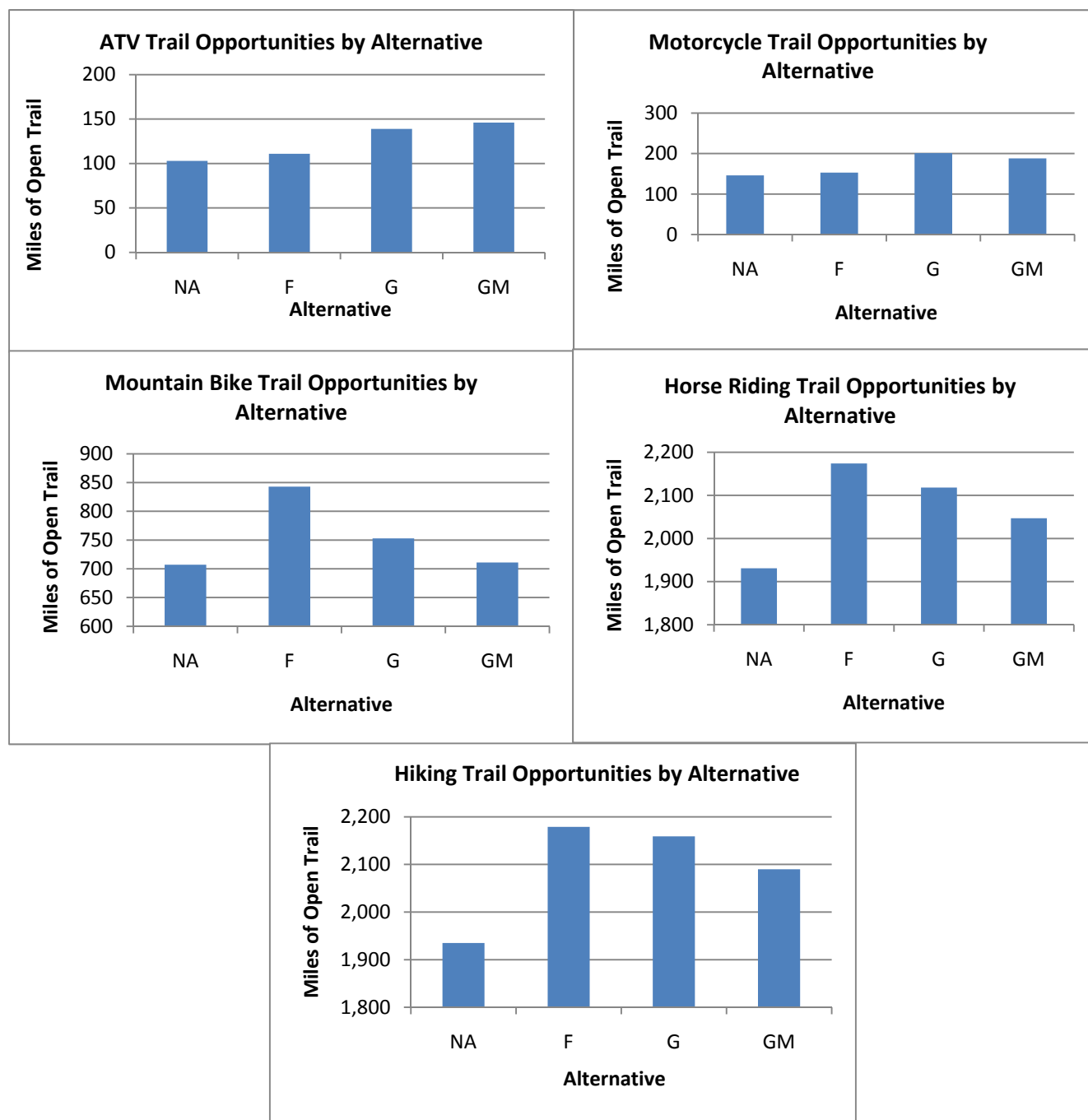
Mountain bike opportunities decreased across the alternatives from Alternative A to Alternative GM. This display of available miles for quality recreation experience opportunities includes level 2 roads, which adds to the overall miles of opportunities outside of trails. While different users have different riding skills and preferences, this addresses users concerns to include loop opportunities and addresses the connectivity of routes available for mountain bike use. Although the addition of level two roads adds to the overall miles, the reduction of trail miles occurs in Alternatives G and GM. This reduction in miles is due to the elimination of trails that accessed wilderness areas, or where riding opportunities did not provide users the type of experience they preferred. These routes included trails where topography limited desirability or where there was no reasonable distance available to ride (i.e. short dead end spurs).

For hiking and horse riding, quality recreation opportunities (trail miles) goes up from the Alternative A because of level 2 roads that were converted to trails and the adoption of user created trails. While opportunities rise the least in Alternative GM, the total number of miles available in Alternative GM is still above Alternative A by over 100 miles.

Figure 3.9 provides comparisons of the total number of trail miles available by alternative by use. Alternative F followed by Alternatives G and GM would have the greatest total trail miles available for hikers and horses. All action alternatives are up from the current baseline system. The net increase of trails is due to the adoption of new trails resulting from level 2 roads that were converted to trails, and looking at manageability and bringing forward some user created trails that were not recognized system routes previously. While there is a slight difference in open trail miles between hikers and horses, those few miles of trails that were closed to horses were done in order to address some of the following management issues: public and livestock safety, trail conditions and/or limiting topography, or where horse use is not a common place or appropriate. Some examples of trails closed to horses are scenic overlook trails (Deep Creek Overlook), Hanging Lake Trail, and campground loops. The total number of trail miles closed to horses is highest in alternative GM at 43 miles. However, as stated previously, Alternative GM still provides over 100 miles of trail above the no-action alternative.

Mountain bike trail opportunities are highest in Alternative F and decrease in available miles to Alternatives G, GM and finally to Alternative A. Decreases in trails open to mountain bikes largely occurred from the closure of short spur trails that are not providing enough available distance for travel, trails that only accessed wilderness, or trails that were unsuitable for mountain bikes.

ATV trail opportunity is highest in Alternative GM followed by Alternatives G, F and A. This is a result of the conversion of level 2 roads to trails. Alternative G would have the greatest total of trail miles available for motorcycles, followed by Alternative GM, which also resulted from the conversion of level 2 roads. For both ATV and Motorcycles the difference in available trail miles across alternatives is relatively minor. For motorcycles, while the mileage is slightly higher from Alternatives F to GM, Alternative F includes a lot of trails that are unsuitable or undesirable for motorcycle use. Those in Alternative GM were identified as desirable by the motorcycle groups.



Source: White River National Forest GIS data

Figure 3.9—Recreation trail opportunities by alternative

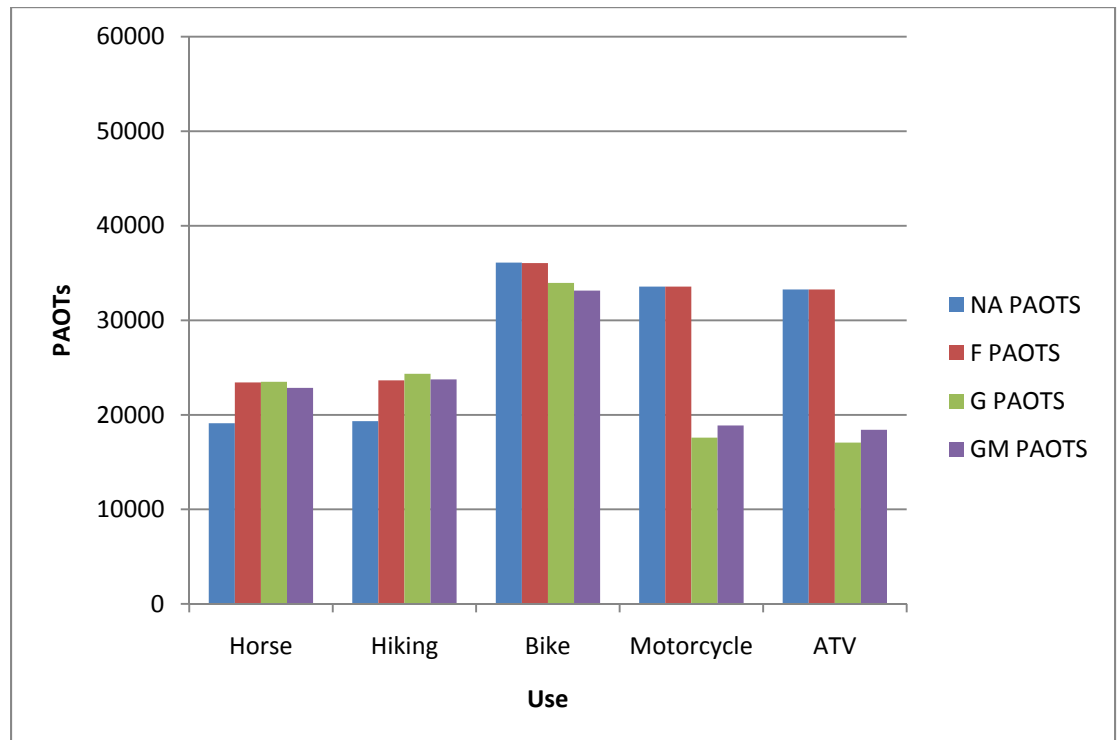
### Capacity

Capacity is measured in the number of persons at one time (PAOT) that may occupy a set distance of road or trail. In addition to looking at the total number of open miles, the

number represented by capacity also takes social factors associated with crowding into account.

The capacity of urban settings is greater because physical facilities are designed and constructed to accommodate more use. The people who visit those settings also tend to be more accepting of development, managerial controls, and a higher number of other users. In contrast, people looking for solitude are not as accepting of large numbers of users or the managerial controls and development necessary to handle intensive use. Therefore, the capacity of the backcountry areas is lower.

Figure 3.10 displays the capacity, expressed in PAOTs, available for each use by alternative. The individual activity columns consider only the total capacity for a particular use and not other uses taking up capacity. Because many of these uses rely on a shared transportation system, the total capacity available for a combination of all shared uses would be less than the sum of adding all the individual uses. This analysis incorporates assumptions for quality recreation experiences by activity. Therefore, capacity for hiking and horse includes only trails, capacity for mountain bikes includes trails and level 2 roads and trails, capacity for ATV and motorcycle includes level 2 and 3 roads and trails open to that use. Not included in this analysis are capacities of level 4 and 5 roadways. For the purposes of this analysis, level 4 and 5 roads are primarily considered to be for general forest access and transportation. Because these roads tend to be in areas of higher development and higher willingness of the visitor to accept less solitude, removal of these routes from the analysis does significantly lower PAOT capacities across all alternatives from those displayed in a similar graphs in the DEIS.



Source: White River National Forest GIS data

**Figure 3.10—Quality Recreation Opportunity Capacity, in PAOTs, on roads and trails by user type. Not including capacity on Level 4 and 5 roadways**

Alternatives A and F would have the highest capacity for quality recreation experience opportunities for mountain biking and motorized activities. Alternatives A and F are the same for those activities because both alternatives carry forward all current designated routes. No changes were made to reflect manageability, and no new user-created routes were considered. In Alternatives G and GM, some level 2 roads that were spurs or short dead end routes off of level 3 roads (where unlicensed use is not allowed) were dropped for ATV and unlicensed motorcycle use for management reasons.

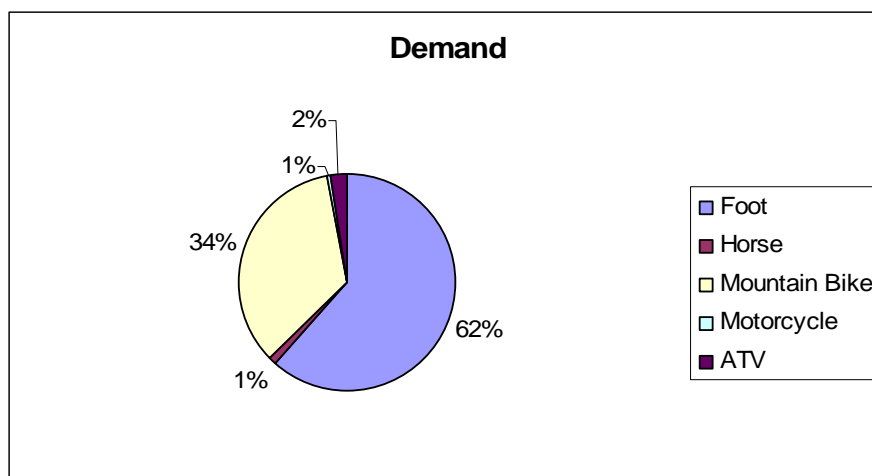
Alternative G has a slightly higher capacity for horse and hiking use than Alternatives F and GM. Alternative A for has the lowest capacity for horse and hiking use based on the overall fewer number of trail miles given that the Alternative did not recognize user-created routes.

### Supply Versus Demand

A discussion point that often arises when offering recreational opportunities is the balance of supply and demand. All users seem to argue for an equitable distribution of the available opportunities among the various user groups.

Discussions also often focus on what defines a quality experience for a particular user. While the quality of experience is a very individual and personal opinion, enough basic assumptions may be made to perform an analysis. Demand is often measured by the number of persons measured engaging in a particular activity or purchasing a particular product.

Figure 3.11 is a graphical display of demand in visits as identified from actual use figures from the forest's visitor use monitoring survey in 2002.



Source: Kocis et.al. 2003, based on 2002 NVUM survey

**Figure 3.11—Demand by user type**

For travel management purposes, supply may be calculated using the number of miles of opportunity available to a particular user group. However, a strict measurement of all miles available does not evaluate what miles may actually be desired and used by a particular user group, nor does it take into account a balance to compare what is expected per visit by user type.

In this comparison, it is assumed that for each visit a hiker will travel an average 5 miles on trails, a horseback rider 15 miles on trails, a mountain bicyclist 15 miles on trails and

roads open to that use, an ATV rider 35 miles on roads and trails open to that use, and a motorcyclist 60 miles on roads and trails open to that use.

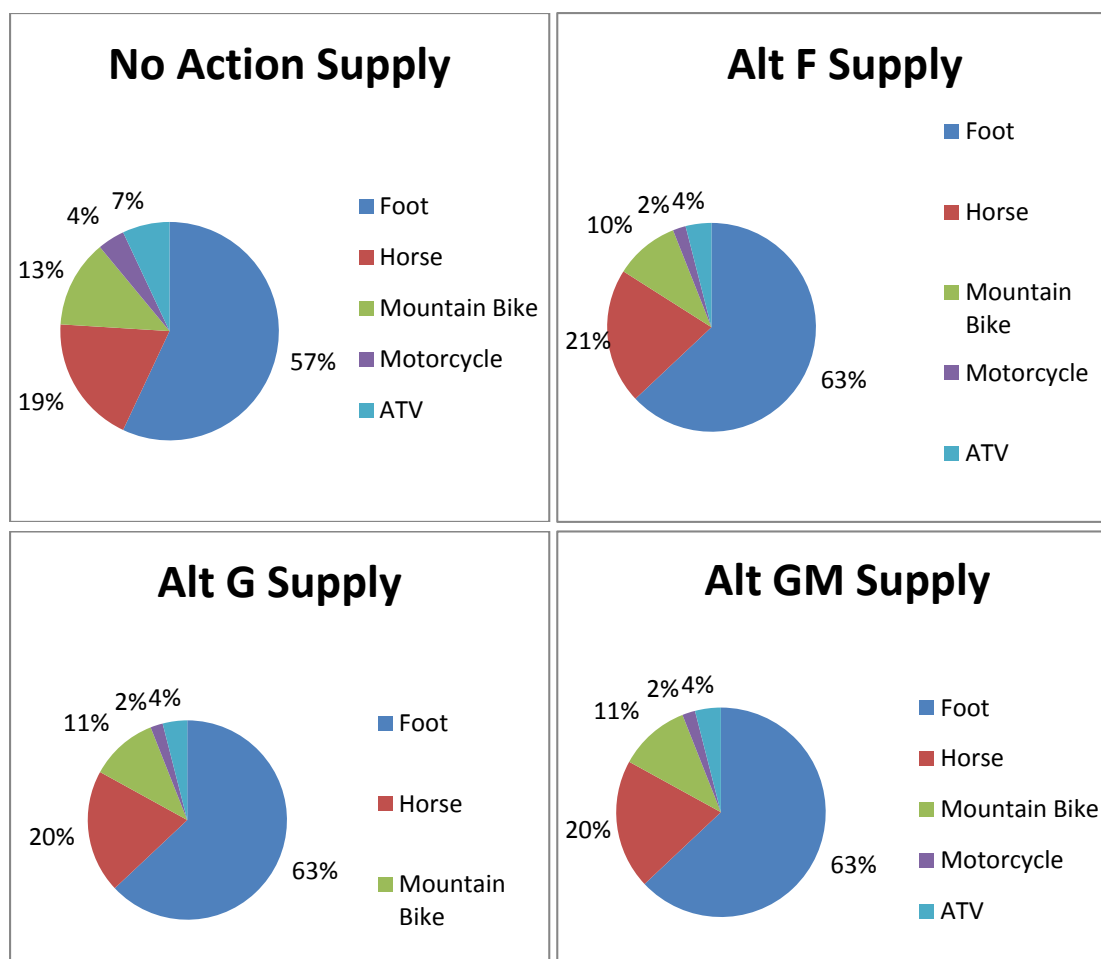
As previously stated, this analysis incorporates assumptions for quality recreation experiences by activity. Total numbers of miles of roads and trails can be found in the transportation section. Therefore, level 2 and 3 roads and trails open to those activities were used for motorcycles and ATVs in this analysis. For mountain bikes, level 2 roads and trails open to that activity were used. For foot and horse only miles of trails open to those activities were used. Level 4 and 5 roads were not considered to be a good recreational experience for any of the above uses, although some may be legal to travel down these routes as connectors.

Figure 3.12 gives a comparison of the supply based on average travel mileage per visit, as compared to the other use types. This is not a comparison of whether total demand for any particular use is over or under-served in total volume, but rather a comparison of the balance of opportunities available to each user group through the travel system for each alternative.

In a comparison with demand from figure 3.11, figure 3.12 shows that no alternative is close to exactly balancing the supply and demand for all activities. However, for hiking, motorcycle, and ATV use, all the action alternatives (F, G and GM) come the closest to having overall supply and demand meet. In all the action alternatives, the amount of supply for hiking is 1% greater than the demand. While the supply for both ATV and motorcycle opportunities is greater in the no-action alternative, Alternatives F, G, and GM still supply double the demand.

The no-action alternative gives the most percentage to mountain bikes, largely because it allows for mountain bikes on all trails outside of wilderness. Alternatives G and GM provides equal percentages to mountain bikes with Alternative F offering 1% less. In all alternatives, the supply for horse use greatly exceeds demand, largely because most trails open to hiking are also open to horses.

The number of routes designated for each type of travel varies between each alternative. While each alternative will reduce existing road densities, each also strives to provide sufficient access to maintain motorized vehicle hunting access. Dispersed camping associated with hunting is only minimally affected. Camping is allowed within 300 feet of a motorized road or trail. Known dispersed camping locations will continue to have motorized access where resource damage is not an issue.



Source: White River National Forest GIS data

**Figure 3.12—Supply balance among types by alternative**

Under the current situation, motorized access and use has increased to the point where, during the hunting seasons, animals are forced to retreat to either relatively inaccessible locations on the forest such as deep canyons or large pockets of dark timber or completely off the forest to private lands or other areas where the general public does not have access. In response to comments received from the CDOW the White River National Forest took a hard look at providing adequate motorized access for hunting opportunities while still providing for non-motorized areas. Overall, by maintaining a limited amount of motorized access to hunting areas and by increasing the acres of wildlife habitat areas that are outside the motorized zone of influence, the overall hunting experience on the forest is expected to improve. Alternative GM provides for a greater opportunity to experience hunting with less motorized conflict due to a lower mileage of level 2 routes, followed closely by Alternative G, then Alternative F and the no-action alternative.

### **Ski Area Roads and Trails—Winter and Summer Seasons**

Ski area winter and summer operations are permit-dependent. In addition to the downhill ski areas, many other special-use permittees, such as resorts, outfitters and guides, huts, and owners of in-holdings, may be permitted to construct and maintain roads and trails

specific to their operations (permitted routes). Many of these permitted routes may not be open to the general public.

Permitted routes generally are analyzed through processes associated with individual permits. Other than ski areas, these permitted routes are scattered across the forest and have little effect overall on travel management for the general public. The construction and maintenance of permitted routes typically are the responsibility of the permittee.

The current summer permitted routes for ski areas are the same in all summer alternatives. No permitted routes on ski areas are proposed to be added or changed in this analysis process. This analysis and decision will serve to combine and affirm previous management decisions on these routes. Any proposals for changes from the existing permitted situation will go through the ski area master development planning process as well as site-specific environmental analysis.

### **Winter Season**

The process used for winter recreation was similar to the summer analysis process. The ranger districts performed site-specific mapping and review by resource specialists by alternative prior to compiling all site-specific data into a forest-wide analysis.

As previously mentioned, user conflicts tend to be high in winter months. Motorized and non-motorized winter recreationists use many of the same access points for their activities, and most of the area around these access points is typically open for motorized use. While the majority of both user groups do get along, the motorized users argue that cross-country skiers and snowshoers have the whole forest to recreate on. These people often do not consider from a practical perspective that the average cross-country skier travels less than 6 miles per visit, and that many non-motorized areas are located 10 miles or more from a winter access point. They further argue that the skiers can access all of the terrain that is open to snowmobiles.

On the converse side, among other arguments, the skiers believe that there are few areas actually accessible that are not open to motorized use. They further argue that the effects of motorized use (largely noise), even in areas adjacent to their use area, degrades their experience.

Figure 3.13 shows motorized winter strategy by acres. All alternatives followed land allocation decisions made in the 2002 forest plan. Alternatives A, F and G have 1,213,600 acres available for motorized use while alternative GM has 1,213,700 acres. There are 1,017,700 acres where motorized use is prohibited; 836,000 of those acres are in either existing designated wilderness or proposed wilderness.

The difference between the alternatives is based on the total number of acres where motorized travel is open or restricted to designated routes. Alternatives A and F both have 437,627 acres where motorized use must stay on designated routes. Both alternatives G and GM show an increase in acres that would restrict motorized travel to designated routes, and an equal amount of decreased acres in areas open to motorized use off of designated routes. The primary reason for restricting motorized travel to designated routes is to accommodate wildlife concerns. Also, some of the acres that were converted from open motorized to restricted to designated routes were done to address stems from isolated parcels that were too small to accommodate open motorized travel.

Winter Strategy in Acres	ALT. NA	ALT. F	ALT. G	ALT. GM
Open Motorized Areas	775,960	775,960	706,497	695,723
Restricted Areas- Motorized routes only	437,627	437,627	507,092	517,963
Areas Closed to Motorized Use	1,017,738	1,017,738	1,017,738	1,017,638

Source: White River National Forest GIS data

**Figure 3.13—Motorized winter strategy by acres**

### Cumulative Effects

The White River National Forest continues to be the most visited tract of publicly owned land in the nation. This trend is not anticipated to change anytime in the near future and, more likely, will only continue to increase in the short-term.

Recent studies on national outdoor recreation participation showed that more than 83 percent of the national population indicated that they walk for pleasure, more than 53 percent drive a vehicle for pleasure, more than 32 percent day hike, 21 percent mountain bike, 19 percent drive off-highway vehicles, 10 percent backpack, 10 percent horseback ride on trails, 5 percent snowmobile, 4 percent cross-country ski, and 2 percent snowshoe (SCORP 2008). From 1999 to 2004 the trend was for continued increases in participation in most activities (Cordell 2004).

The 2008 Colorado Statewide Comprehensive Outdoor Recreation Plan (CDPOR 2008) identifies the top choice for recreation destinations for 51 percent of the state's population as being wilderness areas with little or no development and for forests and lakes with limited trails, camping, boating and fishing opportunities. Echoing the national data trends, 74 percent of Colorado residents indicate that they have participated in non-motorized trail-dependent recreation (hiking and mountain biking) in the past 2 years, while 31 percent indicate they have participated in motorized trail recreation in that same period (CDPOR 2003).

The Federal Highway Administration and Colorado Department of Transportation have an analysis underway to determine how best to relieve the congestion on I-70 caused primarily by recreation traffic. In their analysis, they identify that 77 percent of summer recreational travelers and 70 percent of winter recreational travelers driving to the White

River National Forest via I-70 are from Colorado's Front Range (USDOT/FHA and CDOT 2004). Their analysis further identifies that current recreational use is being suppressed because of traffic congestion on I-70. Future improvements to travel along I-70 could potentially increase use levels above those anticipated based on local population increases and general user participation increases.

Although most use on the forest occurs during winter months on downhill ski areas, use in the summer months continues to show the most rapid growth. Discussion in the forest plan (USDA Forest Service/WRNF 2002b) provides history and background on anticipated use and demand patterns during the next several years.

Use is increasing not only on the White River National Forest but also on surrounding public lands. When land management agencies in charge of managing these areas see more impacts on the land and have to deal with more user conflict, they sometimes have to implement more regulations and restrictions on their units. The White River National Forest has had a policy of designating routes for motorized and mechanized use, where these uses are allowed, for several years. The Forest Service has adopted this policy nationwide for motorized use. The BLM is also moving toward a policy of all motorized and mechanized travel will be limited to designated routes on all public lands they administer. Both the Colorado State Parks and National Park Service have followed more restrictive travel management policies for years.

A rising population, advancements in equipment in modes of transportation, and the development of new technologies for outdoor recreation will increase the demand for additional road and trail systems on the forest. At the same time, flat maintenance budgets will continue to cause the potential for a reduction in the number, and quality of road and trail miles as well as associated targeted experiences.

## Roadless Areas

---

### Introduction

Unroaded and undeveloped areas provide the forest with opportunities to manage for potential wilderness areas, non-motorized and limited motorized recreation, and other commodity and amenity uses. Areas that are undeveloped or roadless in nature can serve a variety of purposes, depending on what is regarded as most appropriate for the site. They can be managed as research natural areas or special interest areas, used for resource production or to provide non-motorized recreation, or, if suitable, recommended as wilderness.

The forest plan assigned a range of management areas to roadless inventory areas based on the management emphasis and resource values of each area. This section addresses the social values associated with inventoried roadless areas. Values such as wildlife habitat, clean water and air, scenery, or other resources are addressed in those specific sections.

### Key Indicators

**Key indicator:** Impacts on solitude and remoteness.

**Measure:** Miles of system trail within each inventoried roadless area.

**Measure:** Miles of trail to be decommissioned within inventoried roadless areas.

### Affected Environment

A current inventory and analysis of roadless areas was completed during the forest plan revision process and is detailed in Appendix C of the forest plan Final EIS (USDA Forest Service/WRNF 2002b), hereby incorporated by reference. The current inventory also was used in the National Roadless Area Conservation Rule of January 2001 (USDA Forest Service 2001b). In May of 2005, the Department of Agriculture, Forest Service revised direction in the Code of Federal Regulations, Protection of Inventoried Roadless Areas, by adopting a new rule that established a petitioning process that will provide state governors an opportunity to seek establishment of or adjustment to management requirements for National Forest System inventoried roadless areas within their states. Currently, the Forest Service is directed to utilize the January 2001 rule. Two states submitted petitions to be analyzed: Colorado and Idaho. The Forest Service is in the process of analyzing the state petitions under NEPA analysis. Both the 2001 rule and the 2005 rule have court cases filed for and against their provisions and use. Travel management proposed in this effort complies under both rules.

There are approximately 640,000 acres of inventoried roadless areas on the White River National Forest. Of them, 37 areas totaling 298,000 acres have been evaluated as capable and available for recommended wilderness. Ten areas, each containing fewer than 500 acres, also were evaluated as capable and available for recommended wilderness in the forest plan. Motorized and mechanized use is prohibited year-round on trails in management area prescription recommended wilderness (Management Area 1.2). Travel management direction for inventoried roadless areas in the remaining management areas is based on forest plan direction.

Inventoried roadless areas have a variety of values, both active and passive. Passive use values "... reflect utility derived by humans from a resource." The value of passive use includes two categories: (1) things people appreciate without actually using them or even

intending to use them are called “existence value” and (2) things people want to remain available for others to use and appreciate are called “bequest values” (Gucinski et al. 2002).

## Environmental Consequences

### General Effects

All action alternatives include road closures within roadless areas. What remains are roads that occur along the boundaries, as the road map was updated to more accurately reflect road locations and roadless boundaries cannot be adjusted. Original mapping shows these roads were intended to create those roadless boundaries.

**Table 3.7—Roads remaining in inventoried roadless areas**

	Alternative A	Alternative F	Alternative G	Alternative GM
Miles of road	18	18	11	10

Since inventoried roadless areas by definition should not include constructed roads, and the roadless areas on the forest minus a few boundary issues adheres to the definition, the effects analysis this travel management plan only considers the following within inventoried roadless areas:

- 1) designation of use on system trails (motorized and non-motorized);
- 2) designation of use on user-created trails (motorized and non-motorized; and
- 3) determination of which system and user-created trails should be scheduled for decommissioning.

Generally, foot, horse, and mountain bike travel in inventoried roadless areas is considered compatible with roadless area characteristics and is not viewed negatively; that type of use is not further analyzed in this section. If motorized trail use is authorized in the selected alternative, the primary short-term impact on inventoried roadless areas will be on the roadless characteristics of solitude and remoteness. The number of miles of increased motorized trail use will have an inverse relationship with solitude and remoteness qualities.

Since system roads are not found within the inventoried roadless areas, the character of the area will essentially remain undeveloped, with approximately 8-10 percent of the trails open to either all-terrain vehicle and/or motorcycle use (a few trails have system road numbers but they are managed as trails). Forest plan direction prohibits summer motorized travel in inventoried roadless areas within management areas: 1.2, recommended wilderness; 1.31 and 1.32, semi-primitive non-motorized; 1.5, wild rivers; and 2.2 research natural areas.

### Direct and Indirect Effects

**Table 3.8—Travel system in inventoried roadless areas**

	Alternative A	Alternative F	Alternative G	Alternative GM
Miles of open motorized trails	45	45	33	30
Miles of non-motorized trails	460	460	445	445
Miles of road, trail, or unauthorized routes to be decommissioned	0	201	229	233

Alternative A will not help to improve roadless area characteristics. Alternative F will help to improve roadless area characteristics by actively rehabilitating routes that are not needed. Alternatives G and GM are the best alternatives (with GM being slightly better) to improve roadless area characteristics as they reduce miles of routes and the amount of overall trails in roadless areas. It is recognized that some system trails are necessary so that people can take advantage of recreation opportunities, and system trails can be maintained to reduce the effects of use.

While some people may feel that motorized travel detracts from roadless area characteristics, it should be noted that motorized travel, limited to ATVs and motorcycles, is allowable. In Alternatives G and GM, only 8 percent of the trails in roadless areas will allow this use. The trails identified are generally concentrated networks that have been traditionally used and are considered quality recreational opportunities.

Conversion of a user-created trail to a system road or construction of new roads within inventoried roadless areas is outside the scope of this document and would require site-specific analysis.

### **Cumulative Effects**

Effects of past road construction and development in roadless areas are minimal, and there is no new road or trail construction proposed in roadless areas in any action alternative. This analysis includes only system trails and unauthorized routes that have already been constructed; therefore, there would be no cumulative effects from additional construction.

Since all action alternatives would decommission some level of unclassified routes, the overall undeveloped nature of inventoried roadless areas would improve. As local communities continue to grow and the demand for nearby recreation increases, it is likely that over time the total miles of routes both on and off forest will increase. The increase in recreation use within the forest and inventoried roadless areas will likely have cumulative effects on the characteristics of solitude and remoteness. By the same token, increased motorized use will be limited to those areas outside of roadless, thus an increased density of that use may occur in those areas.

There are no specific proposals for further road building or development in roadless areas at this time. Project proposals in the near future, especially for forest vegetation management, minerals, and natural gas development, may affect some roadless areas. These would be analyzed in the site-specific project environmental analysis and are likely to be authorized only under a special use permit rather than open for public recreational travel. The emphasis will be on temporary roads necessary for commodity or management access. For timber, these roads tend to be in place for 3-5 years, then are decommissioned; for natural gas and minerals, the roads may be in place for 5-30 years.

## Scenery Management

---

### Introduction

In addition to the production of timber and numerous other resources, forested landscapes provide beauty, which is a valuable resource to many citizens. This resource is explicitly recognized by law. The National Environmental Policy Act requires equal consideration of aesthetics and science, and the Forest Service requires application of scenery management to all National Forest System lands. Scenic resource analysis is used to minimize the impacts on scenery by human-caused development on National Forest System lands. This section describes the scenery analysis and potential impacts that may occur due to implementation of the White River National Forest Travel Management Plan.

The forest plan establishes acceptable limits of change for the scenic resource (USDA Forest Service/WRNF 2002a). The acceptable limits of change are the documented scenic integrity objectives, which serve as a management goal for scenic resources.

### Key Indicators

**Key indicator:** Potential visual impacts in "very high" or "high" scenic integrity objective areas.

**Measure:** Miles of road within "very high" or "high" scenic integrity objective areas.

### Affected Environment

Scenery is an integral component of all forest settings and heavily contributes to the visitors' experience. Scenic resources vary by location and existing natural features including vegetation, water features, landforms, geology, and human-made elements. All activities that forest visitors experience are performed in a scenic environment defined by the arrangement of the natural character of the landscape along with components of the built environment. Scenery combines all ecological features and human elements in a landscape to provide for our experience. The composition of these attributes is what gives a landscape its character or image. Scenery, like other natural resources, must be managed in the present to maintain quality scenery for future generations and to provide a range of experiences for a variety of users of the forest.

The report of the President's Commission on America's Outdoors (USDA Forest Service/Intermountain Research Station 1987) states that America's most important attribute for recreation is natural beauty. In surveys, Americans have repeatedly identified driving for pleasure as a favorite recreational activity. The requirement of scenic roads for this activity links scenic quality to tourism, which has become a major component of local and state economies (AASHTO 1991). Driving to enjoy scenery has been the top national recreation activity for more than a decade. The White River National Forest is the most heavily visited national forest in the nation. People who drive to view scenery account for 11 million visits annually. Scenery is an integral component of all forest settings and contributes to the quality of the users' experience. Managing a natural-appearing landscape for these visitors is important.

It is important to evaluate the management of multiple resources and possible effects associated with scenic resources. Management of multiple resources has altered the natural landscape character into the existing condition of the landscape. Management decisions are not only based on multiple use, but also on providing a range of experiences

across the forest for both motorized and non-motorized customers. The most obvious and significant effects on scenic resources are from vegetation and landform alterations. Multiple resource management activities that have altered scenic resources include but are not limited to timber management, mining, oil and gas extraction, recreational facility development including ski areas, roads and trails, campgrounds and picnic grounds, utility corridors, fire management (suppression and prescribed burning), and livestock grazing. It is important to evaluate the management of multiple resources and the possible effects associated with scenic resources. The scenery management system provides the framework to effectively manage scenic resources within an ecologically-aesthetic discipline.

The varieties of features on the landscapes of the White River National Forest provide a setting for spectacular scenery in the heart of the Rocky Mountains. The forest is composed of a diverse range of landscapes, vegetation, and water features that range from 5,500 feet in elevation to peaks towering over 14,000 feet. Foothills, mountains, plateaus, alpine peaks, and canyon lands provide a range of topography. Shrubs and grasslands, aspen and spruce-fir forests, alpine turfs, meadows, and wetlands form the vegetative mosaic of the forest. Hundreds of small lakes and ponds are scattered across the forest. Large reservoirs include Green Mountain, Dillon, Homestake, and Ruedi reservoirs, which provide an aesthetic and recreational setting in the forest. The Colorado, Eagle, White, Roaring Fork, Fryingpan, Blue, and Crystal rivers are the major streams flowing through the forest.

Large panoramic vistas can be found on several locations of the forest. Distinctive features of the landscape are experienced at a smaller scale. The diversity of scenery on the forest varies from steep canyons defined by towering cliffs that only a few visitors ever see, to the international destination of the Maroon Bells—one of the most photographed areas in the nation. The eight wilderness areas on the forest contain some of the most outstanding natural landscapes of the Rocky Mountains. Trappers Lake and the surrounding Flat Tops wild lands inspired Arthur Carhart to create the wilderness concept in the early 1900s. The Trappers Lake area is now known as the “Cradle of the Wilderness.” Mount of the Holy Cross in the Holy Cross Wilderness was the site of religious pilgrimage in the early 1900’s. The awe and wonder of the beauty of these natural wild lands is a national treasure.

Three scenic byways go through the forest. The Flat Tops Scenic Byway on the north side of the forest, the West Elk Loop Scenic Byway on the south side of the forest, and The Top of The Rockies Scenic Byway on the east side of the forest provide spectacular scenery for sightseers. The forest has such a vast array of scenic areas, they cannot all be described here. Please refer to the landscape character descriptions found in the Appendices of the forest plan FEIS for more detailed information (Volume 3, Appendix P, pgs. P-1 to P-44. See also Volume 1, Topic 3, Part 4, page 3-505 to 3-512). The existing condition of the scenery resource is well-documented by the scenery management system maps found within the White River National Forest GIS system. The entire forest has been inventoried for both existing and desired future conditions. There was an extensive scenery analysis and scenery specialist report completed for the forest plan. In addition, there were several scenery GIS coverages developed for the forest which were used for the scenery analysis.

The Scenery Management System (SMS) has two different landscape elements which have similar names, Existing Scenic Integrity (ESI) and Scenic Integrity Objective (SIO), but are very different. The ESI is a snapshot in time of the existing condition of the landscape. The SIO is one of the components of the desired condition for scenic quality.

Scenic Integrity Objectives are derived by combining the ESI with other landscape elements. They are expressed as forest plan objectives.

Table 3.9 shows each level of scenery and compares the acres of ESI at the time of the forest plan analysis to the SIO of the selected alternative in the forest plan. The table is included in this document to illustrate the differences in the ESI and the SIO as related to the forest. For further information on the scenery-related questions which are not covered in this report, refer to the forest plan.

**Table 3.9—Acres and percentage of forest at Existing Scenic Integrity (ESI) and Scenic Integrity Objective (SIO)**

Category	Existing Scenic Integrity level		Scenic Integrity Objective	
	Acres	Percent of forest	Acres	Percent of forest
Very high	889,000	36	544,000	24
High	549,500	22	458,000	20
Moderate	950,700	38	705,000	31
Low	38,600	2	533,855	23
Very low	46,700	2	46,000	2
Unacceptably low	7,300	>1	—*	—*

- \* An unacceptably low SIO is never a scenic integrity objective (Source: White River National Forest GIS data)

The forest plan identifies 7,300 acres that have an ESI of unacceptably low as shown in tables 3.9 and 3.10. Unacceptably low can describe only an existing condition and is never a management objective. Thus, all existing unacceptably low areas must be decommissioned in accordance with forest plan direction as forest budget allows and as project opportunities arise (USDA Forest Service/WRNF 2002b, appendix Q).

**Table 3.10—Acres of unacceptably low existing scenic integrity needing rehabilitation to meet scenic integrity objectives**

Scenic Integrity Objective	Acres of unacceptably low ESI* needing rehabilitation
Moderate	5,989
Low	1,311

- \* ESI = existing scenic integrity

## Environmental Consequences

### General Effects

The complete travel management system is one wherein the elements of design, construction, and maintenance have been integrated to provide facilities that possess the optimum of utility, safety, beauty, resource protection, and economy. Even a well-designed travel system inevitably creates a set of changes to the local landscape, and some values are lost while others are gained. In general, roads (wider than 50 inches) cause greater impacts on the scenery resource than trails simply due to the fact that they are more visible and cause changes to landforms and vegetation.

The major impacts of roads and trails are caused by their linear configuration within the natural non-linear landscape. Limited gradients, constant road widths, traveling surfaces,

and vegetation removal, which contrast in texture and color from the adjacent landscape, cause further visual impacts (Agricultural Handbook #483, National Forest Landscape Management, vol. 2, chapter 4, Roads, p.2). Current levels of trail maintenance are generally sufficient to protect soil and stream banks, but there are potential scenic effects associated with erosion, multiple “braided” trails, and damage to stream crossings.

Different phases of road development, such as building, maintaining, using, decommissioning, or abandonment, will have widely varying effects on scenery. Dust produced by vehicles moving on unpaved roads reduces visibility. Road closures potentially can have both a negative and positive effect on scenic resources. Decommissioning (including recountouring) roads can positively influence the forest setting by reducing contrast in form, line, color, and texture. When road rehabilitation is necessary, consideration will need to be given to how the rehabilitation is accomplished and viewed from other roads, trails, and viewpoints (FEIS, Vol. 1, Topic 3, Part 4, page 3-519).

The effects of roads differ over time. Some effects are immediately apparent such as the loss of solitude or the creation of edge. Other effects may become more of a visual impact after the passage of time, such as when a large storm event causes a sudden mass movement of earthen material. Road effects also differ by landscape position and behave differently based on the topography they cross (i.e., ridgetop, midslope, and valley floor roads) (USDA Forest Service 2000, pp. 5, 7, 13, 80).

A wide variety of uses occurs on the forest. Those uses, as well as new uses, are expected to continue to increase in the future. Sightseeing and driving outdoors for pleasure are examples of activities that directly use roads as part of the recreation experience. The character of scenic views and access to the views will directly depend on the road system in place. Increasing the recreational use of areas may provide scenery benefits to a larger number of people. Altering road systems can disrupt long-established access and use patterns.

Placement, scale, class, and setting of roads can also greatly affect the quality of scenic views and access to outstanding scenic vistas. It is important to be aware of the indirect effects that roads have on the scenic resource. As demand for forest recreational opportunities continues to grow, even a stable number of forest roads and a stable condition of forest roads will likely result in increased congestion, and thus lower the quality of the experience of the scenery (USDA Forest Service 2000, pp. 61-62).

Maintaining or increasing visitor access must be balanced with maintaining the scenic integrity objective in any given area.

### **Direct and Indirect Effects**

All of the action alternatives have the potential to alter the existing landscape in any of the scenic integrity objectives. Changes in landscapes that have been previously altered usually are more acceptable than alterations made in undisturbed landscapes.

Alternative A and Alternative F have the highest number of miles of roads within areas with high or very high scenic integrity objectives, with 313 miles (Alternative A) and 286 miles (Alternative F). However, the other two alternatives are fairly close: Alternative G has 277 miles and Alternative GM has 275 miles. On the one hand, providing the most roads within high or very high SIO areas can provide more viewing opportunities for a greater number of people. Conversely, limiting roads within these areas will be more beneficial to the scenery. While a smaller number of people may experience the views

(such as with hikers), the views will be of a greater quality (due to less dust, congestion, and impacts on other resources such as erosion).

Alternative F provides the greatest number of miles of road open to public travel over Alternatives G and GM. However, the quality of the scenic resource (natural setting) would not be as high in Alternative F as in Alternatives G and GM.

Alternatives G and GM will decommission more routes than Alternative F, and Alternative A will not decommission any. Since Alternative GM provides the most miles of road to be decommissioned, this alternative will remove the most travel route scars on the land.

Alternatives G and GM best meets the scenery management system's underlying ecological aesthetic. Under SMS, activities which improve forest health also improve forest aesthetics, and therefore move toward the forest plan long-term desired condition. The Alternative GM would best protect scenic resources, with Alternative G being second best, although a lower number of people would have access to the scenery in both of these alternatives.

Two trails are identified in the Unacceptably Low category of SIO (see table 3.10 in the affected environment section above): the Ute Creek Trail #1824, and the Oyster Lake Trail #1825. In all of the alternatives, both trails are open to horses and hiking. These system trails are scheduled to remain on the system in all alternatives, open to horse and hike travel. No unauthorized routes are being added to these areas. The travel management plan does not improve nor diminish the scenery integrity of these areas.

### **Cumulative Effects**

Management of multiple resources has altered the natural landscape character, creating the existing condition of the landscape. The most obvious and significant effects on scenic resources are from vegetation and landform alterations. Multiple resource management activities that have altered scenic resources include but are not limited to: timber management; mining; oil and gas extraction; recreational facility development (including ski areas, roads and trails, campgrounds, and picnic grounds); utility corridors; fire management (suppression and prescribed burning); and livestock grazing.

A wide variety of uses occur on the forest. Those uses, as well as new uses, are expected to continue to increase in the future. Sightseeing and driving outdoors for pleasure are examples of activities that directly use roads as part of the recreation experience. The character of scenery and access to scenic views will directly depend on the road system in place. Increasing the recreational use of areas may provide scenery benefits to more people. Alteration of road systems can disrupt long-established access and use patterns.

Placement, scale, class, and setting of roads can also greatly affect the quality of scenic views and access to outstanding scenic vistas. It is important to be aware of the indirect effects that roads have on the scenic resource. As demand for forest recreational opportunities continues to grow, the use of forest roads will likely increase in congestion, and thus lower the quality of scenery (USDA Forest Service 2000c).

The area that may be indirectly and cumulatively affected includes areas outside the forest boundary; most notably as viewed from populated areas and along heavily traveled corridors. Any activities detrimental to the scenic landscape may negatively affect the quality of the tourist experience, which is a leading industry in Colorado (USDA Forest Service 1995b). Ultimately, development of private lands (which introduces contrast into the landscape such as color, reflectivity, shape, and line) adjacent to the national forest is

the greatest threat to national forest scenery when viewed from primary transportation routes and key public viewpoints (USDA Forest Service/WRNF 2002a).

## Soils and Geology

### Introduction

Within the variety of landscapes across the White River National Forest, erosion is the key natural process that is most likely to be influenced by travel management when considering the soil and geologic resources therein. Compared to naturally permeable soil conditions that facilitate water infiltration, the compacted nature of trails and roads make these features more prone to runoff of precipitation and accelerated erosion, irrespective of soil and geology type. Erosion risk can be assessed on a landscape scale through a number of modeling programs and algorithms. For the purposes of this analysis, a GIS-based approach was taken where road and trail segments were compared against a stability layer derived from slope, soil, and geologic characteristics. Summations of the range of variability found between the different alternatives with regards to soil and geology types are provided in several tables derived from GIS analysis.

### Key Indicators

**Key indicator:** Erosion risk

**Measure:** Acres and miles of travel corridor by landscape stability

### Affected Environment

Soils on the White River National Forest (WRNF) reflect the natural diversity of climate, biological organisms, geologic parent material, topographic relief, and time that contribute to their formation. Spanning 2.5 million acres across high deserts to alpine glaciers, the breadth of environmental and, subsequently, soil conditions found on the WRNF is immense. Soil surveys are the best available planning tool for a variety of land use activities that impact the soil resource, including the location of transportation corridors such as roads and trails. Describing each of the soil map units individually is not practical for the scope of analyzing the entire travel network for the WRNF. Table 3.11 details the number of soil map units and individual soil types found on the footprint left by the least (GM) and most (NA) expansive of the proposed alternatives in the 2010 revision of the Travel Management Plan. Two soil surveys on the WRNF, the Holy Cross Area and Flat Tops Soil Surveys, break the landscape into soil management units based on soil properties such as sand, silt, and clay content, rock fragment percentage, and depth. These soil properties, along with site characteristics such as slope and aspect, couple to provide land management agencies a tool to conduct risk assessment on activities such as transportation corridor planning. Another section of the Forest Plan combines ecological map units into geomorphic-based landscape groups to reflect the forest's dominant landscapes of mountains, hills, valleys, and tablelands. The hills, valleys, and tablelands landscapes are generally found on the north western portion of the forest (north of Interstate 70), while the southern and eastern portion is dominated by mountainous landscapes. A summation of these soil ecological groupings can be found on Table 17 of the Forest Plan Final EIS (USFS, 2002b); this table provides general pairings of geology, climate zones, dominant landforms, and potential vegetation into discreet landscape units. It also includes the common range of natural erosion hazards within each group.

Geologic processes and formations that have shaped the landscape and soils of the WRNF cover half of Earth's estimated 4.5 billion year history, accounting for the wide-ranging variability of rock types and associated landforms found on the WRNF. Much of

this heterogeneity owes to the forest's location at the nexus between the eastern margin of the Colorado Plateau and the heart of the Central Rocky Mountain uplift. The disparate lithologies and geomorphic components that comprise the dramatic landscape of the WRNF contribute to the highly variable soils that create the road surface or base users experience on the forest. Igneous (granite and basalt), metamorphic (gneiss, schist, and quartzite), sedimentary (sandstone, limestone, shale, and siltstone), and unconsolidated (glacial till/outwash, alluvial deposits) geology types weather to produce very different soil and landforms, which in turn present different management challenges from a road and trail network perspective. A well-conceived travel management plan takes these factors into account when selecting areas to commission new, decommission old, and maintain existing travel corridors.

Tables 3.11 and 3.12 summarize the results of a GIS-based analysis regarding the number of soil and geology types found by overlapping the road and trails by alternative, displaying the most (NA) and least (GM) expansive travel corridors. Roads that were not already considered decommissioned are not part of the analysis. Soil polygons from the Holy Cross and Flat Tops Soil Surveys and geology polygons from the Geology of Colorado layer files were then clipped to the polygon road layer. This methodology allows for an overview of the range of soil and geology units by each alternative and subsequent analysis by landscape stability (Tables 3.13 and 3.14).

**Table 3.11—Range of Soil Types found by Alternative by Smallest (Alternative GM) and Largest (Alternative NA) Footprint**

Alternative GM	Acres	Number of Soil Polygons	Number of Soil Map Units
Holy Cross Soil Survey	13054	3161	143
Flat Tops Soil Survey	6018	1207	113
<b>Totals</b>	<b>19072</b>	<b>4368</b>	<b>256</b>
Alternative NA	Acres	Number of Soil Polygons	Number of Soil Map Units
Holy Cross Soil Survey	17414	3889	148
Flat Tops Soil Survey	7446	1367	117
<b>Totals</b>	<b>24860</b>	<b>5256</b>	<b>265</b>

**Table 3.12—Range of Geology Types found by Alternative by Smallest (Alternative GM) and Largest (Alternative NA) Footprint**

Alternative	Acres	Number of Geology Polygons	Number of Unique Lithologies
NA	24880	628	57
GM	19074	574	57

## Environmental Consequences

### General, Direct, and Indirect Effects

Roads and trails are linear, non-vegetative, compacted features that cross the landscape so that different modes of travel can be utilized. Although these features serve as pathways of erosion and compacted soils, they do help keep users on designated routes rather than causing more widespread resource damage through unplanned, user-created trails and roads. Appropriate design criteria and engineering principles can be applied to help mitigate the deleterious effects of road and trail networks on soil and stream health. “The suitability of soil for a particular use depends on its response to that use. The performance of engineering works will depend on the correct assessment of engineering properties to determine suitability and to predict performance of a soil for its intended use” (Johnson and DeGraff, 1988). For the purposes of this landscape-scale analysis, the placement of the current system roads and trails was analyzed using GIS.

**Table 3.13—Landscape stability ratings for travel routes on the system left as a footprint by acre**

Stability Rating	Alt. NA- % of Acreage by Stability Rating	Alt. GM- % of Acreage by Stability Rating	Alt. F- % of Acreage by Stability Rating	Alt. G- % of Acreage by Stability Rating
Slight	57	56	56	56
Low	29	28	28	28
Moderately Low	12	12	13	13
Moderately High	1	1	1	1
High	1	1	1	1
Severe	1	1	0	1

*\*Stability ratings are based on geologic lithology, soils, and slope. These three factors were combined and ranked from none to severe for potential erosion, with a rating of “severe” posing the greatest risk. The statistics are based on overlaying road and trail data with landscape stability model in GIS and calculating acres based on where the overlap occurs. This analysis was conducted on both an acreage basis (road and trail segments were converted from line features to polygon features using a 20 foot buffer) and mileage basis (using the unaltered road/trail line segment) for the “summer” transportation system. Winter travel routes were not analyzed for the purposes of this analysis. This analysis also did not consider roads and trails that have been previously decommissioned but require more work to be fully rehabilitated.*

**Table 3.14—Landscape stability ratings for travel routes on the system by mile**

Stability Rating	Alt. NA- Number of Miles	Alt. NA- % of Miles by Stability Rating	Alt. GM- Number of Miles	Alt. GM- % of Miles by Stability Rating	Alt. F- Number of Miles	Alt. F- % of Miles by Stability Rating	Alt. G- Number of Miles	Alt. G- % of Miles by Stability Rating
Slight	2901	56.3	2218	56	2363	55.9	2243	55.9
Low	1465	28.4	1117	28	1199	28.4	1139	28.4
Moderately Low	630	12.2	484	12	537	12.7	505	12.6
Moderately High	66	1.3	57	1	56	1.3	58	1.4
High	46	0.9	32	1	33	0.8	34	0.8

Stability Rating	Alt. NA- Number of Miles	Alt. NA- % of Miles by Stability Rating	Alt. GM- Number of Miles	Alt. GM- % of Miles by Stability Rating	Alt. F- Number of Miles	Alt. F- % of Miles by Stability Rating	Alt. G- Number of Miles	Alt. G- % of Miles by Stability Rating
Severe	26	0.5	20	1	20	0.5	21	0.5
Not Rated	20	0.5	18	0	17	0.4	17	0.4
	<b>5154</b>		<b>3946</b>		<b>4225</b>		<b>4017</b>	

All alternatives have a low amount of roads and trails in the severe and high stability rating classes (greatest potential risk of erosion). Conversely, the majority of roads and trails fall within the slight to low ranges with similarly low percentages in the moderate risk ranges. All alternatives show an overall trend of proper location from the perspective of landscape stability, particularly if adherence to Forest Plan standards and relevant management measures are followed. The tables included in this analysis show a high degree of similarity in the number of soil and geology units that are crossed by the current and alternatively proposed transportation routes on the WRNF. If and when any roads and trails are removed (decommissioned), these linear features will largely return to a natural vegetative state over time, which will reduce erosion and sedimentation potential on these lands.

### Effects Common to All Alternatives

With all alternatives, trails and roads will continue to erode at rates above those of natural conditions. However, with proper maintenance and design criteria, erosion from trails and roads can be reduced to acceptable levels. Lost soil productivity due to road systems is typically small when evaluating the landscape as a whole due to the overall. Erosion within insufficient stream buffers is typically where erosion becomes problematic for water quality, as eroded material is more readily transported to stream courses as sediment. It is in these locations that priorities should be given to design criterion that reduces erosion and sedimentation. Consideration of geology type (e.g. soft-sediment formations or gypsum-bearing strata) and geologic hazards (e.g. landslide deposits or unconsolidated glacial deposits) is also important in current and future travel corridor planning.

### Cumulative Effects

No alternative of the current WRNF Travel Management Plan proposes elimination of a trail and road system altogether; all alternatives would continue contributing cumulatively in combination with natural and other man-made features where soil is exposed to water and wind. The alternatives that propose higher levels of decommissioning and rehabilitation would have an overall reduction of potential erosion when compared to the existing condition, allow for natural vegetation to grow in these corridors.

## Timberland Vegetation Management

### Introduction

Roads are a necessary element of the forest's infrastructure to access forested stands so that vegetation management treatments can occur and/or timber products can be removed cost-efficiently. Historically, forest vegetation management has concentrated on timber production in specified areas of the forest, commonly referred to as the suitable timber base.

More recently, the application of silvicultural methods has broadened to routinely address a variety of other resource objectives, such as wildlife habitat enhancement, scenery management, insect and disease infestations, and fuels reduction. Since the development and release of the 2006 Travel Management DEIS, the forest has experienced dramatic increases in mountain pine beetle and spruce beetle infestations, prompting the need for increased forest management. As mandated by the Healthy Forest Initiative (HFI), the need to reduce the accumulation of heavy fuels and to reforest beetle-killed lands for the future has become one of the forest's highest priorities.

Forested stands without existing road access would require road construction from the project area to the nearest system road to facilitate treatment and product removal. Under special circumstances, forwarders—ground-based yarding machines that provide for full suspension of the logs—can increase practical yarding distance and reduce the need for temporary roads. Roads for direct project access may exist short term or over the long term, depending on immediate needs or future administrative needs. However, this analysis assumes that any new road construction for timber access would be temporary and decommissioned after use. This assumption does not preclude project-specific environmental analysis from proposing the construction of new system roads.

The forest harvested an average of about 770 acres per year over the last 50 years, predominately salvage. The forest plan FEIS (USDA Forest Service/WRNF 2002b) selected alternative projects with an average annual harvest of 1030 acres over a 10 year period. Because of extensive bark beetle mortality, the number of treatment acres per year since 2005 are twice the amount projected in the forest plan, and that trend is expected to continue through 2012. However, the average annual harvest for the 10 year planning horizon as described in the forest plan FEIS is not anticipated to be exceeded.

The road system also provides public access for the collection of special forest products including posts and poles, Christmas trees, firewood, mushrooms, and transplants.

### Key Indicators

**Key Indicator:** The amount of allowable sale quantity (ASQ) acreage that is accessible from the system roads.

**Measure:** Amount of ASQ acreage within ¼-mile of a road.

**Key Indicator:** The amount of ASQ acreage that is not accessible from the system roads.

**Measure:** Miles of temporary road construction required to access area of ASQ beyond ¼-mile of a system road.

### Affected Environment

This analysis considers the availability and location of system roads that can accommodate a full-sized vehicle (FSV) as appropriate for logging truck traffic. There

are just over 1,700 miles of system roads that can accommodate a FSV. Some of these roads do not comply with the forest plan direction (USDA Forest Service/WRNF, 2002a). In addition, there are over 925 miles of non-system roads and trails supporting illegal access and reducing forest productivity.

This analysis considers all allowable sale quantity (ASQ) stands within ¼- and ½-mile of roads that can accommodate a full-size vehicle (FSV). The forest's suitable timber base, from which the ASQ is derived, totals just over 424,900 acres, including 156,486 acres (37%) in inventoried roadless areas that are currently withheld from timber management under current management direction for Roadless.

## Environmental Consequences

### General Effects

Some of the system and unauthorized roads that can accommodate a full-size vehicle are redundant, and their decommissioning would not reduce access for timber management. Other roads on the forest access lands that are not suitable for timber management. Decommissioning these roads would not affect timber management. In all alternatives the road system would be adequate for providing public access to collect special forest products.

### Direct and Indirect Effects

Access for timber management within ¼ mile of roads typically require no additional roads to facilitate harvest although short spurs may be desirable to locate landings off a busy road for safety reasons. ASQ acres between ¼ and ½ mile from roads would require on average ¼ mile of temporary road for access. Acres beyond ½ mile from roads would on average require ½ mile of temporary road for access. Depending on terrain and number of units in an area, more or less roads may be required to access a project area. In rare cases where access will be needed overtime, a main collector road may be constructed. Currently on the forest, access for timber management has been on existing roads and in some cases with short temporary roads.

**Table 3.15—ASQ Acreage within ¼ and ½ mile of roads**

Alt	Total miles of road*	Miles of road within ASQ*	Total ASQ acres	AQQ in Roadless (IRA)		ASQ within ¼-mile of roads & not in IRA		ASQ between ¼- and ½-mile of roads & not in IRA		ASQ beyond ½-mile of roads & not in IRA	
				Acres	%	Acres	%	Acres	%	Acres	%
A	1,984	138	424,949	156,483	37	115,693	27	67,327	16	85,445	20
F	1,736	113	424,949	156,483	37	102,619	24	65,807	16	100,040	23
G	1,506	92	424,949	156,483	37	90,988	21	62,991	15	114,487	27
GM	1,502	96	424,949	156,483	37	93,061	22	64,260	15	111,144	26

\*Includes maintenance level 1 roads—roads in storage

**Alternative A**

Alternative A would provide direct access to a total of 115,693 acres (27%) of suitable timber lands. The remaining 152,772 acres of ASQ stands would require some amount of road access to facilitate management.

In addition, some 925 miles of non-system roads and trails would remain as non-system roads and trails and a non-productive footprint on otherwise forested lands. On average, 1 mile of road or trail footprint represents approximately 2 acres of lost soil productivity from compaction. While the reduction in productivity is relatively insignificant (0.2% of the acres of forest cover types on the WRNF), the indirect effect of illegal access may have a broader and adverse effect in terms of trampling newly established seedlings on thousands of acres adjacent to non-system roads and trails that have been harvested to remove beetle-killed trees.

This alternative represents the baseline for comparing the action Alternatives F, G and GM.

**Alternative F**

There is a slight difference in system road access between Alternatives A and F as some roads would be closed based on forest plan direction. Alternative F would provide direct access to a total of 102,619 acres (24%) of suitable timber lands. The remaining 165,847 acres of ASQ stands would require some amount of road access to facilitate management.

In total, 925 miles of non-system roads and trails are proposed for decommissioning along with further treatment of 354 miles of all ready decommissioned routes across all cover types on the WRNF. This represents some 2,500 acres returned to productivity. Indirectly, decommissioning these routes may protect acres of reforestation from site compaction resulting from illegal access.

**Alternative G**

Alternative G would reduce the miles of road and would reduce the number of ASQ acres within  $\frac{1}{4}$  mile of a system road to 90,988 acres. There would be a decrease in the ASQ acreage between  $\frac{1}{4}$  and  $\frac{1}{2}$  mile of a system road to 62,991 acres, and an increase in the ASQ acreage beyond  $\frac{1}{2}$  mile of a system road to 114,487 acres. An additional miles temporary road would be needed to facilitate timber harvest.

An increase in temporary roads would reduce the stumpage value of the timber sold. The amount would vary from project to project based on such factors as the number of miles proposed, the terrain, and the number of drainage crossings. The cost of building and decommissioning roads on the forest is estimated to average \$3,000 per mile.

In total, 1,482 miles of roads and trails are proposed for decommissioning treatment across all cover types on the WRNF. This represents some 3,000 acres returned to productivity. Indirectly this also may protect acres of reforestation from site compaction resulting from illegal access.

**Alternative GM**

While this alternative reduces the total miles of road (by 4 miles), it increases by 4 miles the amount of road in ASQ. Access within  $\frac{1}{4}$  mile of ASQ stands increases over Alternative G by 2,000 acres. Access beyond  $\frac{1}{4}$  mile is about the same as Alternative G. There would be an increase in the need for temporary roads to access these acres over Alternatives A and F.

This alternative has the most acres return to productivity. In total, 1,551 miles of roads and trails are proposed for decommissioning treatment across all cover types on the WRNF. This represents some 3,100 acres returned to productivity. Indirectly this also may protect acres of reforestation from site compaction resulting from illegal access.

### **Cumulative Effects**

With the beetle infestation and aging forest, efforts will be conducted in the future to restore forests to diverse healthy stands. Timber management will be needed to meet the goals of age class diversity and stand diversity. Activities will include harvesting, salvaging, and restoration of these lands. Goals include the enhancement of forested vegetation, improved wildlife habitat, and providing wood products for the nation. In many cases, access is already in place to be able to meet these goals. In some cases temporary and in rare cases, permanent roads are needed to access these lands. Temporary roads will be decommissioned upon completion of the project. Road construction would meet forest plan standards and guidelines, and the effects would be analyzed in the project environmental analysis prior to approval.

## Transportation and Infrastructure

### Introduction

The goal of the transportation system is to provide access to the White River National Forest for users by providing an efficient, safe, and economical system of roads and trails, while minimizing the effects to the local environment. Reasonable and well-designed access enhances opportunities for the forest visitor or user. The transportation system that currently serves users on the forest consists of approximately 2,181 miles of system roads and approximately 1,954 miles of system trails. An additional 1,087 miles of unauthorized roads and trails are currently inventoried. This section primarily addresses the road network and access. See the Recreation section for a detailed discussion on recreation effects from road and trail designation.

### Road Network

Access to communities and to the roads that lead into the forest begins with highly developed interstate and state highways. Interstate 70 is a major east-west route across the United States that bisects the forest. Several resort communities exist in and around the White River National Forest. Many of the persons who live in these communities are here for the beauty of the area and the variety of recreation opportunities available. Due to the ease of access and overall increases and geographic shifts in population, several resort communities have grown rapidly along the I-70 corridor and along the state highways that connect to I-70, such as State Highway 82 leading to Aspen. These roads serve the local population for daily commutes as well as for access to the forest, and they continue to be upgraded to meet the increasing demand.

County roads (farm to market roads) are often connected to state highways. Many of these roads have been around since the area was first settled, and some lead directly into the forest. For the most part, county managed roads are designed to accommodate passenger cars, but may not always be paved or graveled.

Roads that exist on NFS lands may fall under several jurisdictions. Most are under Forest Service jurisdiction. These are called National Forest System roads. Forest Service roads are considered roads necessary for the administration, utilization, and management of public lands. The counties, state, BLM, or private citizens have received rights-of-way, or in some cases obtained jurisdiction over some of the roads on NFS lands. Rights that have been previously established will continue to be recognized under this document.

### Functional Class

The roads on the forest are generally broken up into one of three classes: arterials, collectors, and local routes. An easy way to describe the total road network is through the description of a tree. A network is generally made up of the main route, or arterial (the trunk of a tree). The main branches off of the main route are called collectors (similar to the main branches from the trunk of the tree), and the several routes, or routes not as highly developed, that come off of the main branches are called local routes (similar to the smallest branches of the tree).

Arterials are designed to handle higher volumes of traffic and to access key locations across the forest. Some may go from one community or major drainage system to another. These are generally the higher standard roads on the forest. Collectors are the intermediate branch roads that collect traffic from the local roads and connect to the arterials. They can vary in volume and standard.

Locals are roads that service end-of-road needs, like camping, trailheads, and general forest access. They are generally lower standard roads and receive the least volume of traffic.

Arterial road miles make up the smallest portion of the road network, followed by collector roads. The majority of the road network is classified as local roads.

### **Maintenance Levels**

Roads are designed to handle different modes of travel. Passenger car roads require a higher degree of user comfort, thus they require higher levels of design and maintenance. These are defined by the Forest Service as maintenance level (ML) 3, 4, and 5 roads. In a memorandum of understanding (MOU) with the Federal Highways Administration (FHWA), the Forest Service agreed to manage the 3, 4, and 5 level roads under the Federal Highway Safety Act. Although the Forest Service and FHWA agree that NFS roads are not public roads per se, many are open to public travel. Open to public travel is defined as a road that is available except during scheduled periods, extreme weather, or emergency conditions; passable by four-wheel standard passenger cars; and open to general public use. Driving surfaces for these roads range from asphalt to aggregate to native surface, with the majority being native surface.

Maintenance level 2 roads are managed and maintained for use by high clearance vehicles. Passenger car traffic is not considered, and travel by a four-wheel drive vehicle is often recommended. Traffic is normally light, usually consisting of one or a combination of administrative, permitted, dispersed recreation vehicles, or vehicles travelling for other specialized uses. Maintenance level 2 roads are the backbone of the road system and make up 72% of the system (1,573 miles).

Administrative roads are defined as roads that are managed for administrative access to and within the national forest. These roads are generally closed to the public for full-sized vehicular use, and may be closed to other uses as well. These roads are generally either under special use permit, have specified easements, or are reserved for Forest Service access needs. These roads may be reserved for commodity access, private land access, or administrative access needs. Some are maintained by the special use permit holder to meet their access needs. They generally are not open to the public because of safety considerations, costs, and/or are not considered necessary for public access. The Forest Service is responsible for the maintenance attributed to public use. These roads range from ML 2 to ML 5, depending on operational needs.

Project roads include all roads that are managed for intermittent use. They are normally closed to use after the project is completed and the area returned to a natural vegetative state or is in the process of returning to a natural vegetative state (placed back into vegetative production). Some roads might be put into service during a timber sale or other intermittent project need, and later taken out of service and put back into "storage." These roads are kept in storage until a subsequent need arises. While in storage they are considered to be in a ML 1 category, where no motor vehicle access is allowed. Maintenance level 1 roads may allow other types of non-motorized access while in storage, such as horse or hiker. Those users are allowed to travel cross country, and generally on all routes, and these ML 1 roads do not need to be maintained for such use. Other ML 1 roads may be designated for use while closed (for horse, hiker, and/or bicycle) and will be maintained for that use.

**Table 3.16—Current miles of National Forest System roads by maintenance level\***

Maintenance levels	Miles
5	14
4	48
3	320
2	1,573
1	224
<b>Unknown (data gap)</b>	<b>2</b>

\*Includes roads where ROW may occur on non-FS lands

### Vehicle Classes

Historically, the forest has listed three classes of summer motorized vehicle use: full size motorized, ATV, and motorcycle. Now, with the non-highway legal vehicle differentiation, additional classes have been added and the titles and definitions of the other vehicle classes refined. The full size motorized class is now licensed motorized only, meant to include highway legal motorcycles as well as all other vehicles legal for use on public roadways under Colorado state law. The motorcycle class is defined to include highway legal and non-highway legal motorcycles. The ATV class is now motorized vehicles less than 50 inches in width, and generally includes licensed and unlicensed motorcycles and ATVs. An additional class is licensed and unlicensed (full sized vehicles, licensed and unlicensed motorcycles, ATVs, and utility type vehicles). The changes are incorporated into the travel management plan.

### Unauthorized Roads

Sometimes referred to as “user-created” or “ways,” unauthorized routes are roads and trails on National Forest System lands that are not managed or recognized as part of the transportation system. Many of these routes are old timber, range, mining, or oil and gas exploration roads that no longer serve their intended purpose and were never properly closed or decommissioned. Others have been created by off-road recreation use (motorized and mechanized). These routes are not system routes and therefore are considered illegal.

Over the years, efforts have been made to close or decommission these routes, particularly where excessive resource damage is occurring. Many of these routes are two-tracks (8 feet wide or less) and are relatively short (less than ¼ of a mile). Some provide access to dispersed camping sites or provide access to other recreational activities. Others were created by people driving off road to get to closer to a natural feature, retrieve game, or to collect firewood. Those who just like the experience of off-road driving create other routes. Mountain bike enthusiasts have also created their own trails and systems. Unfortunately, most of these user-created routes were not created with the benefit of design or construction oversight, and because they are not part of the system, they are not maintained.

### Key Indicators

**Key indicator:** Cost of route maintenance

**Measure:** Miles of road to be maintained

**Measure:** Miles of trail to be maintained

**Key indicator:** Cost of routes to be decommissioned

**Measure:** Miles of routes (system and user-created) to be decommissioned

## **Affected Environment**

### **Access**

Historically, the roads on the forest were created mostly for commodity access, primarily mining, timber, and livestock production. Some were alternate routes connecting small communities. While roads still continue to provide access for natural gas production, vegetation management, transferring of livestock, and mine extraction, the majority of use today comes from public recreation.

### **Commodity**

Currently, two large efforts are underway on the White River National Forest that require road access. First, due to national needs, emphasis has been placed on increasing production of domestic natural gas and oil. There is a large natural gas reserve that occurs in western Colorado, eastern Utah, and southern Wyoming. Though most of this reserve occurs on private and BLM land, portions underlie the western part of the White River National Forest. Utilization and improvements to the road system in these locations are necessary for gas well and facility access.

Second, there is a need to access the forest for vegetation management. The current mountain pine beetle and spruce beetle epidemics have prompted the need for increased forest management in lodgepole pine and spruce stands. As identified under the Healthy Forest Initiative, the need to prevent severe wildfires and manage forest lands for the future has led to the need to treat areas where tree mortality has occurred. On the White River National Forest, these areas are mostly on the eastern side of the forest in Summit and Eagle Counties, with some spruce beetle attacks occurring in the southern part of the forest. The need for treatment leads to several different vegetation management techniques requiring an efficient road network for access. Roads for direct project access may exist short term or long term depending on project needs. Many of these roads are temporary and are decommissioned once the project is complete.

Other commodities include movement of livestock, mining extraction, and product gathering (firewood, for example), though on a smaller scale. Roads also provide access to private in-holdings and in some cases to areas for research and development. Special use permits can be issued to individuals and companies for road use and maintenance so that they can access and execute approved projects.

Roads are necessary for the Forest Service and other agencies (such as the Colorado Division of Wildlife) for administrative use and access to management activities across the forest.

When a project is initiated, the roads to and in the affected area are maintained by the industry. Many of the NFS roads are maintained or upgraded by the user to accommodate its specific needs. However, this only occurs where and when the project(s) are underway.

### **Recreation**

The White River National Forest attracts a large number of visitors every year. Most come to the area to recreate, therefore access to the forest is critical for accommodating many recreation uses. A transportation system may serve as either a route to destination recreation or as the recreation location itself. For destination recreation, roads serve as the means to get to a drop-off point to engage in the recreation activity, such as a trail, trailhead, fishing site, picnic site, camping site, or scenic view. Where the road itself

serves as the focus of the recreation activity, users may participate in pleasure driving, four-wheel driving, motorcycling, ATV riding, biking, horseback riding, hiking, snowmobiling, and cross-county skiing.

The White River National Forest administers special use permits for 11 downhill ski resorts. The resorts construct roads that allow access to service resort infrastructure in the summer and that serve as snow trails in the winter. There are currently 210 miles of roads and trails serving ski area operations. The ski resorts are responsible for management of the roads and trails within the ski area permit boundary and bear management costs under their operations. Other special use permits for road use and access can be issued for outfitter and guide operations. Approximately 197 additional miles of road and 14 miles of trail are currently managed under the special use permit system on the forest.

While National Forest System roads still continue to service commodity and private inholding access, the roads have evolved primarily for recreation use and access. Tourism has become the primary industry for the area and the forest is a key component of most visitors' vacation experience. Very little direct revenue for forest service road maintenance comes from the recreation industry. The forest receives some annual congressional appropriations for maintenance and improvements.

The forest considers public access to recreational facilities and general forest areas for highway legal motorized vehicles in this document. A second component of access that needs to be considered involves whether the use of non-highway legal vehicles may also be authorized to drive to certain destinations. Often, users of the forest must rely on state, county, or local roadways to access forest roads and trails. State law prohibits non-highway legal motorized vehicle use on public roadways unless the entity controlling the roadway has made a formal declaration to allow that use (Colorado State Law, Title 33, Article 14.5).

The forest will work with the various state, county, and local road management agencies to determine where non-highway legal vehicles may be legally used on roads under the jurisdiction of these entities. Decisions in the final travel management plan will reflect the legality and practicality of non-highway legal motor vehicles being able to access areas of the forest. Consideration must be given to factors such as the availability of adequate OHV loading and off-loading areas and whether the road most likely to be used is legal even though there may be other legal options that are unlikely to be used.

### **Seasonal Limitations**

Seasonal limitations are placed on roads to protect resources. Some of these restrictions are to protect the road itself. Most roads are native surface and vulnerable to accelerated erosion particularly during spring run-off and early fall snows. Other restrictions are in place to limit disturbance to wildlife and sensitive areas during critical times. At any time a decision-maker can issue an order to restrict access to protect users and/or the resource as necessary.

### **Management**

The Chief of the Forest Service established an agenda called the Healthy Forest Initiative to improve the condition of National Forest System lands. The Initiative: Keeping America's forests and grasslands healthy requires restoring and rehabilitating damaged areas to: (1) prevent severe wildfires, (2) stop the introduction, establishment, and spread of invasive species, (3) reduce the conversion of forests and grasslands that leads to fragmentation of rural landscapes through subdivision, and (4) manage impacts of motorized recreation vehicles by restricting use to designated roads and trails.

Transportation systems can help or hinder the success of these initiatives. Providing well designed networks where access is needed and decommissioning roads where they are not necessary can help to achieve the goals outlined above.

### **Safety**

The White River National Forest is the most visited national forest in the nation. While downhill skiing accounts for the majority of visits, summer use has dramatically increased in the past 20 years. In the past, use was light and originated from local communities. Today, use is heavy and much of the visitor use originates from locations outside the area. The forest visitor's ability to move around the forest is critical to accessing the many recreational opportunities available. As visitor use increases, concerns regarding safety conflicts also increase.

The forest is currently managing the road system based on the 1984 land and resource management plan and the subsequent 1985 forest supervisor's closure order. The 1985 order did not differentiate between the types of motorized vehicles on roads and this was not an issue at the time because there were very few non-highway legal motorized vehicles and drivers using the forest. The road system worked adequately when use levels were lower. Circumstances have changed significantly since 1985. Between 1995 and 2003, off-highway vehicle registrations in Colorado have risen by 223%, an average of 18% annually (SCORP, p. 15).

The general understanding of driving mountain roads has also changed during the last twenty years. Twenty years ago the majority of people traveling forest roads were from local communities and drivers were old enough to understand the inherent risks of traveling mountain roads as well as the driving techniques one should use to mitigate those risks. Today's drivers are from other areas, are younger, are unfamiliar with the mountain roads they are traveling, and are unaware of the risks associated with traveling different types of forest roads.

Adding to the increased use and the associated safety concerns are the technological advancements in the types and capabilities of vehicles used to travel forest roads. Advancements in today's OHVs allow machines to travel into more areas and with less operating skill than in the past. Today's visitor traveling in a standard passenger car may encounter full size four wheel drive vehicles, ATVs, motorcycles, mountain bikes, UTVs (utility type vehicles), and large commercial vehicles (tractor/trailer) all on the same road.

Most of the forest road system was developed for timber removal, mining, livestock grazing, inter-community connections, or for transporting people through the forest to another destination. The current road system was never designed to safely accommodate the volume of traffic we have today, nor was it designed to safely accommodate the many types of vehicles we see used today to access and travel around the forest.

### **Practicality and Manageability**

Safety is only one factor to consider when deciding what types of motorized use to authorize on which roads. The Forest Service must evaluate many other factors when determining the practicality and manageability of a road for motorized use. In determining the practicality and manageability of a road or a system of roads, one must evaluate the following:

- 1) Are the regulations easy and clear for the visitor to understand the opportunities available?
- 2) Is the forest able to enforce motorized use regulations in the area?

- 3) Is the use of non-highway legal vehicles consistent with the current forest plan?
- 4) What does it costs to reduce or mitigate the identified safety issues associated with motorized use?
- 5) Does the road or system of roads provide the type or amount of recreational opportunity for a quality user experience? and
- 6) Does motorized mixed use on a specific forest road encourage or invite the user to violate regulations on roads under the control of other government entities?

The forest considered all these factors when deciding what types of motorized use should be allowed on a specific road or in a certain area.

### **Motorized Mixed Use**

In the 2005 travel management rule, the agency acknowledges the need to mix highway legal and non-highway legal traffic on some National Forest System roads. These designation decisions will be advised by professional engineering studies and will include design features deemed appropriate by engineering studies. *Guidelines for Engineering Analysis of Motorized Mixed Use on National Forest System Roads* (USDA Forest Service 2005) outlines the procedures to be undertaken and factors to consider while analyzing the safety risks of authorizing highway legal vehicles (licensed) and non-highway legal vehicles (unlicensed OHV) to operate on the same road (motorized mixed use). Safety and engineering considerations are to be evaluated while conducting the motorized mixed use studies.

During 2006 and 2007, motorized mixed use analyses (professional engineering studies) were conducted on ML 3 through ML 5 roads by the forest's engineering department. These roads are the forest's arterials and collectors and the main access routes that the public uses to get to the forest. Professional engineering analysis and judgment was used to evaluate the potential for a crash as well as the severity of an accident should a crash occur. The crash potential rating is based on roadway factors such as traffic volume and type, surface type and condition, sight distances, driving speeds, and roadway alignment (horizontal and vertical curves). Crash severity ratings were based on roadside conditions (natural ground slopes, slope/height of embankments, and large unyielding features next to the road), speed, and traffic types (the larger the difference in size of vehicles, the greater the severity). The forest conducted motorized mixed use analyses on approximately 246 miles of roads being considered for designation. These judgments determined that approximately 132 miles could be designated for motorized mixed use without increasing the safety risk to the public. Of the 114 miles determined to have an increased risk to public safety, approximately 60 miles included management options that could be implemented to reduce that risk to a manageable level. For ML 2 roads (four-wheel drive roads) the conditions are considered to be safe enough to allow for mixed motorized use.

In the fall of 2009, four roads were re-evaluated for motorized mixed use in an effort to respond to public comments on the SDEIS. Considerations were made based on possible management options to improve safety to an acceptable level. These options included additional signing, clearing, etc.

The Fourmile Road (NFSR 300) was re-evaluated and while the original findings for the first 4.9 miles remain unchanged, the remaining 12.8 miles of the road was determined to be appropriate for use by highway legal vehicles (licensed) and non-highway legal vehicles (unlicensed ATVs, dirt bikes, and UTVs). These 12.8 miles were re-evaluated as medium crash probability and severity rating.

On the Coffee Pot Road (NFSR 600) non-highway legal vehicle (unlicensed ATVs, dirt bikes, and UTVs) use by operators from the forest boundary could be considered a medium crash probability rating and a low crash severity rating.

The Buford/New Castle (NFSR 245) and Eagle/Thomasville (NFSR 400) were re-evaluated with considerations for possible mitigations such as signing, additional clearing, etc. and were still found to have high probability and severity ratings for mixed use. Therefore no changes were made to these roads.

The Eagle/Thomasville Road (NFSR 400) was evaluated and recommended that it remain open to highway legal vehicles (licensed) only as the high/medium probability and severity ratings could not be significantly lowered.

### **Other Regulations**

Other direction that directly influences road management includes:

- Federal and state laws;
- Code of Federal Regulations – 36 CFR 212, 251, and 261 (as modified by the rule);
- The MOU between FHWA and the Forest Service (as described above);
- Forest Service manuals and handbooks – 7000 series; and
- Forest plan direction.

All of these documents provide regulations that govern how roads should be designed, administered, and managed by the Forest Service. This list is not all-inclusive as the Forest Service is bound by all laws and regulations that pertain to public land management. Key elements from the travel rule, laws, and manual direction on road management implementation provide the ability for the Forest Service to be able to manage and administer NFS roads, particularly the ability of the forest to:

- Determine how to make roads safer for users, including what uses should be allowed;
- Enforce the rules imposed on the roads;
- Maintain the roads to standard, including the roads themselves and all structures related to the roads; and
- Provide gates, signs, and other information to help guide users.

## **Environmental Consequences**

### **Direct and Indirect Effects**

#### ***Effects of Roads***

Roads evolved generally from trails to cart paths to wagon roads to accommodating motorized vehicles. In order to allow motorized vehicles, they have to be constructed with drainage, bridges, and pavement structures. When construction takes place, roads are no longer natural to the landscape. They require the ground to be exposed and flattened into a prism, and in some cases the roads require cut and fill slopes, ditches, water diversions (dips), culverts, outlet ditches (from water diversions), bridges,

surfacing, and clearing. Because road prisms are not natural, water is often diverted from its natural paths and tends to run along the road prism, potentially causing erosion and sedimentation above levels that would occur naturally.

Features such as surfacing, ditches, culverts, dips, and outlet ditches are built into the design of roads to mitigate erosion and sedimentation and support the loads applied to the road (e.g. heavy trucks). These features are designed to get the water off the road prism frequently and as quickly as possible. Good design, construction, and maintenance of these features help to keep the effects from roads at a minimum.

### ***User Effects (Indirect Uses)***

Roads transport people to certain areas of the forest where people can disperse and participate in the recreational activity of their choice. Statistics show a majority of users recreate within ½ mile from a road or trail (Cordell and Bergstrom 1989). As a result, roads indirectly affect where people are going to have the most impact on the forest. Road location can help direct where people go. Provisions for certain recreation experiences also help to define how and what people do in certain locations.

Safety is also a main consideration when designing and maintaining road systems. Considerations for road use and design are based on modes of travel, amount of use, type of drivers, mixture of uses, geography, topography, soils, and weather conditions. Signs, gates, turnouts, surfacing, road widening, road realignment, speed limits, clearing, parallel routes for different modes of travel, and allowing only certain modes of travel on a road or trail are all ways to mitigate for safety.

Within the constraints imposed by funding and other resources and priorities established by Congress and the current administration, the Forest Service strives to provide a safer experience for users traveling NFS roads. It is always the ultimate responsibility of the user to drive safely and follow all laws. The Traffic Control Devices Handbook (Institute of Traffic Engineers 2001, p. 30) and Geometric Design of Low Volume Local Roads (AASHTO 2001, p. xxii, and EM-7100-15 2005, p. 3-1) discuss designing roads for the prudent, reasonable, competent driver. The prudent driver can be best defined as cautious and careful, exercising sound judgment and making wise driving decisions, and considering all related circumstances before acting.

While roads can have both positive and negative impacts, there is no doubt that roads are necessary. The ability to travel by motorized vehicle is woven into the fabric of the American way. A well planned and developed transportation system can direct people to where they need to go, while minimizing impacts. The travel network should be developed within an interdisciplinary format, considering all resources (wildlife, vegetation, access, etc.). When systems are not well thought out, roads are not located in best place for minimal impacts, or they are developed where they are not really needed, duplicate where other roads go, or do not service the majority. The goal is to create a network of roads that serve the forest while minimizing impacts where and when possible. It truly is a balance between providing what is needed while lessening the impacts through amount or design.

The travel management planning endeavor has made a concerted effort to devise a transportation system that is safe, economically sustainable, and environmentally sound. Total road miles are reduced as a result of a multi-faceted strategy that is a combination of identifying the necessary road system, decommissioning unnecessary roads, and converting roads to trails where appropriate. Some roads and trails are managed by special use permits, which place all maintenance responsibilities on the holder of the permit. Reductions in the user-created routes will be accomplished by adding routes to

the road and trail system found to be important to the overall network, and rehabilitating the remaining routes.

The following tables display the miles by road and by trail for specific types of uses.

**Table 3.17—Miles of roads, by use, on the White River National Forest\***

Legend	Alternative A	Alternative F	Alternative G	Alternative GM
Licensed motorized only	17	17	575	548
Licensed and unlicensed allowed	1693	1691	847	872
Motorized vehicles < 50" in width	7	0	4	5
Motorized two-wheeled vehicles	0	0	0	0
Mechanized (bicycles)	150	18	39	36
Foot and horse (pack animal)	113	10	41	41
Managed under special use permit	197	189	197	201
Closed to the public but remain on the system	4	0	0	0
Total road system	2181	1926	1703	1703

\*Does not include ski area roads

**Table 3.18—Miles of trails available, by use, on the White River National Forest\***

Legend	Alternative A	Alternative F	Alternative G	Alternative GM
Licensed motorized only	0	0	0	0
Licensed and unlicensed allowed	0	0	0	0
Motorized vehicles < 50" in width	103	111	139	146
Motorized two-wheeled vehicles	43	43	62	42
Mechanized (bicycles)	561	689	553	523
Foot and horse (pack animal)	1228	1336	1406	1379
Managed under special use permit	14	18	45	46
Closed to the public but remain on the system	5	0	0	0
Total trail system	1954	2196	2205	2137

\*Does not include ski area trails

## Direct Costs

### Road System

Each year the Forest Service is responsible for maintaining and decommissioning National Forest System roads across the forest. The following table reflects the most current accomplishment data available. 2005, 2006, and 2007 data has been updated. 2003 and 2004 data has been replaced with 2008 and 2009 data.

**Table 3.19—White River National Forest road work accomplishments, in miles, for the past five years (2005 – 2009)**

Year	Road maintenance	Road decommissioning	
		NFS roads	Unauthorized
		Miles	
2005	667	1.5	2.8
2006	663	0	6.3
2007	618	0	10.8
2008	682	0.9	11.7
2009	730	0	7.1
5-year average	672	0.5	7.7

Source: Annual road accomplishment reports

Roads require various levels of maintenance and investment to stay functional. These levels are broken into those elements that are preformed on an annual or continual basis, and those that are referred to as deferred maintenance. Annual or continual maintenance includes surface grading, ditch cleaning, culvert cleaning, dust abatement, gravel replacement, and roadside clearing. Elements of deferred maintenance are improvements to mitigate the impacts of a road or to keep a road at its current operating level. Deferred maintenance generally involves longer lasting items such as replacement of culverts, rolling dips, signs, gates, ditches, outlet ditches, resurfacing, hardening a surface, adding turnouts, and realignment or widening of a road. Table 3.20 reflects the amount of money allocated from the budget to the forest for road construction and maintenance. The table has been updated to display the most current funding data available. 2005 and 2006 data has been updated. 2003 and 2004 data has been replaced with data for 2008 and 2009.

**Table 3.20—Funding allocated to White River National Forest for roads (CMRD)**

Fiscal Year	Amount Allocated
2005	\$1,509,479
2006	\$1,572,900
2007	\$1,702,600
2008	\$1,903,000
2009	\$2,401,404
5-year average	\$1,817,877

Source: White River National Forest budget work plans

Funding allocated to White River National Forest for roads for 2009 was significantly higher than the average funding level for 2005 - 2008. The 2009 funding level is not expected to continue and the forest anticipates funding levels for roads to be more in the range of the five year average or less.

The forest has agreements with various counties whereby the counties assist in the maintenance of ML 3, 4, and 5 roads. Funding allocations are used in part to fund the forests' share of the work, and the counties receive reimbursement from the Highway Users Trust Fund. On average, the entire 382 mile system of ML 3, 4, and 5 roads is maintained each year under these agreements. The remaining dollars go toward maintenance of ML 2 roads, and repair and improvements for all roads.

Other roads are maintained under project work such as a timber sale or oil and gas well exploration and development. The type and amount of project work varies from year to year and by location. Sometimes it coincides with roads heavily used by the public and there is a direct benefit, other times the projects are located in areas that sees little recreational use. Certain roads are managed solely for special use, which places all maintenance responsibilities on the holder of the special use permit.

### **Costs for Maintenance**

Annual maintenance is minor road work that is conducted on a cyclical basis. Annual maintenance costs for local roads can range from \$750 per mile for maintenance of dips and outlet ditches (minimal ML 2 requirements) to \$4,125 per mile for light reconditioning of a local road. Light reconditioning includes the blading and shaping of the road and ditch, minor roadside clearing and brushing, cleaning corrugated metal pipe (culvert) inlets and outlets, and cleaning rolling dips, grade dips, and outlet ditches.

Annual maintenance costs for arterial and collector roads can range from \$2,100 per mile for road surface grading and ditch cleaning, to \$4,125 per mile for light reconditioning.

Maintenance costs are higher because these roads tend to be wider, require a higher standard of maintenance, and may have aggregate surfacing.

Deferred maintenance costs for local roads can range from \$4,125 per mile for light reconstruction, up to \$9,625 per mile for moderate reconstruction, and to \$16,500 per mile for heavy reconstruction work. Deferred maintenance refers to road work that goes beyond the usual maintenance work done annually. This work is often required to repair roads that have deteriorated or where events such as landslides, flooding, or heavy spring runoff has affected the road condition. Light reconstruction work includes reconditioning of the roadbed, moderate roadside clearing and brushing, reconstruction or installation of dips, replacement or installation of smaller diameter culverts, and replacement or installation of signs. Moderate reconstruction includes light reconstruction work plus installation of medium sized culverts, moderate roadside clearing and brushing, turnout construction, spot surfacing with pitrun, and re-enforcing dips with pitrun. Heavy reconstruction includes all of the above plus heavy roadside clearing and brushing, adding dips and culverts, adding larger diameter culverts, plating over rocky sections, realignments, and adding fabric and pitrun material to soft sections.

Deferred maintenance costs for arterial and collector roads can range from \$4,825 per mile for light reconstruction, up to \$12,375 per mile for moderate reconstruction, and \$20,625 per mile for heavy reconstruction. Again, the costs are higher because these roads generally contain more drainage features, require more safety features due to higher volumes of traffic, and are of a higher standard.

Other costs include gates, cattleguards, signs, aggregate surfacing, culverts, pit development, and mobilization. Depending on the amount of work, these costs can add up quickly, from \$3,125 for a gate to \$82,500 per mile for aggregate surfacing. Moderate to heavy reconstruction work many times requires a contract to accomplish the work. Additional contract costs include contract preparation, inspection, and administration.

Annual and deferred maintenance costs reflect what expenditures are necessary to keep roads to standard. Other costs, called capital improvements, are also necessary when the forest needs to upgrade or enhance a road. These upgrades include elements such as informational, regulatory, or warning signs; aggregate surfacing or hardening of the road surface; adding turnouts; replacing culverts with arch culverts to enhance fisheries; road widening; road realignments; and adding safety features such as guardrails. Capital improvements can be funded through additional money allocated by congress. National forests generally have to compete for this type of project funding. Policy requires contracting of any project that exceeds \$50,000.

Finally, bridges and large culverts need to be considered when discussing road costs. Bridges and large culverts are considered facilities and are tracked and funded as facilities. According to current bridge and culvert inspections recorded in the Forest Service's database, there are 7 structurally deficient bridges and 13 functionally deficient bridges or large culverts on National Forest System roads in White River National Forest.

The Forest Service is also obligated to monitor road conditions and safety. Motorized mixed use analysis and road inspections can cost anywhere from \$125 per mile for a basic inspection to \$1,250 per mile for a full mixed use analysis.

The forest has averaged approximately 672 miles of road maintenance per year with an average annual budget of \$1,817,877, which equates to an average of \$2,705 per mile. Road maintenance costs, per mile, are approximately 191% higher than trail maintenance costs.

## Trail System

### Basics

Each year the White River National Forest is responsible for maintaining National Forest System trails across the forest. The following tables reflect the amount maintained and the funding that is budgeted for trails on the White River National Forest. The tables have been updated to display the most current accomplishment and funding data available. 2006 and 2008 accomplishment data has been updated. 2008 funding data has been update. 2009 accomplishment and funding data has been added.

**Table 3.21—White River National Forest trail maintenance accomplishments, in miles, for the past four years (2006 – 2009)**

Year	Trail maintenance
2006	630
2007	422
2008	478
2009	502
4-year average	508

Source: Annual work plan accomplishment reports

**Table 3.22—Funding allocated to White River National Forest for trails (CMTL)**

Fiscal Year	Amount Allocated
2006	\$651,134
2007	\$652,423
2008	\$622,800
2009	\$949,842
4-year average	\$719,050

Source: White River National Forest budget work plans

White River National Forest trail funding for 2009 is significantly higher than average funding levels for 2006 -2008. The 2009 funding level is not expected to continue and the forest anticipates funding levels for trails to be more in the range of the four year average or less.

### Costs for Trail Maintenance

With about 2,000 miles of trails, the forest relies heavily on the use of volunteers (individuals and user groups) to assist with trail maintenance and reconstruction for both summer and winter use. In 2003, more than 37,800 hours of volunteer time in recreation and facilities programs was donated on the forest (USDA Youth and Volunteer Programs Accomplishment Report 2003). Especially during winter months, maintenance of trails is done almost exclusively through a combination of volunteer time and state grants. Additional non-quantified assistance for trail maintenance comes from the general public and the numerous outfitters and guides on the forest, who are generally the first to travel down many of the routes in the spring following snowmelt. They often perform trail maintenance out of necessity to continue their permit operations.

A final category of people performing trail maintenance includes permittees whose permit, at least for part of the year, is centered on uses requiring trail networks. Many of these routes are open to free public use. Conversely, some routes, such as winter cross-country ski areas in winter, may charge a fee.

In addition to the use of allocated trails funding, the Forest Service also relies on other funding and labor to help accomplish trail work. The forest receives trust funds annually, amounting to 5 percent of the revenues taken in from various permits on the forest. This funding is to be used for maintenance of roads and trails and for fish passage studies as defined in the legislation for the fund.

The forest has averaged approximately 508 miles of trail maintenance per year with an average annual budget of \$719,050, which equates to an average of \$1,415 per mile. It costs approximately \$18,000 per mile to reconstruct a trail to meet Forest Service standards. The cost to replace a trail bridge can range from a few thousand dollars for a small wilderness bridge of primarily native materials constructed by forest crews, to more than \$200,000 for a design and construct contract on a larger multi-use trail bridge near urban areas. Trail maintenance costs per mile are approximately 52% of road maintenance costs.

Maintenance of the trail system is only one cost associated with the trails program. Other costs include: planning, trail system design and management, volunteer program coordination, tracking, and reporting.

### ***Decommissioning***

When a system road is no longer necessary, it needs to be either converted to some other use such as a trail or allowed to be returned to the surrounding natural condition. This is called decommissioning, and can be defined as those activities that result in the stabilization and restoration of unneeded roads or trails to a more natural state. The road or trail is put back into production and permanently removed from the transportation system. The activities range from blocking the entrance, scattering debris on the roadbed (logs, rocks, branches, and stumps), or re-vegetating and water barring; to removing fills and culverts, reestablishing drainage-ways, pulling back shoulders, or full recontouring of the cut and fill slopes for full obliteration.

Each road that is designated to be decommissioned, whether it is a system or unauthorized road, needs to have some level of treatment so that it can return to a natural state. The costs for treatment methods described above range from \$250 (blocking the entrance) to \$10,000 per mile (full obliteration). These methods, if effective, are a onetime cost. Once returned to a natural state, the impacts of the road no longer exist and no further maintenance expenditures are required.

### ***Unauthorized Routes***

Decisions are required to determine if the 1,087 miles of unauthorized routes across the forest should be added to the system as roads or trails or be decommissioned and returned to the surrounding natural condition. The forest is making a commitment in this document to evaluate unauthorized routes submitted by the public and from within the agency, that may be necessary for the road or trail system. This will also fulfill the obligation to look at unauthorized routes as stated in the travel rule, 36 CFR 212.52. Unauthorized routes considered for addition were examined on the ground by forest staff as funding and time permitted. These routes were reviewed to ensure that they truly are necessary and are in good enough condition to be added to the system, and to determine if they actually exist or if they have been previously rehabilitated. Approximately 162

miles have had some type of closure or rehabilitation treatment previously applied on the ground. These routes may require further rehabilitation treatments to be effective. All routes considered unnecessary to the system, or routes that would require major construction or reconstruction work to be brought to an acceptable standard, are going to be considered unauthorized and will be decommissioned.

All user-created routes discovered subsequent to this document will also be considered unauthorized and will be decommissioned as directed in the forest plan. Any route proposed after the signing of this document will require full consideration and disclosure under a decision making process. The process is quite extensive. The process includes examination of the purpose and need, travel analysis, environmental analysis, surveying, design, contract preparation, contract inspection and administration, and all construction and maintenance costs.

### **Alternative Comparison**

Some roads that were designed for passenger cars are no longer able to accommodate them. Extensive road reconstruction may be necessary to bring them back to a passenger car standard. In some cases, other roads are providing passenger car access to the same destinations. In these cases, it may not be worth the continual investment to maintain a road at a passenger car standard. Some of these roads may serve better as a four wheel drive road (4WD) or even as a 4WD road with mixed use. The forest is proposing to reduce some of the ML 3 roads to ML 2 in these cases. This is one method the forest can use to reduce maintenance costs. The vast majority of the ML 3, 4, and 5 roads will remain and be maintained for passenger car use (low clearance). Maintenance level 3, 4, and 5 roads are maintained annually by the various counties with which the forest has agreements.

Maintenance level 2 roads do vary by alternative, and therefore the costs for maintaining them vary as well. Overall, the greater the miles of road, the more maintenance dollars are necessary. The amount of funding dedicated to road maintenance has been fairly consistent and is likely to remain at current levels. The annual budget dedicated to road maintenance is not alternative-dependent. However, the number of miles of road to be maintained and how long it may take before a road gets maintained are alternative-dependent. The more roads and miles, the longer the maintenance cycle; the longer it takes before a road is maintained, the more deterioration can occur. The more deterioration, the harder it is to maintain that road and the greater the costs that may be incurred with maintaining the road to standard.

Ideally, ML 2 roads should be maintained every three to five years. Some may require more frequent cycles, some less. Maintenance frequency is dependent on road use (type and amount), location, soils, and weather. The more roads and miles, the harder it is to maintain the schedule. Most of the ML 2 roads are maintained or improved by the forest, although a few are maintained through approved project work. On average, the forest is able to maintain approximately 177 miles of ML 2 roads per year. This can vary depending on the type and amount of work required for each road. Since the annual allocations do not meet or exceed what is necessary to be able to maintain these roads, it is assumed that these allocations will be fully spent regardless of which alternative is selected. However, the miles of road requiring maintenance and the maintenance frequency for these roads do vary by alternative. The following table displays the expected maintenance cycle by alternative.

**Table 3.23—Expected maintenance cycle of National Forest System roads on White River National Forest**

<b>Legend</b>	<b>Alternative A</b>	<b>Alternative F</b>	<b>Alternative G</b>	<b>Alternative GM</b>
Miles of ML 1-5 roads maintained	2,181	1,926	1,703	1,703
Miles of ML 2 roads maintained	1,573	1,465	1,230	1,226
Miles of ML 2 roads maintained annually (historically)	177	177	177	177
Level 2 maintenance cycle frequency (years)	9	8	7	7

Source: White River National Forest, GIS data and annual road accomplishment reports

The variance in maintenance cycle frequency is moderate, a 9-year maintenance cycle versus a 7-year maintenance cycle. None of the alternatives present a scenario where the White River National Forest, under current funding allocations, would be able to meet the desired maintenance frequency of three to five years. If the travel management plan developed an alternative that was based solely on allocations for roads, it would not be able to meet the purpose and need to identify and designate an official transportation system on the White River National Forest that attempts to balance the physical, biological, and social values of the forest. Many of the opportunities for the public to access the forest would be shut down.

Alternatives G and GM provide a road system with the least miles (1,703) and the most favorable economic scenario in regards to system miles requiring maintenance. These two alternatives reduce the road system by the greatest number of miles (a reduction of 478 miles, 22 percent). Alternative F provides a road system with the second least miles (1,926) and the next most favorable economic scenario of system miles requiring maintenance. Alternative F reduces the road system by the next greatest number of miles (a reduction of 255 miles, 12 percent). The no-action alternative does not reduce the existing road system at all, and therefore provides the least favorable economic scenario; this alternative has the most system miles (2,181) requiring maintenance and no reductions in expenditures.

Alternatives G and GM provide an opportunity to improve the condition of the road system, as the maintenance frequency could be reduced by 22 percent (7 year cycle versus a 9 year cycle). Alternative F could improve the road condition slightly (11 percent frequency reduction – 8 year cycle versus a 9 year cycle). Under the no-action alternative, road conditions would not improve, as the maintenance frequency would remain at 9 year intervals.

If the road maintenance frequency were to remain the same (9 years), then Alternatives G and GM provide the greatest reduction in road maintenance obligations; they reduce the road system by 22 percent. This reduction could then be redirected towards other road priorities, such as maintaining roads more often, increasing maintenance on roads experiencing greater use due to increased concentrations of use, creating signage for travel management, converting system and unauthorized routes to system roads or trails identified in this process, decommissioning system roads, and the rehabilitating unauthorized routes. Alternative F would have the next greatest reduction (12 percent), followed by Alternative A with zero reductions.

The forest will establish priorities for roads and then decide which items (maintenance frequency, signage, decommissioning, rehabilitation, conversion of routes, etc.) is the priority, on which roads, and in which areas.

### Trail System

**Table 3.24—Expected maintenance cycle of National Forest System trails**

<b>Legend</b>	<b>Alternative A</b>	<b>Alternative F</b>	<b>Alternative G</b>	<b>Alternative GM</b>
Miles of trail maintained	1,954	2,196	2,205	2,137
Miles of trail maintained annually (historically)	508	508	508	508
Trail maintenance cycle frequency (years)	3.85	4.32	4.34	4.21

*Source: White River National Forest, GIS data and annual trail accomplishment reports*

The maintenance frequency variance is even less for trails than for roads. If the travel management plan developed an alternative that was based solely on allocations for trails, it would not be able to meet the purpose and need to develop a transportation system to meet an increasing demand for recreational travel opportunities and to provide a spectrum of quality experiences for a wide variety of forest users.

As with roads, the greater the miles of system trails, the more funds the forest will need to maintain that system. The no-action alternative provides the most favorable economic scenario with the least amount of trail miles to maintain (1,954). Alternative GM provides the next most favorable economic scenario with the second least amount of trail miles to maintain (2,137 miles, an increase of 183 miles or 9 percent). Alternative G provides the least favorable economic scenario with the greatest number of miles to maintain (2,205 miles, an increase of 251 miles or 13 percent). Alternative F provides a slightly more favorable economic scenario than Alternative G; it results in only 9 fewer miles of trail to be maintained (2,196 miles) by increasing the trail system by 242 miles, or 12 percent.

To maintain the proposed trail system, allocations would need to increase by 12 percent for Alternative F, 13 percent for Alternative G, and 9 percent for Alternative GM. The forest can also decide to extend the maintenance frequency to 4.35 years, which would not require an increase in trail allocations.

As with roads, the forest will need to establish priorities for trails and then decide which items (maintenance frequency, signage, decommissioning, rehabilitation, conversion of routes, etc.) is the priority, on which trails, and in which areas.

### Decommissioning and Rehabilitation

One of the objectives of travel management planning is to identify a transportation system (roads and trails) that is truly necessary and to decommission the remaining system roads and trails that are no longer needed. It is also important to decommission unauthorized roads that are not incorporated through the travel management planning process. For this discussion, decommissioning and rehabilitation are defined as: activities that result in the stabilization and restoration of unneeded roads or trails to a more natural state. The road or trail is put back into production and permanently removed from the transportation system. Decommissioning/rehabilitation can be accomplished through various methods such as physically obliterating the route, recontouring, scarifying,

seeding, blocking the route entrance, or slashing in the route with logs and rocks. Many factors go into the amount of work needed for decommissioning/rehabilitating a route. While each route will vary in cost for decommissioning/rehabilitation, the more miles to decommission, the more funding that will have to be dedicated to the effort. Some routes may have already been decommissioned, however these efforts may not have been effective, and further treatment may be necessary. Chapter 2 provides a summary table of the miles of roads and trails to be decommissioned. Alternative GM has the greatest miles of routes to be removed from the transportation system (1,551 miles), followed by Alternative G (1,483 miles), and then Alternative F which would remove 1,279 miles. Alternative A would only allow for the 341 miles previously identified for decommissioning. Therefore the costs for decommissioning/rehabilitating would be greatest in Alternative GM, followed by Alternative G, Alternative F, and Alternative A. It is important to remember that route decommissioning/rehabilitation, if effectively done, is a one-time cost. The benefits associated with this effort are a reduction in resource impacts that unnecessary routes may have on the land.

### Summary of Costs

The following table displays the relative cost rating for each alternative relative to the transportation system identified. Each transportation cost comparison was assumed to be of equal importance and value. The lower the numerical value, the lower the anticipated cost.

**Table 3.25—Relative cost rating for each alternative for transportation system activities**

Legend	Alternative A	Alternative F	Alternative G	Alternative GM
Indicator: Cost of route maintenance				
Measure:	3	2	1	1
Miles of road to be maintained	(2,181 mi)	(1,926 mi)	(1,703 mi)	(1,703 mi)
Measure:	1	3	4	2
Miles of trail to be maintained	(1,954 mi)	(2,196 mi)	(2,205 mi)	(2,137mi)
Indicator: Cost of routes to be decommissioned				
Measure:	1	2	3	4
Total miles of routes to be Decommissioned (system and user-created)	(341 mi)	(1,279 mi)	(1,483 mi)	(1,551 mi)
Total Score	5	7	8	7

From a strict transportation system viewpoint, Alternative A has the least total impacts relative to cost, namely because there are no roads or trails to decommission and very few to rehabilitate. Alternative A has the greatest miles of road requiring maintenance, but the least miles of trail requiring maintenance. It has the greatest overall total transportation system mileage (4,135 miles). Alternative A does not meet the direction of the current forest plan and does nothing to meet the intent of the travel rule, and fails to address 925 miles of identified unauthorized routes on the forest.

Alternative F and Alternative GM have the second lowest costs relative to the other alternatives. Alternative F has the second greatest miles of road requiring maintenance and the third greatest miles of trail requiring maintenance. This alternative has the second greatest total transportation system mileage (4,122 miles). Alternative F would have the second lowest decommissioning/rehabilitation cost. Alternative F reduces the total road

system miles by the second greatest amount (255 miles, 12 percent), while increasing trail system by 242 miles, an almost one to one ratio of road reductions versus trail increases. Alternative F minimally complies with the current forest plan, and partially meets the intent of the travel rule by rehabilitating all identified miles of unauthorized routes. Alternative F does not add any unauthorized routes to the transportation system and only decommissions 13 miles of system routes that are no longer needed.

Alternative G has the highest costs relative to the other alternatives. Alternative G has the least miles of road requiring maintenance, which is the same as Alternative GM (1,703 miles). While this alternative has the least miles of roads requiring maintenance, it has the greatest miles of trail requiring maintenance (2,205 miles). This alternative has the second smallest total transportation system mileage (3,908 miles). This alternative would have the second highest decommissioning/ rehabilitation cost. Alternative G reduces the total road system miles by (478 miles, 22 percent), which is the same decrease as Alternative GM. This alternative has the greatest increase in system trail miles (251), almost a two to one ratio of road reductions versus trail increases. Alternative G adds the greatest miles (251) of unauthorized routes to the system (road, trail, and historic), while decommissioning a total of 228 miles of system routes—the second greatest reduction of the four alternatives. This alternative fully complies with the current forest plan and fully meets the intent of the travel rule by rehabilitating all of the remaining miles of unauthorized routes.

Alternative GM is lowest in terms of cost impacts and equals Alternative F in that regard. This alternative has the least miles of road requiring maintenance (1,703), which equals Alternative G, and the second lowest miles of trail requiring maintenance (2,137). It has the least amount of total transportation system miles, 3,840 miles, which is 68 miles less than Alternative G and 282 miles less than Alternative F. Alternative GM does have the highest decommissioning/rehabilitation costs, as it treats a total of 1,551 miles of system and user-created routes. Alternative GM equals Alternative G as it reduces the total road system miles by (478 miles, 22 percent), while increasing trail system by 266 miles – almost a two to one ratio of roads decommissioned verses trails added. This alternative fully complies with the current forest plan and fully meets the intent of the travel rule. Alternative GM adds the second greatest miles (225) of unauthorized routes to the system (road, trail, and historic), while decommissioning a total of 295 miles of system routes – the greatest reduction of the four alternative. Alternative GM provides a transportation system that best meets the needs of the forest. It creates the smallest transportation system of the four alternatives and eliminates more duplicate, unnecessary, and unauthorized routes than other alternatives.

Each of the alternatives, including Alternative A, would cost more to implement than the current forest travel management budget. The current budget does not provide enough road maintenance and decommissioning funding to fully implement management needs. Unless routinely maintained, roads can deteriorate to a condition where travel becomes difficult, or where drainage structures no longer function properly, thus affecting other resources such as water quality. Additional funding would then be required to bring the road back to standard.

### **Cumulative Effects**

A route identified for decommissioning is no longer needed for access. Returning the route to a natural state helps to prevent illegal use, reduce further resource damage, and mitigate unnecessary wildlife fragmentation. However, it does take funding to

accomplish this. One of the factors in deciding the method for decommissioning will need to be the amount of available funding.

Over time and as funding permits, the travel management plan will be implemented on the ground. Travel management and motorized mixed use signage will allow the public to easily identify which modes of travel are allowed on which roads and trails. The forest will continue to evaluate the road and trail system in an effort to provide a safe, economically sustainable, and environmentally sound transportation system that provides the user with a quality experience. The forest will also continue to evaluate roads designated for motorized mixed use as traffic increases on these roads due to the emphasis on motorized recreation on certain roads and in certain areas.

The transportation system will continue to evolve in an effort to meet future access needs for commodities and access to recreational opportunities across the forest. On the commodity side, oil and gas production, mining, and timber harvesting will continue to use the existing road system and most likely will expand the current system. When new roads are developed, the Forest Service will decide the best location, whether they should provide temporary or permanent access, and the best way for the roads to serve not only the individual commodity need, but the overall access needs of the entire area.

As local communities continue to grow and as tourism continues to increase, more people will come to the area to visit and recreate. Projects such as the I-70 expansion and local airport expansions will make it easier for people to visit the area. The easier it is for people to visit and recreate on the forest, the greater the demand on the transportation system. This increased demand will lead to increased maintenance needs.

In order to resolve access objectives, additional analysis and decision-making may be required on specific routes and facilities. When the forest opts to resolve an access goal or is faced with an outside opportunity to resolve access goals, design and execution parameters will be developed.

## Watershed Resources

---

### Introduction

Watersheds are areas of land that drain rainfall and snowmelt into a common stream, stream network, or body of water. Healthy watersheds are critical to protecting water quality, sustaining dependent ecosystems, providing a reliable public water supply, and preventing or reducing erosion or flooding from high-runoff events. In a natural state, watersheds are in dynamic equilibrium determined by geologic and climatic variables. The natural functions of a watershed, however, can be disrupted by human caused activities where the ground and/or vegetation are disturbed. The degree of disturbance and the effectiveness of any mitigation efforts govern the magnitude of long term damage and recovery.

Roads and trails can impact the hydrologic functions of a watershed through compaction of soil, interception of snowmelt and rainfall runoff, and loss of wetlands and riparian vegetation. Unless effectively mitigated, these impacts can result in soil erosion, landslides and impaired water quality and can affect the long-term health of a watershed and its benefits to ecosystems and human settlements.

### Key Indicators

This analysis of watershed health addresses the impacts of maintenance level 1 and 2 roads, motorized trails and non-motorized trails at the 7<sup>th</sup> level or catchment scale. Maintenance level 3, 4, and 5 roads do not vary considerably by alternative and, as such, are not analyzed directly. They are, however, considered within the context of cumulative impacts. Analysis of the impacts of each alternative will consider the following indicators:

**Key indicator:** Impacts on watersheds from the quantity of roads and trails.

**Measure:** Road/trail density by watershed.

**Key indicator:** Road interference to stream flow.

**Measure:** Road-stream crossing density.

**Key indicator:** Road and trail impacts on streams, riparian, and wetland areas.

**Measure:** Road/trail miles within 300 feet of streams, riparian, and wetland areas.

### Affected Environment

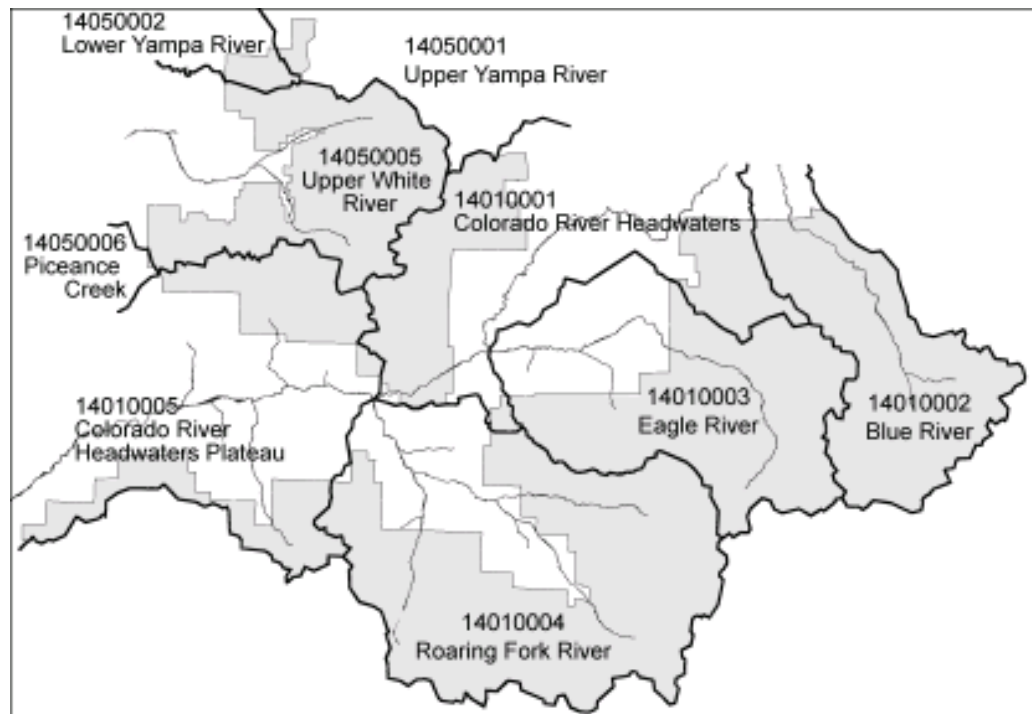
There are 2,181 miles of National Forest System roads currently on the system. Of those 1,797 are maintenance level 1 and 2 roads. Currently there are 1,954 miles of National Forest System trails. In addition there exists 925 miles of unauthorized roads and trails. The extent of adverse impacts of an individual road or trail depends on numerous factors such as geology, level of maintenance, use rate and its proximity to streams, wetlands, or riparian areas.

### Watershed Setting

The White River National Forest encompasses the headwaters of the Blue, Eagle, and Roaring Fork rivers, all of which are direct tributaries to the Colorado River. Portions of the forest also lie within the headwaters of the White, Yampa, and Piceance-Yellow rivers, which are tributaries to the Green River.

Watersheds on the White River National Forest are delineated into a series of subdivisions using a classification system developed by the U.S. Geological Survey. They are divided and subdivided into progressively smaller nested watersheds with the first level being the largest land area relative to watersheds of successive levels. Each level is identified systematically by a hydrologic unit code number (HUC). Fourth-level watersheds (or 4<sup>th</sup> level HUC's) are often called sub-basins; 5<sup>th</sup>-level watersheds (5<sup>th</sup> level HUC's) are simply referred to as watersheds; 6<sup>th</sup>-level watersheds are known as subwatersheds; and 7<sup>th</sup>-level watersheds are called catchments.

Because the Forest covers a broad range of terrain that varies widely in natural and human-caused sensitivities to watershed disturbances, further description of watersheds is provided in terms of six geographic units (figure 3.14). These units roughly represent 4<sup>th</sup>-level watersheds, or sub-basins, on the Forest, each with a unique set of resource management issues.



**Figure 3.14—Fourth-level sub-basins on the White River National Forest, according to USGS hydrologic unit codes (HUCs)**

### Surface Waters

Water resources on the forest include streams, wetlands, riparian areas, lakes, ponds, and reservoirs. They contribute significantly to public water supplies and to agricultural and recreational uses. They also support habitat for fisheries and wildlife and provide aesthetic values important to many Forest users.

There are approximately 2,690 miles of perennial streams and 9,270 miles of intermittent streams on the Forest. Open water comprises about 11,500 acres. An estimated 50,900 acres of riparian/wetland communities are associated with these surface waters.

### Public Supply Watersheds

While most municipal use of forest water is provided to eastern slope users, western slope use has increased along with this area's population. No formerly designated public

supply watersheds are located on the forest. There are 40 watersheds on the White River National Forest, however, that supply water for municipal use (table 3.26).

With two exceptions, road impacts have not been identified as water quality concerns in these watersheds. The exceptions are Straight Creek and Black Gore Creek; these public supply watersheds are both affected by sedimentation resulting from traction sand from Interstate 70. The Forest Service is working with the State departments of Public Health and Transportation and with local governments and organizations to reduce sanding impacts on these creeks.

**Table 3.26—Public Supply Watersheds on the White River National Forest**

<i>Name</i>	<i>Area served</i>	<i>White River National Forest District</i>
Castle Creek	Aspen	Aspen
Garrett Gulch Creek	Snowmass Ski Area	Aspen
Green Cabin Creek	Snowmass Ski Area	Aspen
Hunter Creek	Aspen	Aspen
Maroon Creek	Snowmass	Aspen
Piney Creek	Pine Creek Cookhouse	Aspen
Snowmass Creek	Aspen	Aspen
Roaring Fork River	Aspen	Aspen
West Fork Brush Creek	Snowmass	Aspen
White River	Meeker	Blanco
Blue River	Breckenridge	Dillon
Cucumber Gulch	Blue River Water District	Dillon
Indiana Gulch	Breckenridge	Dillon
Lasky Gulch	Dillon, Dillon Valley	Dillon
Lehman Gulch	Breckenridge Ski Area	Dillon
Morgan Gulch	Town of Montezuma	Dillon
North Fork of Cucumber Gulch	Blue River Water District	Dillon
North Fork of the Snake River	Arapahoe Basin Ski Area	Dillon
North Fork of the Snake River	Keystone	Dillon
North Fork of the Snake River	Loveland Pass Village	Dillon
North Fork of Cucumber Gulch	Blue River Water District	Dillon
North Fork of South Barton Gulch	Blue River Water District	Dillon
North Tenmile Creek	Frisco	Dillon
Straight Creek	Dillon, Dillon Valley	Dillon
West Tenmile Creek	Copper Mountain Ski Resort	Dillon
Antones Cabin Creek	Gypsum	Eagle
Brush Creek	Eagle	Eagle
Eagle River	Gypsum	Eagle
Mosher Creek	Gypsum	Eagle
Beaver Creek	Beaver Creek Ski Area	Holy Cross
Black Gore Creek	Vail	Holy Cross
Booth Creek	Vail	Holy Cross

<i>Name</i>	<i>Area served</i>	<i>White River National Forest District</i>
Cross Creek	Minturn	Holy Cross
Eagle River	Redcliff	Holy Cross
Fall Creek	Gilman	Holy Cross
Gore Creek	Vail	Holy Cross
Homestake Creek	Colorado Springs/Aurora	Holy Cross
Mill Creek	Vail	Holy Cross
Turkey Creek	Redcliff	Holy Cross
Beaver Creek	Rifle	Rifle
East Elk Creek	New Castle	Rifle
Grizzly Creek	Glenwood Springs	Rifle
No Name Creek	Glenwood Springs	Rifle
Oasis Creek	West Glenwood Springs	Rifle
Roaring Fork River	Glenwood Springs	Sopris
Carbonate Creek	Marble	Sopris
East Creek	Redstone	Sopris
Fryingpan River	Basalt	Sopris
Nettle Creek	Carbondale	Sopris
North Fork of the Crystal River	Crystal	Sopris

### Water Quality

Water quality within the forest can be affected by natural and/or human-caused factors. The primary water parameter of concern related to travel management is sedimentation originating from road erosion. The underlying geology can play a significant role in determining the impacts a road or trail has on erosion. In some areas, additional water quality concerns include water temperature (from the significant loss of riparian vegetation from roads constructed adjacent to streams and water bodies) and salinity (from the application of road salts for de-icing or dust abatement purposes).

The State of Colorado reports biannually on the status of water quality. The most recent report indicates that two stream segments that occur within the forest, Straight Creek and Black Gore Creek, are impaired because of sediment from I-70 (CDPHE 2004). Ongoing efforts are being made by the WNRF, Colorado Department of Transportation and local agencies and organizations to restore the health of both Straight Creek and Black Gore Creek and remove these segments from the State's list of impaired streams (ERWC 2009, Healy 2007; Healy 2008). No other stream segments on the forest are identified as impaired because of road runoff.

The State of Colorado also has identified stream segments where no degradation of water quality is allowed (CDPHE 2010a, CDPHE 2010b). These are called "outstanding waters," many of which occur within wilderness areas on the White River National Forest. Each of these "outstanding waters" segments are identified below along with the type of transportation systems that occur within the contributing basins:

- 1) White River Basin–Segment 1: All tributaries to the White River, including all wetlands, within the boundaries of the Flattops Wilderness area. Transportation system within this basin is entirely non-motorized trails.

- 2) White River Basin – Segment 24: All lakes and reservoirs tributary to the White River which are within the boundaries of the Flattops Wilderness Area, including Trappers Lake. Transportation system within this basin is entirely non-motorized trails.
- 3) Lower Colorado River Basin – Segment 9c: Battlement Creek, including all tributaries and wetlands, from the source to the most downstream boundary of BLM lands. Transportation system within this basin is motorized and non-motorized trails and a four-wheel-drive road.
- 4) Upper Colorado River – Segment 9: All tributaries to the Colorado and Fraser Rivers, including all wetlands, within the Never Summer, Indian Peaks, Byers, Vasquez, Eagles Nest and Flat Tops Wilderness Areas. Transportation system within this basin is entirely non-motorized trails.
- 5) Blue River – Segment 4b: North Fork of the Swan River, including all tributaries and wetlands, from the source to the confluence with the Swan River. Travel within this basin is primarily via a four-wheel-drive road.
- 6) Blue River – Segment 16: All tributaries to the Blue River, including all wetlands, within the Eagles Nest and Ptarmigan Peak Wilderness Areas. Transportation system within this basin is entirely non-motorized trails.
- 7) Blue River – Segment 21: All lakes and reservoirs within the Eagles Nest and Ptarmigan Peak Wilderness Areas. Transportation system within this basin is entirely non-motorized trails.
- 8) Eagle River – Segment 1: All tributaries and wetlands to the Eagle River system within the Gore Range – Eagles Nest and Holy Cross Wilderness areas. Transportation system within this basin is entirely non-motorized trails.
- 9) Eagle River – Segment 10b: Abrams Creek, including all tributaries and wetlands, from the source to the eastern boundary of the United States Bureau of Land Management lands. A small portion of this basin lies within the WRNF. Travel on NFS lands within this basin is primarily via a four-wheel-drive road.
- 10) Eagle River – Segment 13: All lakes and reservoirs within the Gore Range – Eagles Nest and Holy Cross Wilderness areas. Transportation system within this basin is entirely non-motorized trails.
- 11) Roaring Fork River–Segment 1: All tributaries to the Roaring Fork River system, including all wetlands, within the Maroon Bells/Snowmass, Holy Cross, Collegiate Peaks, Raggeds, and Hunter/Fryingpan Wilderness areas. Transportation system within this basin is entirely non-motorized trails.
- 12) Roaring Fork River – Segment 11: All lakes and reservoirs within the Maroon Bells/Snowmass, Holy Cross, Collegiate Peaks, Raggeds, and Hunter/Fryingpan Wilderness areas. Transportation system within this basin is entirely non-motorized trails.

### **Wetland and Riparian Areas**

Roads can affect wetlands and riparian areas directly or indirectly by modifying surface and subsurface drainage to and from these areas. Roads and trails can also affect water quality in wetlands.

There are 50,864 acres of mapped riparian and wetland areas on the forest. Although riparian and wetland areas occupy only about 2 percent of the lands managed by the

White River National Forest, they are key to productive fisheries and wildlife habitat, natural water quality protection, and flood attenuation.

Riparian ecosystems constitute the transition area between the aquatic ecosystem and the adjacent terrestrial system. Wetlands are areas inundated by surface or groundwater with a frequency sufficient to support vegetation or aquatic life that requires saturated or seasonally saturated soil conditions. Executive Orders 11988 and 11990 direct federal agencies to avoid the loss of wetlands on federal lands.

### **Geographic Units**

A manageable perspective of the watershed conditions on the forest is presented in terms of six geographic units, which generally are based on 4<sup>th</sup>-level watersheds (figure 3.14). These six units are the Blue River, Eagle River, Roaring Fork River, Upper Colorado River, Lower Colorado River and Upper White River.

The hydrologic and physiographic descriptions of each of these geographic units are detailed in Chapter 3 of the Forest Plan. The following descriptions under each geographic unit include current water quality conditions as determined by the Colorado Water Quality Commission.

#### **Blue River Unit**

The Blue River unit is located entirely within the Dillon Ranger District. Twelve streams in this unit that occur on the forest contribute to ten public water supply entities. Straight Creek (COUCBL18), which is a public water supply, is currently listed by the Colorado Water Quality Commission as not supporting cold water aquatic life due to sedimentation from runoff from Interstate Highway 70 (CDPHE 2008a). An approved Total Daily Maximum Load (TMDL) plan is in place to improve water quality in Straight Creek.

There are three other segments that include National Forest System lands that were identified by the Commission are listed as not supporting water quality needs for certain uses and in need of a TMDL plan (CDPHE 2008b). They are ID COUCBL06 (Snake River below Peru Creek to Dillon Reservoir for copper, zinc, lead, pH, and cadmium pollution from mining), COUCBL07 (Peru Creek for zinc, copper, cadmium, pH, and manganese from mining) and COUCBL12 (Illinois Gulch and Fredonia Gulch for zinc from mining).

#### **Eagle River Unit**

The Eagle River unit represents the National Forest System lands that occur within the Eagle River basin, a 4th-level watershed. Lands within this unit fall within the Eagle and Holy Cross ranger districts. Fourteen watersheds within this unit are a public supply water source. Black Gore Creek, a public water supply, is listed by the Colorado Water Quality Control Commission as water quality limited because of sediment (CDPHE 2008b). The Commission's requirement of a TMDL plan for Black Gore Creek is listed as a high priority. Three other segments that include National Forest System lands have been identified by the Water Quality Commission as not supporting water quality needs for cold water aquatic life. These are ID# COUCEA5a, 5b and 5c and encompass the main stem of the Eagle River from Belden to Gore Creek. Impairment is from copper and zinc pollution from mining.

#### **Roaring Fork River Unit**

The Roaring Fork River unit represents the National Forest System lands that occur within the Roaring Fork River basin, a 4th-level watershed, or sub-basin. Lands within this unit fall within the Aspen and Sopris ranger districts. Fifteen watersheds within this

unit serve as a public water supply source. None of the stream segments within this unit have been identified by the Colorado Water Quality Control Commission as not supporting water quality needs for designated uses.

### **Upper Colorado River Unit**

The Upper Colorado River unit represents lands managed by the White River National Forest that occur within the Upper Colorado River basin to Glenwood Springs, excluding the Blue, Eagle, and Roaring Fork river basins. Lands within this unit fall in the north portion of the Holy Cross Ranger District, the northwest portion of Eagle Ranger District, a small northwest segment of Sopris Ranger District, and an eastern portion of the Rifle Ranger District. Two watersheds within this unit provide a source of water to Glenwood Springs. None of the stream segments within this unit have been identified by the Colorado Water Quality Control Commission as not supporting water quality needs for designated uses.

### **Lower Colorado River Unit**

The Lower Colorado River unit represents lands managed by the White River National Forest that occur within the Lower Colorado River basin from Glenwood Springs and downstream. Lands within this unit fall entirely within the Rifle Ranger District. Three watersheds within this unit are public water supply sources. No segments within National Forest System lands in this unit have been identified by the Colorado Water Quality Control Commission as water quality limited.

### **Upper White River Unit**

The Upper White River unit represents lands managed by the White River National Forest that occur within the Upper White River Basin as well as a few 7<sup>th</sup>-level watersheds that drain into the Upper and Lower Yampa River and Piceance Basin. Lands within this unit fall entirely within the Blanco Ranger District.

The White River is a water supply for Meeker. One stream segment, Flag Creek, has been identified by the Colorado Water Quality Control Commission as not supporting water quality needs for cold water aquatic life. The cause is selenium from mineralization. The Water Commission has identified this segment as a low priority for developing a TMDL plan.

## **Environmental Consequences**

The alternatives presented in this analysis do not propose construction of new motorized or non-motorized travel routes. Rather, the alternatives look at designation options of existing routes whether or not they are currently authorized.

This assessment provides a broad evaluation to compare alternatives to travelway designations in 7<sup>th</sup> level watersheds. It is limited to routes only within National Forest System lands. Comparisons between the four alternatives assume that decommissioned travelways are effectively closed with no further hydrologic impacts.

Unpaved roads and trails are vulnerable to surface erosion from rainfall and runoff. Paved or unpaved, they serve to concentrate and accelerate runoff, which can erode unarmored surfaces such as road fills and hillslopes. Without any means of detention such as vegetation or sediment basins, roads and trails can efficiently convey sediments directly into a stream system.

The collective impacts of a road include its prism of cut, fill and travel surface which typically disturb and occupy a wider pathway than does a trail. Because they generally

disturb more area per route length than do trails, this analysis assumes that roads are a greater source and/or cause of erosion within a watershed.

Research indicates that impacts to watershed resources by hiking, mountain biking and horse riding are similar and that the severity of use specific impacts depend on variables such as actual usage, riding styles, and resource sensitivity (Pickering et al. 2010). This analysis assumes that the impacts on trails by motor bikes, mountain bikes, horse riding and hikers are equivalent. Impact severity of each of these uses if better addressed at a project specific level where riding style and resource sensitivity are more specifically available for analysis.

Table 3.27 compares the total miles of roads and trails that would occur under each alternative.

**Table 3.27—Miles of National Forest roads and trails**

	Alternative A	Alternative F	Alternative G	Alternative GM
Level 1 and 2 roads	1,797	1,530	1,323	1,320
Level 3, 4, 5 roads	382	382	378	379
Motorized trails	152	152	203	191
Non-motorized trails	2,048	2,050	2,034	1,976
Unauthorized travelways remaining	925	0	0	0
Unauthorized travelways all ready (previously decided) or to be decommissioned	341	1,087	823	853

### General Effects

National Forest System roads and trails are generally associated with timber harvests, dispersed recreation, mining, private land access, and ski areas. They can impact the physical and biological resources within a watershed that are necessary to sustain a healthy ecosystem. Roads will generally have greater watershed impacts than trails due to a wider prism width and larger cut and fill slopes.

Roads and trails can also serve as conduits to water contamination from biological and chemical pollution inputs. The causes include vehicle spills, road ice treatments, dust abatement measures, and fecal matter from livestock trail use.

Roads and trails constructed too near a stream or other water body can result in significant loss of water shading riparian vegetation and contribute to increased water temperatures that threaten fish and other aquatic organisms.

Travelway impacts can persist long after a road or trail is closed unless measures are taken to disconnect runoff pathways into a stream channel and/or onto a road or trail surface. Proper design and location of travelways can significantly reduce the risk of flood flows, slope failures, sedimentation, and stream channel degradation. This includes avoidance of steep slopes, high-erosion hazard areas, stream channels, riparian and wetland areas, and areas of high mass movement potential. When roads and trails are properly planned, constructed, and maintained, their long-term impacts on watershed resources, whether or not they are open or closed to travel, are effectively reduced.

The method of travel generally determines the distance covered over a time period which, in turn, can influence aggregate impacts to watershed resources. For example, motorized travel typically allows greater distances to be covered than by a slower means of travel such as hiking. As such, the potential for larger areas of ground disturbance is greater with motorized travel than with hiking when assessed over the same time period.

Watershed conservation practices and forest plan standards and guidelines prescribe extensive measures to protect soil, riparian, wetland, and aquatic resources. Generally, adverse impacts on these resources can be minimized when all applicable measures are applied and effective. However, protective measures are not failsafe especially when one or more impacts exceed the capability of mitigation efforts to be effective. The risk of impacts will rise with the length of roads and/or trails within a watershed.

For this analysis, analytical assumptions were made regarding road/trail density, proximity to streams, wetlands and riparian areas and stream crossings. These assumptions are used to compare alternatives. The assumptions and parameters for analysis are identified under each effect described in the following section.

## **Direct and Indirect Effects**

### **Travelway Density**

Roads and trails can modify the hydrologic response to snowmelt and rainfall runoff. They can also act as direct conduits for sediments to reach a stream channel. In some cases, travelways may be constructed such that they undercut an already unstable slope which could lead to landslides or slumps.

This analysis includes an assessment of road and trail density in each 7<sup>th</sup> level HUC where National Forest System lands occupy at least five percent of the watershed area. The assumption in this assessment is that there is a greater risk of adverse hydrologic impacts in a watershed with a higher density of roads and/or trails.

Risk ratings used in this analysis are defined as follows:

**Higher risk:** Watersheds with 3.0 or more miles per square miles roads and trails;

**Moderate risk:** Watersheds with 1.5 to 2.9 miles per square mile roads and trails; and

**Lower risk:** Watersheds with 1.4 or fewer miles per square mile roads and trails.

These risk ratings are broad and do not factor in other components to watershed health such as geologic stability, vegetation, or road/trail conditions. Table 3.28 compares the number of watersheds under each risk rating for each geographic unit. The no-action alternative includes unauthorized roads and trails that will not be decommissioned. Alternatives F, G and GM assume these unauthorized roads and trails are either closed or incorporated into the authorized road and trail system.

Table 3.28—Number of watersheds under each density risk rating

Watershed	Sq. Miles NFS* lands	No-Action			Alternative F			Alternative G			Alternative GM		
		H**	M	L	H	M	L	H	M	L	H	M	L
-----number of watersheds-----													
Colorado River Headwaters	457	0	22	31	0	16	37	0	8	45	0	8	45
Blue River	489	8	23	28	2	17	40	3	24	32	3	21	35
Eagle River	612	5	26	39	1	21	48	0	16	54	0	14	56
Roaring Fork River	1,022	2	24	76	0	11	91	0	10	92	0	11	91
Colorado Plateau	396	1	6	34	0	5	36	0	4	37	0	4	37
White River***	598	1	13	27	1	9	31	0	8	33	0	6	35
Totals	3,574	17	114	235	4	79	283	3	70	293	3	64	299

\* NFS – National Forest System

\*\* H-high, M-moderate, L-low road/trail density risk rating

\*\*\* This Watershed is a composite of four 4<sup>th</sup> Level HUCs: Upper White River, Piceance/Yellow Creek, Upper Yampa River and Lower Yampa River.

Overall, the no-action alternative would see the greatest number of 7<sup>th</sup> level watersheds falling under the road/trail density rating of high risk and moderate risk. Alternative GM would see the greatest number of 7<sup>th</sup> level watersheds falling under the low risk road/trail density rating suggesting that this alternative would generally be most protective of watershed resources.

Table 3.29 identifies selected watersheds of high and moderate road/trail densities under each of the three alternatives. Densities at high risk are identified as shaded cells.

Table 3.29—High and moderate risk road densities for selected watersheds, in miles per square mile (High risk densities are italicized in bold font)

HUC* #	Watershed name	No-Action	Alt F	Alt G	Alt GM
<b>Colorado River Headwaters</b>					
14010001160303	Middle Sheephorn Ck C	1.62	1.43	1.10	1.10
14010001160304	Slate Creek	2.36	1.83	1.73	1.73
14010001160305	Lone Lick Cr	2.95	2.66	2.59	2.59
14010001180101	Lower Piney River C	2.39	1.56	1.29	1.29
14010001180102	Castle Creek	2.33	2.05	0.93	0.93
14010001180607	Stark Creek	1.78	1.74	1.09	1.09

HUC* #	Watershed name	No-Action	Alt F	Alt G	Alt GM
14010001180609	Rock Creek	2.12	0.94	1.66	1.66
14010001181316	Freeman Creek	2.60	1.54	2.17	2.17
14010001240100	Lower Derby Creek C	1.56	1.34	1.09	1.09
14010001250100	Lower Sweetwater Creek C	1.95	1.13	0.48	0.48
14010001250405	Lake Creek	1.78	1.41	0.34	0.34
14010001250407	Cross Creek	2.05	1.44	0.57	0.57
14010001260304	Upper Deep Creek	2.04	1.67	1.38	1.37
14010001280102	Upper Cottonwood Creek	2.89	1.45	1.59	1.61
<b>Blue River</b>					
14010002010300	Spruce Creek	<b>4.06</b>	1.00	0.66	0.66
14010002010500	Deep Creek	2.81	1.90	2.01	1.42
14010002010600	Elliott Creek	1.81	1.01	1.11	0.33
14010002020101	Green Mountain Res. C	1.83	1.58	1.41	1.42
14010002020612	Harrigan Creek	2.04	0.15	0.15	0.15
14010002021921	Salt Lick Gulch	<b>5.44</b>	0.82	1.24	1.24
14010002030101	Dillon Reservoir C	<b>3.89</b>	2.27	2.31	1.89
14010002030102	Soda Creek	2.25	0.27	0.59	0.59
14010002030103	Miners Creek	2.55	0.53	0.58	0.58
14010002040101	Lower Snake River C	2.06	1.36	1.36	0.78
14010002040102	Frey Gulch	<b>3.30</b>	2.79	2.67	1.45
14010002040508	Upper Snake River	2.37	1.70	1.75	1.72
14010002050101	Blue River at Gold Hill C	2.00	0.11	1.27	1.27

HUC* #	Watershed name	No-Action	Alt F	Alt G	Alt GM
14010002050200	Swan River	2.67	1.49	1.53	1.45
14010002050605	French Gulch	2.32	1.13	1.22	1.34
14010002050606	Blue Rvr at Breckenridge C	1.89	0.51	1.01	1.00
14010002050609	Indiana Creek	2.27	1.03	1.44	1.33
14010002050611	Pennsylvania Creek	1.94	0.00	1.08	0.62
14010002050614	Upper Blue River	1.95	0.28	0.41	0.41
14010002060101	Lower Tenmile Creek C	1.96	1.72	1.72	1.72
<b>Eagle River</b>					
14010003020103	Old Mans Gulch	2.76	1.12	1.14	0.36
14010003020104	Fish Pond Gulch	1.80	1.40	0.90	0.47
14010003030102	Abrams Creek	2.36	2.35	1.62	2.35
14010003030103	Third Gulch	2.44	2.02	1.66	1.78
14010003030506	Bruce Creek	1.63	0.00	0.00	0.00
14010003031012	Upper West Brush Creek	1.53	1.25	1.03	1.03
14010003050103	Red Canyon Creek	1.58	1.50	0.26	0.26
14010003050404	Eagle Rvr near Wilmore C	2.69	2.69	1.23	1.23
14010003050405	Squaw Creek	1.62	0.56	0.45	0.45
14010003050606	Eagle Rvr abv Edwards C	2.97	2.88	1.34	1.34
14010003050607	Berry Creek	<b>3.44</b>	2.35	1.20	1.20
14010003050910	June Creek	<b>3.60</b>	2.56	1.51	1.51
14010003050911	Metcalf Creek	2.06	1.42	0.42	0.42
14010003070103	Red Sandstone Creek	2.04	1.43	1.77	1.77
14010003070105	Spraddle Creek	1.62	1.22	0.16	0.16

HUC* #	Watershed name	No-Action	Alt F	Alt G	Alt GM
14010003080101	Eagle River abv Minturn C	1.55	0.76	1.00	1.00
14010003080911	McAllister Gulch	1.80	1.74	1.69	1.69
14010003080912	Eagle Rvr abv Pando C	<b>3.49</b>	1.58	1.24	1.24
14010003080913	Resolution Creek	1.62	1.22	1.02	0.97
14010003080914	Yoder Gulch	1.91	0.84	0.84	0.84
14010003081000	Turkey Creek	1.93	1.48	0.65	0.66
<b>Roaring Fork River</b>					
14010004010303	Middle Cattle Creek C	2.68	0.80	0.80	0.80
14010004010304	Upper Cattle Creek	1.56	0.71	0.79	0.83
14010004020104	Blue Creek	2.26	0.87	1.28	1.28
14010004020708	West Sopris Creek	1.55	0.16	0.14	0.14
14010004020709	Lower East Sopris Creek C	1.85	0.00	0.00	0.00
14010004030103	Taylor Creek	1.64	1.38	0.32	1.38
14010004030128	Rocky Fork Creek	2.36	0.99	0.77	0.77
14010004030129	Bear Creek	1.66	0.01	0.29	0.01
14010004030731	Ruedi Reservoir C	1.54	1.10	0.93	1.04
14010004031919	Ivanhoe Creek	1.67	1.45	1.44	1.44
14010004033232	Fryingpan Rvr nr Norrie C	2.29	2.14	1.89	1.83
14010004040104	Red Canyon	2.95	1.17	1.90	1.98
14010004040506	Little Woody Creek	2.03	0.71	0.71	0.71
14010004040507	Collins Creek	2.18	0.13	0.13	0.13
14010004050106	McFarlane Creek	1.59	0.71	0.69	0.69

HUC* #	Watershed name	No-Action	Alt F	Alt G	Alt GM
<b>Colorado Plateau</b>					
14010005020304	Hadley Gulch	2.48	1.26	1.17	1.08
14010005020606	Meadow Creek	1.86	1.11	1.29	1.22
14010005041000	Alkali Creek	1.67	1.04	0.83	0.83
<b>White River</b>					
14050002010200	Milk Creek at Thornburgh C	1.89	1.20	1.73	1.20
14050005010200	Fawn Creek	1.69	1.62	1.54	1.54
140510005020509	Buck Creek	2.07	1.31	0.94	0.94
14050005030501	Coal Creek	<b>3.20</b>	<b>3.00</b>	2.12	2.54
14050005030602	Dickerville Creek	1.75	1.75	1.24	0.61
14050005030900	Dry Creek	2.37	2.22	1.84	1.84
14050005031100	Big Beaver Creek	1.82	1.76	1.72	1.72

\* HUC = hydrologic unit code.

### Proximity to Stream Channel

Ideally, roads and trails should be located as far away from streams as possible to protect water quality and maintain hydrologic integrity. The more a road or trail is buffered from a stream, the less likely that sediment and other water pollutants will be directly transported into a stream channel. Table 3.30 compares the miles of trails and of level 1 and 2 roads within 300 feet of a stream channel. Road prisms include cut, fill and the road bed. Overall, roads constructed adjacent to stream channels pose a greater risk than trails of impacting aquatic resources. This is because roads generally disturb more ground than do motorized and non-motorized trails.

Table 3.30—Miles of roads and trails within 300 feet of a stream channel

	Blue River	Colorado River Headwaters	Eagle River	Roaring Fork River	Colorado Headwaters-Plateau	White River Area
<b>No-Action</b>						
<b>Roads</b>	94	91	115	93	89	122
<b>Motorized Trail</b>	3	9	5	5	0	59
<b>Non-motorized Trl</b>	115	135	163	249	79	166
<b>Unauthorized Ways</b>	84	28	47	114	48	19
<b>Total Miles</b>	<b>297</b>	<b>262</b>	<b>331</b>	<b>461</b>	<b>216</b>	<b>366</b>
<b>Alternative F</b>						
<b>Roads</b>	69	83	96	83	74	117
<b>Motorized Trail</b>	3	9	5	5	1	61
<b>Non-motorized Trl</b>	141	142	183	258	93	169
<b>Total Miles</b>	<b>213</b>	<b>234</b>	<b>284</b>	<b>347</b>	<b>168</b>	<b>347</b>
<b>Alternative G</b>						
<b>Roads</b>	71	59	70	70	74	102
<b>Motorized Trail</b>	14	1	0	16	3	55
<b>Non-motorized Trl</b>	160	128	171	236	82	169
<b>Total Miles</b>	<b>245</b>	<b>188</b>	<b>242</b>	<b>323</b>	<b>159</b>	<b>325</b>
<b>Alternative GM</b>						
<b>Roads</b>	69	63	70	70	59	102
<b>Motorized Trail</b>	7	1	2	19	1	58
<b>Non-motorized Trl</b>	154	116	166	230	128	167
<b>Total Miles</b>	<b>229</b>	<b>181</b>	<b>237</b>	<b>320</b>	<b>156</b>	<b>327</b>

Mileage of roads and trails within 300 feet of a stream channel would be greatest under the no-action alternative. The Blue River geographic area would see the least miles of trails under Alternative F and little change, overall, in the miles of roads under each action alternative. Within the Eagle River geographic area, Alternative GM would see the least miles of roads and trails. Miles of motorized trails in the Roaring Fork geographic area would be the least under Alternative F and the No-action alternative (five miles) and increase to 19 miles under Alternative GM. Miles of roads and non-motorized trails in this geographic area would be the least under Alternative GM.

### Stream Crossings

The number of stream crossings, by analysis area and alternative, is presented in table 3.31. Tabulating the number of stream crossings by roads provides an estimate of the potential for disruption of streamflow rates and sediment input during runoff events.

Table 3.31—Number of stream crossings by Level 1 and 2 roads and trails

	Blue River	Colorado River Headwaters	Eagle River	Roaring Fork River	Colorado Headwaters-Plateau	White River Area
<b>No-Action</b>						
<b>Roads*</b>	170	180	201	171	141	199
<b>Motorized Trail</b>	8	25	7	3	0	97
<b>Non-motorized Trl</b>	176	236	206	336	88	237
<b>Unauthorized Ways</b>	196	63	101	233	119	43
<b>Total Miles</b>	<b>550</b>	<b>504</b>	<b>515</b>	<b>743</b>	<b>348</b>	<b>576</b>
<b>Alternative F</b>						
<b>Roads*</b>	118	154	166	148	113	184
<b>Motorized Trail</b>	8	25	7	3	1	102
<b>Non-motorized Trl</b>	229	260	241	359	115	247
<b>Total Miles</b>	<b>355</b>	<b>439</b>	<b>414</b>	<b>510</b>	<b>229</b>	<b>533</b>
<b>Alternative G</b>						
<b>Roads*</b>	138	120	120	122	119	152
<b>Motorized Trail</b>	23	2	0	31	6	98
<b>Non-motorized Trl</b>	279	217	218	325	97	237
<b>Total Miles</b>	<b>440</b>	<b>339</b>	<b>338</b>	<b>478</b>	<b>222</b>	<b>487</b>
<b>Alternative GM</b>						
<b>Roads*</b>	135	126	121	120	107	153
<b>Motorized Trail</b>	3	2	2	35	9	100
<b>Non-motorized Trl</b>	267	207	207	317	98	235
<b>Total Miles</b>	<b>405</b>	<b>335</b>	<b>330</b>	<b>472</b>	<b>214</b>	<b>488</b>

\* Mileage reflects maintenance level 1 and 2 roads only.

The no-action alternative would result in the most stream crossings. Overall, Alternative GM would result in the fewest road/trail crossings. For most watersheds there would not be much difference in the number of stream crossings between the action alternatives. Stream health would be enhanced in those watersheds where stream crossings by a road or trail are minimized.

### Proximity to Riparian and Wetland Areas

Roads can affect wetlands and riparian areas directly or indirectly through changes in hydrology. Modification of surface and subsurface drainage can result in changes in moisture regimes of these areas thereby impacting their beneficial functions to wildlife and aquatic habitat. Road proximity also can affect water quality in wetlands and riparian areas.

Table 3.31—Miles of roads/trails within 300 feet of wetlands and riparian areas, by analysis area

	Blue River	Colorado River Headwaters	Eagle River	Roaring Fork River	Colorado Headwaters-Plateau	White River Area
<b>No-Action</b>						
Roads*	23	31	15	20	11	17
Motorized Trail	<1	1	<1	0	<1	4
Non-motorized Trl	31	31	22	42	5	32
Unauthorized Ways	16	7	3	12	4	2
<b>Total Miles</b>	<b>70</b>	<b>70</b>	<b>40</b>	<b>74</b>	<b>20</b>	<b>55</b>
<b>Alternative F</b>						
Roads*	16	28	12	18	10	16
Motorized Trail	<1	1	<1	0	1	4
Non-motorized Trl	38	33	24	44	6	33
<b>Total Miles</b>	<b>54</b>	<b>62</b>	<b>37</b>	<b>62</b>	<b>17</b>	<b>53</b>
<b>Alternative G</b>						
Roads*	17	24	11	16	11	15
Motorized Trail	3	1	0	2	1	4
Non-motorized Trl	40	27	22	38	5	31
<b>Total Miles</b>	<b>60</b>	<b>52</b>	<b>33</b>	<b>56</b>	<b>17</b>	<b>50</b>
<b>Alternative GM</b>						
Roads*	17	23	11	16	11	15
Motorized Trail	2	1	<1	1	1	4
Non-motorized Trl	38	27	22	38	5	31
<b>Total Miles</b>	<b>57</b>	<b>51</b>	<b>33</b>	<b>55</b>	<b>17</b>	<b>50</b>

\* Mileage reflects maintenance level 1 and 2 roads only.

Overall, the no-action alternative would see greater miles of roads and trails within 300 feet of wetlands and/or riparian areas. Under the action alternatives, the greatest reduction in road proximity to these sensitive areas would be within the Blue River and Colorado River Headwaters geographic areas.

Alternative F, with more road miles than the other two action alternatives, would present a greater overall potential risk from road impacts on wetlands and riparian areas.

Alternative GM, with the fewest road miles, would present the least overall risk to these areas.

### Cumulative Effects

Nearly every land use activity has the potential to impact streams, riparian and wetland resources. On National Forest System lands they include ground disturbance related to recreation management, logging, livestock grazing, mining, and water diversions. The cumulative impact of past, present and future land uses on watershed resources depends on the magnitude of land disturbance and its

impacts to slope stability, hydrologic connectivity, and riparian/wetland vegetation as well as a watershed's inherent ability to absorb additional disturbance to its biological and physical elements. Land use activities in watersheds of shared ownership (local, state, federal agencies and private land owners) will also add cumulatively to watershed impacts.

### **Resource Protection Measures**

Watersheds and their streams can sustain some resource use and disturbance without serious consequences. Some watersheds, because of their geology, are more resistant to disturbance than others. Consequently, resource development and use in each watershed must be carried out in such a way that watershed and stream health are not compromised. Management on the forest will provide protection of aquatic, riparian, and wetland resources by following standards in the Watershed Conservation Practices (WCP) Handbook (Forest Service Handbook, Region 2 supplement 2509.25).

The WCP Handbook identifies standards for all management activities to protect soil, aquatic resources, and riparian areas. Each standard has one or more design criteria that describe in more detail how an activity will be conducted to protect soil productivity, stream channel integrity, and water quality. The WCP Handbook complies with non-point source pollution control regulations and the National Forest Management Act (NFMA).

In watersheds in which the human or naturally caused risks are high, watershed improvement or extraordinary mitigation measures may be used to offset the impacts of the proposed project. Appendix J of the forest plan (USDA Forest Service/WRNF 2002b) contains additional information regarding watershed risk ratings.

## Wilderness

---

### Introduction

The White River National Forest fully manages three wilderness areas and shares management of five wilderness areas with adjoining national forests. Current management emphasis allows natural processes to be maintained or improved within wilderness and is outlined in the forest plan. All motorized and mechanized vehicular use is prohibited in a national forest wilderness (USDA Forest Service 2004a, 36 CFR 261.16).

### Management Direction

The overall direction for managing recreation resources on the White River National Forest includes the national strategic goals to provide outdoor recreation opportunities in natural forest settings, promote access to recreation opportunities, and provide primitive types of experience in wilderness settings (USDA Forest Service/WRNF 2002a). One of the forest-wide goals and objectives for wilderness is to improve the capability of wilderness and protected areas to sustain a desired range of benefits and values. Wilderness should be managed so that changes in the ecosystem are primarily a consequence of natural forces or within the range of natural variability and succession (USDA Forest Service/WRNF 2002a).

Applicable guidelines for management area 1.11 and the pristine recreation opportunity spectrum (ROS) category direct that trails should not be constructed or reconstructed and that when resource damage exists from concentrated use of cross-country travelways, measures be taken to correct problems. Guidelines for management area 1.12 and primitive ROS direct the forest to take the following actions when needed: (a) minimize trail impacts on scenic resources and (b) eliminate duplicate trails. Finally, in management area 1.13 and semi-primitive ROS, recreational livestock is prohibited or restricted except for through-travel use.

### Desired Condition

The desired condition for recreation requires balancing the needs to provide diverse recreation opportunities, facilitate user access, and protect wilderness resource values. The desired condition for wilderness management is described below for each management area on the forest.

*1.11 Pristine Wilderness:* These areas provide the most outstanding opportunities for solitude and isolation. User-created trails or game trails may exist but are not maintained or designated on maps or trail guides. Recreation opportunities in this pristine ROS offer primitive and unconfined experiences.

*1.12 Primitive Wilderness:* Recreation is managed to protect natural conditions, provide opportunities for primitive recreation, offer a moderately high degree of solitude, and incorporate a ROS of semi-primitive non-motorized or primitive year-round. Travel is along primitive trails or unconfined.

*1.13 Semi-Primitive Wilderness:* These areas are managed to protect natural conditions and to provide access to primitive or pristine areas. Encounters with other users may be frequent because of concentrated use in the area. Trail and bridge construction incorporate natural designs and native materials that complement the surrounding landscape whenever possible. Travel is primarily along a well-defined trail system.

## Key Indicators

**Key indicator:** Impacts on solitude and remoteness in designated wilderness.

**Measure:** Miles of system trail open to foot and horse use.

**Measure:** Miles of system trail open to foot use only.

**Measure:** Miles of unauthorized (non-system) trails to be decommissioned.

**Measure:** Miles of unauthorized (non-system) trails added to the system.

## Affected Environment

Approximately one-third of the forest, totaling 755,100 acres, is designated wilderness, the largest proportion of any national forest in Colorado. This represents 24 percent of the state's designated wilderness on National Forest System lands.

Figure 3.15 displays the location of existing wilderness areas on the White River National Forest. Basic establishment and acreage data are summarized in table 3.32. Further background information on wilderness is incorporated by reference to the forest plan (USDA Forest Service/WRNF 2002b).

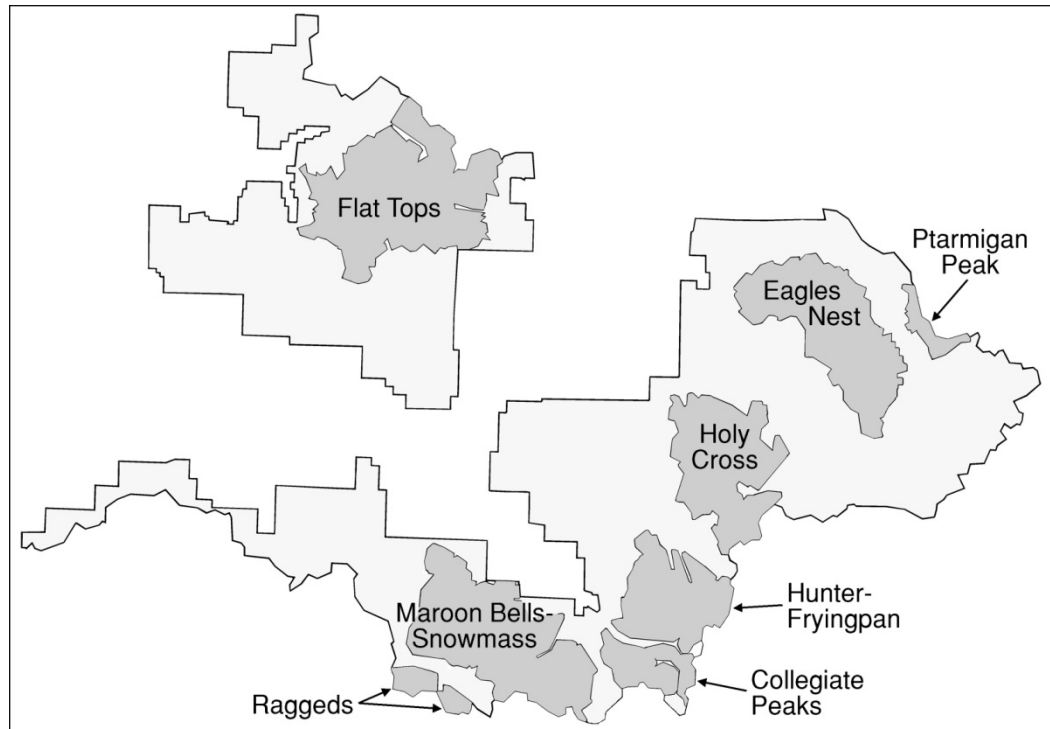


Figure 3.15—Existing wilderness areas on the White River National Forest

**Table 3.32—Acres of existing wilderness on the White River National Forest**

Name	Establishing law	White River National Forest	Other acreage*	Total
		-----Acres-----		
Collegiate Peaks	P.L. 96-560 12-22-80	35,482	189	35,671
Eagles Nest	P.L. 94-352 07-12-76	133,311	185	133,496
Flat Tops	P.L. 94-146 12-12-75	196,344	192	196,536
Holy Cross	P.L. 96-560 12-22-80	113,366	475	113,841
Hunter-Fryingpan	P.L. 95-237 02-24-78	82,026	40	82,066
	P.L. 103-77 08-13-93			
Ptarmigan Peak	P.L. 103-77 08-13-93	13,175	0	13,175
Raggeds	P.L. 96-560 12-22-80	16,793	39	16,832
Maroon Bells	P.L. 88-577 09-03-64	161,984	1,499	163,483
/Snowmass	P.L. 96-560 12-22-80			
<b>Totals</b>		<b>752,481</b>	<b>2,619</b>	<b>755,100</b>

\*The "other acreage" category includes lands under private or other type of ownership. It does not include National Forest System acreage on adjoining national forests. Source: USDA Forest Service 2003.

### Recreation Activities

The Wilderness Act of 1964 limits the type of recreation activities that may occur in designated wilderness to non-motorized and non-mechanized methods of travel. Table 3.33 displays the current mileage of wilderness trails. During the snow-free season, most system and non-system trails are open to foot and horse travel. National Forest System trails are those that are maintained as system trails. Unauthorized (non-system) trails usually are not-constructed routes that are currently used by recreationists but are not maintained by the Forest Service. Many of these routes are game trails or user-created trails.

During the winter, the area-wide strategy for wilderness allows non-motorized and non-mechanized travel predominately in the modes of cross-country skiing and snowshoeing. Year-round, off-trail travel is allowed for horse and foot traffic but not encouraged because of the potential resource impacts with repeated use.

**Table 3.33—Miles of trail in each wilderness area on the White River National Forest**

Wilderness area	NFS trails Foot/horse	Non-system Unauthorized	Total
	-----Miles-----		
Collegiate Peaks	13	3	6
Eagles Nest	158	17	175
Flat Tops	267	26	293
Holy Cross	115	19	134
Hunter-Fryingpan	67	10	77
Maroon Bells-Snowmass	154	18	172
Ptarmigan Peak	14	0.0	14
Raggeds	11	0.0	11
<b>Totals</b>	<b>799</b>	<b>93</b>	<b>985</b>

Mileage calculations are based on GIS analysis.

### **Recreation Use and Capacity**

Nation-wide the most popular recreation activities include walking, sightseeing, and picnicking (USDA Forest Service 2000a). The White River National Forest NVUM results (Kocis et al. 2003) estimate that there are 291,640 wilderness visits (error rate 15 percent), with most users being from Colorado and average length of stay 7.9 hours. Visitor use of wilderness areas on national forests is forecasted to grow between 0.5 percent and 1 percent per year for the next 50 years (Cordell 1999). Locally, there is an increased demand for pristine, primitive, and semi-primitive non-motorized recreation opportunities as private land is developed; the growth rate of local counties is as high as 4 percent annually, and Colorado's overall growth has increased 30.6 percent since 1990 (U.S. Department of Commerce 2004).

Theoretical capacity for recreational opportunities for wilderness and non-wilderness travel are displayed on a trail (snow-free) and area-wide (snow-covered) basis (see the capacity discussion in the recreation section of this chapter). The forest plan and travel management plan helps to establish the framework for determining recreation capacity within designated wilderness. Additional analysis will be required to determine site-specific limiting factors and establish practical capacities for these areas.

### **Travel Management Conflicts**

Within wilderness, travel management conflicts exist. Some hikers dislike encountering horses or even the evidence of horse use in wilderness areas (Cordell 1999). Popular peaks, such as those above 14,000 feet within wilderness, receive use levels inconsistent with primitive and semi-primitive recreation opportunity guidelines. Frequently, when private land is developed near wilderness, recreationists expect nearby access to the national forest and will pioneer routes when those are not provided.

## **Environmental Consequences**

### **General Effects**

Short-term impacts on wilderness resources on the forest are not anticipated, because only legal uses will be considered for travel management strategies. Long-term impacts on the wilderness resource are expected only if the selected alternative adds significant additional mileage of non-system miles to the system, restricts the type of activity allowed, or decommissions part of the system, thereby changing the amount of activity allowed. Table 3.34 summarizes the number of miles of system trail open to foot and horse; table 3.35 summarizes miles of non-system ways decommissioned and miles of non-system ways added to the system.

Table 3.34—Miles of system trails in wilderness areas, by alternative

Wilderness	Foot/horse			
	Alternative A	Alternative F	Alternative G	Alternative GM
Collegiate Peaks	13	13	13	13
Eagles Nest	158	158	149	147
Flat Tops	267	267	261	260
Holy Cross	114	114	110	110
Hunter-Fryingpan	67	67	60	59
Ptarmigan Peak	14	14	14	10
Raggeds	11	11	11	11
Maroon Bells/Snowmass	154	154	153	152
<b>Totals</b>	<b>798</b>	<b>798</b>	<b>771</b>	<b>762</b>

*Note: System trail miles not adopted in alternatives would be decommissioned and is not reflected in total mileage shown in table below for “non system” routes.*

Table 3.35—Miles of unauthorized (non-system) trails decommissioned or added to the system by alternative and wilderness area

Wilderness	Miles of unauthorized (non-system) trails							
	Decommissioned				Added to the system (miles reflected in table above)			
	Alt A	Alt F	Alt G	Alt GM	Alt A	Alt F	Alt G	Alt GM
Collegiate Peaks	0	3	3	3	0	0	0	0
Eagles Nest	0	17	7	9	0	0	10	8
Flat Tops	0	26	24	26	0	0	2	0
Holy Cross	0	19	17	17	0	0	2	2
Hunter-Fryingpan	0	10	10	10	0	0	0	0
Ptarmigan Peak	0	0	0	0	0	0	0	0
Raggeds	0	0	0	0	0	0	0	0
Maroon Bells/Snowmass	0	18	17	17	0	0	1	1
<b>Totals</b>	<b>*0</b>	<b>93</b>	<b>78</b>	<b>82</b>	<b>*0</b>	<b>*0</b>	<b>15</b>	<b>11</b>

\* Alternative A considers the current condition where no unauthorized routes are recognized, would be adopted or decommissioned. Alternative F considers the minimum actions needed to bring the forest into compliance with the forest plan, therefore there is no consideration (adoption) of user created routes.

## Direct and Indirect Effects

### Recreation opportunities

No alternative proposed would add net trail miles to the existing system inside wilderness. Alternative GM would result in a reduction and decommissioning of 36 miles; Alternative G would result in a reduction of 27 miles, while Alternative F and Alternative A retain the current condition.

Non-system routes that were added to the system were done so to facilitate existing use that was occurring to access the wilderness area's onto one access route.

### **Prohibitions for Stock**

Currently, very few trails are closed to stock users. Area-wide stock use would continue to be permitted and remains unchanged in all alternatives. Under Alternatives G and GM, there are only four trails or portions of trails that were identified for closure to stock within wilderness areas. Decisions to close those trails were done to provide for visitor and livestock safety. These trails occur within Eagles Nest, Holy Cross, and the Maroon Bells wilderness areas. Of the entire forest trail system, this accounts for less than 1 percent of the total open wilderness trail miles and less than ½ of 1 percent of the total forest trail miles.

### **Management of Unauthorized Trails (Non-system trails)**

Alternative F would decommission the most miles of non-system trails (92 miles), followed by Alternative GM (81 miles). As the non-system routes are returned to their natural state, the opportunities for pristine and primitive recreation opportunities would increase, and opportunities for semi-primitive recreation opportunities would decrease.

Overall, additions to system trails would increase recreational opportunities and the capacity for recreation use. Future planning efforts, specifically the forest-wide recreation capacity analysis, will be used to address site-specific conflicts between trail recreation use numbers and wilderness management direction.

### **Winter recreation**

The area-wide strategy for winter travel within designated wilderness will continue to allow non-motorized and non-mechanized travel both on system trails and cross-country. Designated routes may be required in areas with critical winter range habitat. No significant change in use patterns or activities from the current condition is anticipated.

### **Cumulative Effects**

Since the Wilderness Act constrains the type of recreation activity within designated wilderness to non-motorized and non-mechanized, there are very few cumulative changes that would occur in the types of recreation activities allowed. As private land continues to develop near or adjacent to designated wilderness, the demand for access trails and eventual overall mileage of trails will continue to increase. There is currently an effort underway to add to the overall designated wilderness acreage on the forest. If successful, this proposal may add to the overall trail mileage.

## Wildlife, Aquatic Species, and Rare Plants

---

### Introduction

The National Forest Management Act (NFMA) requires the White River National Forest to provide for a diversity of plant and animal communities, and to maintain viable populations of existing native and desired nonnative vertebrate species. To this end, the forest plan established goals, objectives, standards, and guidelines across the forest to maintain or improve habitat for terrestrial and aquatic wildlife, fish, and rare plant species.

The Endangered Species Act of 1973 (as amended) requires all federal departments and agencies to conserve Threatened and Endangered species and the habitats on which they depend, and to consult with the U.S. Fish and Wildlife Service on all actions authorized, funded, or carried out by the agency to ensure that the actions will not likely jeopardize the continued existence of any Threatened and Endangered species or adversely modify critical habitat (FSM 2670).

In addition, the Forest Service requires a biological evaluation of effects on species proposed for federal listing as Threatened or Endangered, and Forest Service Sensitive species and habitat (FSM 2672.4). Sensitive Species are identified by the Forest Service Regional Forester as “those...for which population viability is a concern, as evidenced by...significant current or predicted downward trends in population numbers or density...” or “significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution” (FSM 2670.5). This biological evaluation is necessary to ensure that Forest Service actions do not contribute to loss of viability of any Threatened, Endangered, Proposed, or Sensitive (TEPS) plant or animal species, or cause any species to move toward federal listing. The biological evaluation is also used to identify opportunities for species and habitat enhancement and to reduce potential negative impacts. Determinations of effects on Threatened, Endangered, Proposed, and Sensitive (TEPS) species are based on the habitats affected and species occurrence.

For a complete picture of the terrestrial wildlife, plant, and aquatic species analysis that was completed for this project, refer to the Biological Assessment (BA) for federally listed Threatened and Endangered species; Biological Evaluation (BE) for Sensitive species; and management indicator species (MIS) report in the project record. The details found in those documents are summarized here, and are available to the reader upon request.

### Affected Environment

The White River National Forest provides habitat to a wide range of birds, mammals, fish, reptiles, amphibians, and invertebrates, and provides habitats for plants ranging in elevations from 5,500 feet to more than 14,000 feet with most of its lands lying between 8,500 and 11,800 feet.

The White River National Forest contains diverse wildlife, fish, and rare plant habitats including montane forests, subalpine forest, mountain shrublands, upland parks, riparian meadows, alpine, and aquatic ecosystems that support a wide range of bird, mammal, fish, reptile, amphibian, invertebrate, and rare plant species.

Fish and wildlife habitats are evaluated at various scales. Fisheries are associated primarily with perennial streams, lakes, and reservoirs. The areas of influence for fisheries generally include the watersheds that influence the waters. For this analysis, 6<sup>th</sup>-

level watersheds (subwatersheds) were used. The area of influence for terrestrial wildlife habitats vary with each species evaluated. Some wildlife species may have a limited distribution and home range, while others may be wide-ranging and have an extensive distribution. More than 250 species of terrestrial wildlife reside on the White River National Forest, either seasonally or year-long. Seasonal conditions affect the use and location of various species.

The area of potential effect of the proposed action varies for each of the 38 TESP plant species that have potential habitat on the WRNF. Some species colonize previously disturbed habitats which are now stabilized such as roadside and trailside habitats where they are vulnerable to use, maintenance and rehabilitation. Other species are especially affected by hydrologic changes which may occur in and adjacent to travel routes through use, maintenance or rehabilitation, while others occupy rocky or inaccessible habitats where they are generally protected. Many species have pollinators which may be impacted through road or trail use, maintenance or rehabilitation by increased dust or by collision with vehicles while others do not require a pollinator to reproduce. Fen obligate plant species appear to be especially susceptible to impacts from over-snow use.

Habitat types can be broadly described in ecological categories that occur across the forest. Each provides habitat characteristics important to various species. The ecological categories used for this analysis include: forested, mixed mountain shrub, grass/forb, riparian, aquatic, and alpine regimes.

About 65 percent of the White River National Forest is forested, with shrubland, grassland, and unvegetated areas making up the remainder (see Table 3-36). More than a fourth of the forest is occupied by Engelmann spruce-subalpine fir.

**Table 3.36—Dominant Vegetation Cover Types of the White River National Forest**

Cover Type	Acres	% of WRNF
Douglas Fir	69,700	3.1
Ponderosa Pine	300	0.01
Lodgepole Pine	256,600	11.2
Engelmann Spruce/Subalpine Fir	650,700	28.5
Oakbrush/Mountain Shrub	181,800	8.0
Pinyon-Juniper	15,100	0.7
Hardwoods (predominately aspen)	426,000	18.7
Other Forest Types <sup>1</sup>	3,900	0.2
Non-forested <sup>2</sup>	668,500	29.3
Water	9,800	0.4
<b>Total</b>	<b>2,282,400</b>	<b>100</b>

<sup>1</sup> Includes blue spruce (0.01%) and limber pine (<0.01%)

<sup>2</sup> Includes willow, Krummholz, grasslands, rock, alpine, and non-open water wetlands

Source: WRNF Forest Plan-2002 Revision, Common Vegetation Unit database, rounded to nearest 100 acres

Table 3.37 shows the structural stages (the developmental stages of tree stands in terms of tree size, age, and canopy closure) of aspen, Douglas-fir, lodgepole pine, and spruce-fir on the forest. Cottonwood, blue spruce, limber pine, pinyon-juniper, and ponderosa pine were excluded because of their limited acreages. In the table, structural stages are identified by number and letter, indicating growth stage and canopy closure respectively.

Table 3.37 does not include recent changes to lodgepole pine forests from the mountain pine beetle epidemic, changes to spruce/fir forests from spruce beetle infestations, nor aspen mortality caused by Sudden Aspen Decline. These insect and disease occurrences have resulted in substantial mortality in mature forests on the White River National Forest since the forest plan was written. Forest structure in the structural stages 5, 4, and many of the structural stage 3 timber stands is changing as trees die.

**Table 3.37—Structural Stages of Forest Habitats on the White River National Forest**

Structural Stage <sup>1</sup>	Aspen	Douglas Fir	Lodgepole	Spruce/Fir	Total
1 and 2	33,200 ac ( 8%)	1,300 ( 2%)	5,900 ac ( 3%)	47,300 ac (8%)	87,700 ac ( 7%)
3A <sup>2</sup>	36,000 ac ( 9%)	7,900 (11%)	8,900 ac ( 4%)	48,000 ac (8%)	100,800 ac ( 8%)
3B	105,000 ac (25%)	8,600 (12%)	38,100 ac (17%)	68,100 ac (11%)	219,800 ac (17%)
3C	145,600 ac (34%)	10,400 (15%)	78,900 ac (35%)	80,200 ac (13%)	315,100 ac (24%)
4A	7,100 ac ( 2%)	8,000 (12%)	4,500 ac ( 2%)	49,200 ac (8%)	68,800 ac ( 5%)
4B	39,900 ac ( 9%)	14,800 (21%)	20,900 ac ( 9%)	148,300 ac (24%)	223,900 ac (17%)
4C and 5	58,200 ac (14%)	18,800 (27%)	68,700 ac (30%)	169,300 ac (28%)	315,000 ac (24%)
<b>Total</b>	<b>425,000 ac</b>	<b>69,800 ac</b>	<b>225,900 ac</b>	<b>610,400 ac</b>	<b>1,331,100 ac</b>

<sup>1</sup> 1: grass/forb; 2: shrub/seedling; 3: sapling/pole; 4: mature; 5: old growth

<sup>2</sup> A: canopy closure of 0-40%, B: 41-70%; C: 71-100%

Source: WRNF Forest Plan-2002 Revision, Common Vegetation Unit database, rounded to nearest 100 acres

## Forests

Forested habitats are found from the lower pinyon/juniper stands on the western sections of the forest at about 6,000 feet to the spruce/fir at approximately 11,500 feet, where alpine habitats start.

Forested communities provide seasonal and year-round habitat for a wide range of wildlife species found on the White River National Forest. Deer and elk use these areas as summer range. A multitude of avian species can be found in these areas throughout the year, and mammals from shrews to bears also find important habitats within forested communities. Species of special interest within these communities include the Canada lynx (Threatened), and Sensitive Species such as the pygmy shrew, wolverine, boreal and flammulated owls, American marten, northern goshawk, American three-toed woodpecker, olive-sided flycatcher, and purple martin.

Forested communities on the White River National Forest provide secondary habitat for four Sensitive plant species where they transition to riparian habitats including: Park milkvetch, lesser panicled sedge, yellow ladies' slipper, and dwarf raspberry. Forested areas also provide secondary habitat for Wetherill milkvetch and Harrington beardtongue within certain geologic formations where pinyon-juniper is widely spaced. Threatened plants DeBeque phacelia (*Phacelia scopulina* var. *Submutica*) and Colorado hookless cactus (*Sclerocactus glaucus*) potential habitat has been identified in the pinyon-juniper habitat type, namely on the very western portions of the forest.

## Mixed Mountain Shrublands

Mixed mountain shrub communities provide important seasonal habitats for big game that migrate from higher elevations in the summer and fall, to lower-elevation, usually south-facing slopes in the winter and early spring. Elk, mule deer, and bighorn sheep are

commonly found using these habitats as winter range areas. A wide range of birds and small mammals also use these habitats either seasonally or year-round. Several species of special interest including Virginia's warbler (MIS) and Sensitive Species such as sage grouse, Columbian sharp-tailed grouse, sage sparrow, and Brewer's sparrow are tied to these habitats.

These areas often are adjacent to Bureau of Land Management (BLM) and private lands, and many areas have seen heavy impacts from human development. Mixed mountain shrub habitats provide primary access points to the forest, and many trails and roads dissect these lower elevation areas. Travelways generally follow drainages and ridgelines, which are also highly used by wildlife.

The mixed mountain shrub community on the White River National Forest provides primary habitat for 4 Sensitive plant species including Wetherill milkvetch, Rocky mountain thistle, Harrington beardtongue, and Sun-loving meadowrue. The mixed mountain shrub type is a very broad ecological category inclusive of several types of shrub communities: sagebrush (*Artemisia spp.*), Gambel oak (*Quercus gambelli*), chokecherry (*Prunus virginianus*), mountain mahogany (*Cercocarpus montanus*) and serviceberry (*Amelanchier alnifolia*). Specialized habitats often occur within these habitat types resulting in high potential habitat for select species including locations where exposures of certain geological formations (Green River, Wasatch, etc) occur. Mixed mountain shrub habitats often occur at lower elevation areas on the forest where they are more common on the western portion of the forest.

### **Grass/Forb Meadows**

Wildlife species associated with mountain grass/forb meadow habitats include many species of small mammals and birds, including the following species of special interest on the forest: pygmy shrew and elk year-round; and ferruginous hawk, loggerhead shrike, and northern harrier during summer and/or migration. Both engineered and user-created travelways are commonly found in these habitats because there is no need to clear vegetation to establish a travel route.

Grass/forb meadow communities on the White River National Forest provide primary habitat for 6 Sensitive plant species including: Fork leaf moonwort, slender moonwort, paradox moonwort, slender-leaf buckwheat, Hall's fescue, and Colorado tansy-aster. Some species colonize previously disturbed habitats which are now stabilized such as roadside and trailside habitats where they are vulnerable to use, maintenance and rehabilitation. Both engineered and user-created travelways are commonly found in these habitats because there was no need to clear vegetation to establish a travel route. Approximately 9 percent of the White River National Forest is composed of grass/forb lands. These communities are made up of a wide range of grasses and forbs; the specific mix of species depends in large part on elevation, slope, and soil types.

### **Riparian Areas and Wetlands**

Although a very limited amount of the White River National Forest is classified as riparian and wetland habitats (less than 3 percent), these areas receive a disproportionately high share of wildlife use. Riparian areas and wetlands are found in association with streams, lakes, ponds, reservoirs, springs, bogs, and marshes. These habitats range from areas that are permanently submerged with emergent vegetation, to areas that are only seasonally saturated at the surface following snowmelt and are vegetated by sedges, rushes, alders, and willows. Many terrestrial and aquatic wildlife species found on the forest including amphibians, waterfowl, and shorebirds, use riparian and wetland habitats as their primary habitat association. These habitats form important

foraging areas and drinking water sources for many other species. Species of interest include many bat species (both MIS and Sensitive Species), elk (MIS), and many Sensitive Species such as the Great Basin silverspot butterfly, pygmy shrew, river otter, bald eagle, peregrine falcon, black swift, Lewis' woodpecker, boreal toad, and northern leopard frog. Traditionally, many of the existing roads and trails are adjacent to riparian and stream corridors that also provide some of the most important wildlife habitats.

Riparian on the White River National Forest areas provide primary habitat for 20 Sensitive plant species including 8 riparian generalist species and 12 fen obligate species. Riparian generalist species include: Ute ladies' tresses orchid, park milkvetch, trianglelobe moonwort, lesser panicled sedge, yellow lady's slipper, giant helleborne, Kotzebue's grass of Parnassus, and dwarf raspberry. Fen obligate species include: livid sedge, round leaf sundew, alai cottongrass, Chamisso's cottongrass, slender cottongrass, simple bog sedge, Porter's feathergrass, hoary willow, autumn willow, peat moss, Baltic bog moss, and lesser bladderwort. Although a very limited amount of the White River National Forest is classified as riparian (less than 3 percent), riparian areas and wetlands support most of the TESP plant species on the planning unit. Fens are a very specialized and limited type of wetland habitat type on the forest. Wetlands including fen are found in association with streams, lakes, ponds, reservoirs, springs, and marshes. These wetlands range from areas that are permanently submerged with emergent vegetation to areas that are only seasonally saturated at the surface following snowmelt and vegetated by sedges, rushes, and willows. Potential habitat for the Ute ladies' tresses orchid (*Spiranthes diluvialis*), a Threatened plant has been identified on particular riparian areas in lands below 7,000 feet elevation.

### Alpine

Alpine habitats have an abundance of wildlife use during the short summer season by big game, small mammals, birds, and insects, but only a few hardy species such as the white-tailed ptarmigan and wolverine use alpine habitats year-round. Species of special interest in alpine communities include management indicator species such as elk and American pipit, and Sensitive species including bighorn sheep, wolverine, and white-tailed ptarmigan. Alpine areas also offer potential habitat for the Endangered Uncompahgre fritillary butterfly.

Alpine areas on the White River National Forest provide primary habitat for 5 Sensitive plant species including: sea pink, smooth rockcress, clawless draba, Gray's Peak draba, and ice cold buttercup. Alpine areas, namely Hoosier Ridge and surrounding areas of similar conditions contain primary habitat for the Penland alpine fen mustard (*Eutrema edwardsii ssp. Penlandii*), a Threatened species.

Alpine areas are defined as areas that rise above the cold limits of trees. These areas are characterized by having severe weather conditions with very short growing seasons. Soils are generally very shallow and take many years to reestablish following disturbances. Many specialized plants and animals often live life "on the edge" in these rugged environments.

### Aquatic

Aquatic ecosystems include the stream channel, lake or estuary bed, water, biotic communities, and the habitat features that occur therein. Cold-water fish habitat on the forest is characterized by clear, cold water; a silt-free rocky substrate in riffle-run areas; areas of slow, deep water; well-vegetated, stable streambanks; and lacustrine (lake) habitat, which is characterized by clear, cold, deep lakes and reservoirs. Warmer-water

fish species of interest occur in streams and rivers at lower elevations on the forest and downstream of the forest.

Table 3.38 lists the species of interest (Threatened, Endangered, Sensitive, and Management Indicator Species) evaluated and their associated habitat types.

**Table 3.38—Species evaluated and their associated habitat types**

Species	Habitat Classification					
	Mixed mountain shrub	Forest	Grass/ forb	Riparian and aquatic	Alpine	Location of evaluation in this EIS
Mammals						
Townsend's big-eared bat	P	P	P	P		BE
Spotted bat	P	P	P			BE
Wolverine	S	P	P	P	P	BE
River otter				P		BE
American marten		P		P	S	BE
Fringed myotis	P	P				BE
Pygmy shrew		P	P	P		BE
North American (Canada) lynx	P	P	P	S	S	BA
Cave bats	P	P	P	P		MIS
Elk	P	P	P	S	S	MIS
Bighorn sheep		P	P		P	BE
Birds						
Northern goshawk	S	P	S	P		BE
Boreal owl		P				BE
Sage sparrow	P					BE
Ferruginous hawk			P			BE
Greater sage grouse	P					BE
Northern harrier	S		P	S		BE
Olive-sided flycatcher		P				BE
Black swift				P		BE
American peregrine falcon	S	P	P	P	S	BE
White-tailed ptarmigan				S	P	BE
Loggerhead shrike	P		P			BE
Lewis' woodpecker				P		BE
Flammulated owl		P				BE
American 3-toed woodpecker		P				BE
Purple martin	S	P	S			BE
Brewer's sparrow	P					BE, MIS
Columbian sharp-tailed grouse	P		S	S		BE
Mexican Spotted owl		P				BA
Bald eagle				P		BE
American pipit					P	MIS

Species	Habitat Classification					Location of evaluation in this EIS
	Mixed mountain shrub	Forest	Grass/ forb	Riparian and aquatic	Alpine	
Virginia's warbler	P					MIS
<b>Amphibians</b>						
Boreal toad				P		BE
Northern leopard frog				P		BE
<b>Fish</b>						
Colorado River cutthroat trout				P		BE
Roundtail chub				P		BE
Bluehead sucker				P		BE
Flannelmouth sucker				P		BE
Mountain sucker				P		BE
Colorado pikeminnow				P		BA
Humpback chub				P		BA
Razorback sucker				P		BA
Bonytail				P		BA
Greenback Cutthroat trout				P		BA
All Trout				P		MIS
<b>Invertebrates</b>						
Great Basin silverspot				P		BE
Uncompahgre fritillary butterfly					P	BA
Aquatic macroinvertebrates				P		MIS
<b>Plants</b>						
<i>Armeria maritima</i>					P	BE
<i>Astragalus leptaleus</i>		S		P		BE
<i>Astragalus wetherillii</i>	P	S				BE
<i>Botrychium ascendens</i>			S	P		BE
<i>Botrychium furcatum</i>			P			BE
<i>Botrychium lineare</i>			P			BE
<i>Botrychium paradoxum</i>			P			BE
<i>Braya glabella</i>					P	BE
<i>Carex diandra</i>		S		P		BE
<i>Carex livida</i>				P		BE
<i>Cirsium perplexans</i>	P					BE
<i>Cypripedium parviflorum</i>		P		S		BE
<i>Draba exungiculata</i>					P	BE
<i>Draba grayana</i>					P	BE
<i>Drosera rotundifolia</i>				P		BE
<i>Epipactis gigantea</i>				P		BE
<i>Eriogonum exilifolium</i>			P			BE
<i>Eriophorum altaicum</i> var. <i>neogaeum</i>				P		BE

Species	Habitat Classification					Location of evaluation in this EIS
	Mixed mountain shrub	Forest	Grass/ forb	Riparian and aquatic	Alpine	
<i>Eriophorum chamissonis</i>				P		BE
<i>Eriophorum gracile</i>				P		BE
<i>Eutrema penlandii</i>				S	P	BA
<i>Festuca hallii</i>			P			BE
<i>Kobresia simpliciuscula</i>				P		BE
<i>Machaeranthera coloradoensis</i>			P		S	BE
<i>Parnassia kotzebuei</i>				P		BE
<i>Penstemon harringtonii</i>	P					BE
<i>Phacelia scopulina</i> var. <i>submutica</i>	P					BA
<i>Ptilagrostis porteri</i>				P		BE
<i>Ranunculus karelinii</i>					P	BE
<i>Rubus arcticus</i> ssp. <i>acaulis</i>		S		P		BE
<i>Salix candida</i>				P		BE
<i>Salix serissima</i>				P		BE
<i>Sclerocactus glaucus</i>	P					BA
<i>Sphagnum angustifolium</i>				P		BE
<i>Sphagnum balticum</i>				P		BE
<i>Spiranthes diluvialis</i>				P		BA
<i>Thalictrum heliophilum</i>	P					BE
<i>Utricularia minor</i>				P		BE

○ P= Primary habitat, S= Secondary habitat; BA=appendix A, BE=appendix B, MIS=appendix C

## Environmental Consequences

### Assumptions

Assumptions were made concerning the effects of the proposed White River National Forest travel management plan as it relates to wildlife, fish, and rare plant species analyzed in this EIS. These same assumptions are used for the BA, BE, and MIS analyses as well. Assumptions include:

- No new road or trail construction is considered in the proposed action.
- The only new ground-disturbing activities resulting from the proposed action will be the rehabilitation of existing roads, trails, and user created routes. Routine maintenance of Forest Service system roads and trails would continue.
- Changes will be made to the category of motorized, mechanized, and non-motorized/non-mechanized uses that will result in various levels of impacts on individual wildlife, fish, and plant species across the forest.
- Alternative A, the No Action Alternative, is considered the current existing situation on the Forest. Alternative A is not compliant with direction in the forest plan. There are a substantial number of user-created roads and trails on the Forest that are identified under this alternative. These user created routes are not a part of the legal White River National Forest transportation system. Motorized

or mechanized use of these routes is not legal, however there currently is some level of illegal activity from both motorized and mechanized users on many of these user created routes on the forest. This illegal use creates some level of impacts to wildlife, fish, and plants. The level of illegal use is likely to be more prevalent where prisms remain on the ground. Under the No Action Alternative, existing impacts to wildlife, fish, and plant species would continue.

- Under Alternatives F, G, and GM, for each of the user-created routes the travel management decision will either rehabilitate them, or incorporate them into the White River National Forest transportation system. New user created routes that are created or found after the existing baseline roads and trail inventory was done would be rehabilitated.
- For user created routes that are converted to legal Forest Service system roads and trails, human use would be expected to increase once these routes are designated, mapped, and signed. Impacts from increased human use are expected to have correspondingly increased impacts for many wildlife, fish, and plant species.
- User created routes and Forest Service system roads and trails that would be rehabilitated would improve habitats and conditions for wildlife, fish, and plants. The rehabilitation of identified travelways may take years to fully rehabilitate and resemble surrounding habitats. The reduction in human use would have immediate benefits to many species. The fewer user-created routes left on the landscape, the less likely it is that physical or behavioral disturbance to wildlife, fish, and rare plant species will occur.
- There are several types of potential travel management related impacts on wildlife, fish, and plant species: (1) impacts related to the actual footprint of the road, trail, or snowplay area affecting habitat, (2) disturbance activities resulting from the use of the travelways, (3) direct mortality caused by use of travelways, (4) travelways that act as vectors for weeds and other introduced species, and (5) physical and behavioral disturbances resulting from the rehabilitation activities.
- Travel management-related impacts on wildlife, fish, and plants vary with the volume, timing, and type of travel; the species of wildlife, fish, and plants in the area; the habitats involved; time of day or season of year; and myriad other factors.
- Each species discussed has different reactions to motorized, mechanized, or non-motorized/non-mechanized use.
- All existing recurring winter motorized use routes will continue to be used by non-motorized recreationists. Although this likely will not be true for some routes (snowmobiles travel much farther from trailheads/access points than skiers do), at this time it is not possible to accurately predict which routes previously open to winter motorized use will or will not continue to be used by non-motorized recreationists.
- Multiple literature reviews of recreation impacts on wildlife, fish, and plant communities have been completed as a part of this EIS. Literary reviews include: Effects of Winter Recreation on Wildlife of the Greater Yellowstone Area: A Literature Review and Assessment (Olliff et al. 1999); Effects of Recreation on Rocky Mountain Wildlife Habitat (Joslin and Youmans 1999); The Environmental Impacts of Recreation: A Bibliography (Anon. 1999); Forest

Roads: A Synthesis of Scientific Information (USDA Forest Service 2000c); Wildlife and Recreationists: Coexistence Through Management and Research (Knight and Gutzwiller 1995); Effects of Off-road Recreation on Deer and Elk (Wisdom et al. 2004) ); The Effects of Highways on Elk (*Cervus elaphus*) Habitat in the Western United States and Proposed Mitigation Approaches (Ruediger et al 2006); and the Colorado Division of Wildlife 2006 report on the Colorado Inventoried Roadless Areas Petition.

These exhaustive reviews of past studies contain a wealth of information concerning the impacts on wildlife, fish, and plant communities from vehicular and other types of recreation use. Many of the reports cite effects of roads such as:

- a) Habitat fragmentation,
- b) Isolation of rare and unique habitats such as bogs/fens or alpine areas,
- c) Direct effects such as collisions with animals,
- d) Physical destruction or degradation of habitats,
- e) Snow compaction,
- f) Barriers to movement,
- g) Physiological reactions to stress related to the impacts of travel,
- h) Abandonment of habitats, and
- i) Vectors for weeds and other introduced species.

The widespread impacts of human disturbance on wildlife, fish, and plants are well documented throughout these reports. No positive benefits to wildlife, fish, or rare plants have been identified from increases in travel management access. Direct and indirect effects on species that have been identified in the literature indicate negative impacts to all studied species as motorized, mechanized, foot, and horse uses increase.

- Many of the tables displayed in this document standardize the changes in travelways for comparison purposes. To make comparisons of differing types and sizes of habitats for the various wildlife, fish, and plant species considered, most analyses use density of miles of travelway per square mile of habitat, or the amount of change in travelway density for each alternative, rather than the total number of miles of change within a habitat over the entire White River National Forest.

For example, the addition of 10 miles of designated system road within a species' range of only 20 square miles of habitat would normally be more substantial than the addition of 10 miles of system road within 1,000 square miles of habitat for another species. Standardization of the analysis displays this as 0.5 new miles of travelway per square mile of habitat in the first scenario, compared to 0.01 miles of travelway per square mile of habitat for the second. This comparison is more meaningful than a comparison of total miles of road or trail for each alternative. Similarly, more meaningful comparisons among alternatives can be made by using the amount of change based on miles per square mile, rather than overall number of miles of change for a relatively large land base across the White River National Forest.

## Key Indicators

Key indicators were developed to help focus the travel management effects analysis on priority issues for wildlife, fish, and rare plant species. These are listed below along with appropriate measures for evaluating each key indicator.

**Table 3.39—Key Indicators and Evaluation Measures for Wildlife, Fish, and Rare Plant Issues**

Key Indicator	➡	Measure
Impacts on wildlife and rare plants from road, trail, and winter use activities type	➡	Road and trail density, and snow play area (winter) percentage by habitat
Impacts of road and trail use on elk	➡	Security habitat
Impacts on aquatic species from road sedimentation	➡	Road density and road proximity to streams and lakes
Impacts on amphibian species from roads and trails	➡	Road and trail proximity to habitats

## General, Direct, and Indirect Effects: Terrestrial and Aquatic

The White River National Forest and adjacent BLM lands contain large tracts of relatively unroaded, unfragmented land that provide essential habitat to fish, wildlife, and rare plants. Most of these areas are associated within existing wilderness, recommended wilderness, research natural areas, backcountry non-motorized areas, and other management areas where motorized travel is restricted or prohibited. Collectively these tracts of land provide large areas of undisturbed habitats important for a wide range of wildlife species which provide security away from motorized human activities.

Natural disturbances (such as fire, insects/disease, wind, flood, and avalanche), and human-caused uses (such as mining, timber harvest, oil and gas development, ski areas, etc.) contribute to the degree of habitat patchiness of the landscapes on the White River National Forest. On a landscape scale, habitat security areas and remote wilderness areas contribute to regional biodiversity. Regional biodiversity refers to the pattern of habitats and species across a land area of thousands to millions of acres. This level of biodiversity has important functional ramifications. For instance, many wide-ranging animals require a variety of habitat types occurring across a large geographic area.

Several recreational based communities are located within close proximity of the Forest and are sources of intense recreational activities. The towns of Aspen, Glenwood Springs, Snowmass Village, Vail, Avon, and multiple communities in Summit County are associated with local ski areas and other year-round tourist activities such as mountain biking, rafting, climbing, hiking, four-wheel driving, backpacking, and pack trips. The activities centered in these towns result in high levels of human activity on the surrounding National Forest System lands. Other high-use recreational activities across the Forest include snowmobiling, cross-country skiing, all-terrain vehicle riding, motorcycling, fishing, driving for pleasure, camping, and hunting. This level of recreation

use is likely resulting in impacts to wildlife, fish, and rare plants. The location and timing of human activities have a substantial effect on the magnitude of impacts.

Travel management-related impacts on wildlife, fish, and rare plants vary with the volume, timing, and type of travel; the species in the area, the habitats involved, time of day or season of year, and a myriad of other factors. Many of the reports reviewed for this travel plan analysis cite the widespread detrimental impacts of human disturbance on wildlife, fish, and plant communities from vehicular and other types of recreation use including habitat fragmentation, isolation of rare and unique habitats, direct effects such as collisions with animals and physical destruction or degradation of habitats, snow compaction, barriers to movement, physiological reactions to stress related to human disturbance, abandonment of habitats, and vectors for weeds and other introduced species.

For many wildlife, fish, and rare plant species, the greatest impacts occur where recreational activities occur within seasonal concentration areas and key habitats. For big game species, the Colorado Division of Wildlife (CDOW) has provided maps of seasonal concentration areas to identify areas of potential conflict. These maps were used during the 2002 Forest Plan revision to map areas of concern for specific wildlife species. The White River National Forest has also continued to identify other specific locations where fish, wildlife, and rare plants have important habitats. Conflicts between current recreational activities and important wildlife, fish, and rare plant habitats have been identified on the forest. These conflicts are associated with periods of concurrent use by people and wildlife/fish. The most disturbances occur when human activities coincide with critical wildlife and fish use periods such as during reproduction seasons and winter months when species survival is most difficult.

Activities that influence water quality have a direct effect on aquatic species populations. Water quality and stream physiographic factors that influence these populations are sedimentation, water temperature, in-channel wood, water depth, and change in stream bank or shoreline vegetation. The demand from recreationists requiring an increase in roads and trails can lead to additional sedimentation into waterways, straightening and simplification of channels, removal of vegetation, and blockage of passage at crossings if not properly engineered. Oil and gas development, timber harvesting, and ski area developments, including the travel systems associated with these activities, and natural occurrences such as fire, flood, insect and disease epidemics, and landslides also lead to changes in water quality.

### **General, Direct, and Indirect Effects: Terrestrial Species**

Road and trail use and high open road/trail density make habitat less desirable and less effective for many wildlife species. Roads and trails allow increased access by people into wildlife habitats. Disturbance by humans and vehicles (including bicycles and snowmobiles) on roads and trails make habitats less secure for wildlife. Habitat which is available for wildlife therefore becomes less effective. Disturbance can include both visual and noise impacts. Disturbance during critical time periods such as winter and breeding seasons may be especially negative. Such disturbance may lead to displacement of individuals from preferred habitats to areas that are less desirable, or in a change of wildlife travel routes and movement patterns. Such changes in wildlife distribution may in turn lead to increased vulnerability to mortality through predation, energy expenditure in winter, and loss of critical food resources. Impacts from increased access into wildlife habitats also include harassment by dogs that accompany hikers, horseback riders, bicyclists, and campers, and some direct habitat degradation from vehicle and camping impacts, most noticeably in riparian and meadow habitats.

Physical impacts of roads, trails, and winter travel routes include habitat fragmentation and isolation of rare and unique habitats which may occur where roads intersect habitats such as wetlands, riparian areas, fens, and creeks, or result in barriers to movement for wildlife and fish. Roads and trails act as common vectors for the introduction of noxious weeds and non-native plants, wildlife, and diseases which can lead to habitat degradation, competition with native species, and potentially reduced survival. Motorized road and trail use also results in direct mortality to wildlife through hunting and vehicle collisions. Roads are a primary chronic source of sedimentation for aquatic, wetland, and riparian habitats. Increased sedimentation in water sources can lead to streambank instability, channel widening and straightening, decreased water depths, changes to water flows, reduced dissolved oxygen capacity, loss of invertebrate and fish spawning habitats, filling of pools, reduction in riparian vegetation, and changes to water temperatures (please see further discussion in the Aquatic Systems section). Snow compaction caused by winter travel and recreation use can result in loss of subnivian (beneath the snow) habitats for small mammals and winter birds, changes in timing of snow melt which can influence plant growth and insect emergence, and exposure of plants and burrowing animals to freezing temperatures beneath the snowpack.

### **Physical Effects from Roads, Trails, and Travel on Terrestrial Species**

Although the actual footprint of roads, trails, user-created routes, and winter routes generally do not result in large amounts of directly impacted habitat acres due to their linear nature, the presence of travel routes in valuable wildlife habitats can result in significant effects to wildlife in some areas. For example, travel routes often follow and cross drainages, ridgelines, mountain passes, open meadows and alpine areas because these areas are easy to traverse. For these same reasons, wildlife often use these same areas for travel. Conflicts between people and wildlife along these travel routes can arise when wildlife movement patterns are substantially changed or habitat conditions are degraded. The importance to wildlife, relative scarcity, and fragility of habitats such as riparian areas, wetlands, fens, mountain meadows, and alpine tundra, make impacts from travel routes in these habitats more substantial for wildlife. These habitats are vulnerable to degradation because travel routes often influence water drainage patterns, produce sedimentation and erosion sources, compact and damage fragile soils, and result in the loss of vegetation.

Roads, trails, non-system and user-created routes create vectors for the introduction of noxious weeds and non-native species (plants, wildlife, invertebrates, and diseases) which can seriously impact wildlife habitats and wildlife species themselves by creating competition for habitats and food sources, degrading or replacing native habitats with unproductive or damaging non-native vegetation, increasing predation pressures, and causing diseases that may cause death or serious injuries to wildlife and plants.

Winter use of travel routes and snowplay areas create corridors and areas of snow compaction. Snow compaction can impact wildlife habitats by physically damaging vegetation close to the snow surface, eliminating access to and use of subnivian (beneath the snow) habitats for small mammals and wintering birds, changing the timing of snowmelt which can influence plant growth and insect emergence, and exposing plants and burrowing mammals to freezing temperatures beneath the snowpack. Snow compaction may also allow access to deep soft snow habitats by wildlife species that normally are not present in these winter habitats. This may lead to increased competition for winter prey sources and increased predation on prey species.

Physical impacts to wildlife species from the use of travel routes also include direct mortality caused by vehicle collisions and hunting access.

### **Disturbance Effects from Human Activity on Terrestrial Species**

As described above, human activities that are associated with travel along roads, trails, and winter routes can disturb wildlife in a variety of ways. Some activities may have serious consequences as the result of interactions between people and wildlife, while others have little or no effect. The type and magnitude of impacts on wildlife vary by the type of travel activity, predictability, frequency and magnitude, timing, and location of disturbance (Knight and Gutzwiller 1995).

Studies of the effects of human disturbance on wildlife have revealed there are critical periods for many species of birds and mammals when disturbance can result in more serious impacts (Knight and Gutzwiller 1995). The immediate postnatal period for mammals and the breeding period for birds are often the most sensitive. Winter is also a time when most mammals and birds are subject to restricted food sources and cold temperatures making survival more difficult.

For big game, seasonal use concentration areas of concern on the Forest include production areas (elk calving areas, bighorn sheep lambing areas, mountain goat kidding areas), summer concentration areas (elk, bighorn sheep, black bear, mule deer, moose), fall concentration areas for black bear, migration areas (elk, mule deer, bighorn sheep), winter ranges (elk, mule deer, moose, bighorn sheep, mountain goats), and elk security areas. The identification of these seasonal ranges and key habitat areas is based on mapping provided by the CDOW and was used to establish several of the management areas allocated during the forest plan revision.

For other species, seasonal use concentration areas of potential concern include raptor nesting sites, sage grouse and Columbian sharp-tailed grouse breeding areas (leks and nesting habitats), Barrow's goldeneye nesting and brood-rearing locations, bat maternity and hibernation colony sites and summer roosting sites, bald eagle winter roost sites and winter concentration areas, white-tailed ptarmigan winter concentration sites and nesting habitats, black swift nesting colonies, Mexican spotted owl nest sites, and Brewer's sparrow breeding sites. The White River forest plan has developed management standards and guidelines to protect these important habitats and species of concern.

### **Management Indicator Species for Travel Management and Recreation Use**

Potential impacts on big game are a significant issue related to travel management. Therefore, much of this analysis is focused on these species and on elk in particular.

Management indicator species (MIS) are wildlife species that have been selected by a National Forest to represent the habitat needs of a larger group of species requiring similar habitat communities and that are likely to reflect changes in habitat conditions. Management indicator species are also chosen to address a significant issue on the National Forest. Elk was chosen in the White River Forest Plan as a MIS for studying the effects of motorized and non-motorized travel and recreation management. Because recreation is the predominant use of the White River National Forest, the effectiveness, quality, and quantity of habitats will be impacted for some wildlife species, primarily those that require seclusion and/or large landscapes. Such species include wolverine, lynx, black bear, elk, deer, bighorn sheep, and others. Elk occur throughout the White River National Forest, and use all of the major vegetated cover types at certain times of the year. Calving and winter use seasons are critical periods for elk, which travel and recreation management could impact. Elk is also a species for which a considerable amount of time, effort, and funding has been expended to document the potential impacts from travel management-related issues. Using elk for analyzing the effects of travel

management on terrestrial wildlife species and their habitats is a good way to identify primary issues resulting from travel management on the White River National Forest.

Most available research on the effects of recreational activities on wildlife is related to the impacts of motorized vehicles on elk, and to a lesser extent on deer. Literature reports that elk respond negatively to human access into their ranges.

One study in the Pole Mountain area of the Medicine Bow National Forest in south central Wyoming provides some information on elk behavior in relation to other types of recreational activity (Ward and Cupal 1979). On the basis of radio telemetry monitoring it was demonstrated that elk prefer to be at least ½-mile from people engaged in such activities as camping, fishing, and picnicking. The heart rates of two adult cow elk and a spike bull showed definite increases on 21 of 23 occasions when people walked within 0.2 miles of the animals when they were in timber; the animals responded by moving away on 16 of the 21 occasions. Moving automobiles and trail bikes had little effect on elk resting in timber at distances of more than 0.2 miles, but the animals' heart rates increased 24 out of 41 times at closer distances. Elk also showed significant reaction when vehicles stopped within 0.33 mile. Ward (1973) showed that elk seldom are alarmed at normal disturbance-type activities such as vehicular traffic, camping, fishing, or other recreational activities beyond a threshold distance of ½ mile. Activities within this distance, however, resulted in evasive movement by elk to reestablish and maintain a ½-mile buffer between themselves and the human activity. Therefore, it appears as though elk tolerate a variety of human activities beyond a threshold distance of ¼- to ½-mile (Ward and Cupal 1979).

The predictability of a given activity shapes wildlife responses to it. When animals perceive a disturbance as frequent enough to be "expected" and non-threatening, they show very little overt response. For example, elk are easily conditioned to repeated patterns of human activity within their home range, but are also keenly aware of deviations from normal patterns (Thomas and Toweill 1982).

The frequency and magnitude of disturbances influence the degree to which wildlife is affected. A number of studies have established the consistent year-round influence of motorized vehicles on elk use of preferred habitats (Thomas and Toweill 1982). Ward (1976), Perry and Overly (1977), Lyon (1979), and others have documented a decline in elk use of areas adjacent to roads. The width of the area avoided by elk has been reported as ranging from 0.25 to 1.8 miles, depending on the amount and kind of traffic, quality of the road, location, and density of the cover adjacent to the road.

Management recommendations derived from elk and deer road impact studies have concluded that to maintain good elk habitat, it is desirable to have open road densities less than or equal to one mile per square mile for primitive roads, ½ mile per square mile for secondary roads, or ¼ mile per square mile for primary roads (Hoover and Wills 1987). To maintain good mule deer habitat, open road densities should be less than 1 mile per square mile (Hoover and Wills 1987). A well known study by L.J. Lyon (1983) found that when road densities neared 1 mile per square mile in optimal elk habitat, potential elk use dropped from 100% to 60%. When road densities approached 2 miles per square mile, potential elk use declined to 50%, and when road densities neared 6 miles per square mile, elk use was rare.

### **Hunting Season**

On the White River National Forest, the magnitude of disturbance to big game increases dramatically during the hunting seasons. Hunting begins with archery season in late August and runs consecutively through the end of the fourth rifle season in mid-

November for elk. Some areas may be included in late hunting seasons that run into January. Roads and trails that normally receive little or no use are used heavily on a daily basis during the hunting seasons.

Hunted populations of elk, such as those on the White River National Forest, are extremely wary of people and sensitive to danger because of the annual hunting seasons. In western Montana, undisturbed elk used habitats in proportions similar to their availability (Hurley and Sargeant 1990). Disturbance by hunters had little effect on elk living in unroaded areas; however, elk living in areas with open roads spent more time away from roads and in dense cover. Other studies have documented that elk behavior changes in response to the hunting season (Hillis et al. 1991). Elk avoid areas adjacent to roads with vehicular traffic, especially during the hunting seasons. Elk movements are generally confined to habitats within a traditionally used home range but they spend more time in dense cover during hunting season than they do before the hunting season begins. Elk also respond to hunting pressure by moving to adjacent undisturbed areas or refuges such as National Parks (Thomas and Toweill 1982), or large tracts of private land closed to hunting.

Displacement of elk onto private land is one of the issues identified under current travel management on the White River National Forest. Elk displacement results in several problems. Elk leave suitable habitats on the Forest and may go to less suitable but more secure areas on private land. Elk can cause damage to private land such as fence damage and loss of livestock hay supplies. Elk harvest objectives may not be met because hunters do not have access to much of the private land, and the desired elk population reduction through harvest may not occur.

The vulnerability of elk to harvest is greater in roaded habitats than in unroaded habitats (Hurley and Sargeant 1990, Leptich and Zager 1990, Unsworth and Kuck 1990). Studies have documented that bull elk in roaded habitats are more than twice as likely to be killed during the fall hunting seasons as those in areas with very few roads (Unsworth and Kuck 1990). The annual animal harvest influences the population structure of big game herds as well as hunter opportunities. Areas with high harvest levels have fewer mature bulls within the population, which can affect herd genetics. A variety of studies have demonstrated that elk vulnerability may be reduced and hunter opportunity to find elk may be increased by providing security areas on public land for elk during the hunting seasons.

### **Important Seasonal Big Game Habitats**

Winter is a time when survival for big game and most other wildlife species is the most difficult due to limited food sources and high energy demands. Elk, deer, and bighorn sheep concentrate on their winter ranges from as early as October until late March or April, depending on winter conditions. Mule deer rely almost exclusively on browse species such as gambel oak, sagebrush, mountain mahogany, serviceberry, chokecherry, and bitterbrush. Elk prefer grasses but will use browse when grass is unavailable during periods of heavy snow. Elk tend to winter higher in elevation than deer. Bighorn sheep feed on both browse and grasses in winter. Big game winter ranges are defined by where forage is available during periods of cold and snow. For elk, deer, and bighorn sheep, these are generally lower-elevation and typically south-facing slopes where snow depths are reduced and temperatures are warmer than other locations in winter. For moose, winter ranges are usually areas with well-developed willow habitats, although moose are also known to winter in forested areas with deep snow as long as aspen, shrubs, and live conifer branches are available as browse.

Winter ranges for mountain goats are high elevation peaks and ridges where wind scour provides access to alpine food sources.

Elk and mule deer use National Forest lands primarily during the summer months. Big game summer ranges are widely available on the forest. Although portions of the forest provide important big game winter ranges, overall less than 10 percent of the winter ranges for deer and elk that use the White River National Forest during the summer months is located within the White River National Forest boundary. Most big game winter ranges occur at lower elevations (6,000 to 8,000 feet) on private or BLM lands adjacent to the National Forest. Important deer and elk winter ranges are identified in the forest plan as management area 5.41 and some portions of management areas 5.43 and 5.42. These management areas include most, but not all, of the important elk, deer, and bighorn sheep winter ranges that occur on National Forest System lands. Winter ranges for moose and mountain goats have also been identified on the Forest.

Key elk calving and bighorn sheep lambing areas are located throughout the forest. The calving and lambing grounds identified are preferred birthing and early rearing areas, used annually by elk and bighorn sheep herds. Many 5.43 and 5.42 management areas delineated in the forest plan protect these important habitat areas. On the White River National Forest, elk calving occurs from early May to the end of June, with peak activity around early June. Bighorn sheep lambing also occurs in May and June with peak births occurring in mid-June. No specific mule deer fawning grounds have been identified on the forest. Mule deer fawning occurs near the upper limits of their winter range, in lower elevation brush fields and forest ecotones. Deer fawning generally occurs in May and June as well. Several small mountain goat kidding areas are known on the forest on high elevation scree slopes and rock faces. Mountain goats give birth in late May and early June.

Big game summer concentration areas are generally preferred habitat locations with available cover, food, water, and space, and are highly influenced by open road density, human activity, forage availability, and presence of cattle. Summer concentration areas for elk, mule deer, black bear (fall concentration areas are also delineated for bear), moose, and bighorn sheep are known on the forest. Management areas 5.43 and 5.42 delineated in the forest plan protect some of these important habitat areas for elk, deer, and bighorn sheep.

Elk, mule deer, and bighorn sheep follow regularly used migration routes between summer and winter ranges. These spring and fall migration areas are known to be present on the forest. Management areas 5.43 and 5.42 provide forest plan guidance to maintain the function of these migration areas.

For big game (and many other wildlife species), the greatest impacts from disturbance occur where human activities take place within these wildlife seasonal concentration areas and key habitats during time periods when human and wildlife use coincide. These disturbances may lead to displacement of individuals or a change of wildlife travel routes and movement patterns to other locations that are less desirable, i.e. less secure from predators or lacking quality resources (food, shelter, water). This then can lead to increased vulnerability to mortality through predation, energy expenditure in winter, and loss of critical food resources. Disturbances to wildlife on winter ranges in particular can result in greater energy expenditures by animals due to increased avoidance movements and physiological stress reactions during a time period when reduced food availability and increased energy demands can greatly influence winter survival. Areas with fewer travel routes reduce human intrusion into these critical habitats, making them more available and effective for wildlife.

## Alternative Comparisons

### Alternative A

Under the No Action Alternative (Alternative A), the existing travel management system and substantial non-system user routes will continue to affect wildlife similarly into the near future. Such impacts result primarily from human disturbance and access into wildlife habitats, some direct mortality from hunting and vehicular collisions, and some direct habitat degradation from vehicle and camping impacts, most noticeably in riparian and meadow habitats. Under Alternative A, there would be no change in travel route density from existing conditions (other than routes already covered for rehabilitation under existing NEPA decisions) and user created routes would remain on the landscape. Designated routes within winter motorized restricted areas would not be determined. Current road/trail/winter route impacts to wildlife and habitats would continue.

### Alternative F

Under Alternative F, existing Forest Service system roads and trails would remain unchanged, but all non-system and user-created routes are proposed for naturalization, reducing travel impacts to wildlife. Routes that would be naturalized would improve habitats and conditions for wildlife. Although naturalization of travelways may take years to fully rehabilitate and resemble surrounding habitats, the reduction in human use would have immediate benefits to many species. The fewer travel routes left on the landscape, the less likely it is that physical or behavioral disturbance to wildlife species will occur. As in Alternative A, designated routes within winter motorized restricted areas would not be determined under Alternative F. Current winter route impacts to wildlife and habitats would continue.

### Alternative G

Alternative G is a more comprehensive alternative that includes the proposed conversion of some non-system and user-created routes to newly designated Forest Service system roads and trails, rehabilitation of some existing system roads and trails, changes to types of travel allowed on some roads and trails, substantial naturalization of non-system and user created routes, designation of winter travel routes within winter motorized restricted areas, and some changes to winter strategy areas. Implementation of Alternative G would result in substantial improvements for wildlife and habitats as human access and disturbance is greatly reduced, damaged habitats are rehabilitated, and erosion and sedimentation sources disappear as revegetation occurs. Degradation particularly of meadow, riparian, and aquatic habitats would be greatly reduced as human and vehicle use ceases along rehabilitated routes. The rehabilitation of routes would also stop new sources of weed infestations and other non-native species invasion.

Wildlife habitat effectiveness would be restored along all routes that would be rehabilitated under Alternative G. Wildlife habitat connectivity would improve and habitat fragmentation and isolation of rare habitats would decrease over time as revegetation and restoration occurs. The risk of collisions between wildlife and vehicles would be reduced. The rehabilitation of routes that currently bisect old growth, interior forest, and otherwise large areas of effective habitat (habitat security areas) would especially benefit many wildlife species. The proposed rehabilitation of routes within specific big game priority habitats including winter ranges, production areas, summer and fall concentration areas, and spring and fall migration areas would be particularly beneficial, removing human intrusion and a habitat degradation source, while promoting wildlife solitude and habitat effectiveness in these areas. Similarly, proposed

rehabilitation of routes that occur in bird breeding territories would benefit nesting raptors, songbirds, waterfowl, and upland game birds by reducing human intrusion during a critical time of year. The proposal to rehabilitate routes within forest plan management areas such as 5.4 (Forested Flora and Fauna Habitats), 5.41 (Deer and Elk Winter Range), 5.42 (Bighorn Sheep Habitat), 5.43 (Elk Habitat), and 5.5 (Forested Landscape Linkages) would promote wildlife solitude and habitat effectiveness in these areas.

The proposed conversions of non-system unauthorized routes to newly designated Forest Service system roads and trails under Alternative G would result in increased use by people once the routes are signed, mapped, and advertised, resulting in increased disturbance to wildlife and a loss of habitat effectiveness along these routes. The effects would be similar for level 1 closed roads that are reopened for public use. Because all of these routes are already being used by people now, habitat effectiveness along these corridors has already declined. For travel routes that are converted to administrative use roads and trails, disturbance to wildlife would occur along these corridors when people are present, although because public use would be restricted and administrative use is likely to be infrequent, habitat effectiveness (which is based on moderate to high levels of recurring use) would likely be maintained.

Proposed changes in types of travel use on system roads and trails under Alternative G would retain travel routes as ineffective habitat corridors for wildlife, although the disturbance zone would be reduced for motorized routes that are converted to non-motorized routes once motorized vehicle use ceases (noise from motorized vehicles creates a wider zone of disturbance than non-motorized uses). Conversely, non-motorized routes that become motorized would result in an expansion of the disturbance zone.

Proposed changes in winter travel management under Alternative G include a net reduction in open motorized areas (these would be converted to motorized restricted areas), and designated winter routes within motorized restricted areas would be identified. These two actions would result in a substantial reduction of winter motorized use in wildlife habitats since over the snow motorized users are free to travel anywhere in open areas but they are restricted to designated routes in winter restricted motorized areas. The proposed reduction of motorized winter recreation use would decrease human access into wildlife winter habitats, substantially reducing human disturbance of wildlife during the critical winter months and during the early spring breeding seasons for some species such as raptors, and decrease snow compaction. Winter habitats therefore would become more secure for wildlife and improve conditions for survival.

Within winter motorized restricted areas, the proposed designation of winter routes would result in much of the winter recreation use becoming predictable and consolidated along specific corridors, allowing wildlife to avoid time periods when use occurs or become accustomed to winter users passing through their habitats. Non-motorized winter travelers are not restricted to designated routes and would continue to affect wildlife similarly as under current conditions. Although it is assumed that winter routes that were being used by motorized users but will not be designated routes under Alternative G would continue to be used by non-motorized recreationists, habitat effectiveness is likely to still improve for wildlife as the disturbance zone would be reduced once motorized vehicle use ceases (noise from motorized vehicles creates a wider zone of disturbance than non-motorized uses). Conversely, the disturbance zone would expand where non-motorized routes are proposed to be opened to motorized vehicles.

The proposed identification of designated Forest Service system motorized winter routes in restricted motorized use areas would likely result in increased use as the routes are signed, mapped, and advertised. These routes are already present however, and are being

used at moderate levels, which is why they are being converted to Forest Service system designated routes. Habitat effectiveness would continue to be compromised along these routes and human disturbance and snow compaction would continue.

Under Alternative G, the proposed conversion of some winter open motorized areas to winter motorized restricted areas would make some existing motorized winter play areas no longer available to motorized recreationists. For wildlife, the proposed reduction in motorized play areas would greatly improve these winter habitats by decreasing human disturbance and resulting in a considerable reduction in snow compaction. Snow compaction impacts such as a loss of subnival (beneath the snow) habitats for small mammals and winter birds, changes in timing of snow melt which can influence plant growth and insect emergence, and exposure of plants and burrowing animals to freezing temperatures beneath the snowpack would be substantially lessened. The reduction of snow compaction would also improve lynx and wolverine winter habitats by retaining deep soft snow habitats in these areas. Similarly, snow compaction would be greatly reduced in winter motorized restricted areas once the proposed designated route system is implemented. Current dispersed winter motorized use in these areas would be consolidated and winter habitats outside the route corridors would remain uncompacted. Under Alternative G, existing winter motorized play areas within open motorized use areas are expected to remain, as are non-motorized play areas within all three winter strategy classifications. Current impacts to wildlife in these areas would continue.

The proposed reduction of winter motorized travel under Alternative G would be especially beneficial in important wildlife habitats such as big game winter ranges, raptor breeding territories, old growth, interior forest, large areas of effective habitat (habitat security areas), and habitats identified in the forest plan as management areas 5.4 (Forested Flora and Fauna Habitats), 5.41 (Deer and Elk Winter Range), 5.42 (Bighorn Sheep Habitat), 5.43 (Elk Habitat), and 5.5 (Forested Landscape Linkages).

### **Alternative GM**

Alternative GM is similar to Alternative G in its range of proposed travel management actions. Alternative GM includes the proposed conversion of some non-system and user-created routes to newly designated Forest Service system roads and trails, rehabilitation of some existing system roads and trails, changes to types of travel allowed on some roads and trails, substantial naturalization of non-system and user created routes, designation of winter travel routes within winter motorized restricted areas, and some changes to winter strategy areas. Alternative GM proposes to convert fewer non-system and user created routes to new Forest Service system roads and trails than Alternative G, and instead would naturalize more miles. Alternative GM would also convert more acres of winter open motorized use areas to restricted motorized use than Alternative G with a small amount (100 acres) of winter motorized prohibited use areas are proposed to be converted to restricted motorized use. Alternative GM proposes fewer miles of designated winter routes than in Alternative G. Potential effects to wildlife from the implementation of Alternative GM are similar to those described for Alternative G, although Alternative GM would be more beneficial due to fewer miles and lower density of summer and winter routes in wildlife habitats.

## **Evaluation Measures Comparisons**

### **Habitat Security Areas**

The evaluation measure being used in this analysis for assessing the key indicator of impacts of road and trail use on elk is the amount of available security habitat.

During hunting seasons (late August through mid November) elk seek security habitat areas on the Forest Service and adjacent Bureau of Land Management lands and private property. Habitat security areas are remote, unroaded tracts of land that reduce elk vulnerability to harvest as well as provide habitat effectiveness for many other wildlife species.

The habitat security areas mapped for the White River National Forest represent large (a minimum of 250 contiguous acres), relatively unfragmented tracts of land. These areas are a minimum of one-half mile from any road or trail receiving regular motorized use (including non-system and user created routes). Habitat security areas represent most native ecosystem types and seral stages across their natural range of variation and provide suitable habitats for those wildlife species sensitive to fragmentation and disturbance. These habitat security areas help offset the impacts of intensively roaded portions of the forest and contribute to the maintenance of viable populations of native species in natural patterns of abundance and distribution.

Table 3.40 displays information on the number and total acres of habitat security area blocks, and the percentage of the White River National Forest in habitat security areas under each Travel Management alternative.

**Table 3.40—Habitat Security Area Blocks on the White River National Forest**

	Alternative A	Alternative F	Alternative G	Alternative GM
Number of security blocks	114	98	92	95
Acres of security blocks	1,198,463	1,425,770	1,495,002	1,489,781
% of Forest Service land in security blocks	52.4	62.3	65.4	65.1

Under existing conditions (Alternative A), there are a total of 114 blocks of security habitat that total approximately 1.2 million acres (52.4 percent of the White River National Forest). Under Alternative F, there would be fewer habitat security blocks (the result of merging adjacent blocks of security habitat as non-system routes are naturalized), but the total acreage would be greater than under Alternative A (62.3 percent of the forest), indicating that some of the blocks would be larger in size. Alternative G would have the fewest number of habitat security blocks, and it would have the greatest total acreage (65.4% of the forest) as adjacent blocks are merged together as a result of rehabilitating routes. Alternative GM is similar to Alternative G with slightly more habitat security blocks and slightly less total acres in security habitats (65.1% of the forest).

### Road and Trail Density

An evaluation measure being used in this analysis for assessing the key indicator of impacts on wildlife from road, trail, and winter use activities is road and trail density.

Table 3.41 displays information on summer road and trail densities across all wildlife habitat types on the White River National Forest under each travel management alternative.

**Table 3.41—Density of Summer Roads, Trails, and User Created Routes by Use Type across all Wildlife Habitats on the White River National Forest\* (in miles per square mile)**

Type of Use	Alternative A	Alternative F	Alternative G	Alternative GM
Motorized	0.56	0.56	0.50	0.50
Mechanized (bicycle)	0.19	0.19	0.16	0.15
Foot/Horse	0.36	0.36	0.39	0.38
Ski area special use permit	0.05	0.05	0.05	0.05
User created routes	0.24	0	0	0
<b>Total</b>	<b>1.40</b>	<b>1.16</b>	<b>1.10</b>	<b>1.08</b>
Proposed for rehabilitation (reduction in density)	0	0.24	0.30	0.32

\* 3,573.6 square miles (2,287,079 acres) wildlife habitat

Under existing conditions (Alternative A), there is an estimated total of 5,039 miles of summer roads, trails, non-system routes, and user created routes on the White River National Forest, resulting in an overall summer travel route density of 1.40 miles per square mile across the wildlife habitats on the forest. Alternative F proposes to naturalize all known user created summer routes, which would result in a decrease of 855 miles and a summer route density reduction of 0.24 miles per square mile across the forest.

Alternative G proposes to make changes in both Forest Service system and non-system summer routes which would result in a net reduction of 1,104 miles across the forest and a net summer route density reduction of 0.30 miles per square mile in wildlife habitats. Alternative GM is similar to Alternative G but proposes additional small net reductions (63 miles) in motorized, mechanized, and foot/horse trails. Alternative GM would result in the most net reduction (0.32 miles per square mile) of summer travel route density in wildlife habitats on the forest.

As discussed previously, elk is the management indicator species that was chosen to study the effects of travel and recreation management. Elk use all terrestrial habitats on the forest. Summer travel route densities as shown in Table 3.41 above for forest-wide terrestrial habitats show that densities are at levels that are likely affecting elk populations at the National Forest level. This conclusion is based primarily on a well known study by L.J. Lyon (1983)<sup>2</sup> that found when road densities neared 1 mile per square mile in optimal elk habitat, potential elk use dropped from 100% to 60%. Current conditions (Alternative A) are well above 1 mile/square mile for summer travel route densities across all terrestrial habitats on the forest. The action alternatives all would decrease summer route densities, with Alternative GM resulting in densities closest to 1 mile/square mile. For elk population trend data, please see the MIS report for this project.

Table 3.42 displays information on winter travel route densities across all wildlife habitat types on the White River National Forest under each travel management alternative.

**Table 3.42—Winter Travelway Densities across all Wildlife Habitats on the White River National Forest\* (in miles per square mile)**

<sup>2</sup> Lyon, J.L. 1983. Road density models describing habitat effectiveness for elk. Journal of Forestry 81(9): 592-595, 613.

Type of Use	Alternative A	Alternative F	Alternative G	Alternative GM
Motorized routes	0.35	0.35	0.32	0.30

\* 3,573.6 square miles (2,287,079 acres) wildlife habitat

Under Alternatives A and F, there are an estimated 1,237 miles of existing motorized routes that receive recurring use during the winter on the White River National Forest, resulting in a density of 0.35 miles per square mile across the wildlife habitats on the forest. Alternative G proposes to designate many but not all of the existing motorized winter routes that occur within winter motorized restricted areas. Existing motorized routes within open winter motorized use areas would continue to be used. Overall, Alternative G would result in a net decrease of 104 miles of winter motorized routes (a reduction in winter motorized route density of 0.03 mile per square mile) across the forest. Alternative GM proposes fewer designated winter routes within winter motorized restricted areas, so would result in a net decrease of 180 miles of winter motorized routes (a reduction in winter motorized route density of 0.05 mile per square mile) across the forest.

### Winter Snow Play Areas

A second evaluation measure being used in this analysis for assessing the key indicator of impacts on wildlife from winter use activities is winter snow play area percentage.

Winter snow play areas are locations where winter recreationists concentrate use over a larger area rather than just a narrow route movement corridor. Snow play areas are often located in open meadows/shrublands or in the alpine tundra above tree line. These areas occur within areas that allow motorized activity. Impacts from winter snow play areas on wildlife result from relatively intensive human disturbance to wildlife due to the concentration of use by people, and larger zones of snow compaction.

Table 3.43 displays information on winter snow play area percentages across all wildlife habitat types on the White River National Forest under each travel management alternative.

**Table 3.43—Winter Snow Play Areas Across All Wildlife Habitats on the White River National Forest\* (in percent of total habitat)**

Winter Snow Play Areas	Alternative A	Alternative F	Alternative G	Alternative GM
Motorized	14.3%	14.3%	12.1%	12.0%

\* 2,287,079 acres (3,573.6 square miles) of wildlife habitat  
Winter play areas do not include developed ski areas

Under Alternatives A and F, there are an estimated 327,530 acres of existing motorized snow play areas that receive recurring use during the winter on the White River National Forest. This is 14.3% of the total acreage of wildlife habitats on the forest. Alternative G contains a reduction of motorized snow play areas primarily due to winter motorized restricted areas. Existing motorized snow play areas within open winter motorized use areas would continue to be used. Overall, Alternative G contains a net decrease of 50,584

acres of winter motorized snowplay areas in wildlife habitats across the forest. Alternative GM contains slightly fewer winter motorized snow play areas (275,682 acres) than Alternative G, resulting in a net decrease of 51,848 acres of winter motorized snowplay areas within wildlife habitats across the forest.

### Winter Management Strategy Areas

The forest is made up of winter management strategy areas including motorized prohibited areas, open motorized areas, and restricted motorized use areas. In restricted motorized use areas, over the snow travel is limited to designated routes and play areas. This travel management decision also includes some proposed changes between winter strategy areas.

Table 3.44 displays information on the winter management strategy areas as percentages across all wildlife habitat types on the White River National Forest under each travel management alternative.

**Table 3.44—Winter Management Strategy Areas Across All Wildlife Habitats on the White River National Forest\* (in percent of total habitat)**

Winter Management Strategy	Alternative A	Alternative F	Alternative G	Alternative GM
Motorized prohibited areas	44.5%	44.5%	44.5%	44.5%
Restricted motorized areas	19.1%	19.1%	22.2%	22.6%
Open motorized areas	33.9%	33.9%	30.9%	30.4%
Special use permit areas (ski areas, etc.)	2.4%	2.4%	2.4%	2.4%
Closed to all uses	<0.1%	<0.1%	<0.1%	<0.1%

\* 2,287,079 acres (3,573.6 square miles) of wildlife habitat

Alternative G proposes to convert approximately 69,464 acres of what is currently managed as open motorized winter use areas into restricted motorized winter use areas. This would be a noticeable reduction of winter motorized use in wildlife habitats since over the snow motorized users are free to travel anywhere in open areas but are restricted to designated routes in winter restricted motorized areas. Alternative GM proposes to convert approximately 80,237 acres of currently open motorized winter use areas into restricted motorized winter use areas. Alternative GM also would include a small decrease in motorized prohibited areas (100 acres) than in Alternative G. These areas would become restricted motorized access and would allow over the snow motorized use on designated winter routes. The proposed designated winter restricted motorized routes were identified from existing winter user created routes. Because these routes already receive predictable recurring winter motorized use, and that use is restricted to relatively narrow trail corridors, wildlife are not expected to modify their current use of habitats. No increase in snow compaction is expected since these routes are already currently compacted in winter.

### Threatened, Endangered, and Sensitive Terrestrial Wildlife Species

Potential travel management effects on Threatened and Endangered species are based on how their habitats may be affected and species occurrence. Critical habitats for federally listed Threatened and Endangered species have not been delineated on National Forest

System lands on the White River National Forest. Since no critical habitats have been identified, suitable habitats within the range of each species are considered. Federal Candidate species and Forest Service Sensitive species have no formal critical habitat designations. For this forest-wide travel management plan, the analysis of potential impacts to Threatened, Endangered, Candidate, and Sensitive Species is focused on how each alternative affects suitable habitats for these species (please see the habitat discussions that follow). Please refer to Table 3-38 for primary and secondary habitat types that are used by each Threatened, Endangered, Candidate, and Sensitive species.

A biological assessment (BA) for this White River National Forest travel management plan was prepared by the Forest Service in consultation with the U.S. Department of the Interior, Fish and Wildlife Service (USFWS), to determine the effects of travel management on federally listed and proposed species. A biological evaluation (BE) for the travel management plan was also prepared by the Forest Service to determine the effects on all Forest Service sensitive species and their habitats. Both of these documents are incorporated by reference into this analysis. The reader is referred to these documents for more detailed impacts analyses for the respective species.

### **Additional Terrestrial Management Indicator Species**

In addition to elk, the other terrestrial management indicator species (MIS) for the White River National Forest are Brewer's sparrow, American pipit, Virginia's warbler, and cave bats. The analysis of potential travel management impacts to MIS is focused on how each alternative affects suitable habitats for these species (please see the habitat discussions that follow). Please refer to Table 3-38 for primary and secondary habitat types that are used by each management indicator species.

An MIS report for this White River National Forest travel management plan was prepared by the Forest Service to determine the effects of the travel management alternatives on management indicator species and their habitats. This report is incorporated by reference into this analysis. The reader is referred to this document for more detailed impacts analyses for management indicator species.

### **Alternative Comparisons for Terrestrial Habitat Types**

For the purposes of analyzing potential impacts of the travel management alternatives on a wide range of wildlife species (including Threatened, Endangered, Sensitive, and management indicator species), the following discussions focus on these general habitat types that support wildlife: alpine, forests, mixed mountain shrublands, grass/forb meadows, and riparian.

#### **Alpine**

Alpine areas are defined as areas that rise above the cold tolerance limits of trees. There are approximately 304,000 acres (475 square miles, or 13 percent of the Forest) of alpine habitats on the White River National Forest. These areas are characterized by having severe weather conditions with very short growing seasons. Soils are generally very shallow and take many years to reestablish following disturbances. Many specialized plants and animals often live life "on the edge" in these rugged environments.

One Threatened plant, the Penland alpine fen mustard, and many of the Sensitive plants that occur on the White River National Forest occur in this life zone. White-tailed ptarmigan, American pipit, several species of rosy finches, and a few other bird species have adapted to life in the alpine areas of the forest. The Uncompahgre fritillary butterfly is an Endangered species that is only found in very high elevation alpine habitat. Bighorn

sheep and mountain goats can be found in suitable alpine habitats especially during the summer months, but some areas of their winter ranges are also located on windblown alpine slopes. Elk are often found in alpine habitats during the summer. Alpine tundra forms important foraging and breeding habitats for wolverine as well.

**Table 3.45—Density of Summer Roads, Trails, and User Created Routes by Use Type in Alpine Habitats on the White River National Forest\* (in miles per square mile)**

Type of Use	Alternative A	Alternative F	Alternative G	Alternative GM
Motorized	0.12	0.12	0.11	0.11
Mechanized (bicycle)	0.07	0.07	0.06	0.06
Foot/Horse	0.27	0.27	0.29	0.29
Ski area special use permit	0.01	0.01	0.01	0.01
User created routes	0.09	0	0	0
<b>Total</b>	<b>0.56</b>	<b>0.47</b>	<b>0.48</b>	<b>0.47</b>
Proposed for rehabilitation (reduction in density)	0	0.09	0.08	0.09

\* Approximately 474.7 square miles (303,783 acres) alpine habitat

Under existing conditions (Alternative A), there is an estimated total of 265 miles of summer roads, trails, non-system routes, and user created routes in alpine habitats on the White River National Forest, resulting in an overall summer travel route density of 0.56 miles per square mile across the alpine habitats on the forest. Alternative F proposes to naturalize all known user created summer routes, which would result in a decrease of 45 miles and a summer route density reduction of 0.09 miles per square mile in alpine habitats across the forest. Alternative G proposes to make changes in both Forest Service system and non-system summer routes which would result in a net reduction of 40 miles of travel routes in alpine habitats across the forest and a net summer route density reduction of 0.08 miles per square mile in alpine habitats. Non-motorized foot and horse trails would be increased by approximately 11 miles. Alternative GM is similar to Alternative G but proposes a few more net reductions in motorized and mechanized routes (43 miles). Alternatives F and GM would result in the most net reduction (0.09 miles per square mile) of summer travel route densities in alpine habitats on the forest, improving conditions for alpine wildlife species the best.

Table 3.46 displays information on winter travel route densities in alpine habitats on the White River National Forest under each travel management alternative.

**Table 3.46—Winter Travelway Densities in Alpine Habitats on the White River National Forest\* (in miles per square mile)**

Type of Use	Alternative A	Alternative F	Alternative G	Alternative GM
Motorized routes	0.10	0.10	0.08	0.07

\* Approximately 474.7 square miles (303,783 acres) alpine habitat

Under Alternatives A and F, there are an estimated 48 miles of existing motorized routes in alpine habitats that receive recurring use during the winter on the White River National

Forest, resulting in a density of 0.10 miles per square mile across the alpine habitats on the forest. Alternative G proposes to designate many but not all of the existing motorized winter routes that occur within winter motorized restricted areas. Existing motorized routes within open winter motorized use areas would continue to be used. Overall, Alternative G would result in a net decrease of approximately 11 miles of winter motorized routes (a reduction in winter motorized route density of 0.02 mile per square mile) in alpine habitats on the forest. Alternative GM proposes 3 miles fewer designated winter routes than Alternative G within winter motorized restricted areas, so would result in a net decrease of 14 miles of winter motorized routes (a reduction in winter motorized route density of 0.03 mile per square mile) in alpine habitats. Alternative GM would result in the greatest benefits to wildlife by having the lowest density of winter motorized routes within alpine habitats.

Table 3.47 displays information on winter snow play area percentages in alpine habitats on the White River National Forest under each travel management alternative.

**Table 3.47—Winter Snow Play Areas in Alpine Habitats on the White River National Forest\* (in percent of total habitat)**

Winter Snow Play Areas	Alternative A	Alternative F	Alternative G	Alternative GM
Motorized	5.0%	5.0%	1.3%	1.3%

\* Approximately 303,783 acres (474.7 square miles) alpine habitat  
Winter play areas do not include developed ski areas

Under Alternatives A and F, there are an estimated 15,149 acres of existing motorized snow play areas in alpine habitats that receive recurring use during the winter on the White River National Forest. This is 5.0 % of the total acreage of alpine habitats on the forest. Alternatives G and GM both contain a reduction of motorized snow play areas primarily within winter motorized restricted areas. Existing motorized snow play areas within open winter motorized use areas would continue to be used. Overall, Alternatives G and GM propose a net decrease of 11,214 acres of winter motorized snowplay areas in alpine habitats across the forest. Implementation of either Alternative G or GM would reduce the percentage of alpine habitats that would have motorized winter use to 1.3%. This would have tremendous benefits to wildlife species that winter in alpine areas on the forest by substantially reducing snow compaction and increasing habitat effectiveness during the critical winter months.

The following Table 3.48 displays information on the winter management strategy areas as percentages across the alpine habitats on the White River National Forest under each travel management alternative.

**Table 3.48—Winter Management Strategy Areas Across Alpine Habitats on the White River National Forest\* (in percent of total habitat)**

Winter Management Strategy	Alternative A	Alternative F	Alternative G	Alternative GM
Motorized prohibited areas	84.9%	84.9%	84.9%	84.9%
Restricted motorized areas	5.0%	5.0%	8.7%	8.7%

Winter Management Strategy	Alternative A	Alternative F	Alternative G	Alternative GM
Open motorized areas	7.4%	7.4%	3.8%	3.8%
Special use permit areas (ski areas, etc.)	2.7%	2.7%	2.7%	2.7%
Closed to all uses	0.0%	0.0%	0.0%	0.0%

\* Approximately 303,783 acres (474.7 square miles) alpine habitat

Alternative G proposes to convert approximately 11,136 acres of what is currently managed as open motorized winter use areas in alpine habitats into restricted motorized winter use areas. This would be a noticeable reduction of winter motorized use in alpine habitats since over the snow motorized users are free to travel anywhere in open areas but are restricted to designated routes in winter restricted motorized areas. Alternative GM proposes to convert approximately 11,308 acres of currently open motorized winter use areas in alpine habitats into restricted motorized winter use areas. The proposed reduction of open motorized winter use areas in alpine habitats under Alternatives G and GM would benefit wildlife by reducing snow compaction, improving habitat effectiveness for species that winter in alpine habitats, and concentrating motorized use on designated routes which allows human use to become predictable and avoidable.

The American pipit and elk are two management indicator species that use alpine habitats. Although roads, trails, and non-system routes are likely negatively impacting individuals at localized sites, summer route densities in alpine habitats are at levels that are unlikely affecting American pipit and elk populations at the National Forest level. Winter travel and recreation use in alpine habitats would not affect pipit or elk populations since both of these species are absent from alpine habitats in the winter months. For population trend data, please see the MIS report for this project.

### Forests

The forest category includes all the major forested habitat types across the White River National Forest, such as spruce/fir, lodgepole pine, aspen, Douglas-fir, pinyon/juniper, and blue spruce. Approximately 1,424,000 acres (2,225 square miles) of forest habitats are found on the White River National Forest, or approximately 62 percent of the entire forest. Forest habitats are found from the lower elevation pinyon/juniper stands on the western sections of the Forest at about 6,000 feet, to the highest elevation spruce/fir forests at approximately 11,500 feet, where alpine habitats start to appear.

A wide range of species of reptiles, amphibians, birds, and mammals use these habitats for various life history requirements throughout the year. The Canada lynx is a Threatened Species that uses conifer habitats such as spruce/fir and lodgepole pine for foraging and breeding. The Mexican spotted owl, also a Threatened Species, uses canyon habitats with Douglas fir, ponderosa pine, spruce/fir, and pinyon-juniper. Forest Service Sensitive Species that use forest habitat types as primary habitat include Townsend's big-eared bat, spotted bat, fringed myotis, pygmy shrew, wolverine, American marten, northern goshawk, boreal owl, flammulated owl, peregrine falcon, olive-sided flycatcher, three-toed woodpecker, and purple martin. White River National Forest management indicator species that use forest habitat types as primary habitat include elk, cave bats, and Virginia's warbler.

**Table 3.49—Density of Summer Roads, Trails, and User Created Routes by Use Type in Forest Habitats on the White River National Forest\* (in miles per square mile)**

Type of Use	Alternative A	Alternative F	Alternative G	Alternative GM
Motorized	0.46	0.46	0.42	0.41
Mechanized (bicycle)	0.19	0.19	0.17	0.16
Foot/Horse	0.34	0.34	0.36	0.36
Ski area special use permit	0.04	0.04	0.04	0.04
User created routes	0.24	0	0	0
<b>Total</b>	<b>1.27</b>	<b>1.03</b>	<b>0.99</b>	<b>0.97</b>
Proposed for rehabilitation (reduction in density)	0	0.24	0.28	0.30

\* Approximately 2,225.5 square miles (1,424,320 acres) forest habitats

Under existing conditions (Alternative A), there is an estimated total of 2,840 miles of summer roads, trails, non-system routes, and user created routes in forest habitats on the White River National Forest, resulting in an overall summer travel route density of 1.27 miles per square mile across the forest habitats on the forest. Alternative F proposes to naturalize all known user created summer routes, which would result in a decrease of 535 miles and a summer route density reduction of 0.24 miles per square mile in forest habitats across the forest. Alternative G proposes to make changes in both Forest Service system and non-system summer routes which would result in a net reduction of 644 miles of travel routes in forest habitats across the forest and a net summer route density reduction of 0.28 miles per square mile in forest habitats. Non-motorized foot and horse trails would be increased by approximately 47 miles within forest habitats. Alternative GM is similar to Alternative G but proposes a few more net reductions in motorized and mechanized routes (683 miles) and less of an increase in foot/horse trails (32 miles). Alternative GM would result in the most net reduction (0.30 miles per square mile) of summer travel route densities in forest habitats on the forest, improving conditions the best for the many wildlife species that use forest habitats.

Elk, cave bats, and Virginia's warbler are three management indicator species that use forest habitats. Although roads, trails, and non-system routes are likely negatively impacting individuals at localized sites, summer route densities in forest habitats are at levels that are unlikely affecting cave bat and Virginia's warbler populations at the National Forest level. For elk, a species known to be sensitive to human disturbance, summer travel route densities under current conditions (Alternative A) as shown in Table 3.49 above for forest habitats are at levels that are likely affecting elk populations at the National Forest level. This conclusion is based primarily on a well known study by L.J. Lyon (1983)<sup>3</sup> that found when road densities neared 1 mile per square mile in optimal elk habitat, potential elk use dropped from 100% to 60%. The action alternatives would all decrease summer route densities to or below 1 mile/square mile, with Alternative GM resulting in the lowest summer route densities across forest habitats on the forest. At these summer route densities, elk population effects at the National Forest level would be alleviated. Winter travel and recreation use in forest habitats would not affect cave bats or Virginia's warbler populations since these species do not use forest habitats in the winter months. Although elk use some lower elevation forest habitats during the winter, effects

<sup>3</sup> Lyon, J.L. 1983. Road density models describing habitat effectiveness for elk. Journal of Forestry 81(9): 592-595, 613.

to wintering elk are assessed under the mixed mountain shrubland habitat section. For population trend data for cave bats, Virginia's warbler, and elk, please see the MIS report for this project.

Table 3.50 displays information on winter travel route densities in forest habitats on the White River National Forest under each travel management alternative.

**Table 3.50—Winter Travelway Densities in Forest Habitats on the White River National Forest\* (in miles per square mile)**

Type of Use	Alternative A	Alternative F	Alternative G	Alternative GM
Motorized routes	0.34	0.34	0.33	0.22

\* Approximately 2,225.5 square miles (1,424,320 acres) forest habitats

Under Alternatives A and F, there are an estimated 758 miles of existing motorized routes in forest habitats that receive recurring use during the winter on the White River National Forest, resulting in a density of 0.34 miles per square mile across the forest habitats on the Forest. Alternative G proposes to designate many but not all of the existing motorized winter routes that occur within winter motorized restricted areas. Existing motorized routes within open winter motorized use areas would continue to be used. Overall, Alternative G would result in a net decrease of approximately 20 miles of winter motorized routes (a reduction in winter motorized route density of 0.01 mile per square mile) in forest habitats on the forest. Alternative GM proposes 491 miles of designated winter routes within winter motorized restricted areas, which would result in a net decrease of 268 miles of winter motorized routes (a reduction in winter motorized route density of 0.12 mile per square mile) in forest habitats. Alternative GM would result in the greatest benefits to wildlife by having the lowest density of winter motorized routes within forest habitats.

Table 3.51 displays information on winter snow play area percentages in forest habitats on the White River National Forest under each travel management alternative.

**Table 3.51—Winter Snow Play Areas in Forest Habitats on the White River National Forest\* (in percent of total habitat)**

Winter Snow Play Areas	Alternative A	Alternative F	Alternative G	Alternative GM
Motorized	12.1%	12.1%	10.1%	10.1%

\* Approximately 1,424,320 acres (2,225.5 square miles) forest habitats  
Winter play areas do not include developed ski areas

Under Alternatives A and F, there are an estimated 172,710 acres of existing motorized snow play areas in forest habitats that receive recurring use during the winter on the White River National Forest. This is 12.1 % of the total acreage of forest habitats on the forest. Alternatives G and GM both contain a reduction of motorized snow play areas primarily within winter motorized restricted areas. Existing motorized snow play areas within open winter motorized use areas would continue to be used. Overall, Alternative G proposes a net decrease of 28,412 acres of winter motorized snowplay areas in forest habitats across the forest. Alternative GM would result in a net decrease of 29,388 acres

of winter motorized snowplay areas in forest habitats. Implementation of either Alternative G or GM would reduce the percentage of forest habitats that would have motorized winter use to 10.1%. This would benefit the many wildlife species that winter in forest habitats by reducing snow compaction and increasing habitat effectiveness during the critical winter months.

Table 3.52 displays information on the winter management strategy areas as percentages across the forest habitats on the White River National Forest under each travel management alternative.

**Table 3.52—Winter Management Strategy Areas Across Forest Habitats on the White River National Forest\* (in percent of total habitat)**

Winter Management Strategy	Alternative A	Alternative F	Alternative G	Alternative GM
Motorized prohibited areas	42.2%	42.2%	42.2%	42.2%
Restricted motorized areas	18.7%	18.7%	21.8%	22.4%
Open motorized areas	36.8%	36.8%	33.7%	33.1%
Special use permit areas (ski areas, etc.)	2.3%	2.3%	2.3%	2.3%
Closed to all uses	0.0%	0.0%	0.0%	0.0%

\* Approximately 1,424,320 acres (2,225.5 square miles) forest habitats

Alternative G proposes to convert approximately 42,709 acres of what is currently managed as open motorized winter use areas in forest habitats into restricted motorized winter use areas. This would be a noticeable reduction of winter motorized use in forest habitats since over the snow motorized users are free to travel anywhere in open areas but are restricted to designated routes in winter restricted motorized areas. Alternative GM proposes to convert approximately 51,829 acres of currently open motorized winter use areas in forest habitats as well as a small amount (86 acres) of motorized prohibited use areas in forest habitats into restricted motorized winter use areas. The proposed reduction of open motorized winter use areas in forest habitats under Alternatives G and GM would benefit wildlife by reducing snow compaction, improving habitat effectiveness for the many wildlife species that winter in forest habitats, and concentrating motorized use on designated routes which allows human use to become predictable and avoidable. The small amount of motorized prohibited use areas that would become legally open to motorized users on designated routes would likely see increased use as these routes are signed, mapped, and advertised as Forest Service system routes. Because these routes are already receiving moderate levels of recurring winter motorized use (which is why they are being designated as system routes), not much change in snow compaction or habitat ineffectiveness is likely to occur from current conditions. Alternative GM would still benefit wildlife the most of all the alternatives since it has the least amount of winter motorized use areas within forest habitats.

Specifically regarding the Canada lynx, conditions would be improved as a whole across lynx habitats on the White River National Forest in Alternatives F, G, and GM with the proposed rehabilitation of summer roads, trails, and user created routes, and proposed reduction of winter motorized use in Alternatives G and GM. However, there are a few

individual LAUs (lynx analysis units) that would result in very small increases in summer (one LAU) and winter motorized (four LAUs) route densities under Alternatives G and GM. An LAU is a delineated analysis area that approximates the size of a single adult lynx home range. The 2002 Forest Plan identified lynx analysis units on the Forest. There are 28 LAUs on the White River National Forest. Please see the Biological Assessment for the Proposed White River National Forest Travel Management Plan, September 2010 for a comprehensive analysis of travel management effects to lynx.

The Forest Service submitted the biological assessment for this project to the US Fish and Wildlife Service (USFWS) for consultation under Section 7 of the Endangered Species Act. The USFWS informed the Forest Service of an adverse affect finding for the Canada lynx due to current conditions in the Camp Hale and Ten Mile LAUs, primarily because of existing and continuing winter snow compaction as a result of winter recreation occurring in the Vail Pass Winter Recreation Area (VPWRA), Vail Ski Area, and Copper Mountain Resort (ski area). Although the travel management decision does not include proposed changes to winter travel routes and snowplay areas in the VPWRA nor the ski areas, and does propose to reduce snow compaction in both the Camp Hale and Ten Mile LAUs, the USFWS concluded that existing conditions warrant an adverse affect finding for lynx. This adverse affect to lynx would apply to all alternatives.

### Mixed Mountain Shrublands

Mixed mountain shrubland communities are generally found in the lower elevations and are more common on the western portion of the forest. They constitute approximately 12 percent of the forest (277,700 acres) and are composed of various combinations of the following major shrub types: sagebrush (*Artemisia spp.*), Gambel oak (*Quercus gambelli*), chokecherry (*Prunus virginianus*), mountain mahogany (*Cercocarpus montanus*) and serviceberry (*Amelanchier alnifolia*).

A wide range of species of mammals and birds use these mixed mountain shrubland habitats for various life history requirements throughout the year. Forest Service Sensitive Species that use shrubland habitat types as primary habitat include Townsend's big-eared bat, spotted bat, fringed myotis, bighorn sheep, greater sage grouse, Columbian sharp-tailed grouse, sage sparrow, Brewer's sparrow, ferruginous hawk, northern harrier, and loggerhead shrike. White River National Forest management indicator species that use shrubland habitat types as primary habitat include elk, cave bats, Brewer's sparrow, and Virginia's warbler.

**Table 3.53—Density of Summer Roads, Trails, and User Created Routes by Use Type in Mixed Mountain Shrubland Habitats on the White River National Forest\* (in miles per square mile)**

Type of Use	Alternative A	Alternative F	Alternative G	Alternative GM
Motorized	0.99	0.99	0.86	0.85
Mechanized (bicycle)	0.27	0.27	0.18	0.17
Foot/Horse	0.32	0.32	0.40	0.39
Ski area special use permit	0.01	0.01	0.01	0.01
User created routes	0.31	0	0	0
<b>Total</b>	<b>1.90</b>	<b>1.59</b>	<b>1.45</b>	<b>1.42</b>

Type of Use	Alternative A	Alternative F	Alternative G	Alternative GM
Proposed for rehabilitation (reduction in density)	0	0.31	0.45	0.48

\* Approximately 433.9 square miles (277,665 acres) mixed mountain shrubland habitats

Under existing conditions (Alternative A), there is an estimated total of 823 miles of summer roads, trails, non-system routes, and user created routes in mixed mountain shrubland habitats on the White River National Forest, resulting in an overall summer travel route density of 1.90 miles per square mile across the shrubland habitats on the Forest. Alternative F proposes to naturalize all known user created summer routes, which would result in a decrease of 135 miles and a summer route density reduction of 0.31 miles per square mile in shrubland habitats across the Forest. Alternative G proposes to make changes in both Forest Service system and non-system summer routes which would result in a net reduction of 193 miles of travel routes in shrubland habitats across the Forest and a net summer route density reduction of 0.45 miles per square mile in shrubland habitats. Non-motorized foot and horse trails would be increased by approximately 36 miles within shrubland habitats. Alternative GM is similar to Alternative G but proposes a few more net reductions in motorized and mechanized routes (209 miles) and less of an increase in foot/horse trails (29 miles). Alternative GM would result in the most net reduction (0.48 miles per square mile) of summer travel route densities in shrubland habitats on the Forest, improving conditions the best for the many wildlife species that use mixed mountain shrubland habitats.

Elk, cave bats, Virginia's warbler, and Brewer's sparrow are four management indicator species that use mixed mountain shrubland habitats. Although roads, trails, and non-system routes are likely negatively impacting individuals at localized sites, summer route densities in mixed mountain shrubland habitats are at levels that are unlikely affecting cave bat, Virginia's warbler, or Brewer's sparrow populations at the National Forest level. Cave bats are active at night when road use is low. Virginia's warblers and Brewer's sparrows have small territories and a lot of available habitat that is away from roads, trails, and non-system routes. For elk, a species known to be sensitive to human disturbance, summer travel route densities under all alternatives as shown in Table 3.53 above for mixed mountain shrubland habitats are at levels that are likely affecting elk populations at the National Forest level. This conclusion is based primarily on a well known study by L.J. Lyon (1983)<sup>4</sup> that found when road densities neared 1 mile per square mile in optimal elk habitat, potential elk use dropped from 100% to 60%. The action alternatives would all decrease summer route densities, but they would still remain above 1 mile/square mile. Alternative GM would result in the lowest summer route densities across mixed mountain shrubland habitats on the Forest. Winter travel and recreation use in forest habitats would not affect cave bats, Virginia's warbler, or Brewer's sparrow populations since these species do not use mixed mountain shrubland habitats in the winter months. Conclusions for elk populations from winter travel activities are presented below. For population trend data for cave bats, Virginia's warbler, Brewer's sparrow, and elk, please see the MIS report for this project.

Table 3.54 displays information on winter travel route densities in mixed mountain shrubland habitats on the White River National Forest under each travel management alternative.

<sup>4</sup> Lyon, J.L. 1983. Road density models describing habitat effectiveness for elk. Journal of Forestry 81(9): 592-595, 613.

**Table 3.54—Winter Travelway Densities in Mixed Mountain Shrubland Habitats on the White River National Forest\* (in miles per square mile)**

Type of Use	Alternative A	Alternative F	Alternative G	Alternative GM
Motorized routes	0.47	0.47	0.47	0.39

\* Approximately 433.9 square miles (277,665 acres) mixed mountain shrubland habitats

Under Alternatives A and F, there are an estimated 204 miles of existing motorized routes in mixed mountain shrubland habitats that receive recurring use during the winter on the White River National Forest, resulting in a density of 0.47 miles per square mile across the shrubland habitats on the Forest. Alternative G proposes to designate almost all of the existing motorized winter routes that occur within winter motorized restricted areas within shrubland habitats. Existing motorized routes within open winter motorized use areas would continue to be used. Overall, Alternative G would result in no net changes in winter motorized routes in shrubland habitats on the Forest. Alternative GM proposes 171 miles of motorized winter routes, which would result in a net decrease of 33 miles of winter motorized routes (a reduction in winter motorized route density of 0.08 mile per square mile) in shrubland habitats. Alternative GM would result in benefits to wildlife by having the lowest density of winter motorized routes within mixed mountain shrubland habitats.

Although winter travel routes are likely negatively impacting some herds of wintering elk at localized sites, winter travel route densities in mixed mountain shrubland habitats across the forest are at relatively low levels (please see Table 3.54 above) that are unlikely affecting elk populations at the National Forest level. Alternative GM would result in the lowest winter route densities across mixed mountain shrubland habitats on the Forest.

Table 3.55 displays information on winter snow play area percentages in mixed mountain shrubland habitats on the White River National Forest under each travel management alternative.

**Table 3.55—Winter Snow Play Areas in Mixed Mountain Shrubland Habitats on the White River National Forest\* (in percent of total habitat)**

Winter Snow Play Areas	Alternative A	Alternative F	Alternative G	Alternative GM
Motorized	13.9%	13.9%	12.1%	12.0%

\* Approximately 277,665 acres (443.9 square miles) mixed mountain shrubland habitats  
Winter play areas do not include developed ski areas

Under Alternatives A and F, there are an estimated 38,505 acres of existing motorized snow play areas in mixed mountain shrubland habitats that receive recurring use during the winter on the White River National Forest. This is 13.9 % of the total acreage of shrubland habitats on the forest. Alternatives G and GM both propose to reduce motorized snow play areas primarily within winter motorized restricted areas. Existing motorized snow play areas within open winter motorized use areas would continue to be used. Overall, Alternative G proposes a net decrease of 5,031 acres of winter motorized

snowplay areas in shrubland habitats across the forest. Alternative GM would result in a net decrease of 5,106 acres of winter motorized snowplay areas in shrubland habitats. Implementation of Alternative G would reduce the percentage of shrubland habitats that would have motorized winter use to 12.1%. Alternative GM would reduce the percentage slightly lower to 12.0%. Alternative GM would have the greatest benefits to the many wildlife species that winter in mixed mountain shrubland habitats by reducing snow compaction and increasing habitat effectiveness during the critical winter months.

Table 3.56 displays information on the winter management strategy areas as percentages across the mixed mountain shrubland habitats on the White River National Forest under each travel management alternative.

**Table 3.56—Winter Management Strategy Areas Across Mixed Mountain Shrubland Habitats on the White River National Forest\* (in percent of total habitat)**

Winter Management Strategy	Alternative A	Alternative F	Alternative G	Alternative GM
Motorized prohibited areas	26.5%	26.5%	26.5%	26.5%
Restricted motorized areas	40.7%	40.7%	44.3%	44.5%
Open motorized areas	32.0%	32.0%	28.4%	28.2%
Special use permit areas (ski areas, etc.)	0.8%	0.8%	0.8%	0.8%
Closed to all uses	0.0%	0.0%	0.0%	0.0%

\* Approximately 277,665 acres (433.9 square miles) mixed mountain shrubland habitats

Alternative G proposes to convert approximately 9,887 acres of what is currently managed as open motorized winter use areas in mixed mountain shrubland habitats into restricted motorized winter use areas. This would be a noticeable reduction of winter motorized use in shrubland habitats since over the snow motorized users are free to travel anywhere in open areas but are restricted to designated routes in winter restricted motorized areas. Alternative GM proposes to convert approximately 10,376 acres of currently open motorized winter use areas in shrubland habitats. The proposed reduction of open motorized winter use areas in shrubland habitats under Alternatives G and GM would benefit wildlife by reducing snow compaction, improving habitat effectiveness for the many wildlife species that winter in mixed mountain shrubland habitats, and concentrating motorized use on designated routes which allows human use to become predictable and avoidable. Alternative GM would benefit wildlife the most of all the alternatives since it has the least amount of winter motorized use areas within shrubland habitats.

### Grass/Forb Meadows

Approximately 9 percent of the White River National Forest is composed of grass/forb lands (205,500 acres). These communities are made up of a wide range of grasses and forbs and are found throughout most elevations on the forest. The specific mix of plant species depends in large part on elevation, slope, and soil types.

A variety of wildlife species use these grass/forb meadow habitats. Forest Service Sensitive Species that use grass/forb habitat types as primary habitat include Townsend's big-eared bat, spotted bat, fringed myotis, pygmy shrew, bighorn sheep, wolverine,

ferruginous hawk, northern harrier, peregrine falcon, loggerhead shrike, and purple martin. White River National Forest management indicator species that use grass/forb habitat types as primary habitat include elk and cave bats. Tables 3.57 – 3.60 present the analysis for grass/forb meadow habitats.

**Table 3.57—Density of Summer Roads, Trails, and User Created Routes by Use Type in Grass/Forb Meadow Habitats on the White River National Forest\* (in miles per square mile)**

Type of Use	Alternative A	Alternative F	Alternative G	Alternative GM
Motorized	1.07	1.07	1.00	1.00
Mechanized (bicycle)	0.26	0.26	0.21	0.20
Foot/Horse	0.66	0.66	0.67	0.67
Ski area special use permit	0.24	0.24	0.24	0.24
User created routes	0.38	0	0	0
<b>Total</b>	<b>2.61</b>	<b>2.23</b>	<b>2.12</b>	<b>2.11</b>
Proposed for rehabilitation (reduction in density)	0	0.38	0.49	0.50

\* Approximately 321.1 square miles (205,492 acres) grass/forb meadow habitats  
Grass/forb habitats do not include alpine or riparian habitats

Under existing conditions (Alternative A), there is an estimated total of 840 miles of summer roads, trails, non-system routes, and user created routes in grass/forb meadow habitats on the White River National Forest, resulting in an overall summer travel route density of 2.61 miles per square mile across the grass/forb habitats on the Forest.

Alternative F proposes to naturalize all known user created summer routes, which would result in a decrease of 124 miles and a summer route density reduction of 0.38 miles per square mile in grass/forb habitats across the Forest. Alternative G proposes to make changes in both Forest Service system and non-system summer routes which would result in a net reduction of 159 miles of travel routes in grass/forb habitats across the forest and a net summer route density reduction of 0.49 miles per square mile in grass/forb habitats. Non-motorized foot and horse trails would be increased by approximately 3 miles within grass/forb meadow habitats. Alternative GM is similar to Alternative G but proposes a few more net reductions in motorized and mechanized routes (164 miles) and a 4 mile increase in foot/horse trails. Alternative GM would result in the most net reduction (0.50 miles per square mile) of summer travel route densities in grass/forb habitats on the forest, improving conditions the best for the many wildlife species that use grass/forb meadow habitats.

Elk and cave bats are two management indicator species that use grass/forb meadow habitats. For elk, a species known to be sensitive to human disturbance, summer travel route densities under all alternatives as shown in Table 3.57 above for grass/forb habitats are at levels that are likely affecting elk populations at the National Forest level. This conclusion is based primarily on a well known study by L.J. Lyon (1983)<sup>5</sup> that found when road densities neared 1 mile per square mile in optimal elk habitat, potential elk use dropped from 100% to 60%. The action alternatives would all decrease summer route densities, but they would still remain well above 1 mile/square mile. Alternative GM

<sup>5</sup> Lyon, J.L. 1983. Road density models describing habitat effectiveness for elk. Journal of Forestry 81(9): 592-595, 613.

would result in the lowest summer route densities across grass/forb meadow habitats on the forest. Although roads, trails, and non-system routes may be negatively impacting individuals at localized sites, summer route densities in grass/forb meadow habitats are unlikely affecting cave bats. Cave bats are active at night when road use is low. Winter travel and recreation use in grass/forb habitats would not affect cave bat populations since these species do not use grass/forb habitats in the winter months. Although elk use some lower elevation grass/forb habitats during the winter, effects to wintering elk are assessed under the mixed mountain shrubland habitat section. For population trend data for cave bats and elk, please see the MIS report for this project.

Table 3.58 displays information on winter travel route densities in grass/forb meadow habitats on the White River National Forest under each travel management alternative.

**Table 3.58—Winter Travelway Densities in Grass/Forb Meadow Habitats on the White River National Forest\* (in miles per square mile)**

Type of Use	Alternative A	Alternative F	Alternative G	Alternative GM
Motorized routes	0.66	0.66	0.67	0.62

\* Approximately 321.1 square miles (205,492 acres) grass/forb meadow habitats  
Grass/forb habitats do not include alpine or riparian habitats

Under Alternatives A and F, there are an estimated 211 miles of existing motorized routes in grass/forb meadow habitats that receive recurring use during the winter on the White River National Forest, resulting in a density of 0.66 miles per square mile across the grass/forb habitats on the forest. Alternative G proposes to designate all of the existing motorized winter routes that occur within winter motorized restricted areas within grass/forb habitats. Existing motorized routes within open winter motorized use areas would continue to be used. Overall, Alternative G would result in a slight net increase of 0.01 miles/square mile in winter motorized routes in grass/forb meadow habitats on the forest. Alternative GM proposes 200 miles of motorized winter routes, which would result in a net decrease of 11 miles of winter motorized routes (a reduction in winter motorized route density of 0.04 mile per square mile) in grass/forb habitats. Alternative GM would result in benefits to wildlife by having the lowest density of winter motorized routes within grass/forb meadow habitats.

Table 3.59 displays information on winter snow play area percentages in grass/forb meadow habitats on the White River National Forest under each travel management alternative.

**Table 3.59—Winter Snow Play Areas in Grass/Forb Meadow Habitats on the White River National Forest\* (in percent of total habitat)**

Winter Snow Play Areas	Alternative A	Alternative F	Alternative G	Alternative GM
Motorized	31.7%	31.7%	28.9%	28.8%

\* Approximately 205,492 acres (321.1 square miles) grass/forb meadow habitats  
Grass/forb habitats do not include alpine or riparian habitats  
Winter play areas do not include developed ski areas

Under Alternatives A and F, there are an estimated 65,057 acres of existing motorized snow play areas in grass/forb meadow habitats that receive recurring use during the winter on the White River National Forest. This is 33.9 % of the total acreage of grass/forb habitats on the forest. This is relatively high and is due to the fact that winter motorized users often find high quality recreation in open areas. Alternatives G and GM both propose to reduce motorized snow play areas primarily within winter motorized restricted areas. Existing motorized snow play areas within open winter motorized use areas would continue to be used. Overall, Alternative G proposes a net decrease of 5,724 acres of winter motorized snowplay areas in grass/forb habitats across the Forest. Alternative GM would result in a net decrease of 5,870 acres of winter motorized snowplay areas in grass/forb habitats. Implementation of Alternative G would reduce the percentage of grass/forb habitats that would have motorized winter use to 28.9%. Alternative GM would reduce the percentage slightly lower to 28.8%. Alternative GM would have the greatest benefits to the wildlife species that winter in grass/forb habitats by reducing snow compaction and increasing habitat effectiveness during the critical winter months.

Table 3.60 displays information on the winter management strategy areas as percentages across the grass/forb meadow habitats on the White River National Forest under each travel management alternative.

**Table 3.60—Winter Management Strategy Areas Across Grass/Forb Meadow Habitats on the White River National Forest\* (in percent of total habitat)**

Winter Management Strategy	Alternative A	Alternative F	Alternative G	Alternative GM
Motorized prohibited areas	40.8%	40.8%	41.0%	41.0%
Restricted motorized areas	9.7%	9.7%	12.3%	12.5%
Open motorized areas	43.8%	43.8%	41.4%	41.2%
Special use permit areas (ski areas, etc.)	5.2%	5.2%	5.2%	5.2%
Closed to all uses	0.0%	0.0%	0.0%	0.0%

\* Approximately 205,492 acres (321.1 square miles) grass/forb meadow habitats  
Grass/forb habitats do not include alpine or riparian habitats

Alternative G proposes to convert approximately 5,215 acres of what is currently managed as open motorized winter use areas in grass/forb meadow habitats into restricted motorized winter use areas. This would be a noticeable reduction of winter motorized use in grass/forb habitats since over the snow motorized users are free to travel anywhere in open areas but are restricted to designated routes in winter restricted motorized areas. Alternative GM proposes to convert approximately 5,772 acres of currently open motorized winter use areas in grass/forb habitats. The proposed reduction of open motorized winter use areas in grass/forb habitats under Alternatives G and GM would benefit wildlife by reducing snow compaction, improving habitat effectiveness for the wildlife species that winter in grass/forb habitats, and concentrating motorized use on designated routes which allows human use to become predictable and avoidable. Alternative GM would benefit wildlife the most of all the alternatives since it has the least amount of winter motorized use areas within grass/forb habitats.

## Riparian

Although a very limited amount of the forest is classified as riparian (less than 3 percent at approximately 58,500 acres), riparian areas receive a disproportionate share of wildlife use. Riparian habitats are generally considered to be diverse in vegetation and wildlife diversity, due in large part to the presence of water. The plant communities that make up riparian habitats on the White River National Forest also are diverse, varying from low-elevation cottonwood/willow woodlands along stream channels, to blue spruce/dogwood-dominated forested communities, to high-elevation willow carrs.

A large variety of wildlife species use riparian habitats. Many Forest Service Sensitive Species use riparian habitat types as primary habitat including Townsend's big-eared bat, spotted bat, fringed myotis, pygmy shrew, river otter, American marten, wolverine, goshawk, northern harrier, peregrine falcon, bald eagle, black swift, Lewis' woodpecker, purple martin, Great Basin silverspot butterfly, boreal toad, and northern leopard frog. White River National Forest management indicator species that use riparian habitat types as primary habitat include Virginia's warbler and cave bats. Tables 3.61 – 3.64 present the analysis for riparian habitats.

**Table 3.61—Density of Summer Roads, Trails, and User Created Routes by Use Type in Riparian Habitats on the White River National Forest\* (in miles per square mile)**

Type of Use	Alternative A	Alternative F	Alternative G	Alternative GM
Motorized	1.03	1.03	0.91	0.94
Mechanized (bicycle)	0.51	0.51	0.44	0.40
Foot/Horse	0.95	0.95	1.00	0.96
Ski area special use permit	0.02	0.02	0.02	0.02
User created routes	0.39	0	0	0
<b>Total</b>	<b>2.90</b>	<b>2.51</b>	<b>2.37</b>	<b>2.32</b>
Proposed for rehabilitation (reduction in density)	0	0.39	0.53	0.58

\* Approximately 91.3 square miles (58,460 acres) riparian habitats

Under existing conditions (Alternative A), there is an estimated total of 264 miles of summer roads, trails, non-system routes, and user created routes in riparian habitats on the White River National Forest, resulting in an overall summer travel route density of 2.90 miles per square mile across the riparian habitats on the forest. This is relatively high, and is attributed to the relatively small land acres of riparian habitats and the common occurrence of travel routes following drainages. Alternative F proposes to naturalize all known user created summer routes, which would result in a decrease of 35 miles and a summer route density reduction of 0.39 miles per square mile in riparian habitats across the forest. Alternative G proposes to make changes in both Forest Service system and non-system summer routes which would result in a net reduction of 48 miles of travel routes in riparian habitats across the forest and a net summer route density reduction of 0.53 miles per square mile in riparian habitats. Non-motorized foot and horse trails would be increased by approximately 4.5 miles within riparian habitats. Alternative GM is similar to Alternative G but proposes a few more net reductions in motorized and mechanized routes (52 miles) and less of an increase in foot/horse trails (1.3 miles). Alternative GM would result in the most net reduction (0.58 miles per square

mile) of summer travel route densities in riparian habitats on the Forest, improving conditions the best for the many wildlife species that use riparian habitats.

Cave bats and Virginia's warbler are two management indicator species that use riparian habitats. Although summer route densities in riparian habitats are relatively high and may be negatively impacting individuals at localized sites, summer roads, trails, and non-system routes in riparian habitats are unlikely affecting cave bat and Virginia's warbler populations at the National Forest level. Cave bats are active at night when road use is low. Virginia's warblers have small territories and available habitats that are away from roads, trails, and non-system routes. Alternative GM would result in the lowest summer route densities across riparian habitats on the forest. Winter travel and recreation use in riparian habitats would not affect cave bat or Virginia's warbler populations since these species do not use riparian habitats in the winter months. For population trend data for cave bats and Virginia's warbler, please see the MIS report for this project.

Table 3.62 displays information on winter travel route densities in riparian meadow habitats on the White River National Forest under each travel management alternative.

**Table 3.62—Winter Travelway Densities in Riparian Habitats on the White River National Forest\* (in miles per square mile)**

Type of Use	Alternative A	Alternative F	Alternative G	Alternative GM
Motorized routes	0.63	0.63	0.65	0.51

\* Approximately 91.3 square miles (58,460 acres) riparian habitats

Under Alternatives A and F, there are an estimated 58 miles of existing motorized routes in riparian habitats that receive recurring use during the winter on the White River National Forest, resulting in a density of 0.63 miles per square mile across the riparian habitats on the Forest. Alternative G proposes to designate all of the existing motorized winter routes that occur within winter motorized restricted areas within riparian habitats plus an additional one mile. Existing motorized routes within open winter motorized use areas would continue to be used. Alternative GM proposes 46 miles of motorized winter routes, which would result in a net decrease of 12 miles of winter motorized routes (a reduction in winter motorized route density of 0.12 mile per square mile) in riparian habitats. Alternative GM would result in the most benefits to wildlife by having the lowest density of winter motorized routes within riparian habitats.

Table 3.63 displays information on winter snow play area percentages in riparian habitats on the White River National Forest under each travel management alternative.

**Table 3.63—Winter Snow Play Areas in Riparian Habitats on the White River National Forest\* (in percent of total habitat)**

Winter Snow Play Areas	Alternative A	Alternative F	Alternative G	Alternative GM
Motorized	20.0%	20.0%	16.8%	16.7%

\* Approximately 58,460 acres (91.3 square miles) riparian habitats  
Winter play areas do not include developed ski areas

Under Alternatives A and F, there are an estimated 11,711 acres of existing motorized snow play areas in riparian habitats that receive recurring use during the winter on the White River National Forest. This is 20.0 % of the total acreage of riparian habitats on the forest. Alternatives G and GM both propose to reduce motorized snow play areas primarily within winter motorized restricted areas. Existing motorized snow play areas within open winter motorized use areas would continue to be used. Overall, Alternative G proposes a net decrease of 1,899 acres of winter motorized snowplay areas in riparian habitats across the Forest. Alternative GM would result in a net decrease of 1,977 acres of winter motorized snowplay areas in riparian habitats. Implementation of Alternative G would reduce the percentage of riparian habitats that would have motorized winter use to 16.8%. Alternative GM would reduce the percentage slightly lower to 16.7%. Alternative GM would have the greatest benefits to the wildlife species that winter in riparian habitats by reducing snow compaction and increasing habitat effectiveness during the critical winter months.

Table 3.64 displays information on the winter management strategy areas as percentages across the riparian habitats on the White River National Forest under each travel management alternative.

**Table 3.64—Winter Management Strategy Areas Across Riparian Habitats on the White River National Forest\* (in percent of total habitat)**

Winter Management Strategy	Alternative A	Alternative F	Alternative G	Alternative GM
Motorized prohibited areas	43.9%	43.9%	43.9%	43.9%
Restricted motorized areas	16.0%	16.0%	21.5%	22.3%
Open motorized areas	37.6%	37.6%	32.1%	31.3%
Special use permit areas (ski areas, etc.)	2.5%	2.5%	2.5%	2.5%
Closed to all uses	0.0%	0.0%	0.0%	0.0%

\* Approximately 58,460 acres (91.3 square miles) riparian habitats

Alternative G proposes to convert approximately 3,168 acres of what is currently managed as open motorized winter use areas in riparian habitats into restricted motorized winter use areas. Alternative GM proposes to convert approximately 3,664 acres of currently open motorized winter use areas in riparian habitats. The proposed reduction of open motorized winter use areas in riparian habitats under Alternatives G and GM would benefit wildlife by reducing snow compaction, improving habitat effectiveness for the wildlife species that winter in riparian habitats, and concentrating motorized use on designated routes which allows human use to become predictable and avoidable. Alternative GM would benefit wildlife the most of all the alternatives since it has the least amount of winter motorized use areas within riparian habitats.

### Rehabilitation of Roads, Trails, and Non-System Routes

Alternatives F, G, and GM propose to naturalize summer non-system and user created routes and rehabilitate some Forest Service system roads and trails. Decommissioning and naturalization would result in substantial improvements for wildlife and habitats.

Habitat degradation particularly of riparian, meadow, and aquatic habitats would be greatly reduced as human and vehicle use ceases, roads and trails are decompacted, recontoured, and revegetated, natural drainage patterns are restored, and erosion, sedimentation, noxious weed, and other non-native plant, wildlife, and disease sources disappear. The recovery and restoration of wildlife habitats would occur quickly (1-3 years) as grasses, forbs, and shrubs are re-established with rehabilitation, and more slowly over time as trees regenerate (5-80 years). Wildlife habitat connectivity would improve and habitat fragmentation and isolation of rare habitats would decrease over time as revegetation and restoration occurs. Although impacts to wildlife habitats along narrow travel corridors typically do not affect many acres, restoration of wildlife habitats contributes to the availability and effectiveness of habitat and ultimately conservation of wildlife species.

Road and trail use impacts to wildlife species such as human disturbance and access into wildlife habitats as well as the potential for collisions between vehicles and wildlife would substantially disappear immediately upon closure of summer routes. Wildlife habitat effectiveness would be restored along all routes that would be rehabilitated.

The proposed rehabilitation of routes that currently bisect old growth, interior forest, and otherwise large areas of effective habitat (habitat security areas) would especially benefit many wildlife species. Proposed rehabilitation of routes within specific big game priority habitats including winter ranges, production areas, summer and fall concentration areas, and spring and fall migration areas would be particularly beneficial, removing human intrusion and a habitat degradation source, while promoting wildlife solitude and habitat effectiveness in these areas. Similarly, the proposed rehabilitation of routes that occur in bird breeding territories would benefit nesting raptors, songbirds, waterfowl, and upland game birds by reducing human intrusion during a critical time of year. The proposal to rehabilitate routes within forest plan Management Areas such as the 1.41 (Core Areas), 3.5 (Corridors Connecting Core Areas), 5.4 (Forested Flora and Fauna Habitats), 5.41 (Deer and Elk Winter Range), 5.42 (Bighorn Sheep Habitat), 5.43 (Elk Habitat), and 5.5 (Forested Landscape Linkages) would promote wildlife solitude and habitat effectiveness in these areas.

The proposed road and trail rehabilitation and user created route naturalization operations could impact wildlife that may be in the proximity of local activities. Some wildlife species may respond with a short term avoidance of rehabilitation sites when work is occurring, but most would be expected to return to local sites and normal behavior patterns once operations are completed. These short term human disturbances are expected to last only one day in localized work sites, during the summer or fall season. Typical progress for road rehabilitation with heavy equipment is one mile per day. Timing restrictions would be used to delay rehabilitation work within active raptor nest buffer areas until after young have fledged or the nests are determined to be inactive. Similarly, timing restrictions would be used within identified big game production areas.

Road rehabilitation work would result in a small short-term increase in soil erosion and sedimentation of some drainages as culverts are pulled and drainages are reconstructed. Typically, culvert removal and drainage reconstruction are done in the fall when intermittent drainages are dry and creeks have a reduced water flow in order to greatly lessen the potential for erosion and sedimentation. Water Conservation Practices would be used to minimize short term impacts to riparian areas, wetlands, streams, ponds, and lake habitats that are adjacent to routes planned for rehabilitation.

Some limited tree felling is likely to aid in effective road, trail, and user created route obliteration. Many of these trees are likely to be trees that have been killed by mountain

pine beetle where they are available. Tree felling could result in localized impacts to wildlife habitat due to the loss of potential nesting or denning sites. This would likely be a short-term impact to individuals for a single nesting/denning season.

Because of the short term duration, small areas of temporarily impacted vegetation, and water conservation practices used to minimize impacts to water sources, the proposed rehabilitation activities are considered to be a minor and discountable effect to most wildlife that might be present in work areas.

### **General, Direct, and Indirect Effects: Aquatic Systems**

For this analysis, it is assumed that when a road is closed it is closed effectively such that it ceases to have impacts on the aquatic system. Seventh level hydrologic unit codes (HUCs) were used for this analysis and are referred to here as “catchments.” There are 388 catchments wholly or partially on the White River National Forest.

The effects of roads on aquatic organisms are well documented. A synthesis of road impact information can be found in “Forest Roads: A synthesis of scientific information” (Gucinski and Furniss 2000). Some of the key findings from this document that relate to travel management include both physical and biological effects:

Physical effects include:

- Roads affect geomorphic process by four primary mechanisms: Accelerating erosion from the road surface and prism itself by both mass and surface erosion processes; directly affecting channel structure and geometry; altering surface flowpaths, leading to diversion or extension of channels onto previously unchannelized portions of the landscape; and causing interactions among water, sediment, and woody debris at engineered road-stream crossings.
- Roads have three primary effects on water: they intercept rainfall directly on the road surface and road cutbanks and intercept subsurface water moving down the hillslope; they concentrate flow, either on the surface or in an adjacent ditch or channel; and they divert or reroute water from flowpaths that it would otherwise take if the road were not present.

These physical effects lead to the following biological effects:

- Increased fine-sediment composition in stream gravel has been linked to decreased fry emergence, decreased juvenile densities, loss of winter carrying capacity, and increased predation of fishes.
- The effects of roads are not limited to those associated with increases in fine-sediment delivery to streams; they can include barriers to migration, water temperature changes, and alterations to streamflow regimes.
- Road-stream crossings have been shown to have effects on stream invertebrates. Hawkins and others found that the aquatic invertebrate species assemblages (observed versus expected based on reference sites) were related to the number of stream crossings above a site.
- Several studies at broad scales document aquatic habitat or fish density changes associated with road density or indices of road density.

Effects of the travel management plan were determined by analyzing three indicators: total road miles or road density by catchment, total road miles within 300 feet of streams or rivers by catchment, and number of road crossings by catchment. Roads only were selected for this analysis since, in general, they have greater impacts on aquatic systems

than trails due to their larger size and level of disturbance. Winter use was not analyzed since there is no associated ground disturbance.

### Road Density

Table 3.65 displays the total number of open roads and the forest-wide road density for all alternatives. Although road density generally decreases in each action alternative, in some localized areas Alternatives G and GM have more system miles than Alternative A, which relates to improvements in some watersheds while others are more impacted.

**Table 3.65—Miles of road and road density by alternative**

	Alternative A	Alternative F	Alternative G	Alternative GM
Miles of road	2139	1918	1698	1698
Average road density (miles per square mile)	0.60	0.54	0.48	0.48

*Miles presented in Alternative A do not include the 853 miles of unauthorized roads and trails currently present on the forest.*

### Roads within 300 Feet of Streams

The closer a road is to a stream system, the greater the impacts on the stream and the organisms inhabiting it. Roads directly adjacent to streams can impact streams by channelizing the stream, eliminating streamside vegetation, and introducing sediment into the stream.

Table 3.66 displays the total miles of maintenance level 1 and 2 roads, and the percent of all ML 1 and 2 roads within 300 feet of streams and rivers for all alternatives. Alternative A has the greatest length of open road within 300 feet of streams and rivers, followed by Alternative F. Alternatives G and GM have the least amount of road within 300 feet of streams and rivers. The percent of the road system within 300 feet of streams and rivers is consistent in all alternatives meaning that roads closed near streams and rivers are proportional to the overall road distribution. There are eight catchments and subwatersheds with at least 10 miles of ML 1 and 2 roads within 300 feet of a stream in one or more alternative.

**Table 3.66—Miles of maintenance level 1 and 2 roads within 300 feet of streams and rivers, and the proportion of open roads and road closures within this area**

	Alternative A	Alternative F	Alternative G	Alternative GM
Miles of ML 1 & 2 road within 300 feet of streams	604	523	446	443
% of ML 1 & 2 roads within 300 feet of streams	39.1%	39.5%	40.2%	40.0%

**Table 3.67—Subwatersheds on the White River National Forest with at least 5 miles of maintenance level 1 and 2 road within 300 feet\* of a stream or river**

Watershed Name	Alternative A	Alternative F	Alternative G	Alternative GM
Swan River	22.2	20.1	17.8	19.8
Miller Creek	20.2	19.7	18.1	18.1
Turkey Creek	19.6	18.5	9.1	9.1
North Elk Creek	14.0	13.2	7.6	7.5
Big Beaver Creek	11.1	11.1	9.8	9.9
Fawn Creek	10.4	10.4	9.3	9.3
Upper Castle Creek	10.3	8.6	8.5	8.5
Green Mtn Reservoir	10.1	10.0	6.1	6.2
Composite watershed				

\*Road miles within 300 feet are presented for all alternatives

### Road-stream Crossings

Road-stream crossings are areas where the impacts of roads are the greatest in terms of channel impacts, sediment, and potential movement barriers. Perennial streams flow year-round and many contain fish populations. Intermittent streams flow seasonally with defined channels and swales flow seasonally with undefined channels. In general, intermittent streams would contain aquatic macroinvertebrates and swales would not. Both swales and intermittent streams can move road derived sediment efficiently to fish-bearing streams downstream. Alternative F has a 17 percent reduction in the number of total stream crossings, Alternative G has a 27 percent reduction in stream crossings, and Alternative GM has a 28 percent reduction in stream crossings (Table 3.68).

**Table 3.68—Number of maintenance level 1 and 2 road crossings by type of stream for each alternative**

Type of stream	Alternative A	Alternative F	Alternative G	Alternative GM
Perennial	236	198	193	187
Intermittent	350	292	242	240
Swale	476	198	336	335
TOTAL	1062	883	772	762

### Aquatic Macroinvertebrates

Aquatic macroinvertebrates are those invertebrates that spend at least part of their life cycle in water. These include worms, mollusks, mites, and insects. Insects are by far the most common. Most insect species spend just the immature phase (larval or nymph phase) in water.

Macroinvertebrate communities occur in all water bodies on the White River National Forest, including ponds, lakes, reservoirs, wetlands, rivers, perennial streams, and intermittent streams. Even degraded systems usually contain aquatic macroinvertebrates, however these communities look very different from those in pristine systems. Because of their wide distribution and their sensitivity to disturbance and pollutants, macroinvertebrates are widely used to monitor the health of streams and rivers.

Macroinvertebrate communities are influenced by the timing of flow and water quality in the streams in which they live. Geology, elevation, temperature, gradient, and substrate

distribution are other factors that commonly influence macroinvertebrate communities. As habitats are degraded, either by chemical pollutants, increased sediment, or unfavorable changes in flow (especially severe reductions), the response of the macroinvertebrate community is typically a reduction in the number of species which occur there, and especially the number of sensitive species.

All alternatives improve the current situation by removing roads that currently exist (see discussion above under “Aquatic systems – general effect”). In the years following this decision, actions will occur to that reduce the impact of these roads. Expected treatments range from allowing a road to revegetate naturally to active recontouring. Some roads will be converted to trails. It is expected that the footprint of the travelway will be reduced when roads are converted to trails. Overall, this project is expected to improve trends in macroinvertebrate populations forest-wide by reducing the impacts of roads currently existing. The magnitude of this improvement varies by alternative, with Alternative F offering the least amount of improvement and Alternatives G and GM offering the greatest amount of improvement to forest-wide trends.

### ***Fish***

Although the primary risk factors for many native fish species are biological (exotic species and to some degree disease), roads can further impact these populations by creating barriers to fish movement, degrading habitat by constraining streams and eliminating riparian vegetation, introducing sediment, and providing angler access.

#### **Colorado River Cutthroat Trout**

There are 38 subwatersheds containing at least one conservation population of Colorado River cutthroat trout. The forest plan has a standard stating that total road density in subwatersheds containing conservation populations of Colorado River cutthroat trout may not be increased. According to the GIS analysis, 34 watersheds with a conservation population meet that standard in all alternatives. Deviations from this standard appear to occur in 4 watersheds in at least one alternative. These watersheds include the Upper Blue River (HUC 140100020506), Headwaters West Divide Creek (140100050407), Colorado River below Battlement Creek (140100050720), and Upper Milk Creek (140500020101). Road increases in three of these watersheds are shown because of the inclusion of a road which exists on old Forest Service maps and is thought to be an accidental omission in the Alternative A layer. The other watershed, Headwaters West Divide Creek, a user created feature crossing a cutthroat stream is adopted as a road in Alternative G only.

The total road mileage and density for all subwatersheds with conservation populations of Colorado River cutthroat trout are presented in Table 3.69. A substantial number of roads are removed in all action alternatives, with Alternatives G and GM removing 17 percent of the existing road mileage. Removal of these roads would have a long-term benefit on Colorado River cutthroat trout. It is possible that reclamation activities would have a short-term negative effect due to sediment and possible direct channel impacts if crossings were removed.

**Table 3.69—Total road miles and road density (in miles per square mile) for all 6th level watersheds containing a conservation population of Colorado River cutthroat trout**

	Alternative A	Alternative F	Alternative G
Total miles	586	531	466
Total road density	0.64	0.58	0.51
Miles removed (compared to Alt. A)	n/a	55	120
% of miles removed (compared to Alt. A)	n/a	9%	20%

The total miles of roads and trails by use within 350 feet of known occupied cutthroat habitat are presented in the biological evaluation. These include all cutthroat trout regardless of genetic purity. In total, road density decreases 5% to 15% adjacent to occupied cutthroat trout habitat in all action alternatives. In Alternative F, unauthorized travelways (“undecommissioned ways”) are planned for rehabilitation and 3 miles of road are converted to non-motorized trail. In Alternative G, an additional 6.5 miles of travelway are planned for rehabilitation within 350 feet of occupied cutthroat trout habitat. In Alternative GM, an additional (from Alt. F) 14.1 miles of travelway are planned for rehabilitation. Roads would be rehabilitated where travel has been eliminated. Removing travelways adjacent to occupied cutthroat trout habitat would have a beneficial effect on the habitat by improving the function of the near-stream areas and decreasing disturbance.

### Greenback Cutthroat Trout

Recent improvements in genetic analysis techniques appear to have made it possible to differentiate Colorado River cutthroat trout from greenback cutthroat trout. Although this differentiation is still considered somewhat preliminary, it is considered best available science and therefore populations identified as “GBlineage” are considered greenback cutthroat trout. The White River National Forest has five populations to date which have been identified as GBlineage: Three Licks Creek, Frey Gulch, Cunningham Creek, Park Creek, and Cache Creek. Twenty-five miles of roads are removed from the GBlineage watersheds. Some are converted to motorized trails and others are scheduled for rehabilitation. Four of these watersheds would have roads rehabilitated within the occupied part of the watershed. The fifth (Cache Creek) also has a trail along the creek which would be removed from the system (allowed to revegetate). There may be short-term negative impacts on these populations from rehabilitation although the long-term effect would be beneficial.

**Table 3.70—Comparison of roads and motorized trails in each alternative in watersheds containing a cutthroat trout population believed to be greenback cutthroat trout**

Roads and trails by alternative	Population (watershed)*					
	Three Licks (Big Hole Creek)	Frey Gulch (Frey Gulch)	Cunningham (North Fork Fryingpan)	Park Creek (North Thompson)	Cache Creek (Cache Creek)	Spruce Creek (Spruce Creek)
Alt. A – roads	3.7	4.7	30.5	28.9	0.4	3.8
Alt. A – trails	0	2.0	14.8	6.2	3.3	0
Alt. F - roads	3.7	4.7	30.5	20.9	0.4	1.0
Alt. F – trails	0	2.0	14.8	13.2	3.3	2.9

Roads and trails by alternative	Population (watershed)*					Cache Creek (Cache Creek)	Spruce Creek (Spruce Creek)
	Three Licks (Big Hole Creek)	Frey Gulch (Frey Gulch)	Cunningham (North Fork Fryingpan)	Park Creek (North Thompson)			
Alt. G – roads	1.2	2.4	20.4	20.8		0.4	0.6
Alt. G – trails	2.1	4.8	25.0	2.5		3.3	1.0
Alt. GM – roads	1.2	3.4	21.5	20.8		0.4	0.6
Alt. GM – trails	2.1	3.4	23.8	2.5		3.3	1.0

\*The subwatershed or catchment containing the population used for analysis is in parenthesis below the population name.

### Mountain Sucker

Mountain sucker occur primarily in the White River drainage on the White River National Forest. They are more sensitive to sediment than other local sucker species and therefore could be negatively impacted by increased road densities, or in the short term by road rehabilitation activities. Road densities in occupied watersheds in general remain stable in Alternatives F, G, and GM, with a large decrease in road density in Deep Creek where mountain sucker have been reported.

### Bluehead Sucker

Bluehead sucker occur primarily downstream of the forest, with the exception of the West Divide Creek watershed. Bluehead sucker are not known to be sensitive to sediment. Alternatives F, G, and GM reduce the road density by about 20 percent in the Divide Creek watershed and by about 10 percent in the West Divide Watershed and would therefore have a long-term beneficial effect on bluehead sucker, although the short-term impact from rehabilitation activities may be slightly negative.

### Roundtail Chub and Flannelmouth Sucker

Roundtail chub and flannelmouth sucker occur in streams and rivers immediately downstream of the forest. Road density in occupied watersheds remains stable to decreases by up to 20 percent. These fishes are not known to be sensitive to sediment, therefore, these changes in the travel system are not expected to affect them.

### Colorado Pikeminnow, Humpback Chub, Razorback Sucker, and Bonytail

These species all occur downstream of the White River National Forest in the Colorado, White, and Yampa rivers. The primary threat to these species from activities on the White River National Forest is water depletion. The proposed action does not call for any change in water distribution or use and therefore will not directly or indirectly affect these species.

### Amphibians

Hydrologic alteration of breeding ponds and the risk of disease are the primary threats to amphibians from travel management. Little is known about how disease moves through the system, but it is logical that increased human contact and disturbance could increase the risk of disease introduction to breeding ponds. Ideally, all travelways should be at least 300 feet away from breeding ponds. In addition to the risk of spreading disease, increased motorized and non-motorized use increases the risk of harassment or death of individuals.

An analysis of known breeding sites for the boreal toad and northern leopard frog was conducted for all alternatives. In Alternative F, user created ways would be removed near six boreal toad breeding populations. However, Alternatives G and GM adopt some of these user created ways within a half mile of two of the breeding populations on the Dillon and Aspen/Sopris Ranger Districts. For leopard frog, there is a twelve percent reduction in open roads within a half mile of breeding ponds (0.37 miles removed) and eighty percent of the almost 2 ½ miles of motorized trails were removed in Alternative G, although some were restored in Alternative GM (53% reduction from Alternatives A and F). Therefore, Alternative F is the best alternative for boreal toads and Alternative G is best for leopard frogs. Alternatives G and GM would have a potential minor negative impact on boreal toads and would have a long-term beneficial effect on leopard frogs (with a short-term negative effect from the disturbance associated with obliterating/closing these travelways).

### **General, Direct, and Indirect Effects: Rare Plants**

There would be three types of potential impacts to the 38 TESP plant species and their habitats through implementation of Travel Management:

1. The actual footprint of the “existing” road or trail affecting habitat.
  - a. Ground was previously disturbed, soil was compacted, biomass was removed.
  - b. Local hydrology was altered in select locations - water was either diverted away from or to select locations or past disturbances resulted in erosion and increased sediment loads to potential habitat.
  - c. Noxious weed invasions often occur where habitats were previously disturbed. If noxious weed invasions have already occurred and continue to exist within occupied habitat, individuals or whole populations could be lost as a result of increased competition from species changes in plant communities.
2. Disturbances resulting from the use and maintenance of the travel routes and ways.
  - a. Recurring ground disturbance, soil compaction, biomass removal, dust and mud. Mostly to trail but there is increased risks to plants from off-trail impacts to selected areas by trail, road or area designation. Plants could be lost by being crushed or ripped up or experience increased dust or be splashed with mud by passing people, pack stock, bicycle tires or vehicle’s tires. As users pass by potential habitat pollinators may be crushed, experience increased dust or be splashed with mud resulting in pollination disruption. Finally habitat could be desiccated if use dissects TESP plant habitats. Intense recreation and vehicle use in wetlands often results in rutting in riparian areas which could divert away from or to select locations causing select species habitats to become too wet or too dry or those disturbances could result in erosion and increased sediment loads to occupied habitat.
  - b. Herbicide treatments targeting invasive species in or near travel routes could have adverse impacts on TESP plant populations.
  - c. Recurring snow compaction and physical damage to vegetation within travel routes and within other areas open to over snow travel. A modified snow cover could have adverse impacts, be neutral or have beneficial impacts to select TESP plant species. Snow compaction which results in altered soil temperature profiles could result in changes to the soils including nitrogen, carbon and microbial dynamics which are the drivers for changes in plant species composition (Baiderin 1980, Baiderin 1983, Fahey and Wardle 1998, Wipf et al 2005, Rixen et al. 2004, Williams and Brook 1998, Meyer 1993, Freppaz et al. 2002). The growing season would essentially become shorter and where this occurs on a yearly basis, changes in plant community composition and subsequent pollinator availability could occur that may persist for decades (Knight et al. 1975). Plant species that are on the edges of their elevation ranges could be negatively affected. Snow

- banks often persist where snow compaction has occurred and when they melt, temporarily impounded sheets of flowing water result which can cause changes to surface flow energy and directions and the creation of pathway drainages (Cooper and Arp 2001).
- d. Physical damage to plants and their habitats could occur if over snow use occurred when snow levels were too low including; soil disturbance, soil compaction, vegetation compaction, and biomass removal.
  - e. Recurring noxious weed vectors. Hikers, bicyclists, pack stock and Off Highway Vehicles (OHV) can transport noxious weeds.

Impacts associated with rehabilitation and/or seeding roads include ground disturbance, biomass removal and increased dust. If these impacts occurred in and near occupied habitat individuals or whole populations could be lost by being crushed or ripped by mechanized equipment as roads are ripped for seeding, user created ruts are reshaped and as culverts are dug up. If occurrences were present in the area which were influenced by local hydrology they could be negatively impacted in the short term if the hydrology there is altered. While these impacts would occur mostly to the rehabilitated road or trail prism, populations growing in or near operations could be negatively impacted in the short term. Machinery cleaning before use on NFS lands would reduce the transport of weed/invasive species seeds from off-site. Re-establishment of natural drainage patterns presents a short term threat to wetland and other riparian plant species and long term benefit to area hydrology. Seed testing for purity prior to introduction to forest would reduce transport of weed/invasive species from off-site.

To reduce potential impacts to plants in the event where a Threatened, Endangered, Proposed and Candidate (TEPC) plant species, Sensitive (S) plant species and plant species of Local Concern (LC) is found in locations coinciding with summer routes the following actions would need to be considered: trail closure, trail re-route, or other methods that would direct and keep people away from occupied habitat.

### ***Effects to Threatened, Endangered and Proposed Plant Species Evaluated***

#### **Penland alpine fen mustard, *Eutrema edwardsii* ssp. *penlandii***

***Effects to Documented Occurrences:*** One occurrence (EO ID 6587) is documented on the WRNF within the Hoosier Ridge Research Natural Area (RNA) where it is afforded protection from motorized summer and winter vehicle use under all alternatives (CNHP 2008). Therefore no direct or indirect impacts from authorized motor vehicle use to this occurrence are expected to occur. Moreover this occurrence is not associated with any existing summer travel routes so impacts associated with rehabilitation and/or summer use including trampling impacts to known occurrences from off trail foot and horse traffic are expected to be unlikely and discountable within the Hoosier Ridge RNA. Finally, non- motorized winter travel routes within the Hoosier Ridge RNA would not be designated. While the travel management plan does not designate non-motorized winter routes an official request to the Dillon District Ranger was submitted to ensure non-motorized winter travel is not promoted in the RNA including designating trails. The occurrence at Blue Lake found this field season occurs near proposed road rehabilitation in the action alternatives, but is outside the area of influence.

***Effects within Potential Habitat:*** There are approximately 1,385 acres of identified potential Penland alpine fen mustard habitat on the WRNF. Tables 3.71 and 3.72 summarize allowed use that intersect the 1,385 acres of identified potential habitat by alternative allowing for both quantitative and spatial comparisons of the potential impacts to suitable habitat by alternative.

**Table 3.71—Allowed use by alternative that intersects potential Penland alpine fen mustard habitat**

<b>Summer Travel Routes, miles</b>				
Allowed use category	Alt. A	Alt. F	Alt. G	Alt. GM
Administrative Vehicle Use	0.055	0.055	0.055	0.055
Foot and Horse trail	0.005	0.005	0.578	0.694
Bicycle trail	0.841	0.841	0.786	0.670
Rehabilitation ways	0.000	0.518	0.000	0.000
(closed) ways	0.518	0.000	0.000	0.000
Total Miles	1.418	1.418	1.418	1.418

<b>Winter Routes, miles</b>				
Allowed use category	Alt. A	Alt. F	Alt. G	Alt. GM
Winter Motorized Routes	0.000	0.000	0.000	0.000

<b>Winter Strategy Areas, acres</b>				
Allowed use category	Alt. A	Alt. F	Alt. G	Alt. GM
Motorized Prohibited Areas	513.662	513.662	513.661	513.661
Non-NFS Lands	125.734	125.734	125.735	125.734
Open Motorized Areas	307.327	307.327	0.000	0.000
Restricted - Motorized Routes Only	131.199	131.199	438.526	438.526
Special Use Permit	307.465	307.465	307.465	307.466
Total Acres	1,385.387	1,385.387	1,385.387	1,385.387

**Table 3.72—Summary of environmental consequences to Penland alpine fen mustard by alternative**

Species	Alt A	Alt F	Alt G	Alt GM
<b>Penland alpine fen mustard</b>  <i>Eutrema edwardsii</i> ssp. <i>penlandii</i>	<p>Alt A and F allow the LEAST (0.901 miles) summer use in habitat including 0.005 miles foot and horse, 0.841 miles bicycle and 0.055 miles admin motorized.</p> <p>Alt A and F allow the LEAST (0.0 miles) winter routes in habitat. However, approximately 0.82 miles of motorized snow compaction are actually occurring under No-Action.</p> <p>Alt A and F allow the MOST (307.327acres) open motorized acres in habitat under winter strategy.</p> <p>Alt A, G and GM would not decommission any roads or trails within habitat. There would be no short term threats or long term benefits to habitat from</p>	<p>Alt A and F allow the LEAST (0.901 miles) summer use in habitat including 0.005 miles foot and horse, 0.841 miles bicycle and 0.055 miles admin motorized.</p> <p>Alt A and F allow the LEAST (0.0 miles) winter routes in habitat. However, approximately 0.82 miles of motorized snow compaction are actually occurring under No-Action.</p> <p>Alt A and F allow the MOST (307.327acres) open motorized acres in habitat under winter strategy.</p> <p>Alt F would decommission 0.518 miles of road or trail in habitat. A short term threat but a long term benefit to area</p>	<p>Alt G and GM allow the MOST (1.418 miles) summer use in habitat. Alt G includes 0.578 miles foot and horse, 0.786 miles bicycle and 0.055 miles admin motorized.</p> <p>Alt G allows the MOST (1.049 miles) winter routes in habitat. All 1.049 miles are non motorized use only. However, Approximately 0.82 miles of motorized snow compaction are actually occurring under No-Action.</p> <p>Alt G and GM allow the LEAST (0.0 acres) open motorized areas in habitat under winter strategy.</p> <p>Alt A, G and GM would not decommission any roads or trails within habitat. There would be no short term threats or long term benefits to habitat from decommissioning.</p>	<p>Alt G and GM allow the MOST (1.418 miles) summer use in habitat. Alt GM includes 0.694 miles foot and horse, 0.670 miles bicycle and 0.055 miles admin motorized.</p> <p>Alt GM allow MORE (1.026 miles) winter routes in habitat than A and F but LESS than G. All miles are non motorized use only. Approximately 0.82 miles of motorized snow compaction are actually occurring under No-Action.</p> <p>Alt G and GM allow the LEAST (0.0 acres) open motorized acres in habitat under winter strategy.</p> <p>Alt A, G and GM would not decommission any roads or trails within habitat. There would be no short term threats or long</p>

Species	Alt A	Alt F	Alt G	Alt GM
	rehabilitation.	hydrology.		term benefits to habitat from decommissioning.

**DeBeque phacelia, *Phacelia scopulina* var. *submutica***

**Effects to Documented Occurrences:** Under all alternatives no direct impacts to known occurrences are expected to occur. All known occurrences and identified potential habitat for this species on the WRNF occur wholly within the proposed Horsethief Research Natural Area (RNA) where they are generally afforded protection from motorized summer vehicle use and wholly afforded protection from winter vehicle use (CNHP 2009). While 0.321 miles of county road open to motorized vehicle use intercept identified potential habitat for DeBeque phacelia, all known WRNF occurrences in proximity to this road are over 1,000 feet away and upslope of that road. Because surveys have occurred near these 0.321 miles of road over the course of several years it is felt we can reasonably assume that DeBeque phacelia is not present in the areas that may be directly affected by the proposed action.

Though no direct contact with populations of this species would be expected the potential for indirect effects exists. While known occurrences are over 1,000 feet away from the 0.321 miles of road open to motorized vehicle use dust generated from road use may affect its flowers, interfere with its pollinators and inhibit its photosynthetic processes. Depending on the proximity, timing and frequency of vehicle travel near occupied habitat this species pollinators may experience increased mortality from passing vehicles which could reduce its reproductive success. These 0.321 miles of potential habitat have been surveyed during the 2010 field season and will continue to be surveyed during the 2011 field season to determine if the species is present or absent from the area of these potential effects. If individuals are found travel management design criteria would be implemented to reduce or avoid the potential for negative impacts to any occurrences found associated with proposed use such that those impacts would be immeasurable or discountable.

**Effects within Potential Habitat:** There are approximately 4,092 acres of identified potential DeBeque phacelia habitat on the WRNF. Tables 3.73 and 3.74 summarize allowed use that intersect identified potential habitat by alternative allowing for both quantitative and spatial comparisons of the potential impacts to suitable habitat by alternative.

**Table 3.73—Allowed use by alternative that intersects potential DeBeque phacelia habitat**

Summer Travel Routes, miles				
Allowed use category	Alt. A	Alt. F	Alt. G	Alt. GM
Administrative Vehicle Use	0.000	0.000	0.000	0.000
Foot and Horse trail	0.000	0.000	0.000	0.000
Bicycle trail	0.000	0.000	0.000	0.000
Motorized Roads	0.321	0.321	0.321	0.321
Rehabilitation ways	0.000	0.000	0.000	0.000
(closed) ways	0.0	0.0	0.000	0.000
Total Miles	0.321	0.321	0.321	0.321

Winter Routes, miles				
Allowed use category	Alt. A	Alt. F	Alt. G	Alt. GM
Motorized	0.000	0.000	0.000	0.000
Plowed Access	0.000	0.000	0.000	0.000
Total Miles	0.000	0.000	0.000	0.000

Winter Strategy, acres				
Allowed use category	Alt. A	Alt. F	Alt. G	Alt. GM
Motorized Prohibited Areas	4,092	4,092	4,092	4,092
Non-NFS Lands	0.000	0.000	0.000	0.000
Open Motorized Areas	0.000	0.000	0.000	0.000
Restricted - Motorized Routes Only	0.000	0.000	0.000	0.000
Total Closure All Uses	0.000	0.000	0.000	0.000
Total Acres	0.000	0.000	0.000	0.000

Table 3.74—Summary of environmental consequences to DeBeque phacelia by alternative

Species	Alt A	Alt F	Alt G	Alt GM
<b>DeBeque phacelia</b>	Under all Alternatives 0.321 miles of summer use would be designated in potential habitat including; 0.321 miles of motorized vehicle use.	Under all Alternatives 0.321 miles of summer use would be designated in potential habitat including; 0.321 miles of motorized vehicle use.	Under all Alternatives 0.321 miles of summer use would be designated in potential habitat including; 0.321 miles of motorized vehicle use.	Under all Alternatives 0.321 miles of summer use would be designated in potential habitat including; 0.321 miles of motorized vehicle use.
<b>Phacelia scopulina var. Submutica (Proposed Threatened)</b>	Under all Alternatives 0.0 miles of winter routes would be designated in potential habitat.	Under all Alternatives 0.0 miles of winter routes would be designated in potential habitat.	Under all Alternatives 0.0 miles of winter routes would be designated in potential habitat.	Under all Alternatives 0.0 miles of winter routes would be designated in potential habitat.
	Under all Alternatives 0.0 acres of open motorized winter vehicle use would be designated in potential habitat.	Under all Alternatives 0.0 acres of open motorized winter vehicle use would be designated in potential habitat.	Under all Alternatives 0.0 acres of open motorized winter vehicle use would be designated in potential habitat.	Under all Alternatives 0.0 acres of open motorized winter vehicle use would be designated in potential habitat.
	Under all Alternatives 0.0 miles of road rehabilitation would occur in potential habitat.	Under all Alternatives 0.0 miles of road decommissioning would occur in potential habitat.	Under all Alternatives 0.0 miles of road decommissioning would occur in potential habitat.	Under all Alternatives 0.0 miles of road decommissioning would occur in potential habitat.

**Colorado hookless cactus, *Sclerocactus glaucus***

**Effects to Documented Occurrences:** To date no occurrences have been found on the WRNF therefore under all alternatives no direct impacts to known occurrences are expected to occur. Approximately 0.321 miles of national forest road open to motorized vehicle use intercepts identified potential habitat for Colorado hookless cactus. No other travel route or way is documented in identified potential habitat. Because surveys have occurred near these 0.321 miles of road over the course of several years it is felt we can reasonably assume that Colorado hookless cactus is not present in the areas that may be directly affected by the proposed action.

Though no direct contact with populations of this species would be expected the potential for indirect effects exists. Assuming it were present near the 0.321 miles of road open to motorized vehicles and has not yet been discovered dust generated from road use could affect its flowers, interfere with its pollinators and inhibit its photosynthetic processes. Depending on the proximity, timing and frequency of vehicle travel near occupied habitat

this species pollinators could experience increased mortality from passing vehicles which could reduce its reproductive success. Through travel management implementation criteria under the proposed action these 0.321 miles of potential habitat have been surveyed during the 2010 field season and will continue to be surveyed during the 2011 field season to determine if the species is present or absent from the area of these potential effects. If individuals are found travel management design criteria would be implemented to reduce or avoid the potential for negative impacts to any occurrences found associated with proposed use such that those impacts would be immeasurable or discountable.

**Effects within Potential Habitat:** There are approximately 2,806 acres of identified potential Colorado hookless habitat on the WRNF. Table 3.75 and 3.76 summarize allowed use that intersect identified potential habitat by alternative allowing for both quantitative and spatial comparisons of the potential impacts to suitable habitat by alternative.

**Table 3.75—Allowed use by alternative that intersects potential Colorado hookless cactus habitat**

<b>Summer Travel Routes, miles</b>				
Allowed use category	Alt. A	Alt. F	Alt. G	Alt. GM
Administrative Vehicle Use	0.000	0.000	0.000	0.000
Foot and Horse trail	0.000	0.000	0.000	0.000
Bicycle trail	0.000	0.000	0.000	0.000
Motorized Roads	0.321	0.321	0.321	0.321
Rehabilitation ways	0.000	0.000	0.000	0.000
(closed) ways	0.0	0.0	0.000	0.000
Total Miles	0.321	0.321	0.321	0.321

<b>Winter Routes, miles</b>				
Allowed use category	Alt. A	Alt. F	Alt. G	Alt. GM
Motorized	0.000	0.000	0.000	0.000
Plowed Access	0.000	0.000	0.000	0.000
Total Miles	0.000	0.000	0.000	0.000

<b>Winter Strategy, acres</b>				
Allowed use category	Alt. A	Alt. F	Alt. G	Alt. GM
Motorized Prohibited Areas	4,092	4,092	4,092	4,092
Non-NFS Lands	0.000	0.000	0.000	0.000
Open Motorized Areas	0.000	0.000	0.000	0.000
Restricted - Motorized Routes Only	0.000	0.000	0.000	0.000
Total Closure All Uses	0.000	0.000	0.000	0.000
Total Acres	0.000	0.000	0.000	0.000

**Table 3.76—Summary of environmental consequences to Colorado hookless cactus by alternative**

Species	Alt A	Alt F	Alt G	Alt GM
<b>Colorado hookless cactus</b>	Under all Alternatives 0.321 miles of summer use would be designated in potential	Under all Alternatives 0.321 miles of summer use would be designated in potential habitat	Under all Alternatives 0.321 miles of summer use would be designated in potential habitat	Under all Alternatives 0.321 miles of summer use would be designated in potential habitat

Species	Alt A	Alt F	Alt G	Alt GM
<i>Sclerocatus glaucus</i> (Threatened)	<p>habitat including; 0.321 miles of motorized vehicle use.</p> <p>Under all Alternatives 0.0 miles of winter routes would be designated in potential habitat.</p> <p>Under all Alternatives 0.0 acres of open motorized winter vehicle use would be designated in potential habitat.</p> <p>Under all Alternatives 0.0 miles of road rehabilitation would occur in potential habitat.</p>	<p>including; 0.321 miles of motorized vehicle use.</p> <p>Under all Alternatives 0.0 miles of winter routes would be designated in potential habitat.</p> <p>Under all Alternatives 0.0 acres of open motorized winter vehicle use would be designated in potential habitat.</p> <p>Under all Alternatives 0.0 miles of road decommissioning would occur in potential habitat.</p>	<p>including; 0.321 miles of motorized vehicle use.</p> <p>Under all Alternatives 0.0 miles of winter routes would be designated in potential habitat.</p> <p>Under all Alternatives 0.0 acres of open motorized winter vehicle use would be designated in potential habitat.</p> <p>Under all Alternatives 0.0 miles of road decommissioning would occur in potential habitat.</p>	<p>including; 0.321 miles of motorized vehicle use.</p> <p>Under all Alternatives 0.0 miles of winter routes would be designated in potential habitat.</p> <p>Under all Alternatives 0.0 acres of open motorized winter vehicle use would be designated in potential habitat.</p> <p>Under all Alternatives 0.0 miles of road decommissioning would occur in potential habitat.</p>

### Ute ladies' tresses orchid, *Spiranthes diluvialis*

**Effects to Documented Occurrences:** Currently there are no documented occurrences of Ute ladies' tresses orchid on the White River National Forest (CNHP 2008). The US FWS (2009) identifies it as having potential to occur on the White River National Forest in Eagle, Garfield and Pitkin County. As previously discussed within WRNF lands the lower portions of East Elk Creek, Main Elk Creek, West Elk Creek and Alkali Creek and select locations in Glenwood Canyon appear to be suitable habitat for while the Frying Pan River, Avalanche Creek, Crystal River and Hell's Gulch do not appear to be suitable habitat.

**Effects within Potential Habitat:** There are approximately 648 acres of identified potential habitat (riparian areas in lands below 7,000 feet elevation) on the White River National Forest (CNHP 2009). The area of potential habitat was buffered by 100 meters. Within the buffered potential habitat there are 43.5 miles of inventoried routes. This includes highways, county roads, FS roads, trails and ways. Routes that are outside of FS jurisdiction will not change by alternative, so after removing them 16.9 miles of inventoried routes occur within FS jurisdiction.

Tables 3.77 and 3.78 summarize allowed use where including 1) where all 43.5 miles intersect identified potential habitat by alternative and 2) where just the 16.9 miles under USFS jurisdiction intersect identified potential habitat by alternative. This approach allows for both quantitative and spatial comparisons of the potential impacts to suitable habitat by alternative.

**Table 3.77—Allowed use by alternative intersecting potential Ute ladies' tresses orchid habitat**

Summer Travel Routes, miles				
Allowed use category	Alt. A	Alt. F	Alt. G	Alt. GM
SUP or historic	1.711	1.711	3.693	3.693
Foot and horse trails	7.478	7.478	7.478	7.478
Bicycle trails	0.187	0.187	0.065	1.315
Motorized roads	30.747	30.747	30.747	29.497

Rehabilitation ways	0.000	3.385	1.525	1.525
Routes closed	3.385	0.000	0.000	0.000
Total miles	43.508	43.508	43.508	43.508

**Summer Travel Routes, Forest Service Jurisdiction only, miles**

Allowed use category	Alt. A	Alt. F	Alt. G	Alt. GM
SUP or historic	1.711	1.711	3.693	3.693
Foot and horse trails	7.289	7.289	7.289	7.289
Bicycle trails	0.187	0.187	0.065	1.314
Motorized roads	4.349	4.349	4.349	3.100
Decommission	0.000	3.385	1.525	1.525
Routes closed	3.385	0.000	0.000	0.000
Total miles	16.921	16.921	16.921	16.921

**Winter Routes, miles**

Allowed use category	Alt. A	Alt. F	Alt. G	Alt. GM
Motorized	0.000	0.000	2.250	0.250
Plowed Access	0.000	0.000	3.399	5.503
Total Miles	0.000	0.000	5.649	5.753

**Winter Strategy, acres**

Allowed use category	Alt. A	Alt. F	Alt. G	Alt. GM
Motorized Prohibited Areas	1,309.659	1,309.659	1,309.671	1,309.660
Non-NFS Lands	1,019.054	1,019.054	1,019.045	1,019.060
Open Motorized Areas	986.601	986.601	0.000	0.000
Restricted - Motorized Routes Only	1,155.246	1,155.246	2,141.871	2,141.842
Total Closure All Uses	3.717	3.716	3.716	3.716
Total acres	4,474.277	4,474.277	4,474.277	4,474.277

**Table 3.78—Summary of environmental consequences to Ute ladies' tresses orchid by alternative**

Species	Alt A	Alt F	Alt G	Alt GM
<b>Ute ladies' tresses orchid</b> <i>Spiranthes diluvialis</i>	Alt A and F allow the LEAST (1.711 miles) summer SUP vehicle use in habitat.  Miles of summer motorized road use are the SAME (4.349 miles) in habitat under all alternatives.  Miles of foot and horse trail in habitat are the SAME (7.478 miles) under all alternatives.  Alt A and F allow MORE (0.187 miles) Bicycle use in habitat then Alt G.  Alt A decommissions the LEAST (0.000 miles) road or trail in habitat. There would be no short term threats or long term	Alt A and F allow the LEAST (1.711 miles) summer SUP vehicle use in habitat.  Miles of summer motorized road use are the SAME (4.349 miles) in habitat under all alternatives.  Miles of foot and horse trail in habitat are the SAME (7.478 miles) under all alternatives.  Alt A and F allow MORE (0.187 miles) Bicycle use in habitat then Alt G.  Alt F decommissions the MOST (3.385 miles) road or trail in habitat resulting in short term threats and long term	Alt G and GM allow the MOST (3.693 miles) summer SUP vehicle use in habitat.  Miles of summer motorized road use are the SAME (4.349 miles) in habitat under all alternatives.  Miles of foot and horse trail in habitat are the SAME (7.478 miles) under all alternatives.  Alt G allows the LEAST (0.065 miles) Bicycle use in habitat.  Alt G and GM decommission LESS (1.525 miles) road/trail in habitat then F resulting in short term threats and long term	Alt G and GM allow the MOST (3.693 miles) summer SUP vehicle use in habitat.  Miles of summer motorized road use are the SAME (4.349 miles) in habitat under all alternatives.  Miles of foot and horse trail in habitat are the SAME (7.478 miles) under all alternatives.  Alt GM allows the MOST (1.315 miles) Bicycle use in habitat.  Alt G and GM decommission LESS (1.525 miles) road/trail in habitat then F resulting in short term threats and long term benefits to

Species	Alt A	Alt F	Alt G	Alt GM
	<p>benefits to habitat.</p> <p>Alt A would close the MOST (3.385 miles) ways in habitat. Benefits habitat.</p> <p>Alt A and F allow the LEAST (0.000 miles) winter travel routes in habitat. However, approximately 2.31 miles of motorized snow compaction are actually occurring under No-Action (Fig 7b).</p> <p>Alt A and F allow the MOST (986.601 acres) of open motorized winter area in habitat.</p>	<p>benefits to habitat.</p> <p>Alt F closes the LEAST (0.000 miles) ways in habitat. No benefit to habitat.</p> <p>Alt A and F allow the LEAST (0.000 miles) winter travel routes in habitat. However, approximately 2.31 miles of motorized snow compaction are actually occurring under No-Action (Fig 7b).</p> <p>Alt A and F allow the MOST (986.601 acres) of open motorized winter area in habitat.</p>	<p>benefits to habitat.</p> <p>Alt G and GM close MORE (0.890 miles) ways in habitat then Alt F. Benefits habitat.</p> <p>Alt G allow the MOST (8.345 miles) winter travel routes in habitat including; 2.250 miles of motorized use, 2.704 miles of non motorized use and 3.399 of plowed access.</p> <p>Alt G and GM allow the LEAST (0.000 acres) of open motorized winter area in habitat.</p>	<p>habitat.</p> <p>Alt G and GM close MORE (0.890 miles) ways in habitat then Alt F. Benefits habitat.</p> <p>Alt GM allow LESS 7.006miles) winter travel routes in habitat including; 0.250 miles of motorized use, 1.254 miles of non motorized use and 5.503 miles of plowed access.</p> <p>Alt G and GM allow the LEAST (0.000 acres) of open motorized winter area in habitat.</p>

### ***Effects to Region 2 Sensitive Plant Species by Habitat***

Effects on R2 Sensitive Plant Species and are based on the habitats affected, species occurrence and required travel management implementation criterion. The ecological categories used for this analysis include: 1) riparian and aquatic, 2) forested habitats, 3) mixed mountain shrub, 4) grass/forb and 5) alpine regimes. Table 3.38 lists the 38 TESP plant species evaluated for this project and their primary and secondary (if applicable) habitat types.

#### **Alpine**

Alpine areas on the WRNF provide primary habitat for 5 Sensitive plant species including; 1) sea pink, 2) smooth rockcress, 3) clawless draba, 4) Gray's Peak draba and 5) ice cold buttercup. Alpine areas are defined as areas that rise above the cold limits of trees. These areas are characterized by having severe weather conditions with very short growing seasons. Soils are generally very shallow and take many years to reestablish following disturbances. Many specialized plants and animals often live life "on the edge" in these rugged environments. Analysis for alpine habitats is presented in Tables 3.45-3.48.

#### **Forests**

Forested communities on the WRNF provide secondary habitat for 4 R2 Sensitive plant species where they transition to riparian habitats including; 1) Park milkvetch, 2) lesser panicled sedge, 3) yellow ladies' slipper and 4) dwarf raspberry. Forested areas also provide secondary habitat within certain geologic formations where pinyon-juniper is widely spaced secondary habitat for; 1) Wetherill milkvetch and 2) Harrington beardtongue. These species are discussed in the plants BE (appendix D). The forest category includes all the major forested types across the White River National Forest, including spruce/fir, lodgepole pine, aspen, Douglas-fir, pinyon/juniper, and blue spruce. Analysis for forested habitats is presented in Tables 3.49-3.52.

#### **Mixed Mountain Shrub**

The mixed mountain shrub community on the WRNF provides primary habitat for 4 sensitive plant species including; the 1) Wetherill milkvetch, 2) Rocky mountain thistle, 3) Harrington beardtongue, and 4) Sun-loving meadowrue. These plants are discussed in

detail in the BE (appendix D). The mixed mountain shrub type is a very broad ecological category inclusive of several types of shrub communities; sagebrush (*Artemisia spp.*), Gambel oak (*Quercus gambelli*), chokecherry (*Prunus virginianus*), mountain mahogany (*Cercocarpus montanus*) and serviceberry (*Amelanchier alnifolia*). Specialized habitats often occur within these habitat types resulting in high potential habitat for select species including locations where exposures of certain geological formations (Green River, Wasatch, etc) occur. Mixed mountain shrub habitats often occur at lower elevation areas on the forest where they are more common on the western portion of the forest. These habitats are often primary access points to the forest. Analysis for mixed mountain shrub habitats is presented in Tables 3.53-3.56

### Grass/Forb Meadows

Grass/forb meadow communities on the WRNF provide primary habitat for 6 R2 sensitive plant species including; 1) Fork leaf moonwort, 2) slender moonwort, 3) paradox moonwort, 4) slender-leaf buckwheat, 5) Hall's fescue and 6) Colorado tansy-aster. Some species colonize previously disturbed habitats which are now stabilized such as roadside and trailside habitats where they are vulnerable to use, maintenance and rehabilitation. Both engineered and user-created travelways are commonly found in these habitats because there was no need to clear vegetation to establish a travel route. Approximately 20 percent of the White River National Forest is composed of grass/forb lands. These communities are made up of a wide range of grasses and forbs; the specific mix of species depends in large part on elevation, slope, and soil types. Analysis for grass/forb meadow habitat is presented in Tables 3.57-3.60.

### Riparian

Riparian on the WRNF areas provide primary habitat for 20 of the 34 R2 Sensitive plant species carried forward into analysis including 8 riparian generalist species and 12 fen obligate species. Riparian generalist species include; 1) Ute ladies' tresses orchid, 2) park milkvetch, 3) trianglelobe moonwort, 4) lesser panicled sedge, 5) yellow lady's slipper, 6) giant helleborne, 7) Kotzbue's grass of Parnassus and 8) dwarf raspberry. Fen obligate species include; 1) livid sedge, 2) round leaf sundew, 3) altai cottongrass, 4) Chamisso's cottongrass, 5) slender cottongrass, 6) simple bog sedge, 7) Porter's feathergrass, 8) hoary willow, 9) autumn willow, 10) peat moss, 11) Baltic bog moss and 12) lesser bladderwort. Although a very limited amount of the White River National Forest is classified as riparian (less than 3 percent), riparian areas and wetlands support most of the TESP plant species on the planning unit. Fens are a very specialized and limited type of wetland habitat type on the forest. Wetlands including fen are found in association with streams, lakes, ponds, reservoirs, springs, and marshes. These wetlands range from areas that are permanently submerged with emergent vegetation to areas that are only seasonally saturated at the surface following snowmelt and vegetated by sedges, rushes, and willows. Traditionally, many of the existing travelways were established adjacent to riparian and stream corridors. Tables 3.61-3.64 present the analysis for riparian habitats.

### Comparative effects for alpine, forested, mountain shrub, grass and forb, and riparian habitat types

**Summer Travel Routes:** There is an anticipated benefit to select R2 sensitive plant species where summer travelway densities in habitats are reduced. Alternatives A and F would provide the same authorized uses within alpine, forested, mountain shrub, grass and forb, and riparian habitat types. Alternative G and GM would slightly reduce both motorized and mechanized uses and would slightly increase foot and horse access.

Planned rehabilitation of travelways would reduce open travelway density in all habitats under Alternatives F, G and GM when compared to the current, existing situation. Alternatives G and GM would have the fewest impacts on R2 sensitive plant species that are affected by motorized or mechanized summer use in these habitat types.

**Winter Travel Routes:** A modified snow cover could have adverse impacts, be neutral or have beneficial impacts to select R2 Sensitive plant species. There is an anticipated benefit to select R2 Sensitive plant species where motorized over-snow use is reduced. Alternatives A and F would provide the same authorized uses within alpine, forested, mountain shrub, grass and forb, and riparian habitats. Alternative G and GM would increase winter motorized routes from the current, existing situation. The designation of these routes allows for a net decrease in motorized over-snow off-trail use.

**Winter Strategy:** There is an anticipated benefit to select R2 Sensitive plant species where over-snow use is reduced. Reduced impacts to rare plants in alpine, forested, mountain shrub, grass and forb, and riparian habitats would be realized by Alternatives G and GM as these alternatives reduce acres of open motorized area and increase acres where motorized over-snow use is restricted to motorized routes only.

### Cumulative Effects for Terrestrial and Aquatic Wildlife Species

Past, present, and future actions that affect fish, wildlife, and rare plants on the Forest include vegetative management activities, water use and management, oil/gas and mineral production, private land development, other transportation management decisions either on the Forest or on surrounding lands, recreation activities, livestock grazing, fishing, big game hunting season regulations, and natural events. All these activities alter or increase human activity and change habitat conditions in some regard, thus affecting living conditions for species and habitat quality.

Commodity production increases the use and demand on the travel system and can lead to temporary or permanent expansion of the road system. These activities can affect wildlife solitude and habitat, interrupt wildlife travel routes and movement patterns, provide new vectors for the introduction of non-native plants, wildlife, and diseases, add sediment to waterways, and potentially increase snow compaction. Individual projects may not have large impacts; however, when a large area is being developed with many projects, considerable cumulative impacts may occur. Some of the impacts can be reduced by developing efficient transportation systems and engineering roads with adequate drainage features that help keep waterways at desired conditions for these areas.

Substantial changes in the lodgepole pine forest systems on the White River National Forest as a result of the mountain pine beetle epidemic are resulting in effects to wildlife, fish, and rare plants along roads, trails, and non-system travel routes. For safety reasons, dead and dying hazard trees are being removed along system roads and trails. In areas with high numbers of hazard trees, tree clearing will widen the ineffective habitat corridor along these travel routes. Outside of road and trail hazard tree clearing areas, as lodgepole pine trees die, more open forest stands also mean reduced habitat effectiveness for wildlife and less interior forest habitat. Wildlife will be more exposed to disturbance from motorized and non-motorized use along roads and trails (including non-system and user created routes), human activity on private land, increased off-road/trail use by vehicles and hikers, and in general have less cover and habitat security for hiding, resting, feeding, and raising young. In particular, important big game concentration use areas and migration corridors near open roads would be impacted by the loss of forest cover and the increased human disturbance. These consequences of the mountain pine beetle epidemic create long lasting changes in forest structure. Hiding and security cover for wildlife will

return generally to lodgepole pine stands as new trees grow and develop into the pole structural stage in approximately 40 years. Mature stand conditions needed for interior forest structure are not expected to return in these stands until new tree regeneration develops again into mature forest habitat. On the White River National Forest, this is likely to be approximately 120 years from the time that a new young stand of lodgepole pine seedlings regenerate.

Private land continues to be developed, especially in the main valleys. This development causes displacement for many wildlife species and fragmentation of wildlife and rare plant habitats. It also places a higher demand on water. Development on private land often increases the need for high-quality habitats and wildlife security on the National Forest. Timber harvest on private lands is expected to continue as the mountain pine beetle epidemic spreads, influencing wildlife, fish, and rare plant habitats. On the west side of the Forest, natural gas development is occurring on private lands. Both of these types of activities result in long term changes to species and habitats. Isolated populations of animals and human-animal conflicts can result from activities such as the proposed I-70 highway expansion and development patterns that dissect habitats and migration routes. If mitigations such as open space and wildlife crossings are implemented, animals may continue to migrate.

As human population and tourism increase in the area, more people will recreate on the Forest. Consequent increases in the human influence on wildlife, fish, and rare plants can cause accelerated changes in wildlife use patterns and habitat quality.

Future activities are those reasonably foreseeable actions that may add to the cumulative effects on forest resources and social impacts. The forest plan stated a goal of road reduction across the forest. This goal was established to align the forest with the national goal for forests to “determine and provide for the minimum forest transportation system that best serves current and anticipated management objectives and public users of National Forest System lands, as identified in the appropriate land and resource management plans” (USDA Forest Service 2001a). It is reasonable to consider that the implementation of the forest plan will include a reduction in the amount of roads.

The opportunities for locals to enjoy the forest have led to an increase in population in the area. Many people have moved to the area for the recreational opportunities, especially downhill skiing. The economies of the resort communities are directly related to the activities the forest provides. Indirectly, even off-forest towns, where many of the resort employees reside with local residents, benefit from expenditures and necessities of the resort communities. These trends will likely continue into the future.

The Federal Highway Administration initiated a study to expand the capabilities of the I-70 corridor because of demand from the Denver area to transport people to the resort towns. Execution of the plan will take more than 20 years. It will increase the transportation capabilities of I-70 and allow more people to come to these resort communities at one time. It would make traveling to and through the area easier and more desirable by tourists. Many of these travelers will likely use the forest for their recreation.

Although new technologies in recreation are likely to occur over the planning period, recognizing cumulative impacts from them is speculative at this stage. This plan is not the final action in travel opportunities on the forest; rather, this is a programmatic document that sets the stage for our anticipated needs currently and in the future. If other needs arise, specific projects can be designed to address them.

Selection of any of the alternatives as the travel management plan will identify where and when different modes of transportation can occur across the forest. The travel

management plan will establish the transportation system so the forest can concentrate resources to the identified system and reestablish native conditions in areas where the system is not needed. The variability of the alternatives is constrained by the mandates in the forest plan. The variability among alternatives is extremely small when viewed against the entire acreage of the planning area.

The likely increase in the I-70 corridor population, the increase in the ability of recreationists to access the forest from Colorado's Front Range, and the forest plan objective to decrease roads will affect forest resources including recreation. The selection of one alternative over another is unlikely to measurably add to those effects. The selection of one alternative over another is unlikely to change the expected population growth patterns or legal use patterns.

Cumulative impacts on forest resources would be based on the amount, timing, and location of the expected increases in recreation use. It is reasonable to expect that there may be local cumulative impacts on resources from the adoption of one alternative over another; however, across the forest the effects are very small. Those local effects may present themselves in a social context (such as increased crowding and user-conflict) or in a physical context (such as soil erosion on a specific trail). Those issues are best addressed site specifically through available management methods.

### **Cumulative Effects for Plant Species**

Space and Time: The rarity of the 38 TESP plant species makes them vulnerable to extirpation due to random events. It is unknown how local populations of these species might interact throughout their range. Since there is very little known about interactions among disjunct populations it is difficult to predict how effects to a single population might influence the status of other populations. Spatially for plants, cumulative effects are analyzed within the White River National Forest (WRNF) planning unit. Time (past, present, and future) cumulative effects are analyzed from approximately 1960 to 2020.

A variety of past and ongoing actions on the WRNF planning unit have resulted in current conditions. Assuming presence; past actions including livestock grazing, timber harvest and thinning, motorized and non-motorized recreational use, road and trail building and maintenance, insect and disease outbreaks, fire suppression, prescribed fire, mining, road construction, urban development (sub-dividing and development of private land), and noxious weed infestation and ditching are likely to have had the greatest past negative impacts on TESP plant species and their habitats. Past actions (timber harvest, fuels reduction, fire use and Rx burning) that cleared forest canopy while minimizing ground disturbance or soil sterilization and avoided the introduction of noxious weeds would likely have been beneficial actions for select TESP plant species.

Past and current activities have altered TESP plant occurrences and their habitats. Such predicted future activities have the potential to cumulatively affect these plant species. These same past and present activities are expected to continue into the future. Other ongoing impacts include those associated with wildlife and climate change.

The effects of these types of activities on TESP plants are as follows:

Livestock grazing leads to biomass removal and trampling. It has led to changes in species composition, compaction of soils, changes in fuel loading and the fire regime, downcutting of riparian areas with subsequent drying of adjacent meadows, and noxious weed invasion. With riparian areas and wet meadows livestock grazing has led to churning of the soil and hummocking. It is likely that grazing impacts occurred within the WRNF in the past at intensities and frequencies greater than current or future levels.

Through allotment management plans, future impacts to rare plant species by the trampling or grazing by livestock can be reduced.

Timber harvest and thinning has led to a more open canopy with additional light reaching the forest floor (which may be beneficial or detrimental depending on the species), soil disturbance and compaction, development of skid roads, and noxious weed invasion. Changes in forest composition, structure and fire frequency have also taken place. It also increases the impacts from recreational activities by allowing improved access for those activities. Timber harvest and fuels reduction activities are increasing on the WRNF planning unit. Especially those associated with the treatment and salvage of beetle infested areas.

Motorized and non-motorized recreational use (including OHV use, camping, horseback riding, mountain biking, hiking, hunting, and fishing) can lead to the development of non-system roads and trails, development of dispersed campsites, erosion, and the vectoring of noxious weeds in previously un-infested areas. Over-snow vehicle and non-motorized use can lead to physical damage to plants and their habitats (biomass removal, vegetation compaction and ground disturbance), snow compaction (ice damming, changes in species composition, habitat degradation and loss) and hydrocarbon emissions (pollutants). Operational activities associated with these actions would continue to occur within the WRNF. Impacts to watershed and riparian habitats and soil compaction by project activities are limited by watershed conservation practices. These impacts are controllable through area closures and travel management.

Winter over-snow motorized (snowmobile) use lead to impacts to rare plants. In general compaction can cause plants to be dormant longer and/or effected by different temperatures than surrounding non-compacted snow. This can effect growth and sometime success of a species. Having designated routes can help reduce potential impact as these critical habitats can then be avoided.

Road/trail construction and maintenance can cause soil disturbance and erosion, fragmentation and destruction of habitat, and noxious weed invasion. It also increases the impacts from recreational activities by allowing improved access for those activities. Operational activities associated with these actions would continue to occur within the Analysis Area. Impacts to watershed and riparian habitats and soil compaction by project activities are limited by watershed conservation practices.

Insect and disease outbreaks are natural events that occur periodically, although current levels are more intense than in recent memory. Such outbreaks lead to tree mortality, creation of forest-gap habitats, opening of meadow habitats, and potentially to stand-replacing fires. While tree mortality from insect and disease events is a natural ecosystem process, habitat availability and habitat suitability for select sensitive plant species on the WRNF are affected. In general, those plant species associated with late successional forest would have decreased amounts of available habitat while those associated with open light regimes would have increased habitat available. The change in evapotranspiration associated with tree mortality may affect the hydrology of fens. Those species associated with fen habitats may benefit from changes but if individual fens are flooded there would be a decrease in habitat in those areas.

Fire suppression has led to increased fuel loading, canopy closure, and higher intensity wildfire.

Fire (Prescribed and Wildfire): Fire is a natural disturbance in the ecosystem. In some areas, habitat successsion and fire could possibly create or improve habitat for select plant species by opening up meadows or reducing the litter accumulation and competition

from other plants. In other areas, wildfires or controlled fires would create high ground temperatures that could sterilize the soil and eliminate fungal species that are necessary for the survival of others.

Mining can cause destruction of habitat, leaching of heavy metals in to streams, changes in stream pH. Activities associated with mining that affect rare plants include road and railroad development, timber harvest, weed invasion and revegetation efforts.

Urban development can destroy rare plant habitat, fragments populations, and increases the risk of weed invasion and fire.

Non-native plant invasion is often the result of the ground disturbing activities listed above. These non-native species displace native plants, mostly through direct competition. In some cases highly competitive non-native species have been used in revegetation efforts, and these species are potent competitors for light, nutrients, and water.

In considering the NEPA cumulative impact of a proposed action one must consider past, present and predicted future management activities and their impacts to TESP plant species. Current management direction is designed to eliminate or reduce negative cumulative impacts by protecting TESP plant species from direct and indirect impacts associated with the proposed action. MacDonald (2000) reports that a critical step in cumulative effects analysis is to compare the current condition of the resource (TESP plants) and the projected changes due to management activities (Travel Management) with the natural variability over time in the resources and processes of concern.

The actions and effects described above can be both additive and interactive to each other and to the direct and indirect effects described above. Because there are policies, standards and guidelines that limit effects to their habitat, the cumulative effects are not expected contribute to any change in status or viability. Also, the cumulative effects are not expected contribute to an increase in any current or predicted downward trend in population numbers or density or to current or predicted downward trends in habitat capability that would reduce the existing distribution of any of the TESP plant species carried forward into this analysis.

## Short-term Uses and Long-term Productivity

---

The National Environmental Policy Act requires consideration of “the relationship between short-term uses of man’s environment and the maintenance and enhancement of long-term productivity” (40 CFR 1502.16). As declared by Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

Alternatives GM, G, F, and A, from most to least, have the potential to improve long-term productivity by reducing the number of miles and trails on the landscape. Once rehabilitated, these areas will have the potential to revert to vegetated conditions.

## Irreversible and Irretrievable Commitments of Resources

---

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as power line rights-of-way or roads.

The implementation of any of the alternatives, including the no-action alternative, would have no irreversible commitment of resources. The alternatives define the road and trail system, consider adoption of some unauthorized roads and trails into the system, and propose rehabilitating roads and trails unnecessary for the transportation system. None of the alternatives consider new construction. Roads and trails can be rehabilitated when no longer needed as part of the transportation system.

Irretrievable commitment of resources would occur under all alternatives. Irretrievable commitments of resources from roads and trails exist because the travelway changes the natural landscape to a non-natural, out-of-vegetative-production landscape. The road and trail designation of the selected alternative would create temporary losses associated with the existence of forest roads and trails. Resources affected would be scenery, vegetation (including range and timber), and associated wildlife habitats. Implementation of any of the alternatives would commit these resources over the life of the road or trail.

The alternative with the highest number of miles of designated roads and trails would also cause irretrievable commitments of the most resources. The alternatives ranked from most to least for irretrievable commitment of resources are alternatives GM, G, F, and A.

## Cumulative Effects

---

Cumulative effects are discussed under each resource section in chapter 3 as appropriate. The following discusses the past, present, and future activities that may have a potential for cumulative effects based on the travel management plan alternatives proposed in this document. The geographic scope of this discussion is the planning area and the surrounding dependent communities. The temporal scope of this discussion is the planning horizon, typically 10 to 15 years.

Past activities are those activities whose effects are still present on the landscape. They include roads built for timber production and mineral exploration, access to private lands and towns, and recreation access. Past activities also include trails that were built for

recreation access and use, and livestock access and distribution. Several miles of non-system roads and trails have been created through repeated use, or are remnant from inadequate closure. Approximately 1,045 miles of non-system (unauthorized) roads and trails, and approximately 4,590 miles of system roads and trails exist across the forest. Currently, approximately 2,000 miles of the system roads and trails are National Forest System roads and 1,950 miles are National Forest System trails.

Present resource activities include vegetation treatments for wildlife and fire under the Healthy Forest Initiative; oil and gas exploration on the southwestern part of the forest; livestock grazing; and a little mining. The highest use across the forest is recreation; the area has and will continue to be one of the premier destination locations for vacationers. These activities will continue into the future.

Future activities are those reasonably foreseeable actions that may add to the cumulative effects on forest resources and social impacts. The forest plan stated a goal of road reduction across the forest. This goal was established to align the forest with the national goal for forests to “determine and provide for the minimum forest transportation system that best serves current and anticipated management objectives and public users of National Forest System lands, as identified in the appropriate land and resource management plans” (USDA Forest Service 2001a). It is reasonable to consider that the implementation of the forest plan will include a reduction in the amount of roads.

The opportunities for locals to enjoy the forest have led to an increase in population in the area. Many people have moved to the area for the recreational opportunities, especially downhill skiing. The economies of the resort communities are directly related to the activities the forest provides. Indirectly, even off-forest towns, where many of the resort employees reside with local residents, benefit from expenditures and necessities of the resort communities. These trends will likely continue into the future.

The Federal Highway Administration initiated a study to expand the capabilities of the I-70 corridor because of demand from the Denver area to transport people to the resort towns. Execution of the plan will take more than 20 years. It will increase the transportation capabilities of I-70 and allow more people to come to these resort communities at one time. It would make traveling to and through the area easier and more desirable by tourists. Many of these travelers will likely use the forest for their recreation.

Although new technologies in recreation are likely to occur over the planning period, recognizing cumulative impacts from them is speculative at this stage. This plan is not the final action in travel opportunities on the forest; rather, this is a programmatic document that sets the stage for our anticipated needs currently and in the future. If other needs arise, specific projects can be designed to address them.

Selection of any of the alternatives as the travel management plan will identify where and when different modes of transportation can occur across the forest. The travel management plan will establish the transportation system so the forest can concentrate resources to the identified system and reestablish native conditions in areas where the system is not needed. The variability of the alternatives is constrained by the mandates in the forest plan. The variability among alternatives is extremely small when viewed against the entire acreage of the planning area.

The likely increase in the I-70 corridor population, the increase in the ability of recreationists to access the forest from Colorado’s Front Range, and the forest plan objective to decrease roads will affect forest resources including recreation. The selection of one alternative over another is unlikely to measurably add to those effects. The

selection of one alternative over another is unlikely to change the expected population growth patterns or legal use patterns.

Cumulative impacts on forest resources would be based on the amount, timing, and location of the expected increases in recreation use. It is reasonable to expect that there may be local cumulative impacts on resources from the adoption of one alternative over another; however, across the forest the effects are very small. Those local effects may present themselves in a social context (such as increased crowding and user-conflict) or in a physical context (such as soil erosion on a specific trail). Those issues are best addressed site specifically through available management methods.

A January 13, 2009 Forest Service document titled *Climate Change Considerations in Project Level NEPA Analysis* states, “It is not currently feasible to quantify the indirect effects of individual or multiple projects on global climate change and therefore determining significant effects of those projects or project alternatives on global climate change cannot be made at any scale” (USDA Forest Service, 2009). The project is limited in scope when compared to any global change in climate. Effects are considered at the appropriate scale in the direct and indirect discussion. It would be impossible to measure any contribution of these effects at a global scale and therefore any effects to climate change would be conjecture and not scientifically based.

# CHAPTER 4:

## CONSULTATION AND COORDINATION

### Preparers and Contributors

---

#### Contributors

Contributors include all members of the White River National Forest. Site-specific information was developed by the personnel of the seven ranger districts that make up the White River National Forest. Leadership team members gave support and guidance to the travel management planning process.

The White River National Forest would like to acknowledge the members of the public who took the time to engage in the travel management plan effort.

#### Interdisciplinary Team Members:

Andrea Brogen, archeologist

Jan Burke, silviculturalist

Bruce Davidson, GIS specialist

Rich Doak, recreation planning specialist

David Francomb, oil and gas specialist

Olivia Garcia, mineral engineer

Denise Gergen, GIS specialist

Donna Graham, landscape architect

Wendy Haskins, forest planner and team leader

Christine Hirsch, fisheries and aquatics biologist

Andrea Holland-Sears, hydrologist, air specialist

Kay Hopkins, recreation planning specialist

Bob Leighty, fuels specialist

Wendy Magwire, wildlife biologist

Bruce Moss, transportation planner and engineer

Linn Pettijohn, range specialist

Roger Poirier, editor

John Proctor, botanist

**Deciding Official: Scott G. Fitzwilliams, Forest Supervisor**

## **Distribution of the Final Environmental Impact Statement**

---

This final environmental impact statement has been distributed to over 900 individuals and organizations who specifically requested a copy of the document. In addition, copies have been sent to federal agencies, federally recognized tribes, state and local governments, and organizations representing a wide range of views regarding travel management on the White River National Forest.

# INDEX

## A

affected environment ..... 36, 46, 105  
 air 7, 11, 47, 48, 49, 98, 197, 5, 15, 19, 4, 8  
 all-terrain vehicle ... 7, 28, 29, 34, 73, 77, 99, 167, 22  
 alpine 6, 31, 102, 107, 160, 161, 163, 164, 179, 180,  
 185, 189, 12, 20  
 Alternative A2, 36, 37, 39, 40, 41, 48, 51, 56, 57, 64,  
 85, 86, 88, 89, 92, 99, 100, 104, 105, 113, 124,  
 130, 132, 133, 142, 157, 158, 172, 173, 174, 175  
 Alternative B ..... 2, 37  
 Alternative C ..... 34, 70, 129  
 Alternative D ..... 30, 34, 70  
 Alternative E ..... 18, 35  
 Alternative F2, 37, 39, 40, 41, 42, 51, 56, 57, 64, 85,  
 86, 89, 93, 94, 99, 100, 104, 105, 113, 124, 130,  
 131, 132, 133, 142, 144, 149, 150, 151, 157, 158,  
 173, 174, 175, 177  
 Alternative G. 2, 3, 18, 23, 31, 32, 35, 38, 39, 40, 48,  
 51, 56, 57, 58, 64, 85, 89, 92, 94, 99, 104, 105,  
 108, 113, 124, 131, 132, 133, 142, 144, 149, 150,  
 151, 157, 158, 173, 174, 175, 177, 189  
 Alternative GM . 3, 31, 32, 35, 39, 40, 48, 51, 56, 57,  
 58, 64, 85, 89, 94, 99, 104, 105, 108, 113, 131,  
 132, 133, 142, 144, 149, 150, 151, 157, 158, 173,  
 174, 175, 177  
 amphibian ..... 159, 160  
 aquatic 140, 141, 142, 143, 148, 150, 152, 159, 160,  
 163, 164, 167, 168, 172, 174, 185, 19, 23  
 ASQ ..... 111, 112, 113  
 ATV . 9, 14, 15, 18, 28, 39, 42, 57, 58, 71, 78, 79, 86,  
 87, 88, 89, 91, 92, 93, 117, 119

## B

biking 7, 9, 41, 42, 67, 77, 86, 92, 96, 119, 142, 167,  
 192, 7  
 boat ..... 32

## C

capacity ..... 34, 56, 73, 75, 81, 91, 92, 156, 158, 168,  
 172, 4, 6, 12, 15, 16, 18, 20, 21  
 conflict 14, 31, 33, 34, 35, 50, 51, 70, 73, 74, 79, 94,  
 97, 167, 191, 196, 5, 22, 1, 7, 10

## D

density ..... 12, 56, 100, 135, 143, 144, 159, 168, 170,  
 172, 175, 177, 189, 193, 11, 20, 21, 5  
 designated route... 12, 13, 28, 35, 38, 39, 41, 42, 45,  
 67, 68, 84, 88, 92, 95, 97, 109, 192, 6, 8

## E

effects, cumulative... 46, 54, 59, 100, 190, 191, 193,  
 194, 195, 10  
 effects, direct and indirect ..... 193  
 elk 6, 12, 78, 79, 159, 161, 162, 163, 169, 170, 171,  
 7, 9, 2, 4, 5, 7, 8, 9, 10  
 environmental consequences 19, 180, 181, 183, 184  
 erosion ..... 7, 56, 104, 105, 107, 109, 110, 119, 122,  
 123, 135, 138, 141, 142, 172, 177, 178, 191, 192,  
 196, 20, 21

## F

fish ..... 128, 142, 159, 160, 164, 166, 167, 168, 172,  
 174, 175, 189, 8, 9, 14, 16, 1  
 fishing... 9, 32, 71, 78, 96, 118, 167, 169, 189, 192, 8  
 forest plan... 3, 1, 2, 4, 7, 8, 9, 10, 11, 12, 13, 17, 18,  
 20, 22, 25, 30, 32, 36, 37, 38, 39, 41, 42, 43, 44,  
 46, 53, 54, 55, 59, 60, 61, 64, 67, 68, 70, 72, 73,  
 74, 75, 77, 81, 83, 84, 85, 95, 97, 98, 101, 102,  
 103, 105, 111, 112, 113, 114, 121, 129, 132, 133,  
 143, 152, 153, 154, 156, 157, 171, 175, 190, 191,  
 195, 197, 7, 8, 14, 15, 20, 21, 23, 1  
 forested.. 67, 68, 101, 111, 113, 114, 160, 161, 185,  
 186, 189, 194, 12, 4  
 frog ..... 163, 165, 177

## G

GIS... 86, 88, 90, 91, 94, 96, 102, 103, 107, 108, 109,  
 130, 131, 155, 175, 197, 6, 19, 2  
 grass/forb ..... 160, 161, 162, 163, 185, 187, 21  
 grazing... 6, 50, 51, 74, 102, 105, 120, 151, 189, 191,  
 195, 9, 16

## H

habitat ..... 9, 10, 31, 35, 43, 63, 64, 94, 98, 111, 114,  
 136, 140, 150, 158, 159, 160, 161, 162, 163, 164,  
 166, 167, 168, 169, 171, 172, 175, 177, 178, 179,  
 180, 181, 182, 183, 184, 185, 186, 187, 188, 189,  
 190, 192, 193, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 18,  
 20, 21, 24, 5, 7  
 habitat effectiveness ..... 171, 9, 5  
 heritage ..... 55, 56, 57, 59, 14  
 high-clearance vehicle ..... 34, 13  
 hike ..... 18, 28, 36, 39, 78, 84, 85, 87, 96, 105  
 hiking... 6, 7, 9, 34, 41, 57, 58, 74, 77, 86, 87, 89, 91,  
 92, 93, 96, 105, 119, 142, 143, 167, 192, 7  
 horse ... 6, 7, 9, 18, 20, 28, 34, 39, 41, 51, 66, 67, 73,  
 74, 78, 86, 87, 89, 91, 92, 93, 96, 99, 105, 116,

119, 124, 142, 154, 155, 156, 157, 168, 179, 180,  
184, 186, 187, 188, 189, 192, 7

## I

invertebrate ..... 160, 168, 172

## K

key issue ..... 1, 2, 3, 22, 23, 31, 38, 41

## L

livestock .. 6, 17, 29, 50, 51, 52, 63, 74, 89, 102, 105,  
118, 120, 142, 151, 153, 158, 170, 189, 191, 195,  
16, 22

lynx ..... 161, 164, 169, 10, 11, 12, 20

## M

maintenance . 6, 7, 10, 14, 15, 16, 17, 26, 29, 30, 31,  
32, 50, 56, 63, 64, 68, 69, 73, 77, 82, 83, 84, 86,  
87, 95, 97, 103, 104, 110, 112, 116, 117, 118,  
119, 123, 124, 125, 126, 127, 128, 129, 130, 131,  
132, 133, 134, 135, 150, 151, 160, 162, 173, 174,  
177, 187, 191, 192, 194, 4, 8, 12, 13, 18

map8, 13, 16, 19, 20, 21, 27, 30, 44, 45, 67, 99, 107,  
167, 6, 8, 13, 9

mechanized . 8, 12, 13, 16, 26, 27, 28, 29, 34, 36, 37,  
46, 51, 53, 67, 81, 83, 97, 98, 117, 153, 155, 158,  
178, 189, 13

mineral ..... 29, 60, 61, 62, 189, 194, 10

motorcycle 14, 18, 39, 41, 42, 85, 87, 88, 89, 91, 92,  
93, 99, 117

motorized 4, 2, 7, 8, 9, 10, 12, 13, 14, 15, 16, 18, 19,  
20, 23, 27, 28, 29, 32, 36, 37, 38, 39, 40, 41, 42,  
43, 45, 46, 47, 48, 49, 50, 51, 56, 57, 58, 63, 64,  
67, 68, 69, 70, 72, 73, 74, 76, 77, 78, 79, 81, 83,  
84, 85, 87, 92, 93, 94, 95, 96, 97, 98, 99, 100,  
102, 117, 119, 120, 121, 122, 123, 124, 134, 135,  
139, 141, 142, 143, 148, 149, 150, 151, 153, 166,  
169, 170, 171, 176, 177, 179, 180, 181, 182, 183,  
184, 189, 191, 192, 17

mountain bike .. 9, 18, 28, 29, 34, 66, 67, 73, 77, 79,  
87, 89, 91, 93, 96, 99, 120, 142, 6, 1

mountain shrub ..... 160, 162, 164, 185, 187, 189

## N

NEPA 4, 9, 11, 17, 22, 30, 33, 36, 46, 62, 70, 98, 193,  
194, 196, 6, 13, 8

non-forested ..... 14, 7

non-motorized 7, 8, 9, 12, 18, 20, 27, 29, 35, 37, 41,  
42, 46, 49, 50, 63, 67, 69, 72, 73, 74, 76, 77, 81,  
84, 94, 95, 96, 98, 99, 102, 116, 135, 138, 139,  
141, 148, 149, 153, 155, 156, 158, 166, 169, 175,  
177, 179, 191, 192, 12, 14, 17

noxious weeds ..... 31, 63, 64, 65, 168, 178, 191, 192

## O

OHV .. 32, 68, 69, 72, 74, 77, 78, 119, 121, 178, 192,  
6, 15

oil and gas... 8, 47, 48, 49, 60, 61, 74, 102, 105, 117,  
125, 134, 167, 195

## P

pack animal ..... 7, 34, 124

PAOT ..... 90, 91, 15

plant ..... 63, 159, 160, 162, 163, 167, 168, 177, 178,  
185, 186, 187, 188, 189, 191, 192, 193, 7, 8, 14,  
15, 16, 18, 19, 20, 21, 2, 5, 7

play area ..... 35, 37, 68

productivity 2, 110, 112, 113, 114, 152, 194, 16, 18,  
20, 21, 23

public ..... 3, 1, 2, 3, 4, 8, 9, 10, 12, 13, 14, 15, 16, 17,  
18, 20, 21, 22, 23, 24, 25, 28, 29, 30, 31, 32, 33,  
34, 35, 36, 38, 39, 40, 44, 46, 48, 51, 53, 55, 57,  
58, 62, 64, 65, 67, 68, 69, 70, 74, 78, 81, 83, 84,  
87, 89, 94, 95, 97, 100, 105, 106, 111, 112, 115,  
116, 117, 118, 119, 121, 122, 124, 125, 127, 128,  
130, 134, 135, 136, 137, 140, 141, 190, 195, 197,  
4, 6, 7, 8, 9, 10, 14, 15, 16, 19, 3, 9

## R

recreation conflict ..... 1, 22, 34, 7  
recreation opportunity . 12, 37, 75, 153, 156, 16, 17,  
19, 23

recreation setting ..... 75, 10

riparian . 31, 135, 136, 138, 139, 142, 143, 150, 151,  
152, 160, 162, 163, 168, 175, 178, 183, 185, 186,  
188, 189, 191, 192, 12, 18, 19, 23

road 3, 4, 1, 6, 7, 8, 11, 12, 13, 14, 15, 17, 18, 19, 26,  
27, 29, 30, 31, 32, 33, 34, 40, 44, 45, 47, 48, 49,  
50, 51, 53, 54, 56, 57, 61, 62, 63, 64, 67, 69, 73,  
74, 75, 77, 78, 82, 83, 85, 86, 87, 90, 93, 97, 99,  
100, 101, 103, 104, 105, 107, 108, 109, 110, 111,  
112, 113, 115, 116, 117, 118, 119, 120, 121, 122,  
123, 124, 125, 126, 128, 129, 130, 131, 132, 133,  
134, 135, 137, 138, 139, 141, 142, 143, 144, 148,  
150, 151, 159, 160, 168, 170, 172, 173, 174, 175,  
176, 177, 178, 179, 180, 181, 182, 183, 184, 190,  
191, 193, 194, 195, 4, 6, 8, 10, 12, 14, 15, 16, 18,  
19, 21, 22, 23, 24, 5, 7, 9, 10

road density ..... 12, 172, 173, 175, 176, 15

roadless ..... 98, 99, 100, 112, 19, 8

ROS ..... 12, 66, 75, 76, 82, 85, 153, 17, 8

## S

scenic integrity ..... 101, 103, 104, 19

scenic resources ..... 101, 104, 105, 153

seasonal ..... 6, 12, 29, 45, 161, 162, 167, 169

SIO ..... 102, 103, 104, 105, 19

ski area ..... 12, 29, 30, 40, 67, 71, 77, 83, 94, 95, 97,  
102, 105, 119, 124, 128, 142, 167, 189, 5, 6, 20

skiing... 6, 7, 9, 20, 37, 66, 69, 71, 73, 74, 77, 81, 84,  
119, 120, 155, 167, 190, 192, 195, 20  
snowmobile ..... 42, 77, 84, 96, 192, 6, 20  
social..... 3, 1, 8, 31, 46, 66, 74, 85, 91, 98, 130, 190,  
191, 194, 195, 196, 5, 8, 10, 16, 20, 10  
soils ..... 19, 107, 109, 123, 129, 178, 191, 19, 7  
stock..... 33, 66, 158, 178, 22  
stream channel ..... 142, 143, 148, 149, 152, 164, 23  
stream crossing..... 104, 135, 143, 149, 150, 172, 174  
summer 3, 1, 8, 10, 11, 12, 16, 19, 20, 27, 28, 29, 36,  
38, 39, 40, 41, 49, 66, 67, 68, 73, 75, 77, 81, 82,  
84, 94, 95, 96, 97, 99, 109, 117, 119, 120, 127,  
161, 162, 163, 169, 178, 179, 180, 181, 183, 184,  
189, 9

## T

timber . 6, 7, 8, 10, 29, 32, 48, 52, 63, 67, 68, 74, 94,  
100, 101, 102, 105, 111, 112, 113, 116, 117, 118,  
120, 125, 134, 142, 161, 167, 169, 191, 193, 194,  
5, 8, 21, 22, 23, 10  
toad..... 163, 165, 177  
trail.. 3, 4, 1, 8, 11, 13, 15, 17, 18, 19, 26, 29, 30, 31,  
33, 34, 40, 44, 45, 47, 48, 50, 51, 56, 63, 64, 66,  
67, 73, 74, 75, 82, 83, 84, 85, 86, 87, 89, 90, 92,  
93, 96, 97, 98, 99, 100, 104, 107, 108, 109, 110,  
113, 115, 117, 118, 119, 123, 124, 126, 127,  
128, 131, 132, 133, 134, 135, 138, 141, 142,  
143, 144, 148, 150, 153, 154, 155, 156, 157, 158,  
159, 160, 168, 169, 175, 176, 177, 178, 179, 180,  
181, 182, 184, 189, 191, 192, 194, 196, 6, 8, 10,  
14, 15, 16, 19, 20, 22, 23  
travel management .. 3, 1, 2, 3, 4, 7, 8, 9, 10, 11, 12,  
13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 27,  
28, 29, 30, 31, 35, 36, 38, 39, 43, 44, 45, 48, 49,  
54, 56, 58, 61, 62, 67, 68, 70, 73, 77, 92, 95, 97,  
99, 103, 105, 107, 108, 117, 119, 121, 123, 130,  
131, 133, 134, 138, 156, 169, 170, 172, 177,  
179, 180, 182, 185, 191, 192, 194, 195, 197, 22,  
1

travel rule 2, 4, 13, 14, 23, 31, 32, 33, 37, 41, 44, 68,  
69, 70, 122, 128, 132, 133  
travelway.. 9, 26, 141, 142, 143, 153, 162, 174, 175,  
177, 187, 188, 189, 194, 12, 15, 22  
tribal..... 26, 55, 56, 8, 9  
trout ..... 165, 175, 176

## V

vegetation . 10, 17, 27, 30, 63, 67, 73, 100, 101, 102,  
103, 104, 105, 107, 110, 111, 114, 118, 123, 135,  
138, 140, 141, 142, 143, 151, 162, 163, 167, 168,  
173, 175, 178, 187, 188, 192, 194, 195, 5, 6, 7, 9,  
11, 12, 16, 19, 21, 22, 23, 7  
visitor use ..... 43, 66, 71, 79, 92, 120, 5  
volunteer..... 127, 128

## W

water quality 7, 9, 19, 110, 133, 135, 137, 138, 139,  
140, 141, 148, 150, 152, 167, 174, 13, 18, 2  
water supply..... 135, 140, 141  
watershed 7, 63, 135, 136, 140, 142, 143, 144, 151,  
152, 173, 175, 176, 192, 9, 23  
wetland ..... 135, 136, 139, 142, 143, 151, 152, 163,  
168, 178, 188  
wheeled vehicle ..... 28, 29, 39, 73, 124  
wilderness ... 6, 26, 27, 43, 47, 53, 61, 67, 73, 84, 89,  
93, 95, 96, 98, 99, 102, 128, 138, 153, 154, 155,  
156, 157, 158, 166, 167, 14, 19, 24, 3, 7  
wildlife... 9, 10, 16, 19, 27, 29, 31, 35, 43, 63, 67, 78,  
79, 94, 95, 98, 111, 114, 119, 123, 133, 136, 140,  
150, 159, 160, 161, 162, 163, 166, 167, 168, 169,  
170, 171, 189, 190, 191, 194, 195, 197, 8, 9, 14,  
16, 24, 4, 5, 6, 10  
winter 3, 4, 1, 2, 6, 10, 12, 16, 19, 20, 21, 23, 27, 28,  
29, 30, 31, 35, 37, 38, 39, 40, 41, 42, 43, 46, 49,  
66, 67, 68, 72, 73, 74, 75, 81, 82, 85, 94, 95, 96,  
97, 119, 127, 128, 155, 158, 159, 162, 167, 168,  
169, 172, 179, 180, 181, 183, 184, 189, 9, 11, 6

# APPENDIX A: ACRONYMS AND GLOSSARY

## Acronyms

ADP	Application for Permit to Drill	MVUM	motor vehicle use map
AMS	Analysis of the Management Situation	NAGPRA	Native American Graves Protection and Repatriation Act
ATV	all-terrain vehicle	NEPA	National Environmental Policy Act
BA	biological assessment	NF	National Forest
BE	biological evaluation	NFMA	National Forest Management Act
BLM	Bureau of Land Management	NFS	National Forest System
CDNST	Colorado Divide National Scenic Trail	NFSR	National Forest System road
CDOW	Colorado Division of Wildlife	NFST	National Forest System trail
CEQ	Council on Environmental Quality	NOI	notice of intent
CFR	Code of Federal Regulations	NRHP	National Register of Historic Places
DAU	data analysis unit	NRT	National Recreation Trail
DEIS	draft environmental impact statement	NST	National Scenic Trail
EIS	environmental impact statement	NTSA	National Trail System Act
EO	Executive Order	NVUM	National Visitor Use Monitoring Survey
EPA	Environmental Protection Agency	NWSRS	National Wild and Scenic Rivers System
ESA	Endangered Species Act	NWPS	National Wilderness Preservation System
ESI	existing scenic integrity	OHV	off-highway vehicle
FEIS	final environmental impact statement	PAOT	persons at one time
FS	Forest Service	PEIS	programmatic environmental impact statement
FSH	Forest Service Handbook	P/J	pinyon-juniper
FSM	Forest Service Manual	RIM	Recreation Information Management
FSV	full-sized vehicle	RMRIS	Rocky Mountain resource inventory system
GIS	geographic information system	RNA	research natural area
GMU	game management unit	ROD	record of decision
HABCAP	habitat capability computer model program	ROS	Recreation Opportunity Spectrum
HRV	historic range of variability	RMBO	Rocky Mountain Bird Observatory
HUC	hydrologic unit code	RPA	Forest and Rangeland Renewable Resources Planning Act
IDT	interdisciplinary team	RVD	recreation visitor day
IRI	integrated resource inventory	SIA	special interest area
IWM	Integrated Noxious Weed Management	SMS	Scenery Management System
LAU	lynx analysis unit	SIO	scenic integrity objective
LRMP	land and resource management plan	SUPO	Surface Use Plan of Operations
LSAA	late successional assessment area	TCP	Traditional Cultural Property
MA	management area	TES	threatened and endangered species
MCB	Monitoring Colorado Birds program	TMP	White River National Forest Travel Management Plan
MIC	management indicator communities	USDA	U.S. Department of Agriculture
MIS	management indicator species	USDI	U.S. Department of the Interior
MBF	thousand board feet	WCP	watershed conservation practices
MDP	master development plan		
MMBF	million board feet		
MMCF	million cubic feet		
MRVD	million recreation visitor days		

## Glossary

---

access	The opportunity to approach, enter and make use of public or private land.
access rights	A privilege or right of a person or entity to pass over or use another person's or entity's travel way.
acre-foot	The amount of water covering one acre to a depth of one foot.
activity	A measure, course of action, or treatment that is undertaken to directly or indirectly produce, enhance, or maintain forest and rangeland outputs or achieve administrative or environmental quality objectives.
activity area	An area of land affected by a management activity or activities. An activity area can range from a few acres to an entire watershed depending on the type of monitoring being conducted.
adaptive management	A type of natural resource management in which decisions are made as part of an ongoing process. Adaptive management involves testing, monitoring, evaluation, and incorporating new knowledge into management approaches based on scientific findings and the needs of society. Results are used to modify management policy.
affected environment	The biological and physical environment that will or may be changed by proposed actions and the relationship of people to that environment.
air pollution	Any substance or energy form (heat, light, noise, etc.) that alters the state of the air from what would naturally occur.
airshed	Basic geographic units in which air quality is managed.
allocation	The assignment of a land area to a particular use or uses to achieve management goals and objectives.
allotment	A designated area of land available for livestock grazing upon which a specified number and kind of livestock may be grazed under a range allotment management plan. It is the basic land unit used to facilitate management of the range resource on National Forest System lands.
allowable sale quantity (ASQ)	The amount of chargeable timber volume that can be sold from the area of suitable land covered by the forest plan for a time period specified by the plan. This quantity is usually expressed on an annual basis as the "average annual allowable sale quantity."
all-terrain vehicle (ATV)	Any motorized, off-highway vehicle 50 inches or less in width, having a dry weight of 800 pounds or less that travels on three or more low-pressure tires with a seat designed to be straddled by the operator.
alluvial	Of or pertaining to sand, mud, and other sediments deposited on land by streams.
alpine	Those portions of mountains that rise above the cold limits of trees.
alternative	A combination of management prescriptions applied in specific amounts and locations to achieve a desired management emphasis as expressed in goals and objectives. One of several policies, plans, or projects proposed for decision making. An alternative need not substitute for another in all respects.
analysis area	One or more capability areas combined for the purpose of analysis in formulating alternatives and establishing various impacts and effects.

annual maintenance	Work performed to maintain serviceability or to repair failures during the year in which they occur. Includes preventive and/or cyclic maintenance performed in the year in which it is scheduled to occur.
aquatic ecosystem	An ecosystem (biological and physical components and their interactions) in which water is the principal medium. Examples include wetlands, streams, reservoirs, and areas with plants or animals characteristic of either permanently or seasonally inundated soils.
arc	A line defined as a set of ordered x, y coordinates used to represent linear features and polygon boundaries.
arterial road	Provides service to large land areas and usually connects with public highways or other arterial roads to form an integrated network of primary travel routes. The location and standard are often determined by a demand for maximum mobility and travel efficiency rather than specific resource management service. It usually is developed and operated for long-term land and resource management purposes and constant service.
aspect	(1) The visual first impression of vegetation or a landscape at a particular time or as seen from a specific point; (2) the predominant direction of slope of the land; (3) seasonal changes in the appearance of vegetation.
attribute column	A field within a database table.
attenuated flooding	Flooding lessened in severity because of natural or man-made structures or areas that disperse water or slow flows.
available lands	Those portions of a national forest not administratively excluded from timber harvest or livestock grazing or other activities.
background	A term used in visual management to describe that part of a scene or landscape that is farthest from the viewer, usually 3 miles to infinity from the observer.
benchmark	Reference points that define the bounds within which feasible management alternatives can be developed. Benchmarks may be defined by resource output or economic measures.
big game	Certain wildlife that may be hunted for sport under state laws and regulations, including elk, pronghorn antelope, mule and white-tail deer, turkey and bighorn sheep.
biogeography	The study of the geographic distribution of plants and animals.
biodiversity	The full variety of life in an area, including the ecosystems, plant and animal communities, species and genes, and the processes through which individual organisms interact with one another and their environments.
biological assessment	A biological assessment evaluates the potential effects of an action on listed and proposed species under the Endangered Species Act and on designated and proposed critical habitat. A biological assessment also determines whether any such species or habitat is likely to be adversely affected by the action. An assessment is used in determining whether formal consultation or a conference is necessary.
biological evaluation	A review of all Forest Service planned, funded, executed or permitted programs and activities for possible effects on regionally listed sensitive species. A biological evaluation may be used or modified to satisfy consultation requirements for biological assessments of construction projects requiring an environmental impact statement.
biological opinion	An official report by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service issued in response to a formal Forest Service request for consultation or conference. It states whether or not the federal action is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat.

biomass	The total amount of living plants and animals above and below ground in an area at a given time.
board foot	The amount of wood contained in an unfinished board one inch thick, 12 inches long and 12 inches wide (2.54 x 30.5 x 30.5 cm).
browse	Twigs, leaves, and young shoots of trees and shrubs upon which animals feed; in particular, those shrubs that are used by livestock and big-game animals for food.
buffer zone	An area on the edge of protected areas with restrictive land-use controls allowing only activities compatible with protection of the core area, such as research, environmental education, recreation and tourism.
Bureau of Land Management (BLM)	An agency in the U.S. Department of the Interior responsible for administering public lands.
canopy cover	The percentage of the ground covered by a vertical projection of the natural spread of the branches and leaves of the trees in an area.
carrying capacity	The maximum number of animals that can be supported in a given environment without deteriorating that environment.
cave	Any naturally formed void, cavity, recess or system of interconnected passages that occur beneath the surface of the earth or within a cliff or ledge, including natural subsurface water and drainage systems large enough to permit a person to enter, whether or not the entrance is naturally formed or created by humans. The term "cave" also includes any natural pit, sinkhole or other feature that is an extension or component of a cave.
ceded lands	Lands that tribes ceded to the U.S. by treaty in exchange for reservation of specific land and resource rights, annuities and other promises in the treaties.
channel	A passage, either naturally or artificially created, that periodically or continuously contains moving water, or that forms a connecting link between two bodies of water. River, creek, run, branch and tributary are some of the terms used to describe natural channels. Natural channels may be single or braided. Canal and floodway are some of the terms used to describe artificial channels.
class I area	All international parks, national parks larger than 6,000 acres, and designated wilderness areas larger than 5,000 acres that existed on August 7, 1977, are considered class 1 areas. The 1977 Clean Air Act amendments provide the most protection to these pristine lands, severely limiting the amount of additional air pollution that can be added to these areas.
class II area	A geographic area designated by Congress for a moderate degree of protection from future air quality degradation. Moderate increases in new pollution may be permitted in class II areas. All wilderness designated after August 7, 1977, are automatically class II areas, as are all other National Forest System lands (except additions to existing class I areas).
climax	(1) The final or stable biotic community in a successional series that is self-perpetuating and in dynamic equilibrium with the physical habitat; (2) the assumed end point in succession.
closed road	An intermittent service road in maintenance level 1 that is closed to all vehicular traffic for more than 1 year.
collector road	A road that serves smaller land areas than a forest arterial road and usually is connected to a forest arterial road or public highway. Collects traffic from forest local roads and/or terminal facilities. The location and standard are influenced both by long-term multi-resource service needs and by travel efficiency. May be operated for either constant or intermittent service, depending on land use and resource management objectives for the area served by the facility.

commercial timber sale	The selling of timber from National Forest System lands for the manufacture of commercial products, such as lumber, plywood, etc.
commercially valuable species	Tree species that are used in the production of wood products and are often bought by purchasers within the White River National Forest's regional timber market. The list of commercially valuable species is subject to change over time depending on the market supply and demand for individual species. The White River National Forest's current list includes Englemann spruce, subalpine fir, Douglas-fir, lodgepole pine, ponderosa pine, and aspen.
composition	The proportion of each tree species in a stand expressed as a percentage of either the total number, basal area, or volume of all tree species in the stand.
concessionaire	A special-use permittee who provides goods and services primarily at Forest Service developed sites (excluding ski areas).
conflict	Goal interference attributed to another's behavior.
conformity determination	An area conforms to air quality standards as determined by the Environmental Protection Agency or state or local entity.
connected disturbed areas	High runoff areas like roads and other disturbed sites that discharge surface runoff into a stream or lake.
connectivity	The arrangement of habitats that allows organisms and ecological processes to move across the landscape. Patches of similar habitats are close together or linked by corridors of appropriate vegetation. The opposite of fragmentation.
construction	The erection, construction, installation, or assembly of a new fixed asset. The supervising, inspecting, actual building, and all expenses incidental to the development of a new facility, including locating, surveying, mapping, costs and acquisition of rights-of-way and elimination of hazards.
consultation	(1) An active, affirmative process that (a) identifies issues and seeks input from appropriate American Indian governments, community groups and individuals; and (b) considers their interests as a necessary and integral part of the BLM and Forest Service decision-making process. (2) The federal government has a legal obligation to consult with American Indian tribes. This legal obligation is based on such laws as Native American Graves Protection and Repatriation Act, the American Indian Religious Freedom Act and numerous other executive orders and statutes. The legal responsibility is, through consultation, to consider Indian interests and account for those interests in the decision. (3) Consultation also refers to a requirement under Section 7 of the Endangered Species Act for federal agencies to consult with the U.S. Fish and Wildlife Service and/or the National Marine Fisheries Service with regard to federal actions that may affect listed threatened or endangered species or critical habitat.
cooperating agency	Any federal agency other than the lead agency that has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal (or a reasonable alternative) for legislation or other major federal action significantly affecting the quality of the human environment.
cost	The negative or adverse effects or expenditures resulting from an action. Costs may be monetary, social, physical or environmental in nature.
cost efficiency	The usefulness of specified inputs (costs) to produce specified outputs (benefits). In measuring cost efficiency, some outputs, including environmental, economic, or social impacts, are not assigned monetary values but are achieved at specific levels in the least cost manner. Cost efficiency is usually measured using present net value, although use of benefit-cost ratios and rates of return may be appropriate.

coverage	An Arc/Info term for a collection of similar spatial features organized within a GIS. It generally represents a single set of geographic objects such as roads. A coverage supports the georelational model—it contains both the spatial (location) and attribute (descriptive) data for geographic features.
cover type	A descriptive classification of vegetation based on the present dominant tree species.
critical habitat	Habitat of federally listed threatened or endangered species where those physical and biological features essential to conservation of the species are found and which may require special management considerations or protection. This habitat may currently be occupied or determined by the Secretary of the Interior to be essential for areas outside the species' current range.
cubic foot	A unit of true volume that measures 1 x 1 x 1 foot (30.48 x 30.48 x 30.48 centimeters).
cumulative impact	The impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.
culvert	A conduit or passageway under a road, trail, or other obstruction. A culvert differs from a bridge in that it is usually constructed entirely below the elevation of the traveled way.
decommission	Activities that result in the stabilization and restoration of unneeded roads or trails to a more natural state. The road or trail is permanently removed from the transportation system. The activities range from blocking the entrance, scattering boughs on the roadbed, revegetating and water barring, to removing fills and culverts, reestablishing drainage-ways, pulling back shoulders, and recontouring the slopes for full obliteration.
design capacity	The maximum theoretical amount of use a developed recreational site was built to accommodate. This is usually expressed in PAOTs (persons at one time).
designated OHV route or area	A National Forest System road, a National Forest System trail, or an area on National Forest System lands that is designated for motor vehicle use pursuant to §212.51 in a use map.
designated route	A route that has been designated for a particular use or type of traffic such as a scenic byway, a groomed snowmobile trail, a road for high clearance vehicles, a trail for mountain bikes, etc. Routes may be designated by an order, act of Congress, state legislature, Forest Service decision, or NEPA decision. Designated routes may have either the "allow" strategy or the "encourage" strategy.
desired future condition	A portrayal of the land or resource conditions that are expected to result if goals and objectives are fully achieved.
developed recreation	This type of recreation is dependent upon facilities provided to enhance recreation opportunities in concentrated-use areas. Examples include campgrounds and ski areas. Facilities in these areas might include roads, parking lots, picnic tables, drinking water, toilets, ski lifts, and buildings.
developed recreation sites	Relatively small, distinctly defined areas where facilities are provided for concentrated public use, such as campgrounds, picnic areas and swimming beaches.
direct effects	Environmental effects caused by an action and that occur at the same time and place.
dispersed campsite	An individual/family-sized campsite that has a general size of about 600–750 square feet. It includes a hardened area around a fire pit, a barren area, and/or user-constructed facilities.

dispersed recreation	Those forest, range, or desert-oriented outdoor recreation activities that normally take place outside of sites or areas that are developed or managed to concentrate recreational use. Dispersed recreation activities may require facilities for safeguarding visitors, protecting resources, and enhancing the quality of visitor experiences.
district ranger	The official responsible for administering the National Forest System lands on a ranger district.
disturbance	An event that causes a significant change from the normal pattern in an ecological system. Disturbances are often subdivided into natural disturbances and man-caused disturbances.
diversity	The distribution and abundance of different plant and animal communities and species within the area covered by a forest plan. This term is derived from the National Forest Management Act (NFMA). It is not synonymous with "biodiversity."
draft environmental impact statement (DEIS)	The statement of environmental effects required for major federal actions under Section 102 of the National Environmental Policy Act and released to the public and other agencies for comment and review.
easement	A special-use authorization for a right-of-way that conveys a conditioned interest in National Forest System land and is compensable according to its terms.
ecosystem	A functional unit consisting of all the living organisms (plants, animals, and microbes) in a given area, and all the non-living physical and chemical factors of their environment, linked together through nutrient cycling and energy flow. An ecosystem can be of any size—a log, pond, field, forest or the earth's biosphere—but it always functions as a whole unit. Ecosystems are commonly described according to the major type of vegetation; for example, forest ecosystem or range ecosystem.
ecosystem composition	The plant and animal species and communities in the plan area.
ecosystem structure	The biological and physical attributes that characterize ecological systems.
ecotone	A transition area between two adjacent ecological communities usually exhibiting competition between organisms common to both.
elk security habitat	An area whose geography, topography, vegetation, or a combination of those features will hold elk during periods of stress. .
endangered species	A taxonomic group of organisms in danger of extinction throughout all or a significant portion of its range.
environmental assessment (EA)	A document that discloses the environmental impacts to be expected from a proposed action and from specific alternatives to the proposed action. An EA is prepared when significant environmental impacts are not anticipated or when there is a question as to the extent of the impacts. Comments are accepted within 30 days of release of an EA, and are considered before a final decision is made. Responses to comments appear in an appendix to the EA.
environmental impact statement (EIS)	A formal public document prepared to analyze the impacts on the environment of a proposed project or action and released for comment and review. An EIS is prepared, instead of an EA, when significant environmental impacts are anticipated. Comments by the public and by other agencies are accepted within 90 days after the release of a Draft EIS, and are considered before the final decision is documented in a Final EIS. Responses to comments appear in an appendix to the Final EIS.

essential habitat	Essential habitat is designated by a Regional Forester. It possesses the same characteristics as critical habitat without having been declared as critical habitat by the Secretary of the Interior or Commerce. The term includes habitats necessary to meet recovery objectives for endangered, threatened, and proposed species and those necessary to maintain viable populations of sensitive species.
exotic species	Non-native fish, wildlife or plant species that were deliberately or accidentally introduced in an ecosystem and that have become permanently established.
extirpated	A species that has become locally extinct; a species or subspecies that has disappeared from a locality or region without becoming extinct throughout its entire range.
federal recognition	Acknowledgement of an Indian tribe as a government entity that has a special relationship with the U.S. government. This relationship recognizes that Indian tribes receive some rights not available to other citizens; for example, health and education benefits from the trust relationship or off-reservation hunting and fishing rights related to treaties with tribal governments.
federally recognized Indian tribes	An Indian group for which: (1) Congress or an executive order created a reservation for the group either by treaty (before 1871), statutory expression, agreement by executive order, or other valid administrative action; and (2) the U.S. has some continuing political relationship, such as providing services through the Bureau of Indian Affairs.
fire management	The activities concerned with the protection of people, property and forest areas from wildfire and the use of prescribed burning for the attainment of forest management and other land use objectives, all conducted in a manner that considers environmental, social and economic criteria.
forest road	Any road that is wholly or partly within, or adjacent to, and serving the National Forest System and that is necessary for the protection, administration, and utilization of the National Forest System and the use and development of its resources.
forest trail	Any trail wholly or partially within, adjacent to, and serving national forests and other areas.
forest highway	A designated forest road under the jurisdiction of and maintained by a public authority that is subject to the Highway Safety Act.
forest land not suitable for timber production	Lands not selected for timber production in a forest plan alternative because: (a) the multiple-use objectives for the alternative preclude timber production; (b) other management objectives for the alternative limit timber production activities to the point at which it is not possible to meet management requirements set forth in 36 CFR 219.27; or (c) the lands are not cost-efficient, over the planning horizon, in meeting forest objectives that include timber production. In the preferred alternative and forest plan, lands not appropriate for timber production are designated as unsuitable.
forest system transportation management	The planning, inventory, analysis, classification, record keeping, scheduling, construction, reconstruction, maintenance, decommissioning, and other operations undertaken to achieve environmentally sound, safe, and cost-effective access for use, protection, administration, and management of National Forest System lands.
forest visitor map	A map that provides detailed information about a national forest. It is to be used by the forest visitor and those interested in specific activities such as driving, camping, hunting, or other recreational activities.

four-season resort	Any recreation facility on National Forest System lands permitted to operate during more than one season of the year. Resorts with either a winter or summer emphasis may be authorized for facilities to remain open to allow additional recreational use during alternative seasons. Permit holders who operate ski-based facilities during the winter season and permit holders with summer-based resorts with overnight lodging normally are assigned responsibility for public safety and resource protection and are required to manage their permit area 365 days per year.
fragmentation	The process of transforming large continuous patches of similar vegetation into one or more smaller patches surrounded by disturbed areas. This may occur naturally through such agents as fire, landslides, windthrow and insects and disease, or through development action of humans. The primary distinction between fragmentation and perforation is in scale; fragmentation impacts usually are large in scale and may inhibit or prevent one or more species from moving from one patch of suitable habitat to another.
geographic information system	Computer software that links geographic information (where things are) with descriptive information (what things are).
habitat	The place where an organism lives and/or the conditions of that environment, including the soil, vegetation, water, and food.
habitat capability	The capability of a given habitat to meet the needs of species, either seasonally or year-round.
habitat effectiveness	Percentage of available habitat that is usable by elk during the non-hunting season. This includes habitat that is considered cover and forage, and is measured against the effects of roads.
historic range of variability	The natural fluctuation of components of healthy ecosystems over time. Refers to the range of conditions and processes that are likely to have occurred prior to settlement of the project area by people of European descent (approximately the mid-1800s), which would have varied within certain limits over time. Historical conditions and processes portrayed include such variables as forest or grassland vegetation types, compositions, and structures; fish and wildlife habitats and populations; and drought, grazing, and fire regimes.
hydrologic unit code (HUC)	Divides watersheds into a series of progressively smaller nested levels, with the first level being the largest land area relative to higher-numbered levels in that watershed. Each level is identified systematically by a hydrologic unit code number. A first-level watershed can be divided into a number of second-level watersheds; each second-level watershed may be further subdivided into third-level watersheds, and so forth.
Indian land	Any land in collective tribal holding or ownership for which the Secretary of the Interior has a continuing trust responsibility to manage for the benefit of the respective tribe. In the past, this term described certain parcels or areas where Indians lived and represented a smaller concept than Indian territory.
Indian territory	Unsurveyed lands that were recognized by the federal government to be occupied or used by Indians. Prior to the U.S. Constitution, lands occupied or used by American Indians were referred to as "Indian Territory." Historical documents dating back to the 16 <sup>th</sup> century refer to these unsurveyed regions as a "territory."
infrastructure	The facilities, utilities and transportation systems needed to meet public and administrative needs.

jurisdiction	<p>The legal right to control or regulate use of a transportation facility. Jurisdiction requires authority but not necessarily ownership. The authority to construct or maintain a road may be derived from fee title, an easement, an agreement, or other method.</p> <p>Forest Service jurisdiction includes National Forest System roads and National Forest System trails, which are roads or trails located on National Forest System lands, other than a road or trail: that has been authorized by a legally documented right-of way held by a state, county, or local public road authority; or that an authorized officer has ascertained, for administrative purposes and based on available evidence, is within a public right-of way for a highway, such as a right-of-way for a highway pursuant to R.S. 2477.</p>
karst	<p>A type of landform that develops when soluble rocks (such as limestone, dolomite, gypsum, anhydrite, and halite) are dissolved. A karst landscape is characterized by well-developed subsurface drainage, collapse features such as sinkholes, dry valleys, vertical shafts, caves, and fluted rock surfaces (epikarst).</p>
land exchange	<p>A discretionary, voluntary transaction involving mutual transfers of land or interests in land between the Secretary of Agriculture acting by or through the Forest Service and a non-federal entity.</p>
landscape	<p>A heterogeneous land area composed of a cluster of interacting ecosystems that are repeated in similar form throughout. Landscapes vary in size, down to a few kilometers in diameter.</p>
landscape ecology	<p>The study of the distribution patterns of communities and ecosystems, the ecological processes that affect those patterns, and changes in pattern and process over time.</p>
lentic	<p>Standing water habitat such as lakes, ponds, seeps, bogs and meadows (wet).</p>
lifeways	<p>Manner and means by which a group of people lives—their way of life. Components include language, subsistence strategies, religion, economic structure, physical mannerisms, and shared attitudes.</p>
limits of acceptable change (LAC)	<p>A framework for establishing acceptable and appropriate resource and social conditions in recreation settings.</p>
lithic	<p>Stone used as raw material for the production of artifacts, such as tools or other utilitarian objects. It may also be used strictly for ceremonial purposes.</p>
local road	<p>Connects terminal facilities with forest collector or forest arterial roads or public highways. The location and standard are usually controlled by topography and a specific resource activity rather than travel efficiency. Forest local roads may be developed and operated for long-term, intermittent, or short-term service.</p>
lotic	<p>Running water habitat such as rivers, streams and springs.</p>
lynx analysis unit (LAU)	<p>The LAU is a project analysis unit upon which direct, indirect, and cumulative effects analyses are performed. LAU boundaries should remain constant to facilitate planning and allow effective monitoring of habitat changes over time. An area of at least the size used by an individual lynx, about 25–50 square miles.</p>

lynx habitat	Lynx occur in mesic coniferous forests that have cold, snowy winters and provide a prey base of snowshoe hare. Lynx records occur predominantly in the following vegetation types: In the western U.S. lodgepole pine, subalpine fir, Engelmann spruce, and aspen cover types on subalpine fir habitat types; cool, moist Douglas-fir, grand fir, or western larch forest, where they are interspersed with subalpine forests, also provide habitat for lynx. In the Southern Rocky Mountain Geographic Area, mature and late-successional spruce/fir forests, provide structure and forage that is superior to mature lodgepole pine forests. (Many parts of the southern Rockies currently have a shortage of regenerating lodgepole pine stands.) In the absence of widespread regenerating forest stands, mature and late-successional spruce-fir forests may constitute some of the most important habitat for lynx. These stands not only provide components necessary for denning habitat, but also produce red squirrels, grouse, and snowshoe hares. Although these forest types may support a lower density of hares than do densely regeneration stands, they also likely provide stable populations of both hares and red squirrels over time.
lynx denning habitat	Habitat used during parturition and rearing of young until they are mobile. The common component appears to be large amounts of coarse woody debris, either down logs or root wads. (In some studies this was estimated at greater than 80 downed logs per acre, but it could be less if properly arranged.) Coarse woody debris provides escape and thermal cover for kittens. Denning habitat may be found either in older mature forest of conifer or mixed conifer/deciduous types, or in regenerating stands (greater than 20 years since disturbance). Denning habitat must be located within daily travel distance of foraging habitat (typical maximum daily distances for females is 3–6 miles).
lynx diurnal security habitat	In lynx habitat, areas that provide secure winter daytime bedding sites for lynx in highly disturbed landscapes; for example, large developed winter recreational sites or areas of concentrated winter recreational use. It is presumed that lynx may be able to adapt to the presence of regular and concentrated human use during winter, so long as other critical habitat needs are being met and security habitat blocks are present and adequately distributed in such disturbed landscapes. Security habitat will provide lynx the ability to retreat from human disturbance during winter daytime hours and to emerge at dusk to hunt when most human activity ceases. Security habitats generally will be sites that naturally discourage winter human activity because of extensive forest floor structure, or stand conditions that otherwise make human access difficult; security habitat should be protected to the degree necessary. Security habitats are likely to be most effective if they are sufficiently large enough to provide effective visual and acoustic insulation from winter human activity and easily allow movement away from infrequent human intrusion. These winter habitats must be distributed such that they are in proximity to foraging habitat.
lynx foraging habitat	Habitat that supports primary prey (snowshoe hare) and/or important alternate prey (especially red squirrels) that are available to lynx. The highest quality snowshoe hare habitats are those that support a high density of young trees or shrubs (greater than 4,500 stems or branches per acre from studies done in the Northern Rocky Mountain Geographic Area, but estimated at 1,000 to 2,000 stems per acre in the lodgepole pine and spruce/fir forests in the Southern Rocky Mountain Geographic Area), tall enough to protrude above the snow. These conditions may occur in early successional stands following some type of disturbance, or in older forests with a substantial understory of shrubs and young conifer trees. Coarse woody debris, especially in early successional stages (created by harvest regeneration units and large fires), provides important cover for snowshoe hares and other prey. Red squirrel densities tend to be highest in mature cone-bearing forests with substantial quantities of coarse woody debris.

lynx habitat connectivity (landscape)	Cover (vegetation) in sufficient quantity and arrangement to allow for the movement of lynx. Narrow forested mountain ridges or shrub-steppe plateaus may provide a linkage between more extensive areas of lynx habitat. Wooded riparian communities may provide travel cover across otherwise open valley floors between mountain ranges; lower elevation ponderosa pine or pinyon-juniper woodlands may link high-elevation spruce/fir forests.
lynx habitat currently in unsuitable condition	Areas within identified/mapped lynx habitat that are in early successional stages as a result of recent fires or vegetation management, in which the vegetation has not developed sufficiently to support snowshoe hare populations during all seasons. Management-created openings would likely include clearcuts and seed tree harvest units and might include shelterwood and commercially-thinned stands depending on unit size and remaining stand composition and structure.
lynx habitat matrix	Matrix is defined as the most extensive and most connected landscape element type present, which plays the dominant role in landscape functioning. A landscape surrounding a patch. For lynx, this is an area that is predominantly lynx habitat but because of natural fragmentation also includes stringers or isolated patches of vegetation such as aspen, riparian areas, sagebrush, grasslands, or alpine. These stringers or patches may have value to lynx for alternate prey species or travelways. Activities in these areas could have effects on adjacent lynx habitat.
lynx unsuitable habitat areas	Areas such as lakes, low-elevation ponderosa pine forest, and alpine tundra that do not support snowshoe hare populations and are not considered to be capable of providing lynx habitat. See also <i>lynx habitat currently in unsuitable condition</i> .
lynx key linkage areas	Critical areas for lynx habitat. Usually, the factors that place connectivity at risk are highways or private land developments. Special management emphasis is recommended to maintain or increase the permeability of key linkage areas.
maintenance	The act of keeping fixed assets in acceptable condition. It includes preventive maintenance normal repairs, replacement of parts and structural components, and other activities needed to preserve a fixed asset so that it continues to provide acceptable service and achieves its expected life. Maintenance excludes activities aimed at expanding the capacity of an asset or otherwise upgrading it to serve needs different from or significantly greater than those originally intended. Maintenance includes work needed to meet laws, regulations, codes, and other legal direction as long as the original intent or purpose of the fixed asset is not changed. The upkeep of the entire forest development transportation facility including surface and shoulders, parking and side areas, structures, and such traffic-control devices as are necessary for its safe and efficient utilization.
maintenance level	Defines the level of service provided by, and maintenance required for, a specific road, consistent with road management objectives and maintenance criteria. Operational is the current status. Objective is what is intended for the future.
maintenance level 1	Assigned to intermittent service roads during the time they are closed to vehicular traffic. The closure period must exceed 1 year. Basic custodial maintenance is performed to keep damage to adjacent resource to an acceptable level and to perpetuate the road to facilitate future management activities. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level. Appropriate traffic management strategies are "prohibit" and "eliminate". Roads receiving level 1 maintenance may be of any type, class, or construction standard and may be managed at any other maintenance level during the time they are open for traffic. However, while being maintained at level 1, they are closed to vehicular traffic but may be open and suitable for non-motorized uses.

maintenance level 2	Assigned to roads open for use by high clearance vehicles. Passenger car traffic is not a consideration, 4x4 traffic is often recommended. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or other specialized uses. Log haul may occur at this level. Appropriate traffic management strategies are either (1) discourage or prohibit passenger cars or (2) accept or discourage high-clearance vehicles.
maintenance level 3	Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities. Roads in this maintenance level are typically low speed, single lane with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed material. Appropriate traffic management strategies are either "encourage" or "accept." "Discourage" or "prohibit" strategies may be for certain classes of vehicles or users.
maintenance level 4	Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and aggregate surfaced. However, some roads may be single lane. Some roads may be paved and/or dust-abated. The most appropriate traffic management strategy is "encourage." However, the "prohibit" strategy may apply to specific classes of vehicles or users at certain times.
maintenance level 5	Assigned to roads that provide a high degree of user comfort and convenience. Normally, roads are double-lane, paved facilities. Some may be aggregate surfaced and dust-abated. The appropriate traffic management strategy is "encourage."
management indicator community	Management indicator communities are important habitats that are selected to predict the likely effects of management actions that are identifiable, measurable, and predictable and can be related to habitat of associated species.
management indicator species	Includes the following endangered and threatened species identified on state and federal lists for the planning area: species with special habitat needs that may be influenced significantly by planned management programs; species commonly hunted, fished or trapped; and additional species selected because their population changes are believed to indicate effects of management activities on other species of a major biological community or on water quality.
map scale	The ratio of the distance on a map to the distance on the earth. It is typically expressed as a fraction (such as 1:24,000; this means that 1 unit on the map equals 24,000 units on the ground).
mature forest	Generally used in an economic sense to indicate that a forest has attained harvest age.
mechanized vehicle	Any contrivance that provides mechanical assistance and has moving parts for the purpose of transporting one or more people across land or water and that is powered by a living or non-living power source. Examples include wagons, bicycles, rollerblades, and paddle-wheeled watercraft. Not included are wheel chairs when used as a necessary medical appliance. Also not included are skis, snowshoes, rafts, canoes, sleds, travois, or similar devices without moving parts.
motor vehicle	Any vehicle that is self propelled, other than a vehicle operated on rails; and any wheelchair or mobility device including one that is battery-powered, that is designed solely for use by a mobility-impaired person for locomotion and that is suitable for use in an indoor pedestrian area.
National Environmental Policy Act (NEPA)	An act declaring a national policy to encourage productive harmony between people and their environment, to promote efforts that will prevent or eliminate damage to the environment and the biosphere and simulate the health and welfare of people, to enrich the understanding of the ecological systems and natural resources important to the nation, and to establish a Council on Environmental Quality.

National Forest Management Act (NFMA)	A law passed in 1976 amending the Forest and Rangeland Renewable Resources Planning Act; NFMA requires the preparation of regional and forest plans and the preparation of regulations to guide that development.
National Forest System (NFS) lands	Federal lands designated by executive order or statute as national forests, national grasslands, or purchase units, or other lands under the administration of the U.S. Forest Service.
National Forest System road	A forest road other than a road which has been authorized by a legally documented right-of-way held by a state, county, or other local public road authority.
National Forest System trail	A forest trail other than a trail which has been authorized by legally documented right-of-way held by a state, county or other local public road authority.
National Recreation Trails	Trails designated by the Secretary of the Interior or the Secretary of Agriculture as part of the national system of trails authorized by Section 4 of the National Trails System Act in or reasonably accessible to urban areas.
National Register of Historic Places (NHRP)	A list of heritage resources that have local, state, or national significance maintained by the Secretary of the Interior.
National Wild and Scenic River System	Rivers with outstanding scenic, recreational, geological, fish and wildlife, historic, cultural, or other similar values designated by Congress under the Wild and Scenic Rivers Act for preservation of their free-flowing condition. See also <i>wild, scenic, and recreational rivers</i> .
National Wilderness Preservation System	All lands covered by the Wilderness Act and subsequent wilderness designations, irrespective of the department or agency having jurisdiction.
natural appearing landscapes	Whether naturally evolved, or culturally established, the landscape appears natural.
natural regeneration	The establishment of a plant or a plant age class from natural seeding, sprouting, suckering, or layering.
new road construction	Activity that results in the addition of forest or temporary road miles.
No-action alternative	An alternative that maintains established trends or management direction.
non-forested area	Lands never having or incapable of having 10 percent or more of the area occupied by forest trees, or lands previously having such cover and currently developed for non-forest use.
non-motorized activities	Activities that do not incorporate the use of a motor, engine or other non-living power source. Excluded by this classification would be such machines as aircraft, hovercraft, motorboats, automobiles, motor bikes, snowmobiles, bulldozers, chainsaws, rock drills and generators.
non-system road or trail	See <i>unauthorized road or trail</i> .
notice of intent	Formal notification that an environmental impact statement will be prepared and considered. The notice briefly describes the proposed action and possible alternatives, the agency's scoping process, and the address and name of the agency to contact regarding questions about the proposed action and the environmental impact statement.
noxious weed	An alien plant that aggressively invades or is detrimental to native plant communities. The direct or indirect effect of the presence of this plant is detrimental to environmentally sound management of natural ecosystems.

obliteration	The act of eliminating the functional characteristics of a travelway and the reestablishment of natural resource production capability. The intent is to make the corridor unusable as a road or a trail and stabilize it against soil loss.
off-highway vehicle (OHV)	As defined by Colorado Revised Statute 33-14.5-101: "any self-propelled vehicle which is designed to travel on wheels or tracks in contact with the ground, which is designed primarily for use off of the public highways, and which is generally and commonly used to transport persons for recreational purposes. <i>Off-highway vehicle</i> does not include the following: (a) vehicles designed and used primarily for travel on, over or in the water; (b) snowmobiles; (c) military vehicles; (d) golf carts; (e) vehicles designed and used to carry disabled persons; (f) vehicles designed and used specifically for agricultural, logging or mining purposes."
open road density	See <i>road density</i> .
outfitter/guide	A special-use permittee who provides all commercial outfitting operations involving services for accommodating guests, transporting persons, and providing equipment, supplies, and materials. The permittee also provides guiding activities wherein the guide furnishes personal services or serves as a leader or teacher.
over-snow vehicle	A vehicle that is designed for use over snow and that runs on a track or tracks and /or a ski or skis, while in use over snow. The vehicle is primarily designed for over-snow use, not retrofitted for over-snow use.
paleontological area	A unit of land that contains fossils of plants and animals, shellfish, early vertebrates, coal swamp forests, early reptiles, dinosaurs, and other prehistoric plants and animals.
particulates	Small particles suspended in the air and generally considered pollutants.
patented mining claim	A parcel of land originally claimed under the Mining Law of 1872 for which title has now passed from the federal government to the mining claimant. A patented mining claim is private land.
permit	A special-use authorization that provides permission, without conveying an interest in land, to occupy and use National Forest System lands or facilities for specific purposes, and which is both revocable and terminable.
persons at one time (PAOT)	A recreational capacity measurement term indicating the number of people who can use a facility or area at one time.
planning area	The area of the National Forest System, including national grasslands, covered by a regional or forest plan.
planning criteria	Standards, tests, rules, and guidelines by which the planning process is conducted and upon which judgments and decisions are based.
planning records	Documents and files that contain detailed information and decisions made in developing the forest plan. Available at the forest supervisor's office.
plant association	The distinctive combination of trees, shrubs, grasses, and herbs occurring in a theoretical terminal or climax community or series of communities.
plant community	A grouping of plants that have reached dynamic equilibrium with the local environmental conditions and is equivalent to climax. On site, there is no evidence of replacement by other dominant plant species and there is no evidence of serious disturbances.
prescribed burning	Controlled application of fire to wildland fuels in either their natural or modified state, under specified environmental conditions, that allows the fire to be confined to a predetermined area and, at the same time, to produce the fireline intensity and rate of spread required to attain planned resource management objectives. Also called <i>management-ignited</i> .
prescribed fire	A fire burning within prescription, resulting from planned or unplanned ignition.

primitive	See <i>recreation opportunity spectrum</i> .
private road	A road under private ownership authorized by easement to a private party, or a road that provides access pursuant to a reserved or private right.
proposed action	In terms of the National Environmental Policy Act, the project, activity, or action that a federal agency intends to implement or undertake and that is the subject of an environmental analysis.
proposed species	Any species of fish, wildlife, or plant that is proposed by the U.S. Fish and Wildlife Service or the National Oceanographic and Atmospheric Administration (NOAA) to be listed as threatened or endangered.
public	The people of an area, state, or nation that can be grouped together by a commonality of interests, values, beliefs, or lifestyles.
public access	Usually refers to a road or trail route over which a public agency has secured a right-of-way for public use.
public involvement	A Forest Service process designed to broaden the information base upon which agency decisions are made by (1) informing the public about Forest Service activities, plans and decisions; and (2) encouraging public understanding about participation in the planning processes that lead to final decision-making.
public issue	A subject or question of widespread public interest identified through public participation relating to management of National Forest System lands.
public-private ventures	Opportunities for private, profit-oriented businesses to invest in the development of campgrounds and other appropriate facilities on National Forest System lands.
range	Land supporting indigenous vegetation that is grazed or that has the potential to be grazed and that is managed as a natural ecosystem.
range allotment	A designated area of land available for livestock grazing upon which a specified number and kind of livestock may be grazed under a range allotment management plan. It is the basic land unit used to facilitate management of the range resource on National Forest System lands and other associated lands administered by the Forest Service.
rangeland	Lands on which the native vegetation is predominately grasses, grass-like plants, forbs, or shrubs suitable for grazing or browsing usage. Includes lands revegetated naturally or artificially to provide a forage cover that is managed like native vegetation.
ranger district	Administrative subdivision of a national forest supervised by a district ranger who reports to a forest supervisor.
reclamation	Returning disturbed lands to a form and productivity that will be ecologically balanced, often in conformity with a predetermined reclamation plan.
reconstruction	Construction activities performed on an existing facility. Reconstruction includes those activities that alter the facility from its originally constructed or subsequently reconstructed condition.
recontouring	Obliteration of a road or trail by means of decompaction, reestablishment of sub-surface flow, debris and rock placements, treatments to gullies and to their connectivity to stream systems, vegetation plantings, seeding, mulching, reestablishing original contours or removal of drainage structures.
record of decision (ROD)	A document separate from but associated with an environmental impact statement that publicly and officially discloses the responsible official's decision on the proposed action.
recreation carrying capacity	The level of recreation use beyond which impacts exceed social or biological levels specified by evaluative standards.

recreation information management (RIM)	The Forest Service system for recording recreation facility condition and use. Technically refers to a database system that has been replaced by one called INFRASTRUCTURE.
recreation opportunity	Availability of a real choice for a user to participate in a preferred activity within a preferred setting in order to realize desired experiences.
recreation opportunity spectrum (ROS)	A framework for stratifying and defining classes of outdoor recreation environments, activities, and experience opportunities. The settings, activities, and opportunities for obtaining experiences are arranged along a continuum or spectrum divided into seven classes: primitive, semi-primitive non-motorized, semi-primitive motorized, roaded natural, roaded modified, rural and urban.
primitive	Area that is characterized by an essentially unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other users is minimal. The area is managed to be essentially free of evidence of human-induced restrictions and controls. Motorized use within the area is not permitted.
semi-primitive non-motorized	Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but would be subtle. Motorized recreation is not permitted but local roads used for other resource management activities may be present on a limited basis. Use of such roads is restricted to minimize impacts on recreational experience opportunities.
semi-primitive motorized	Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Concentration of users is low but often there is evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present but would be subtle. Motorized use of local primitive or collector roads with predominantly natural surfaces and trails suitable for motor bikes is permitted.
roaded natural	Area is characterized by predominantly natural-appearing environments with moderate evidence of the sights and sounds of people. Such evidence usually harmonizes with the natural environment. Interaction between users may be moderate to high, with evidence of other users prevalent. Resource modification and utilization practices are evident but harmonize with the natural environment. Conventional motorized use is allowed and incorporated into construction standards and design of facilities.
roaded modified	Area is characterized by substantially modified environments except for campsites. Roads, landings, slash and debris may be strongly dominant from within yet remain subordinate from distant sensitive roads and highways. Interaction between users and evidence of others may be moderate on roads but there is little evidence of others or interaction at camp sites. The area is managed in such a way that few on-site controls may be present except for gated roads. Conventional motorized use is allowed and incorporated into construction standards and design of facilities.
rural	Area is characterized by a natural environment that has been substantially modified by development of structures, vegetative manipulation or pastoral agriculture development. Resource modification and utilization practices may be used to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities often are provided for special activities. Moderate user densities are present away from developed sites. Facilities for intensified motorized use and parking are available.

urban	Area is characterized by a substantially urbanized environment, although the background may have natural-appearing elements. Renewable resource modification and utilization practices are often used to enhance specific recreational activities. Vegetation cover often is exotic and manicured. Sights and sounds of humans are predominant on the site. Large number of users can be expected both on the site and in nearby areas. Facilities for highly intensified motor use and parking are available with forms of mass transit often available to carry people throughout the site.
recreation residence	Cabins on National Forest System land that normally were established in tracts and built for recreation purposes with agency approval and supervision. These cabins are authorized by special-use permit and are not the primary residences of the owners.
recreation visitor day (RVD)	Twelve visit hours, which may be aggregated continuously, intermittently, or simultaneously by one or more persons. Recreation visitor days are used to measure recreational production or output capacity.
reconstruction (road)	Activity that results in improvement or realignment of an existing forest road as defined as: road improvement—activity that results in an increase of an existing road's traffic service level, expands its capacity, or changes its original design function; road realignment—activity that results in a new location of an existing road or portions of an existing road and treatment of the old roadway.
reforestation	The reestablishment of forest cover either naturally (by natural seeding, coppice, or root suckers) or artificially (by direct seeding or planting). Reforestation usually maintains the same forest type and is done promptly after the previous stand or forest was removed (synonymous with <i>regeneration</i> ).
Region 2	See <i>Rocky Mountain Region</i> .
rehabilitation	Actions taken to restore or reclaim site productivity, water quality or other values.
research natural area (RNA)	Formally designated tracts of land where natural processes are allowed to continue and where natural features are preserved for education and research. These conditions are ordinarily achieved by allowing natural physical and biological processes to prevail without human intervention. However, under unusual circumstances, deliberate manipulation may be used to maintain the unique feature that the RNA was established to protect.
responsible official	The Forest Service employee who has the delegated authority to make a specific decision.
restoration	Holistic actions taken to modify an ecosystem to achieve desired, healthy, and functioning conditions and processes. Generally refers to the process of enabling the system to resume its resiliency to disturbance.
revegetation	The reestablishment and development of plant cover. This may take place naturally through the reproductive processes of the existing flora or artificially through the direct action of reforestation or reseeding.
right-of-way	Land authorized to be used or occupied for the construction, operation, maintenance and termination of a project or facility passing over, upon, under or through such land.
riparian	Refers to land bordering a stream, lake or tidewater, and generally implying a particular type of habitat physiognomy often characterized by an overstory of trees or other large woody plants with a complex understory of other woody and/or herbaceous species.

riparian area	Ecological units with distinctive vegetation, landform, and soil and water regimes consisting of the aquatic ecosystem and wet-to-moist areas located between aquatic ecosystems and adjacent terrestrial ecosystems. They include floodplains and wetlands. Riparian ecosystems are distinguished by soil characteristics and distinctive existing or potential vegetation communities that are adapted to soils with consistently high levels of moisture.
riparian community	Repeating, classified, defined and recognizable assemblages of plant or animal communities associated with riparian areas.
riparian ecosystem	A transition between the aquatic ecosystem and the adjacent upland terrestrial ecosystem. It is identified by soil characteristics and by distinctive vegetation communities that require free or unbounded water.
road	A motor vehicle route over 50 inches wide, unless identified and managed as a trail.
roadless area	An area in a national forest or national grassland that (1) is larger than 5,000 acres or, if smaller, contiguous to a designated wilderness or primitive area, or lies east of the 100th Meridian and therefore under the jurisdiction of the Eastern Wilderness Act; and (2) contains no roads; and (3) has been inventoried by the Forest Service for possible inclusion in the Wilderness Preservation System.
roaded modified	See <i>recreation opportunity spectrum</i> .
roaded natural	See <i>recreation opportunity spectrum</i> .
Rocky Mountain Region	The Forest Service organizational unit consisting of Colorado, Wyoming, and parts of South Dakota, Nebraska and Kansas. Also known as Region 2.
route	A road or trail that is signed and managed as a unique entity. Management can change along its length but it is singularly identified. This term is also used in GIS to denote a linear feature composed of one or more arcs or parts of arcs.
salable minerals	Salable minerals include common varieties of sand, stone, gravel, pumice, pumicite, cinders and clay. In general, these minerals are widespread and relatively low in value. They are generally used for construction materials and for road-building purposes.
scoping process	An early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to the proposed action. Scoping requires examining a proposed action and its possible effects; establishing the depth of environmental analysis needed; and determining analysis procedures, data needed, and task assignments. During the scoping period, the public is encouraged to participate and submit comments on proposed projects.
scenic integrity	A measure of the degree to which landscape is visually perceived to be complete. It can describe an existing situation (ESI) or desired future condition (SIO).
Scenery Management System (SMS)	A systematic approach, founded on an ecological aesthetic, for assessing visual resources in a project area and then using the assessment findings to help make management decisions on a project.
scenic byway	The National Scenic Byways program is part of the U.S. Department of Transportation, Federal Highways Administration which establishes, recognizes, and preserves selected roads throughout the United States. These roads are located in scenic or historic country.
sediment	Material that is suspended in water or air, or the deposition of such material onto the surface underlying such water or air.

sensitive species	Those plant and animal species identified by regional foresters for which population viability is a concern, as evidenced by: (a) significant current or predicted downward trends in population numbers or density, or (b) significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution. (For a list of Region 2 sensitive species that are known or thought to occur on the White River National Forest, see appendix E of the revised forest plan).
silviculture	The art and science of controlling the establishment, growth, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis.
silviculture system	A planned series of treatments for tending, harvesting, and re-establishing a stand.
site	The classification of land based on its climate, physiographic (physical geography), edaphic (soil), and biotic factors that determine its suitability and productivity for particular species and silvicultural alternatives.
size class	Tree size recognized by distinct ranges, usually of diameter or height.
ski area	A site and attendant facilities expressly developed to accommodate alpine or Nordic skiing and from which the preponderance of revenue is generated by the sale of lift tickets and fees for ski rental, skiing instruction and trail passes, or for the use of permittee-maintained ski trails. A ski area also may include ancillary facilities directly related to the operation and support of skiing activities. Operation of Nordic and alpine ski areas for up to 40 years and encompassing such acreage as the forest officer determines sufficient and appropriate is authorized by the National Ski Area Permit Act of 1986.
snowshoe hare habitat	See <i>lynx foraging habitat</i> under <i>lynx habitat</i> .
snowmobile	A motor vehicle that is designed exclusively for use over snow, with a seat that is straddled, and that runs on a track or tracks and/or a ski or skis.
social analysis	An analysis of the social (as distinct from the economic and environmental) effects of a given plan or proposal for action. Social analysis includes identification and evaluation of all pertinent desirable and undesirable consequences to all segments of society, stated in some comparable quantitative terms, such as persons or percent of population in each affected social segment. It also includes a subjective analysis of social factors not expressible in quantitative terms.
soil compaction	A physical change in soil properties that results in a decrease in porosity and an increase in soil-bulk density and strength.
soil erosion	The detachment and movement of soil from the land surface by water or wind.
soil productivity	The inherent capacity of a soil to support the growth of specified plants, plant communities or a sequence of plant communities. Soil productivity may be expressed in terms of volume or weight per unit area per year, percent plant cover, or other measures of biomass accumulation.
special-use permit	See <i>permit</i> .
species	A singular or plural term for a population or series of populations of organisms that are capable of interbreeding freely with each other but not with members of other species. <i>endemic</i> : A species originating in, or belonging to, a particular region. <i>exotic</i> : A species introduced accidentally or intentionally to a region beyond its natural range. <i>subspecies</i> : A subdivision of a species. A population or series of populations occupying a discrete range and differing genetically from other subspecies of the same species.

species diversity	A measurement that relates the density of individuals of a species in a habitat to the number of different species present in the habitat. The number of different kinds of species in a given habitat.
special interest area	Areas managed with emphasis on protecting or enhancing unusual characteristics. These areas are managed to maintain their special interest values.
standard	In Region 2, a standard is defined as a mandatory requirement. Mandatory adherence to standards is the most important feature distinguishing standards from desired condition statements.
structural stages	Any of several developmental stages of tree stands described in terms of tree age and the extent of canopy closure they create. They include:
structural stage 1	<b>Grass/forb.</b> Forest openings created by disturbances, such as fire or windthrow. Meadows and prairies are also modeled as grass/forb although succession will not move beyond this stage.
structural stage 2	<b>Shrubs/seedlings.</b> Developmental stage dominated by tree seedlings (less than one-inch DBH) and shrub species.
structural stage 3	<b>Sapling/pole.</b> Developmental stage dominated by young trees one to seven inches diameter breast height, 10 to 50 feet tall and usually less than 50 years old. This stage is subdivided into three canopy closure classes: (a) less than 40 percent; (b) 40 to 70 percent; and (c) greater than 70 percent.
structural stage 4	<b>Mature.</b> Consists of trees larger and older than stage 3. Also classified by the same canopy closure categories as stage 3.
structural stage 5	<b>Old growth.</b> This structural stage is characterized by trees at least 200 years old for spruce-fir or Douglas-fir; 150 years old for lodgepole pine; or 100 years old for aspen.
succession	The progress of vegetational development whereby an area becomes successively occupied by different plant communities.
suitable forest lands	Land to be managed for timber production on a regulated basis.
sustainability	A concept that reflects the capacity of a dynamic ecosystem to maintain its composition, function, and structure over time thus maintaining the productivity of the land and a diversity of plants and animals.
temporary road	A road authorized by contract, permit, lease, other written authorization, or emergency operation that may be associated with a timber sale contract, fire activity, or other short-term access need, and not intended to be part of the forest development transportation system and not necessary for future resource management. When intended use is ended, these roads are treated to eliminate motor vehicle traffic and permit the reestablishment of vegetation to minimize erosion with intent to return to a natural state.
thermal cover	Cover used by animals to ameliorate the effects of weather. Optimally, thermal cover is provided by a stand of coniferous trees, 30 to 60 acres in size, at least 40 feet tall, with a canopy cover of at least 70 percent.
threatened species	Any species likely to become endangered within the foreseeable future throughout all or a significant portion of its range and that has been designated in the <i>Federal Register</i> by the Secretary of the Interior as such.
tiering	The elimination of repetitive discussions of the same issue by incorporating by reference the general discussion in an environmental impact statement of broader scope (e.g., a project environmental assessment could be tiered to the forest plan EIS).
timber	A general term applied to tree stands that provide a wood-fiber product.
timber base	The lands within a national forest suitable for timber production.

timber production	The purposeful growing, tending, harvesting and regeneration of regulated crops of trees to be cut into logs, bolts or other round sections for industrial or consumer use, except fuelwood.
traditional	The beliefs, acts, practices, objects, or sites for the perpetuation of an Indian culture originating from or historically located at a specific area. This may include traditional cultural practices that are so interrelated with spiritual activities that they cannot be separated from the land location.
trail	A route 50 inches or less in width or a route over 50 inches wide that is identified and managed as a trail.
trailhead	The parking area, signage, or other facilities available at the beginning of a trail.
trail vehicle	Vehicles designed for trail use, such as bicycles, snowmobiles, trail motorcycles, and all-terrain vehicles (ATVs).
travel management	The integrated planning of and provision for appropriate movement of people and products to and through National Forest System lands.
travel management strategy	A designation of acceptable modes, methods and time periods for travel over a road, trail, or area.
travel order	A travel management decision issued by the Regional Forester or Forest Supervisor to restrict, prohibit or allow the use of a described area or transportation facility over which the Forest Service has jurisdiction.
travelway	A way for passage of vehicles, conveyances, persons or domestic livestock (stock driveways), developed by construction or use; may be referred to as a road or a trail.
treaty	A legally binding agreement between two or more sovereign governments. With respect to American Indian tribes, a treaty is a document negotiated and concluded by a representative of the president of the U.S. and ratified by two-thirds majority vote of the U.S. Senate.
tribe	Term used to designate a federally recognized group of American Indians and their governing body. Tribes may comprise more than one band.
unauthorized roads or trails	Roads or trails on National Forest System lands that are not managed as part of the forest transportation system, such as unplanned roads, abandoned travelways, and off-road vehicle tracks that have not been designated and managed as a road or trail; and those roads that were once under permit or other authorization and were not decommissioned upon the termination of the authorization. Synonyms: <i>non-system road, non-system trail, user-created and way.</i>
understory	The lowest layer of vegetation in a forest or shrub community composed of grass, forbs, shrubs and trees less than 10 feet tall. Vegetation growing under the tree canopy.
undesirable species	(1) Species that conflict with or do not contribute to the management objectives; (2) species that are not readily eaten by animals.

unsuitable forest land (not suited)	Forest land not managed for timber production because: (a) Congress, the Secretary, or the Chief has withdrawn it; (b) it is not producing or capable of producing crops of industrial wood; (c) technology is not available to prevent irreversible damage to soil productivity, or watershed conditions; (d) there is no reasonable assurance based on existing technology and knowledge, that it is possible to restock lands within 5 years after final harvest, as reflected in current research and experience; (e) there is, at present, a lack of adequate information about responses to timber management activities; or (f) timber management is inconsistent with or not cost-efficient in meeting the management requirements and multiple-use objectives specified in the forest plan.
urban	See <i>recreation opportunity spectrum</i> .
utility corridor	A linear strip of land defined for the present or future location of transportation or utility facilities within its boundaries
vegetation management	Any activities undertaken to modify the existing condition of the vegetation.
viable population	A group of individuals of a particular species that produces enough offspring for long-term persistence and adaptation of the species or population in a given place.
viewshed	Total visible area from a single observer's position or the total visible area from multiple observer positions. Viewsheds are accumulated seen areas from highways, trails, campgrounds, towns, cities, or other view locations. Examples are corridors, feature or basin viewsheds.
water influence zone	The land next to water bodies where vegetation plays a major role in sustaining long-term integrity of aquatic systems. It includes the geomorphic floodplain, riparian ecosystem, and inner gorge. Its minimum horizontal width (from top of each bank) is 100 feet or the mean height of mature dominant late-seral vegetation, whichever is most.
watershed	An area of land that collects and discharges water into a single main stream through a series of smaller tributaries. The area of land, bounded by a divide, that drains water, sediment and dissolved materials to a common outlet at some point along a stream channel, or to a lake, reservoir or other body of water. Also called drainage basin or catchment.
watershed level	Divides watersheds into a series of progressively smaller nested levels, with the first level being the largest land area relative to higher-numbered levels in that watershed. Each level is identified systematically by a hydrologic unit code number, or HUC. A first-level watershed can be divided into a number of second level watersheds; each second-level watershed may be further subdivided into third-level watersheds; and so forth.
water yield	(1) The measured output of surface water, usually measured in acre-feet; (2) the runoff from a watershed, including groundwater outflow.
way	See <i>unauthorized road or trail</i> .
wild, scenic and recreational rivers	Rivers or sections of rivers designated by congressional actions under the 1968 Wild and Scenic Rivers Act as wild, scenic, or recreational by an act of the legislature of the state or states through which they flow. See also <i>National Wild and Scenic Rivers System</i> . Rivers may be classified and administered under one or more of the following categories:
wild river	River or section of river that is free of impoundments with watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.
scenic river	River or section of river that is free of impoundments, with watersheds still largely undeveloped, but accessible in places by roads.

recreational river	River or section of river that is readily accessible by road or railroad that may have some development along its shoreline and that may have undergone some impoundment or diversion in the past.
wilderness	An area of undeveloped federal land that Congress designated as wilderness and that retains its primeval character and influence, without permanent improvements or human habitation, and that is protected and managed to preserve its natural conditions. An area that: (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; 3) comprises at least 5,000 acres of land or is of sufficient size to make practicable its preservation and use in an unimpaired condition; and 4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.
wildfire	Any wildland fire not designated and managed as a prescribed fire within an approved prescription. All wildfires will be given an appropriate suppression action.
wildlife	Collectively, non-domesticated vertebrate animals, except fishes. The natural community of animals and plants.

## APPENDIX B: RELEVANT FEDERAL AND STATE STATUTES AND OTHER REGULATIONS

All statutes, regulations, laws, executive orders, Forest Service directives, and the forest plan—current or future—are also hereby incorporated into the travel management plan. The following list includes statutes, regulations, laws, executive orders, and agreements relative to the travel management plan. The travel management plan will be modified if necessary to incorporate any new or revised statutes, regulations, laws, executive orders, or Forest Service directives. The travel management plan will also be modified if necessary to reflect any changes to the forest plan.

### Statutes

American Indian Religious Freedom	<i>Act of August 11, 1978</i>
Americans with Disabilities Act	<i>Act of 1990</i>
Anderson-Mansfield Reforestation and Revegetation	<i>Act of October 11, 1949</i>
Antiquities Act	<i>Act of June 8, 1906</i>
Archaeological Resources Protection Act, as amended 1988	<i>Act of October 31, 1979</i>
Architectural Barriers Act	<i>Act of 1968</i>
Bankhead-Jones Farm Tenant Act	<i>Act of July 22, 1937</i>
Clarke-McNary Act	<i>Act of June 7, 1924</i>
Clean Air Act Amendments of 1977 and 1990	<i>Act of August 7, 1977</i>
Clean Water Acts (1948-87)	
Clean Water Amendments ("Federal Water Pollution Control Act Amendments of 1972")	
Color of Title	<i>Act of December 22, 1928</i>
Common Varieties of Mineral Materials	<i>Act of July 31, 1947</i>
Cooperative Forestry Assistance Act	<i>Act of July 1, 1978</i>
Disaster Relief Act	<i>Act of May 22, 1974</i>
Eastern Wilderness Act	<i>Act of January 3, 1975</i>
Economy Act	<i>Act of June 30, 1932</i>
Emergency Flood Prevention (Agricultural Credit Act)	<i>Act of August 4, 1978</i>
Endangered Species Act	<i>Act of December 28, 1973</i>
Energy Security Act	<i>Act of June 30, 1980</i>
Federal Advisory Committee Act	<i>Act of October 6, 1972</i>
Federal Cave Resources Protection Act	<i>Act of November 18, 1988</i>
Federal Coal Leasing Amendments Act	<i>Act of August 4, 1976</i>
Federal Insecticide, Rodenticide, and Fungicide Act	<i>Act of October 21, 1972</i>
Federal Land Policy and Management Act	<i>Act of October 21, 1976</i>
Federal Noxious Weed Act	<i>Act of January 3, 1975</i>
Federal Power Act	<i>Act of June 10, 1920</i>
Federal-State Cooperation for Soil Conservation	<i>Act of December 22, 1944</i>
Federal Water Pollution Control Act, as amended (Water Quality Act of 1965, Clean Water Restoration Act of 1966)	<i>Act of July 9, 1956</i>
Federal Water Project Recreation Act	<i>Act of July 9, 1965</i>
Fish and Wildlife Conservation	<i>Act of September 15, 1960</i>
Fish and Wildlife Coordination Act	<i>Act of March 10, 1934</i>
Forest and Rangeland Renewable Resources Planning Act	<i>Act of August 17, 1974</i>
Forest Highways	<i>Act of August 27, 1958</i>
Freedom of Information Act	<i>Act of November 21, 1974</i>
Geothermal Steam Act	<i>Act of December 24, 1970</i>
Granger-Thye Act	<i>Act of April 24, 1950</i>
Historic Preservation Act	<i>Act of October 15, 1966</i>

Joint Surveys of Watershed Areas Act	<i>Act of September 5, 1962</i>
Knutson-Vandenberg Act	<i>Act of June 9, 1930</i>
Land Acquisition	<i>Act of March 3, 1925</i>
Land Acquisition-Declaration of Taking	<i>Act of February 26, 1931</i>
Land Acquisition-Title Adjustment	<i>Act of July 8, 1943</i>
Land and Water Conservation Fund Act	<i>Act of September 3, 1964</i>
Law Enforcement Authority	<i>Act of March 3, 1905</i>
Leases Around Reservoirs	<i>Act of March 3, 1962</i>
Mineral Leasing Act	<i>Act of February 25, 1920</i>
Mineral Leasing Act for Acquired Lands	<i>Act of August 7, 1947</i>
Mineral Resources on Weeks Law Lands	<i>Act of March 4, 1917</i>
Mineral Springs Leasing	<i>Act of February 28, 1899</i>
Mining and Minerals Policy Act of 1970	<i>Act of December 31, 1970</i>
Mining Claims Rights Restoration Act	<i>Act of August 11, 1955</i>
Multiple Use and Sustained Yield Act	<i>Act of June 12, 1960</i>
National Environmental Policy Act	<i>Act of January 1, 1970</i>
National Forest Management Act	<i>Act of October 22, 1976</i>
National Forest Roads and Trails Act	<i>Act of October 13, 1964</i>
National Historic Preservation Act	<i>Act of October 15, 1966</i>
National Historic Preservation Act Amendments of 1980 and 1992	<i>Act of December 12, 1980</i>
National Trails System Act	<i>Act of October 2, 1968</i>
Occupancy Permits	<i>Act of March 4, 1915</i>
Organic Administration Act	<i>Act of June 4, 1897</i>
Petrified Wood	<i>Act of September 28, 1962</i>
Pipelines	<i>Act of February 25, 1920</i>
Preservation of American Antiquities	<i>Act of June 8, 1906</i>
Preservation of Historical and Archaeological Data	<i>Act of May 24, 1974</i>
Public Land Surveys	<i>Act of March 3, 1899</i>
Public Rangelands Improvement Act	<i>Act of October 25, 1978</i>
Rehabilitation Act of 1973, as amended	<i>Act of 1973</i>
Renewable Resources Extension Act	<i>Act of June 30, 1978</i>
Research Grants	<i>Act of September 6, 1958</i>
Right of Eminent Domain	<i>Act of August 1, 1888</i>
Rural Development Act	<i>Act of August 30, 1972</i>
Safe Drinking Water Amendments	<i>Act of November 16, 1977</i>
Sikes Act	<i>Act of October 18, 1974</i>
Small Tracts Act	<i>Act of January 22, 1983</i>
Smokey Bear Act	<i>Act of May 23, 1952</i>
Soil and Water Resources Conservation Act	<i>Act of November 18, 1977</i>
Solid Waste Disposal (Resource Conservation & Recovery Act)	<i>Act of October 21, 1976</i>
Supplemental National Forest Reforestation Fund	<i>Act of September 18, 1972</i>
Surface Mining Control And Reclamation Act	<i>Act of August 3, 1977</i>
Sustained Yield Forest Management	<i>Act of March 29, 1944</i>
Timber Export	<i>Act of March 4, 1917</i>
Timber Exportation	<i>Act of April 12, 1926</i>
Title Adjustment	<i>Act of April 28, 1930</i>
Toxic Substances Control Act	<i>Act of October 11, 1976</i>
Transfer Act	<i>Act of February 1, 1905</i>
Twenty-Five Percent Fund	<i>Act of May 23, 1908</i>
Uniform Federal Accessibility Standards U.S. Criminal Code (Title 18 USC Chapter 91 – Public Lands)	<i>Act of June 25, 1948</i>
U.S. Mining Laws (Public Domain Lands)	<i>Act of May 10, 1872</i>
Volunteers in the National Forests Act	<i>Act of May 18, 1972</i>
Water Quality Improvement Act	<i>Act of April 3, 1965</i>
Water Resources Planning Act	<i>Act of July 22, 1965</i>
Watershed Protection and Flood Prevention Act	<i>Act of August 4, 1954</i>
Weeks Act	<i>Act of March 1, 1911</i>
Weeks Act Status for Certain Lands	<i>Act of September 2, 1958</i>
Wild and Scenic Rivers Act	<i>Act of October 2, 1968</i>
Wild Horse Protection	<i>Act of September 8, 1959</i>
Wild Horses and Burros Protection Act	<i>Act of December 15, 1971</i>
Wilderness Act	<i>Act of September 3, 1964</i>

Wildlife Game Refuges  
Wood Residue Utilization Act  
Woodsy Owl/Smokey Bear Act  
Youth Conservation Corps

Act of August 11, 1916  
Act of December 19, 1980  
Act of June 22, 1974  
Act of August 13, 1970

## Regulations

36 CFR 60	National Register of Historic Places
36 CFR 212	Forest Development Transportation System
36 CFR 213	Administration Under Bank-Jones Act
36 CFR 219	Planning
36 CFR 221	Timber Management Planning
36 CFR 222	Range Management
36 CFR 223	Sale and Disposal of National Forest System Timber
36 CFR 228	Minerals
36 CFR 241	Fish and Wildlife
36 CFR 251	Land Uses
36 CFR 254	Landownership Adjustments
36 CFR 261	Prohibitions
36 CFR 291	Occupancy and Use of Developed Sites and Areas of Concentrated Public Use
36 CFR 292	National Recreation Areas
36 CFR 293 s	Wilderness Primitive Area
36 CFR 294	Special Areas
36 CFR 296	Protection of Archaeological Resources
36 CFR 297	Wild and Scenic Rivers
36 CFR 800	Advisory Council on Historic Preservation
40 CFR 1500–1508	Council on Environmental Quality
National Electrical Code	
National Fire Code	
Uniform Building Code	
Uniform Mechanical Code	
Uniform Plumbing Code	

## Executive Orders

EO 11593	Protection and Enhancement of Cultural Environment
EO 11988	Floodplain Management
EO 11644/11989	Use of Off-Road Vehicles
EO 11990	Protection of Wetlands
EO 12113	Independent Water Project Review
EO 12898	Environmental Justice
EO 13007	Indian Sacred Sites

## State and Local Laws

Colorado Air Quality Control Act

## Forest Service Directives

*Forest Service Manual* (FSM) contains legal authorities, goals, objectives, policies, responsibilities, instructions, and guidance needed on a continuing basis by Forest Service line officers and primary staff, in more than one unit, to plan and execute assigned programs and activities.

*Forest Service Handbooks* (FSH) are directives that provide instructions and guidance on how to proceed with a specialized phase of a program or activity. Handbooks are either based on a part of the FSM or they incorporate external directives.

## **Agreements**

### *Memorandum of Understanding*

Federal Highway Administration (FHWA) and Forest Service

Forest Service Roads subject to the Highway Safety Act–1976, 1982

State of Colorado and Forest Service, National Park Service, and Bureau of Land Management

Travel Management Signs for Public Lands in Colorado–September 30, 2002

### *Colorado Senate Bill 94-217 (1994)*

Requires state Air Pollution Control Division to periodically evaluate federal actions and their impacts to visibility and other air-quality-related values in Class I areas.

### *Federal Multi-Agency Source Water Agreement*

Thirteen federal agencies, including the Forest Service, agreed to assist states and local entities, within the mission and resources of the agency, to complete local source water assessments and protection activities.

## APPENDIX C: LITERATURE CITED AND OTHER REFERENCES

- Aiken, S.G., M.J. Dallwitz, L.L. Consaul, C.L. McJannet, L.J. Gillespie, R.L. Boles, G.W. Argus, J.M. Gillett, P.J. Scott, R. Elven, M.C. LeBlanc, A.K. Brysting and H. Solstad. 2003. Flora of the Canadian Arctic Archipelago: descriptions, illustrations, identification, and information retrieval. Version: 29 April 2003. <http://www.mun.ca/biology/delta/arcticf/htm> [Accessed 13 January 2005].
- American Association of State Highway and Transportation Officials [AASHTO]. 1991. A guide for transportation landscape and environmental design. Washington D.C.: AASHTO Highway Subcommittee on Design Task Force for Environmental Design.
- Andrews, R. and Rieghter, R. 1992. Colorado birds. Denver, CO: Denver Museum of Natural History. 442pp.
- Anon. 1999. The environmental impacts of recreation: a bibliography. Unpublished report.: Biodiversity Legal Foundation. 221pp.
- Barrett, N. and M. Overly. 1992. Species of concern field guide for the Routt National Forest and White River National Forest. Unpublished report. Steamboat Springs: U.S. Department of Agriculture, Forest Service, Rocky Mountain Region. 216pp.
- Beatty, B.L., W.F. Jennings, and R.C. Rawlinson. 2004 (January 30). *Machaeranthera coloradoensis* (Gray) Osterhout (Colorado tansyaster): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. <http://www.fs.fed.us/r2/projects/scp/assessments/machaerantheracoloradoensis.pdf> [Accessed 13 January 2005].
- Beecham, J.J. Jr., C.P. Collins, and T.D. Reynolds. (2007, February 12). Rocky Mountain Bighorn Sheep (*Ovis canadensis*): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: <http://www.fs.fed.us/r2/projects/scp/assessments/rockymountainbighornsheep.pdf> [Accessed 10 June 2008]
- Bestgen, K.R., and D.L. Propst. 1989. Distribution, status, and notes on the ecology of *Gila robusta* (Cyprinidae) in the Gila River Drainage, New Mexico. The Southwestern Naturalist 34:402–412.
- Bezzlerides, N., and K.R. Bestgen. 2000. Status review of roundtail chub *Gila robusta*, flannelmouth sucker *Catostomus latipinnis*, and bluehead sucker *Catostomus discobolus* in the Colorado River Basin. Draft report, August 2000. Larval fish lab contribution #118. Fort Collins, CO: Colorado State University Larval Fish Laboratory.
- Buys and Associates. 2008. Air Quality Technical Support Document for the Hell's Gulch and Hightower Mountain Natural Gas Development Projects And Cumulative Analysis. Revised February 2008. Copy of document available at the White River National Forest Supervisor's Office.
- Carothers, P., J.J. Vaske, and M.P. Donnelly. 2001. Social values versus interpersonal conflict among hikers and mountain bikers. Leisure Sciences 23(1): 47–61.
- CDPHE. 2007a. Colorado State Implementation Plan for Regional Haze, Technical Support Document for Mandatory Class I Federal Area: Eagles Nest Wilderness Area. Colorado Department of Health and Environment, Air Pollution Control Division, Denver, CO.
- CDPHE. 2007c. Colorado – Eagles Nest Wilderness, Flat Tops Wilderness, Maroon Bells-Snowmass Wilderness, and West Elk Wilderness: Class I Areas' Reasonable Progress Profile Analysis, White River IMPROVE monitoring site. October 25, 2007 Draft. Colorado Department of Health and Environment, Air Pollution Control Division, Denver, CO.
- CDPHE. 2007c. Colorado State Implementation Plan for Regional Haze, Technical Support Document for Mandatory Class I Federal Area: Maroon Bells-Snowmass Wilderness Area. Colorado Department of Health and Environment, Air Pollution Control Division, Denver, CO.
- CDPHE. 2008a. Status of Water Quality in Colorado – 2008. Prepared by the Water Quality Control Division, Colorado Public Health and Environment, Denver, CO.
- CDPHE. 2008b. SECTION 303(d) LIST WATER-QUALITY-LIMITED SEGMENTS REQUIRING TMDLS. Water Quality Control Commission, Denver, CO.

- CDPHE. 2008c. Colorado Visibility and Regional Haze State Implementation Plan for the Twelve Mandatory Class I Federal Areas in Colorado: Revised Regional Haze Plan – BART Revisions, Air Quality Control Commissions, approved 12/19/2008, Colorado Department of Health and Environment, Air Pollution Control Division, Denver, CO.
- CDPHE. 2009. Garfield County Emissions Inventory. Colorado Department of Health and Environment, Air Pollution Control Division, Denver, CO.
- CDPHE. 2010a. Classification and Numeric Standards for Upper Colorado River Basin and North Platte River (Planning Region 12), Regulation No. 33. Water Quality Control Commission, Denver, CO. Amended February 8, 2010, Effective June 30, 2010.
- CDPHE. 2010b. Classification and Numeric Standards for Lower Colorado River Basin, Regulation No. 37. Water Quality Control Commission, Denver, CO. Amended February 8, 2010, Effective June 30, 2010.
- Center for Plant Conservation. 2005. National collection of endangered plants. <http://www.centerforplantconservation.org> [Accessed 31 January 2005].
- Chenoweth, R. What is forest beauty worth?. 1991. Forum for Applied Research and Public Policy 6(3).
- Coles, J.J. 2002. Region 2 Sensitive Species Evaluation [Online]. USDA Forest Service, Rocky Mountain Region. <http://www.fs.fed.us/r2/projects/scp/evalrationale/evaluations/dicots/astragalusleptaleusone.pdf> [Accessed 3 March 2004].
- Colorado Department of Demography [CDOD]. 2004. Population and Growth. <http://dola.colorado.gov/demog/demog.cfm>.
- Colorado Division of Parks and Outdoor Recreation [CDPOR]. 2003. Colorado statewide comprehensive outdoor recreation plan (SCORP). Denver, CO: Colorado Division of Parks and Outdoor Recreation: Pages 26, 27, 41, 45.
- Colorado Division of Parks and Outdoor Recreation [CDPOR]. 2008. Colorado statewide comprehensive outdoor recreation plan (SCORP). Denver, CO: Colorado Division of Parks and Outdoor Recreation: Section 2-page 3, Section 3-pages 70, 71.
- Colorado Division of Wildlife [CDOW]. 1984. The bats of Colorado: shadows in the night. Denver, CO: Colorado Division of Wildlife. 23pp.
- Colorado Division of Wildlife[CDOW]. 1995. Grand Mesa elk data analysis unit plan. Unpublished document. Denver, CO: Colorado Division of Wildlife. 50pp.
- Colorado Division of Wildlife[CDOW]. 1999. E-13 Williams Fork elk data analysis unit plan. Unpublished document. Denver, CO: Colorado Division of Wildlife. 46pp.
- Colorado Division of Wildlife[CDOW]. 2001. Greater sage-grouse conservation plan, Middle Park, CO. Unpublished report prepared by the Middle Park Sage Grouse Committee. Grand Junction, CO: Colorado Division of Wildlife. 67 pp.
- Colorado Division of Wildlife[CDOW]. 2002. Draft White River elk herd data analysis unit plans for DAU E6, E13, E15 and E16. Unpublished draft documents. Denver, CO: Colorado Division of Wildlife.
- Colorado Division of Wildlife[CDOW]. 2004. Greater sage-grouse conservation plan, northern Eagle County and southern Routt County. Unpublished report prepared by the Northern Eagle/Southern Routt Working Group. Grand Junction, CO: Colorado Division of Wildlife. 70 pp.
- Colorado Natural Heritage Program [CNHP]. 1999. Conservation status handbook: Colorado's animals, plants, and plant communities of special concern. Volume 3, Number 2. Fort Collins, CO: Colorado State University, Colorado Natural Heritage Program. 259 pp.
- Colorado Natural Heritage Program. 2003. Data base reports and GIS data for BLM/USFS sensitive species. Fort Collins, CO: Colorado Natural Heritage Program. 1 CD-ROM, dated November 2003.
- Copeland, J.P. 1996. Biology of the wolverine in central Idaho. M.S. Thesis. [CITY]: University of Idaho. 138pp.
- Cordell, H.K., principal investigator. 1999. Outdoor recreation in American life: a national assessment of demand and supply trends. [http://www.srs.fs.usda.gov/pubs/rpc/1999-03/rpc\\_99mar\\_08](http://www.srs.fs.usda.gov/pubs/rpc/1999-03/rpc_99mar_08).
- Cordell, H.K., ed. 2004. Recreation statistics updates. Athens, GA: U.S. Department of Agriculture, Forest Service, Southern Research Station. 11 pp.

- Cordell, H.K., and J.C. Bergstrom. 1989. Theory and techniques for assessing the demand and supply of outdoor recreation in the United States. Athens, GA: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station. 33 pp.
- Cordell, H.K., and J.C. Bergstrom. 1993. Theory and techniques for assessing the demand and supply of outdoor recreation in the United States. Fort Collins, CO: Rocky Mountain Experiment Station. p 25.
- Cordell, H.K., J.C. Bergstrom, L.A. Hartmann, [and others]. 1990. An analysis of the outdoor recreation and wilderness situation in the United States: 1989–2040. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Experiment Station. 113pp.
- Cordell, H.K., J. Teasley, G. Super, [and others]. 1997. Outdoor recreation in the United States: results from the national survey on recreation and the environment, Rocky Mountain Region. Athens, GA: U.S. Department of Agriculture, Forest Service, Southern Research Station. 88 pp.
- Doak, R.L. 2004. Analysis for forest recreation niche. Glenwood Springs, CO: U.S. Department of Agriculture, Forest Service. 1pp.
- Dunkle, S.W. 2000. Dragonflies through binoculars. New York: Oxford University Press. 266 pp.
- Eagle River Watershed Council (ERWC). 2009. Black Gore Traction Sand. Online article – <http://www.eagleriverwatershedcouncil.org/pages/blackgore.html>.
- Eisenhauer, B.W., R.S. Krannich, and D.J. Blahna. 2000. Attachments to special places on public lands: an analysis of activities, reason for attachments, and community connections. *Society and Natural Resources* 13: 421–441.
- Ellison, L.E., M.B. Wunder, C.A. Jones, C. Mosch, K.W. Navo, K. Peckham, J.E. Burghardt, J. Annear, R. West, J. Siemers, R.A. Adams, and E. Brekke. 2003. Colorado bat conservation plan. Colorado Committee of the Western Bat Working Group. <http://www.wbwg.org/colorado/colorado.htm>.
- Ferris, C. and F. Brown, eds. 1981. Butterflies of the Rocky Mountain states. Norman, OK: University of Oklahoma Press.
- Fitzgerald, J.P., C.A. Meaney, and D.M. Armstrong. 1994. Mammals of Colorado. Denver, CO: Denver Museum of Natural History and University Press of Colorado. 467pp.
- Forbes, B., J. Ebersole, and B. Strandberg. 2001. Anthropogenic disturbance and patch dynamics in circumpolar arctic ecosystems. *Conservation Biology* 15(4): 954–969.
- Freddy, D. J., W.M. Bronaugh, and M.C. Fowler. 1986. Response of mule deer to disturbance by persons afoot and snowmobiles. *Wildlife Society Bulletin* 14:63–68.
- Gindele, S. 2002. Region 2 sensitive species evaluation [online]. USDA Forest Service, Rocky Mountain Region. <http://www.fs.fed.us/r2/projects/scp/evalrationale/evaluations/dicots/astragaluswetherillii.pdf> [Accessed 3 March 2004].
- Graefe, A.R., and B. Thapa. 2004. Conflict in natural resource recreation. In: Manfredo, M.J., J.J. Vaske, B.L. Bruyere, D.R. Field, and P. Brown, eds. *Society and natural resources: a summary of knowledge*. Jefferson, MO: Taylor and Francis: 209–224.
- Gucinski, H., M.J. Furniss, R.R. Ziemer, and M.H. Brookes. 2002. Forest roads: a synthesis of scientific information. Unpublished report. Washington, DC: U.S. Department of Agriculture, Forest Service.
- Handley, J., B. Heidel and S. Laursen. 2002. Region 2 sensitive species evaluation [online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Region. <http://www.fs.fed.us/r2/projects/scp/evalrationale/evaluations/monocots/carexdiandratwo.pdf> [Accessed 3 March 2004].
- Hartman, R. and B. Nelson. 2001. A checklist of the vascular plants of Colorado. Laramie, WY: Rocky Mountain Herbarium. <http://www.rmh.uwyo.edu/colorado/index.html> [Accessed 17 February 2005].
- Hazen and Sawyer. 2001. Analysis of the economic contribution of off-highway vehicle use in Colorado. Draft report. Denver: Colorado Off-Highway Coalition. 25 pp.
- Healy, Brian. 2007. Straight Creek Fish and Macroinvertebrate Monitoring Report. White River National Forest, Holy Cross Ranger Station, Minturn, Colorado. Available from the Holy Cross Ranger Station.
- Healy, Brian. 2008. Black Gore Creek TMDL Aquatic Habitat and Macroinvertebrate Monitoring (2004 – 2007). White River National Forest, Holy Cross Ranger Station, Minturn, Colorado. Available from the Holy Cross Ranger Station.

- Heidel B., and S. Laursen 2002a (February 19). Region 2 sensitive species evaluation [online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Region. <http://www.fs.fed.us/r2/projects/scp/evalrationale/evaluations/dicots/cypripediumparviflorumfour.pdf> [Accessed 3 March 2004].
- Heidel B., and S. Laursen 2002b (June 4). Region 2 sensitive species evaluation [online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Region. <http://www.fs.fed.us/r2/projects/scp/evalrationale/evaluations/dicots/parnassiakotzebuei.pdf> [Accessed 3 March 2004].
- Hillis, J.M., M.J. Thompson, J.E. Canfield, L.J. Lyon, C.L. Marcum, P.M. Dolan, and D.W. McCleerey. 1991. Defining elk security: the Hillis paradigm. In: proceedings of a symposium on elk vulnerability. Bozeman, MT: Montana State University.
- Hoover, R.L. and D.L. Wills, eds. 1984. Managing forested lands for wildlife. Denver, CO: Colorado Division of Wildlife. 459pp.
- Hu, J.M., M.F. Wojciechowski, and M. Sanderson. 1991. Website for the largest genus of vascular plants. Davis, CA: University of California. [http://ginger.ucdavis.edu/astragalus/images/Astragalus\\_images/Aleptaleus.htm](http://ginger.ucdavis.edu/astragalus/images/Astragalus_images/Aleptaleus.htm) [Accessed 13 January 2005].
- Hu, J.M., M.F. Wojciechowski, and M. Sanderson. 1999. Website for the largest genus of vascular plants. Davis, CA: University of California. [http://ginger.ucdavis.edu/astragalus/images/Astragalus\\_images/Aleptaleus.htm](http://ginger.ucdavis.edu/astragalus/images/Astragalus_images/Aleptaleus.htm) [Accessed 13 January 2005].
- Hurley, M.A., and G.A. Sargeant. 1990. Effects of hunting and land management on elk habitat use, movement patterns, and mortality in western Montana. In: proceedings of a symposium on elk vulnerability. Bozeman, MT: Montana State University.
- Jacob, G.R., and R. Schreyer. 1980. Conflict in outdoor recreation: a theoretical perspective. Journal of Leisure Research 12: 368–380.
- Johnson, Robert B., DeGraff Jerome V. 1988. Principals of Engineering Geology. John Wiley & Sons publishing. 497pp.
- Johnston, B. 2000a (December 15). Habitat relationships and management direction report for sun-loving meadowrue *Thalictrum heliophilum* Wilken and DeMott (vascular plants: Thalictraceae) on the White River National Forest, Colorado. Glenwood Springs: U.S. Department of Agriculture, Forest Service, Rocky Mountain Region.
- Johnston, B. 2000b (December 18). Habitat relationships and management direction report for sea pink *Armeria scabra* Pallas ssp. *sibirica* (Turczaninov ex Boissier) Hylander (vascular plants: Limoniaceae) on the White River National Forest, Colorado. Glenwood Springs: U.S. Department of Agriculture, Forest Service, Rocky Mountain Region.
- Johnston, B. 2001a (January 15). Habitat relationships and management direction report for Altai cottongrass *Eriophorum altaicum* Meinshausen var. *neogaeum* Raymond (vascular plants: Cyperaceae) on the White River National Forest, Colorado. Glenwood Springs: U.S. Department of Agriculture, Forest Service, Rocky Mountain Region.
- Johnston, B. 2001b (January 15). Habitat relationships and management direction report for Kotzebue grass-of-Parnassus *Parnassia kotzebuei* Chamisso and Schlechtendal (vascular plants: Parnassiaceae) on the White River National Forest, Colorado. Glenwood Springs: U.S. Department of Agriculture, Forest Service, Rocky Mountain Region.
- Johnston, B. 2001c (January 15). Habitat relationships and management direction report for Porter feathergrass *Ptilagrostis porteri* (Rydberg) W. A. Weber (vascular plants: Poaceae) on the White River National Forest, Colorado. Glenwood Springs: U.S. Department of Agriculture, Forest Service, Rocky Mountain Region.
- Johnston, B. 2001d (January 17). Habitat relationships and management direction report for De Beque phacelia *Phacelia submutica* J.T. Howell (vascular plants: Hydrophyllaceae) on the White River National Forest, Colorado. Glenwood Springs: U.S. Department of Agriculture, Forest Service, Rocky Mountain Region.
- Johnston, B. 2001e (January 23). Habitat relationships and management direction report for Harrington beardtongue *Penstemon harringtonii* Penland (vascular plants: Scrophulariaceae) on the White River National Forest, Colorado. Glenwood Springs: U.S. Department of Agriculture, Forest Service, Rocky Mountain Region.

- Johnston, B. 2001f (January 23). Habitat relationships and management direction report for tundra buttercup *Ranunculus gelidus* Karlin and Kirilow ssp. *grayi* (Britton) Hultén (vascular plants: Ranunculaceae) on the White River National Forest, Colorado. Glenwood Springs: U.S. Department of Agriculture, Forest Service, Rocky Mountain Region.
- Johnston, B. 2001g (January 24). Habitat relationships and management direction report for Colorado tansy-aster *Machaeranthera coloradoensis* (Gray) Osterhout (vascular plants: Asteraceae) on the White River National Forest, Colorado. Glenwood Springs: U.S. Department of Agriculture, Forest Service, Rocky Mountain Region.
- Johnston, B. 2002. Region 2 sensitive species evaluation [Online]. U. S. Department of Agriculture, Forest Service, Rocky Mountain Region.  
<http://www.fs.fed.us/r2/projects/scp/evalrationale/evaluations/dicots/ranunculuskarelinii.pdf>  
 [Accessed 3 March 2004].
- Joslin, G., and H. Youmans, coordinators. 1999. Effects of recreation on Rocky Mountain wildlife: a review for Montana. Missoula: The Wildlife Society, Montana Chapter, Committee on Effects of Recreation on Wildlife. 307pp.
- Keinath, D., B. Heidel, and G.P. Beauvais. 2003. Wyoming plant and animal species of concern. Laramie, WY: University of Wyoming, Wyoming Natural Diversity Database.
- Kingery, H. E. 1998. Colorado breeding bird atlas. Denver, CO: Colorado Bird Atlas Partnership. 636pp.
- Knight, R.L., and K.J. Gutzwiller. 1995. Wildlife and recreation. Washington, D.C.: Island Press. 372pp.
- Kocis, S.M., B.K. English, S.J. Zarnoch, [and others]. 2003. National visitor use monitoring results, USDA Forest Service Region 2, White River National Forest. 21 pp.  
[http://www.fs.fed.us/recreation/programs/nvum/reports/year3/R2\\_F15\\_white\\_river\\_final.doc](http://www.fs.fed.us/recreation/programs/nvum/reports/year3/R2_F15_white_river_final.doc)  
 [Accessed 11 April 2005].
- Ladyman, J.A.R. 2004a (July 14). *Draba exunguiculata* (O.E. Schulz) C.L. Hitchcock (Garys Peak draba): a technical conservation assessment. U.S. Department of Agriculture, Forest Service, Rocky Mountain Region. <http://www.fs.fed.us/r2/projects/scp/assessments/drabaexunguiculata.pdf> [Accessed 26 October 2004].
- Ladyman, J.A.R. 2004b (July 28). *Draba grayana* (Rydb.) C.L. Hitchcock (Gray's draba): a technical conservation assessment. U.S. Department of Agriculture, Forest Service, Rocky Mountain Region. <http://www.fs.fed.us/r2/projects/scp/assessments/drabagrayana.pdf> [Accessed 26 October 2004].
- Ladyman, J.A.R. 2004c (October 29). *Eriophorum altaicum* Meinshausen var. *neogaeum* Raymond (whitebristle cottongrass): a technical conservation assessment. U.S. Department of Agriculture, Forest Service, Rocky Mountain Region.  
<http://www.fs.fed.us/r2/projects/scp/assessments/eriphorumaltaicumvarneogaeum.pdf> [Accessed 29 October 2004].
- Leptich, D.J., and P. Zager 1990. Road access management effects on elk mortality and population dynamics. In: proceedings of a symposium on elk vulnerability. Bozeman, MT: Montana State University.
- Louis Berger Group, Inc.(July 2009) Economic contribution of off-highway vehicle use in Colorado. Lakewood, CO. Denver: Colorado Off-Highway Coalition. 25 pp.
- Lyon, L.J. 1979. Habitat effectiveness for elk as influenced by roads and cover. Ogden, UT: U.S. Department of Agriculture, Forest Service. Intermountain Forest and Range Experiment Station.
- Lyon, L.J. 1983. Road density models describing habitat effectiveness for elk. Journal of Forestry 81(9): 592–595.
- Lyon, L.J. 1985a. Some observations about road models and their application to elk habitat management. Presented at 1985 Missoula wildlife biologist workshop. Unpublished report. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Forest Sciences Lab..
- McCool, S.F., and D.N. Cole. 2001. Thinking and acting regionally: toward better decisions about appropriate conditions, standards, and restrictions on recreation use. The George Wright FORUM 18(3): 85–98.
- McDonald P.M., and R.B Litton, Jr. 1998. Combining silviculture and landscape architecture to enhance the roadside view. Research paper PSW-RP-235. Albany,CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station.

- McKee, J. 2002a (September 24). Region 2 sensitive species evaluation [online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Region.  
<http://www.fs.fed.us/r2/projects/scp/evalrationale/evaluations/monocots/cypripediumparviflorumthreepdf> [Accessed 3 March 2004].
- McKee, J. 2002a (September 24). Region 2 sensitive species evaluation [online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Region.  
<http://www.fs.fed.us/r2/projects/scp/evalrationale/evaluations/monocots/cypripediumparviflorumone.pdf> [Accessed 3 March 2005].
- McKee, J. 2002b (October 1). Region 2 sensitive species evaluation [online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Region.  
<http://www.fs.fed.us/r2/projects/scp/evalrationale/evaluations/dicots/thalictrumheliophilum.pdf> [Accessed 3 March 2004].
- Melcher, C.P., and J.E. Gross. 2001. COVERS: Software application user's guide. Version 3. Denver, CO: Colorado Division of Wildlife. 51pp.
- Morse, C., 2001. Region 2 sensitive species evaluation [online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Region.  
<http://www.fs.fed.us/r2/projects/scp/evalrationale/evaluations/monocots/cypripediumparviflorumone.pdf>. [Accessed 3 March 2004].
- Moseley, R., 1991. A field investigation of park milkvetch (*Astragalus leptaleus*) in Idaho. Boise, ID: Idaho Department of Fish and Game, Nongame and Endangered Wildlife Program, Conservation Data Center. 18 pp.
- NatureServe. 2005. NatureServe explorer: an online encyclopedia of life [web application]. Version 4.2. Arlington, VA: NatureServe. <http://www.natureserve.org/explorer> [Accessed 31 January 2005].
- Needham, J.G., M.J. Westfall, Jr., and M.L. May. 2002. Dragonflies of North America, revised edition. Gainesville, FL: Scientific Publishers. 939 pp.
- Nickens, P.R. 1992. Archeological sites protection and preservation notebook. Vicksburg, MS: U.S. Army, Corp of Engineers, Waterways Experiment Station.
- Ode, D. 2001. Region 2 sensitive species evaluation [online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Region.  
<http://www.fs.fed.us/r2/projects/scp/evalrationale/evaluations/monocots/eriophorumgracileone.pdf> [Accessed 3 March 2004].
- Olliff, T., K. Legg, and B. Kaeding, editors. 1999. Effects of winter recreation on wildlife of the Greater Yellowstone Area: a literature review and assessment. Yellowstone National Park, WY: Greater Yellowstone Coordinating Committee. 315 pp.  
<http://www.nps.gov/yell/publications/pdfs/wildlifewinter/>.
- Page, L.M., and B.M. Burr. 1991. A field guide to freshwater fishes, North America North of Mexico. Boston: Houghton Mifflin Company. 432 pp.
- Panjabi, S.S. and D.G. Anderson. 2004 (August 31). *Cirsium perplexans* (Rydb.) Petrak (Rocky Mountain thistle): a technical conservation assessment. U.S. Department of Agriculture, Forest Service, Rocky Mountain Region.  
<http://www.fs.fed.us/r2/projects/scp/assessments/cirsiumperplexans.pdf> [Accessed 26 October 2004].
- Parker, K.L., C.T. Robbins, and T.A. Hanley. 1984. Energy Expenditures for Locomotion by Mule Deer and Elk. *Journal of Wildlife Management* 48(2):474-488.
- Perry, C., and R. Overly. 1977. Impact of roads on big game distribution in portions of the Blue Mountains of Oregon and Washington. Olympia, WA: Washington Game Department, Environmental Management Division. Applied Research Station, Bulletin No. 11, April 1977.
- Pickering, CM, W. Hill, D. Newsome, Y. Leung. 2010. Comparing hiking, mountain biking and horse riding impacts on vegetation and soils in Australia and the United States of America. *Journal of Environmental Management* 91 (2010) 551-562.
- Rocky Mountain Recreation Initiative [RMRI]. 2002. Off-road vehicles in Colorado: facts, trends, recommendations. [City unknown]: Nederland. 39pp.
- Rogers, W.P., and J.W. Rold. 1972. Engineering geologic factors of the Marble area, Gunnison County, Colorado. Denver: State of Colorado, Department of Natural Resources, Colorado Geological Survey.

- Ruediger, B., J. Claar, S. Gniadek, B. Holt, L. Lewis, S. Mighton, B. Naney, G. Patton, T. Rinaldi, J. Trick, A. Vandehey, F. Wahl, N. Warren, D. Wenger, and A. Williamson. 2000. Canada Lynx conservation assessment and strategy. FS pub. R1-00-53. Missoula, MT: U.S. Department of Agriculture, Forest Service; U.S. Department of the Interior, Fish and Wildlife Service, Bureau of Land Management, and National Park Service. 142 pp.
- Ruediger, W.C., K. Wall, R. Wall. 2006. Effects of highways on elk (*Cervus elaphus*) habitat in the Western United States and proposed mitigation approaches. IN: Proceedings of the 2005 International Conference on Ecology and Transportation, Eds. Irwin CL, Garrett P, McDermott KP. Center for Transportation and the Environment, North Carolina State University, Raleigh, NC: pp. 269-278.
- Schmidt, C.A. 2003. Conservation assessment for the fringed myotis bat in the Black Hills National Forest South Dakota and Wyoming. Unpublished report. Custer, SD: U.S. Department of Agriculture, Forest Service.
- Schneider, I.E. 2000. Responses to conflict in urban-proximate areas. *Journal of Park and Recreation Administration* 18(2): 37–53.
- Schneider, I.E., and W.E. Hammitt. 1995. Visitor response to on-site recreation conflict. *Journal of Applied Recreation Research* 20 (4): 249–268.
- Schuster, R. 2000. Coping with stressful situations and hassles during outdoor recreation experiences in wilderness environments. Unpublished doctoral dissertation. Clemson, SC: Clemson University.
- Scott, J.A. 1986. *The butterflies of North America: a natural history and field guide*. Stanford, CA: Stanford University Press. 583pp.
- Siemers, J. 2002. A survey of Colorado's caves for bats. Unpublished report. Fort Collins: Colorado Natural Heritage Program. 19pp.
- Sigler, W.F. and J.W. Sigler. 1996. *Fishes of Utah*. Salt Lake City: University of Utah Press. 375pp.
- Simpson, J.C., and R.L. Wallace. 1982. *Fishes of Idaho*. Moscow, ID: University of Idaho Press.
- Sovell, J. 2000. Personal communication. Colorado Natural Heritage Program.
- Spackman, S., B. Jennings, J. Coles, C. Dawson, M. Minton, A. Kratz, C. Spurrier, C. Johnson, and M. Barry. 1999. *Colorado rare plant field guide*. Fort Collins, CO: Colorado State University, Colorado Rare Plant Technical Committee.
- Steinauer, R. 2002. Region 2 sensitive species evaluation [online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Region. <http://www.fs.fed.us/r2/projects/scp/evalrationale/evaluations/monocots/carexdiandraone.pdf> [Accessed 3 March 2004].
- Swarthout, E.C.H., and R.J. Steidel. 2002. Experimental effects of hiking on breeding Mexican spotted owls. *Conservation Biology* 17(1): 307–315.
- Thomas, J.W., and D.E. Toweill. 1982. *Elk of North America: ecology and management*. Harrisburg, PA: Stackpole Books. 698pp.
- Thomas, J.W., et al. 1979. *Wildlife Habitats in managed forests: the Blue Mountains of Oregon and Washington*. Agriculture Handbook 553. Washington, DC: U.S. Department of Agriculture, Forest Service. 512pp.
- Thurston, R.C., W.A. Reiners, and K.L. Driese. 1995. Riparian and non-forested land cover digitizing report: challenge cost-share agreement between White River National Forest and University of Wyoming. Agreement #FSF-11021500-93-000404-01. Laramie, WY: University of Wyoming, Department of Botany. [Copy available at Supervisor's Office, White River National Forest, Glenwood Springs, CO.]
- Toth, M.I., A.B. Wilson, T.M. Cookro, V. Bankey, and J.E. Case. 1993. Mineral resource potential and geology of the White River National Forest and the Dillon Ranger District of the Arapaho National Forest, Colorado. U.S. Geological Survey Bulletin 2035. Denver, CO: U.S. Geological Survey. 117pp.
- Unsworth, J.W., and L. Kuck 1990. Bull elk vulnerability in the Clearwater drainage of north-central Idaho. In: proceedings of a symposium on elk vulnerability. Bozeman, MT: Montana State University.
- U.S. Department of Agriculture [USDA], Forest Service. 1973. *National forest landscape management*. Agriculture Handbook 434, vol.1. Washington, DC: U.S. Department of Agriculture, Forest Service.
- U.S. Department of Agriculture [USDA], Forest Service. 1977. *National forest landscape management*. Agriculture Handbook 483, vol.2, ch. 4 (roads). Washington, DC: Department of Agriculture, Forest Service.

- U.S. Department of Agriculture [USDA], Forest Service. 1984. Recreation inventory and monitoring report. Glenwood Springs, CO: U.S. Department of Agriculture, Forest Service.
- U.S. Department of Agriculture [USDA], Forest Service. 1986. ROS Book. Washington D.C.: U.S. Department of Agriculture, Forest Service. 275 pp.
- U.S. Department of Agriculture [USDA], Forest Service. 1987. National forest landscape management, vol.2, ch. 8 (recreation). Agriculture Handbook 666. Washington, DC: U.S. Department of Agriculture, Forest Service.
- U.S. Department of Agriculture [USDA], Forest Service, White River National Forest [WRNF]. 1993. Oil and gas leasing final environmental impact statement. Glenwood Springs, CO: U.S. Department of Agriculture, Forest Service, White River National Forest.
- U.S. Department of Agriculture [USDA], Forest Service. 1995a. A desk reference for NEPA air quality analyses. Washington DC.: U.S. Department of Agriculture, Forest Service.
- U.S. Department of Agriculture [USDA], Forest Service. 1995b. Landscape aesthetics: a handbook for scenery management. Agriculture Handbook 701. Washington DC: U.S. Department of Agriculture, Forest Service.
- U.S. Department of Agriculture, Forest Service. 1998. Combining Silviculture and Landscape Architecture to Enhance the Roadside View. Philip M. McDonald and R.Burton Litton, Jr. USDA Forest Service, Pacific Southwest Research Station. Research Paper PSW-RP-235.
- U.S. Department of Agriculture [USDA], Forest Service. 2000a. Forest Service roadless area conservation rule final environmental impact statement, vol. 1. Washington, D.C.: U.S. Department of Agriculture, Forest Service: pages A1–A13.
- U.S. Department of Agriculture [USDA], Forest Service. 2000b. RPA assessment of forest and range lands. FS-687. Washington, DC: U.S. Department of Agriculture, Forest Service. 78pp. <http://www.fs.fed.us/pl/rpa/rpaasses.pdf> [Accessed 11 April 2005].
- U.S. Department of Agriculture [USDA], Forest Service. 2000c. Forest roads: a syntheses of scientific information. Unpublished report. Washington, DC: U.S. Department of Agriculture, Forest Service. 117pp.
- U.S. Department of Agriculture [USDA], Forest Service. 2001 (January 12). 36 CFR Part 294, special areas, roadless area conservation, final rule. *Federal Register* 66(9): 3205–3241.
- U.S. Department of Agriculture [USDA], Forest Service. 2003. Land areas of the National Forest System–September 2003. <http://www.fs.fed.us/land/staff/lar/LAR03> [Accessed 11 April 2005].
- U.S. Department of Agriculture [USDA], Forest Service. 2004b. Consolidated decision for appeals of the White River National Forest revised land and resource management plan. Washington, D.C.: USDA Forest Service. 117p.
- U.S. Department of Agriculture [USDA], Forest Service. 2005. Travel management: designated routes and areas for motor vehicle use—final rule. RIN 0596-AC11. 36 CFR Parts 212, 251, 261, and 295. November 9, 2005. Washington, DC: USDA Forest Service. <http://www.fs.fed.us/recreation/programs/ohv/> [Accessed 30 May 2006]
- U.S. Department of Agriculture [USDA], Forest Service, Intermountain Research Station. 1987. Report of the president’s commission on Americans outdoors: the legacy, the challenge, with case studies. Washington, DC: Island Press.
- U.S. Department of Agriculture [USDA], Forest Service, Rocky Mountain Region. 2004. Colorado recreation strategy. Denver, CO: U.S. Department of Agriculture, Forest Service.
- U.S. Department of Agriculture [USDA], Forest Service, White River National Forest [WRNF]. 1985. White River National Forest and Dillon District, Arapaho National Forest and U.S. Department of the Interior, Bureau of Land Management, Glenwood Springs Resource Area travel map and national forest and public land travel order. October 1. Glenwood Springs, CO: U.S. Department of Agriculture, Forest Service, White River National Forest.
- U.S. Department of Agriculture [USDA], Forest Service, White River National Forest [WRNF]. 1993. Oil and gas leasing final environmental impact statement. Glenwood Springs, CO: U.S. Department of Agriculture, Forest Service, White River National Forest.
- U.S. Department of Agriculture [USDA], Forest Service, White River National Forest [WRNF]. 2002a. White River National Forest, land and resource management plan 2002 Revision. Glenwood Springs CO: USDA Forest Service, White River National Forest. [http://www.fs.fed.us/r2/whiteriver/projects/forest\\_plan/index.shtml](http://www.fs.fed.us/r2/whiteriver/projects/forest_plan/index.shtml) [Accessed October 2010].

- U.S. Department of Agriculture [USDA], Forest Service, White River National Forest [WRNF]. 2002b. White River National Forest, land and resource management plan 2002 revision, final environmental impact statement. Glenwood Springs, CO: U.S. Department of Agriculture, Forest Service, White River National Forest.  
[http://www.fs.fed.us/r2/whiteriver/projects/forest\\_plan/index.shtml](http://www.fs.fed.us/r2/whiteriver/projects/forest_plan/index.shtml) [Accessed October 2010].
- U.S. Department of Agriculture [USDA], Forest Service, White River National Forest [WRNF]. 2003. Forest-wide road analysis report. Unpublished report. Glenwood Springs, CO: U.S. Department of Agriculture, Forest Service, White River National Forest.
- U.S. Department of Agriculture [USDA], Forest Service, White River National Forest [WRNF]. 2005. Rocky Mountain elk, White River National Forest MIS monitoring protocol. Unpublished report. Glenwood Springs, CO: U.S. Department of Agriculture, Forest Service, White River National Forest.
- U.S. Department of Agriculture [USDA], Forest Service, White River National Forest [WRNF]. 2005. White River National Forest, land and resource management plan amendment 01, final environmental analysis and decision notice. Glenwood Springs, CO: U.S. Department of Agriculture, Forest Service, White River National Forest.  
[http://www.fs.fed.us/r2/whiteriver/projects/forest\\_plan/index.shtml](http://www.fs.fed.us/r2/whiteriver/projects/forest_plan/index.shtml) [Accessed October 2010].
- U.S. Department of Agriculture [USDA], Forest Service, White River National Forest [WRNF]. 2005. White River National Forest, land and resource management plan amendment 02, final environmental analysis and decision notice. Glenwood Springs, CO: U.S. Department of Agriculture, Forest Service, White River National Forest.  
[http://www.fs.fed.us/r2/whiteriver/projects/forest\\_plan/index.shtml](http://www.fs.fed.us/r2/whiteriver/projects/forest_plan/index.shtml) [Accessed October 2010]
- U.S. Department of Agriculture [USDA], Forest Service, White River National Forest [WRNF]. 2005. White River National Forest, land and resource management plan amendment 03, final environmental analysis and decision notice. Glenwood Springs, CO: U.S. Department of Agriculture, Forest Service, White River National Forest.  
[http://www.fs.fed.us/r2/whiteriver/projects/forest\\_plan/index.shtml](http://www.fs.fed.us/r2/whiteriver/projects/forest_plan/index.shtml) [Accessed 05 May 2006]
- U.S. Department of Agriculture [USDA], Forest Service, White River National Forest [WRNF]. 2008. Air resource management plan: White River National Forest. Glenwood Springs, CO: U.S. Department of Agriculture, Forest Service, White River National Forest, Supervisor's Office.
- U.S. Department of Agriculture [USDA], Forest Service, and U.S. Department of the Interior [USDI], Bureau of Land Management. 2001. Off-highway vehicle environmental impact statement and proposed plan amendment for Montana, North Dakota and Portions of South Dakota. Missoula, MT: U.S. Department of Agriculture, Forest Service, Northern Region, and U.S. Department of the Interior, Bureau of Land Management, Montana State Office. 252pp.
- U.S. Department of Commerce [USDC], Bureau of Census. 2004. Colorado quick facts.  
<http://quickfacts.census.gov/qfd/states/08000.html> [Accessed 11 April 2005].
- U.S. Department of the Interior [USDI], Bureau of Mines. 1993. Regional mineral appraisal of the Leadville 2 Degree Quadrangle, Colorado. Mineral Land Assessment Open File Report 20-93. Denver, CO: U.S. Department of the Interior, Bureau of Mines.
- U.S. Department of the Interior [USDI], Fish and Wildlife Service [FWS]. 1994. Uncompahgre fritillary butterfly recovery plan. Denver, CO: U.S. Department of the Interior, Fish and Wildlife Service. 20pp.
- U.S. Department of the Interior [USDI], Fish and Wildlife Service [FWS]. 1999. Final programmatic biological opinion for Bureau of Reclamation's operations and depletions, other depletions, and funding and implementation of recovery program actions in the upper Colorado River above the confluence with the Gunnison River. December. <http://www.r6.fws.gov/crrip/>.
- U.S. Department of the Interior [USDI], Fish and Wildlife Service [FWS]. 2002. Biological opinion on the White River National Forest revised land and resource management plan. Unpublished correspondence. Grand Junction, CO: U.S. Department of the Interior, Fish and Wildlife Service. 62pp.
- U.S. Department of Transportation [USDOT], Federal Highway Administration [FHA]. 1994. Conflicts on multiple use trails: synthesis of the literature and state of the practice. 68 pp.
- U.S. Department of Transportation [USDOT], Federal Highway Administration [FHA], and Colorado Department of Transportation [CDOT]. 2004. I-70 mountain corridor draft programmatic environmental impact statement section 4(f) evaluation. Project IM 0703-244. Denver, CO: U.S.

- Department of Transportation, Federal Highway Administration, and Colorado Department of Transportation [CDOT].
- Vaske, J. J., Donnelly, M. P., Wittman, K., and Laidlaw, S. 1995. Interpersonal versus social value conflict. *Leisure Sciences* 22: 205–222.
- Wallis, W., H. Britten, J. Capodice, J. Coles, T. Holland, T. Ireland, and P. A. Opler. 1994. Uncompahgre fritillary butterfly recovery plan. Unpublished report. Denver, CO: U.S. Department of the Interior, Fish and Wildlife Service. 20pp.
- Ward, A.L. 1973. Elk behavior in relation to multiple uses on the Medicine Bow National Forest. Ft. Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station.
- Ward, A.L. 1976. Elk behavior in relation to timber harvest operations and traffic on the Medicine Bow Range in South-central Wyoming. Ft. Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station.
- Ward, A.L., and J.J. Cupal. 1979. Telemetered heart rate of three elk as affected by activity and human disturbance. Ft. Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station.
- Water Erosion Prediction Project (WEPP).2001. Forest Service WEPP interfaces. <http://forest.moscowfs.wsu.edu/fswepp/>. [Accessed 11 April 2005.]
- Weber, W.A., and R.C. Wittmann. 2001. Colorado flora: western slope, third edition. Niwot, CO: Colorado Associated University Press. 488 pp.
- Westerling, A.L., H.G. Hidalgo, D.R. Cayan, T.W. Swetnam. 2006. Warming and earlier spring increase western U.S. Forest wildfire activity. *Science* 313 (2006): 904-943. Accessed through: [http://www.srs.fs.usda.gov/pubs/ja/ja\\_westerling001.pdf](http://www.srs.fs.usda.gov/pubs/ja/ja_westerling001.pdf)
- Wisdom, M. J., H.K. Preisler, N.J. Cimon, B.K. Johnson. [in press]. Effects of off-road recreation on mule deer and elk. Transactions of the North American wildlife and natural resources conference 69. Washington D.C.
- Woodling, J. 1985. Colorado's little fishes, a guide to the minnows and other lesser known fishes in the State of Colorado. Project No. 1-161-R-1. Denver, CO: Colorado Division of Wildlife.

