Pike and San Isabel National Forests

Pikes Peak, South Platte,

and South Park Ranger Districts

Affected Watersheds: Cheesman Lake, Fourmile/Deckers, Goose Creek, Lower Lake George, Lower Trout Creek, Manitou Park, Tappan Mountain, Waterton/Deckers, West Creek, and Wigwam Creek

Roads Analysis Report

Hayman Fire Burn Area

United States Department of Agriculture
Forest Service
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Introduction

Background

The 2002 Hayman Fire, Colorado's largest recorded fire, burned 137,760 acres in four counties: Park, Jefferson, Douglas, and Teller. The fire, which originated June 8 and was controlled July 18, burned 600 structures, including 133 residences. Suppression costs totaled $39.2 million.

A roads analysis is required prior to implementing projects that involve significant road activity or road management. Because the Hayman burn area has required and continues to require extensive maintenance and repair, a roads analysis was deemed necessary to produce a tool for assessing immediate and future roads-related projects within the burn area. To that end, this report documents a landscape-scale analysis of 10 watersheds affected by the Hayman Fire to facilitate spending repair monies on priority road projects that are environmentally and socially appropriate.

Objective

The Hayman Roads Analysis Project was conducted by the Pike and San Isabel National Forests and Cimarron and Comanche National Grasslands (PSICC) from April to September 2003. The objective of this analysis is to provide line officers with information needed to identify and manage a road system that is safe, responsive to public and agency needs, is environmentally sound, and is affordable and efficient to manage. This roads analysis report is not a decision document, nor does it constitute a federal action. It does not prescribe changes in land allocation nor select specific projects for implementation. Rather, this report provides recommendations for an overall transportation management strategy within the watersheds encompassing the burn area that would have minimal ecological effects and bring maintenance needs in balance with available funding. The management opportunities identified through this analysis will complement and integrate previous and ongoing analytical efforts, including the post-fire rehabilitation projects for roads and recreation facilities, NEPA analyses, and all other relevant planning and analysis projects. The roads analysis will also serve to identify potential maintenance and restoration needs for future project consideration within affected watersheds. In addition, this report should contribute to the forest-wide roads analysis.

Scope

The Hayman Roads Analysis Project included a review of approximately 620 miles of road over an area of 457 square miles within the following *sixth-field* (see glossary, Appendix E) watersheds: Cheesman Lake, Fourmile/Deckers, Goose Creek, Lower Lake George, Lower Trout Creek, Manitou Park, Tappan Mountain, Waterton/Deckers, West Creek, and Wigwam Creek. (See Map 1: "Hayman Burn Area Roads Analysis Locator Map.") Because the Hayman Roads Analysis was conducted on a watershed-scale, it encompassed an area larger than the burn area—293,000 acres total. The analysis examined the risks to aquatics, wildlife habitat, noxious weeds infestation, cultural and heritage sites, and soil erosion as well as the value of roads to recreation, social, and economics.

Assumptions

All classified and many unclassified forest roads within the watersheds affected by the Hayman Fire have been analyzed. Most unclassified roads were recommended for obliteration unless a special-use permit is in place or other legal/administrative requirements for keeping the road exist. Intense analysis was limited to roads under Forest Service jurisdiction. Use and cumulative effects of roads under other jurisdictions were considered where those roads ran through the forest or connected forest roads to other main transportation outlets and facilities.

For this project, a ***road*** is defined as a vehicle travel-way greater than 50 inches wide. ***Classified roads*** are roads constructed or maintained for long-term motor vehicle access (including high-clearance 4x4 vehicles). ***Unclassified roads*** are not managed as part of the forest transportation system and include unplanned roads, abandoned travel-ways, and travel-ways resulting from illegal off-highway vehicle use. (See Appendix E for a full glossary of road-related terms.)

Underlying assumptions about this process included producing a roads analysis report that would:

- be science-based;
- determine consistency of current road management practices with Forest Plan Standards and Guidelines;
- help allocate budgets and establish schedules;
- identify existing parts of the system that are essential for public access and resource management;
- identify where additions to the system are essential for public access and management;
- identify where and what roads should be relocated or upgraded;
- identify roads in ecologically unique (high risk or hazard) areas where decommissioning may be warranted;
- identify and prioritize road maintenance and restoration needs, including stream crossings;
- display major risk factors and major value factors for individual roads;
- identify ecological, social, and economic issues pertinent to future decisions about the transportation system;
- identify the Public Road System;
- determine needed right-of-ways and jurisdictional exchanges;
- incorporate, where possible, adjacent public lands and their transportation system; and
- verify road management objectives and maintenance levels.

Process

Tasks for this analysis included:

- an interdisciplinary evaluation of all roads within the 10 affected watersheds;
- identification of roads that should be maintained for long-term motor vehicle access;
- characterization of system road conditions and work needed to meet assigned maintenance levels;
- analysis of classified and unclassified roads, some of which could lead to consideration for closure, decommissioning, or incorporation into the transportation system; and
- prioritization of future road projects.

As required by the final road management policy published on January 12, 2001, this analysis followed the six-step process outlined in the report Roads Analysis: Informing Decisions About Managing the National Forest Transportation System (USDA Forest Service, Misc. Report FS-643) and in the Region 2 (R2) Roads Analysis Supplement to FS-643. A summary of this six-step process as it relates to the Hayman Roads Analysis Project composes the remainder of this report.

Products

In addition to this report, which documents the information and analyses used to identify opportunities and to set priorities for future Hayman burn area roads projects, products resulting from the Hayman Roads Analysis Project include:

- A summary of key road-related issues and the list of screening questions used to evaluate them. (See Steps 3 and 4 of this report.)
- A locator map showing the Hayman Roads Analysis Project area in relationship to the burn area. (See Map 1: "Hayman Burn Area Roads Analysis Locator Map.")
- A road maintenance recommendations spreadsheet. (See Appendix G: "Road Maintenance Recommendations Spreadsheet")
- A map depicting road maintenance recommendations. (See Map 2: "Interdisciplinary Resource Team System Road Recommendations.")
- Resource-specific risk/value rating spreadsheets. (See Appendices H through K on accompanying CD)
- A map depicting classified road densities within the project area. (See Map 3: "Hayman Roads Analysis Project Classified Road Density.")
- A map depicting classified and unclassified road densities within the project area. (See Map 4: "Hayman Roads Analysis Project Classified & Unclassified Road Density.")
- A map depicting authorized unclassified roads within the project area. (See Map 5: "Hayman Roads Authorized Unclassified Roads.")

Step 1 Setting up the analysis

The Hayman Roads Analysis Project was designed to produce an overview of the road system and to identify pertinent ecological, social, and economic road management issues essential to making future decisions about affected transportation systems. In setting up the analysis, line officers established an interdisciplinary (ID) team and identified the proper analytic scales. (See Appendix A, "Hayman Roads Analysis ID Team.") The ID Team then developed a process plan for conducting the analysis. The output from this step included assignments to ID Team members, a list of information needs, and a ranking plan for the analysis.

Public scoping was conducted through ground mailings, e-mails, and a web site. Public scoping requested interested and affected groups and individuals outside the Forest Service to provide input on the roads within the project area. The team was interested in receiving access and resource concerns related to the project area.

Information Needs

In addition to identifying the appropriate watersheds to include within the analysis, the ID Team identified a specific roads-database and GIS needs for the project area.

Watershed. Forest Service policy requires that a watershed-scale roads analysis support all transportation system related management decisions made after July 12, 2001. The ID Team decided to only include watersheds that will definitely have roads projects within them. The team also decided not to analyze Elevenmile Canyon, since this watershed had been considered during an in-depth total maximum daily load (TMDL) resource analysis.

Roads Database. The ID Team could not address unclassified roads in the same manner as classified roads, since time did not permit the labeling of unclassified roads during this analysis. While it was left to each resource specialist to determine how to incorporate unclassified roads, road density, public use and resource impacts played an important role in the level of assessment by each specialist. Roads on adjacent private lands were not included in this analysis.

Geographic Information System Mapping (GIS). GIS is a tool used by each resource specialist to analyze the spatial effects of the current road system on the surrounding nearby resources. A corresponding GIS database exists for the roads project, and the ID Team used the most current data to perform its analysis. Because the Hayman Roads Analysis is an iterative process, data gaps identified during this project will become part of future projects.

Plan of Analysis

Roads were evaluated on a segment basis separated by watershed and maintenance level. (See Appendix B: "Road Management Strategies.") Each ID Team specialist provided ratings of high (H), moderate (M), low (L), or not applicable (N/A) for each road segment. Ratings reflected either a risk rating or a value rating for compiling into a resource-by-resource database. The following resource areas have a risk rating associated with them: Aquatic, Wildlife, Botany, Weeds, and Archaeology. The following resource areas have a value rating associated with them: Recreation, Range, Special Uses, Vegetation Management, Timber, and Fuels. (See Appendix C: "Risk/Value Rating Factors for Hayman Roads Analysis.") Using these ratings, the roads were then evaluated by the ID Team to develop recommendations that can be used as the basis for prioritizing road projects and for meeting current and future transportation needs. In addition to a spreadsheet that summarizes these compiled ratings (see Appendix G), a narrative response detailing the impact of the existing road system and future road projects on specific resources is provided in Steps 3 and 4.

Step 2 Describing the situation

The Hayman Roads Analysis Project area contains 620 miles of road, including classified, unclassified, and temporary roads. This analysis uses the road definitions contained in 36 CFR 212.1. (See Appendix F.) Appendix G contains the list of road segments evaluated, and Map 2 ("Interdisciplinary Resource Team Classified Road Recommendations") shows existing roads within the project area.

Nearly all of the existing road system on Pike National Forest System lands has evolved from the demand for access to natural resources and recreational opportunities. Maintenance and reconstruction requirements of the existing system depend mainly on the volume of recreational use, access for fire suppression activities, and to a lesser extent timber hauling. The amount of future construction is dependent primarily on the need to access and manage natural resources and recreation opportunities. Minor new construction for recreation opportunities (such as access to a new trailhead or campground) may occur in the near future to replace opportunities destroyed by the Hayman Fire. Extensive reconstruction of existing roads, bridges, ditch lines, drainages and culverts may be done to correct safety deficiencies or to address adverse resource impacts from the road.

Of primary importance in assessing the viability of any current or future road system is understanding the soil composition of the area and its potential for erosion and landslide hazards. This is especially critical following a large-scale fire event such as the Hayman Fire. (See AQ(3) in Step 4 for a detailed discussion of potential soil erosion and landslide hazards. See also tables in Appendix D.)

The Hayman Roads Analysis Project included an initial scope of analysis by which the ID Team, in conjunction with line officers and through public scoping, identified important road-related issues and the information needed to address these concerns for both existing and future roads. Each ID Team member evaluated the existing road system in relation to current Forest Plan direction. The team compiled descriptions of access needs and information about physical, biological, social, cultural, recreational and economic conditions associated with this road system. The output from Step 3 includes a summary of key road-related issues and the basis by which team members evaluated existing resource conditions. Step 4 includes the list of screening questions used to evaluate these issues.

Step 3 Identifying issues

What follows is a summary of key road-related issues and the basis by which team members evaluated existing resource conditions.

AQUATIC RESOURCES

There is a concern that fish populations and other aquatic resources are depressed in the project area due to deteriorated habitat condition, specifically sedimentation and floodplain functions related to roads. Road effects have been identified as contributing to the loss of quality in stream, riparian, and wetland habitats. The aquatic analysis used direction from FS-643 and the R2 Supplement. The rating method concentrated on road influences on habitat potential in aquatic, riparian, and wetland communities using existing information on road density and road/stream-crossing ratios. This helped prioritize planning and treatment by watersheds and sub-basins. To characterize habitats that are impacted by roads, this analysis used existing stream habitat and fish population data as well as the South Platte Wild and Scenic River Study.

Hydrologic scope. There is a concern that roads are affecting water quality and quantity in terms of stream temperature and sediment load. Roads across the forest have impacted streams causing flooding, stream channel aggradation, channel incision, and changes in channel types. As a result of road building, wetlands and floodplains have filled in and have become disconnected from their stream channels. Hydrologic analysis used direction from FS-643 and the R2 Supplement to provide input regarding all classified and unclassified roads in the roads database.

TERRESTRIAL WILDLIFE

Because high road density interrupts habitat, there is a concern that the presence of roads and their associated use have adverse effects on terrestrial wildlife species. Some of these effects include habitat loss and modification, changes in behavior, barriers to dispersal, displacement, increased rates of parasitism and predation, introduction of pests and forest diseases, reduced nesting and/or denning success, and death or injury from road crossings.

This analysis used a variety of analytical tools and information sources, including: FRAGSTATS, UTOOLS, HABCAP, and other spatial databases; a survey of literature and other Wildlife Habitat Relationship tools; and the Colorado Natural Heritage database. The analysis was conducted at various scales based on the species' home range and movement patterns. For example, while the effect of roads removing habitat and of associated human disturbance from road use was observed at the site of the road, these effects were evaluated at a larger (e.g., watershed) scale. Unlike modeling efforts that generate relative known effects of road densities for some species, the specific number or density of roads required to affect other species are not well known. Therefore, in addition to some

discussion of the quantitative road effects, this analysis also relied on a discussion of qualitative effects. Many of these effects are related to the number and density of roads within the watershed.

BOTANY AND NOXIOUS WEEDS

There is concern that roads may be impacting sensitive plant species and that invasive plants are increasing in the project area due to species characteristics, existing invasive plant densities, and soil disturbance related to roads. Road effects have been identified as directly contributing to increases in the numbers of invasive plant species and their populations, resulting in losses of quality upland, riparian, and wetland habitats.

The Hayman Fire area contains a variety of plant communities on National Forest System lands. Plant habitats include: Ponderosa pine (55.2%), Douglas-fir (38.7%), grassland (5.5%), aspen (1.3%), spruce/fir (0.7%), lodgepole pine (0.3%), Gambel oak (0.2%) and limber pine (0.1%). Botanical species diversity is dependent on the variety of habitats found throughout the National Forest. This diversity is a vital part of ecosystems that is important to the viability of other organisms. Special habitats for this analysis are defined as candidate research natural areas and known locations of sensitive plant species. These habitats often represent a relatively small portion of the landscape, yet are vital to overall ecosystem health.

There are 12 sites that have been nominated for evaluation as research natural areas within the watersheds under discussion. The areas (all or part) within the analysis area are: Badger Gulch, Bridge Gulch-Polhemus Gulch, Green Mountain, Little Creek, Long Scraggy Peak, Marksbury Gulch, Noodleheads, Raleigh Peak, Sheep Rock, South Platte, Cheesman, Thunder Butte, and Trout Creek. Of these, only Long Scraggy Peak has been carried forward for further evaluation as a research natural area. Because of the fire, some of these may have lost the features for which they were being considered. Some may have been transformed into areas that may also have greater implications for post-fire research.

There are no listed Threatened or Endangered plant species within the analysis area. The area has eight plant species on the Regional Forester Sensitive Species list: green spleenwort (*Asplenium trichomanes-ramosum*), Peck's sedge (*Carex peckii*), yellow lady-slipper (*Cypripedium parviflorum*), Weber's monkey-flower (*Mimulus gemmiparus*), pale blue-eyed grass (*Sisyrinchium pallidum*), white upland aster (*Solidago ptarmicoides*), bird's-foot violet (*Viola pedatifida*), and great-spurred violet (*Viola selkirkii*).

Weed populations are found anywhere there has been ground disturbance. The introduction of noxious weeds threatens habitats for sensitive species and degrades wildlife habitats. Noxious weeds threaten essentially all types of habitats. Noxious weeds can out-compete native species and reduce habitat quality. Roads have a direct effect on the introduction and movement of noxious weeds. People, animals, and machinery move noxious weeds from place to place. Roads provide constantly disturbed habitats, devoid of competing vegetation, for establishment of weeds. Road maintenance contributes to the movement of weed seed. Among noxious weeds known to occur in the assessment area are: musk thistle (*Carduus nutans*), diffuse knapweed (*Centaurea diffusa*), spotted knapweed (*Centaurea maculosa*), Canada thistle (*Cirsium arvense*), leafy spurge (*Euphorbia esula*), orange hawkweed (*Hieraceum aurantiacum*), yellow toadflax (*Linaria vulgaris*), and Dalmation toadflax (*L. genistifolia* ssp. *dalmatica*).

All roads have a high risk of facilitating the spread and establishment of noxious weeds. Due to limited budgets, inventory and mapping of noxious weeds has been limited and has not kept pace with the rapid rate of spread of noxious weeds. As a result, existing noxious weed sites were missing in the electronic analysis; therefore, the noxious weed analysis relied heavily on the knowledge of district botanists and ecologists. Noxious weed risk can be reduced by annual inventory and treatment (i.e., early detection and treatment), and by following Best Management Practices for road maintenance and projects that occur along or near roads.

ARCHAEOLOGY / CULTURAL RESOURCES

There is a concern that the existing road system within the Hayman burn area and related watersheds—as well as potential plans for road construction, closure, or decommissioning—could lead to historic site degradation and may carry cultural, symbolic, sacred, spiritual, or religious impacts. Specific questions include: how the road system might affect access to paleontological, archaeological, and historic sites; how roads that are historic sites might be affected by road management; how the road system affects cultural and traditional uses and American Indian treaty rights; how the road system, or its management, might affect certain groups of people; and what the traditional uses are of animal and plant species within the area of analysis.

This analysis used direction from FS-643, the R2 Supplement*,* 36 CFR 800 106/110, NAGPRA, NHPA, and AIRFA, as well as existing heritage resource material and inventories to assess roads within each of the watersheds in the project area. Reference material reviewing included: 1) survey and site atlas, 2) cultural resource report files, and 3) database queries. Known heritage resource information is based on previous project surveys and associated recorded heritage resources. At best, these previous surveys are sporadic within the project area.

RECREATION

Recreation is an important industry on the Pike National Forest and generates a major portion of the local economic base through tourism. According to the 2002 National Visitor Use Monitoring (NVUM) Report, there were 3.87 million national forest visits on the PSICC. The top five recreation activities of these visitors were viewing natural features, relaxing, viewing wildlife, driving for pleasure, and hiking/walking. Roads are the primary means of providing recreation on the National Forest; visitors use them to drive, walk, or bicycle onto and through the forest. Although visitors depend on roads to enjoy national forests, parts of the expansive road system threaten the very naturalness many people are seeking (Fan and Bengston, 1997). Many of the roads on the National Forest were built not for travelers, but for timber harvesting, livestock trailing, mining, and other access needs.

Recreation has increased dramatically over the years and so has the need for roads to safely transport travelers through the forest. In the Hayman burn area, the occurrence of flash-flood events on Forest Service roads has amplified the need for safe public roads on the forest. Flash-flood events are going to be the prime problem with the roads for the next few years and reconstruction from flood events will probably take the majority of road funds. Providing road systems that are safe to the public, responsive to public needs, environmentally sound, affordable, and efficient to manage is among the Forest Service's top priorities. The roads analysis process is a key step to meeting this objective. This analysis used direction from the PSICC Forest Plan, the FS-643, and various other roads analysis reports, including those from Metolius Basin, Medicine Bow Forest, Routt Forest, and Box Creek.

RANGE

Roads are needed for access into and within several of the grazing allotments within the Hayman burn area and the 10 watersheds that encompass the project area. These include some county and Forest Development roads to provide permittee access to the grazing allotments. Grazing on Forest Service system lands is authorized by permit. All roads within the project area were assessed as to how they affect management of grazing allotments. Road effects on range allotment management may include lack of access by permittees, impacts on allotment management through gates left open, lack of cattle guards, and destruction of fences because of lack of access into an area. In addition to consulting Forest Service District and Supervisor's Office personnel, additional available data were obtained from the INFRA Database. This analysis used available information from the Forest Plan, Forest Service Manuals, GIS data, allotment and permittee files, and allotment management plans to rate roads in relation to their access to grazing allotments.

SPECIAL USES
Roads are needed to access the numerous special-use authorizations permitting various types of activities including outfitter/guide activities within the Hayman burn area and the 10 watersheds that encompass the project area. These include some county roads, some roads that lead residents to their homes (e.g., driveways), and roads accessing utility lines and communication sites. These special uses are authorized by permit. (Roads that are authorized by easement are addressed in the "General Public Transportation" section in Step 4.) All roads within the project area were assessed as to how they affect management of special-use permit sites. In addition to consulting Forest Service District and Supervisor's Office personnel, additional available data were obtained from the Special Uses Database (SUDS).

Minerals Management. This analysis used available information from the Forest Plan, GIS data, oil and gas leasing analyses, current leases, stipulations, special-use permits, and BLM records to rate roads in relation to their access to existing, locatable, leasable, and salable minerals within the project area.

VEGETATION MANAGEMENT
Road access is a necessity for most management projects. Many of these projects, such as tree planting or pre-commercial thinning, put money into the local community through local contractors. Other projects such as timber harvest also produce commodities. These forest products create additional cash flow for local and regional communities when placed into the wholesale and retail markets. Revenues from the sale of these commodities are used to offset management costs.

TIMBER
Road access is a necessity for timber harvest. Timber harvest projects produce commodities and create additional cash flow for local and regional communities when placed into the wholesale and retail markets. Revenues from the sale of these commodities are used to offset management costs. In times of high timber-market values, these revenues can offset any associated roads system costs, at least for the short term.

FUELS
Roads are one of our greatest fire suppression tools. Roads allow for rapid access for equipment and, in many instances, are used as fire breaks. There is no accurate way of predicting the monetary value of the road system in fire suppression activities. Over a long-term period, this figure could possibly be in the millions of dollars with the successful suppression of just one fire that would otherwise reach 5,000 acres or more.

Step 4 Assessing benefits, problems, and risks

What follows is the list of screening questions used by the ID Team to evaluate road-related issues. These questions are taken from the R2 Roads Analysis Supplement to FS-643.

Aquatic, Riparian Zone, and Water Quality (AQ)

AQ(1): How and where does the road system modify the surface and subsurface hydrology of the area?

Road systems can alter the surface and subsurface hydrology of an area by intercepting, concentrating, and diverting flows from their natural flow paths (Wemple et al 1996). Typically, intercepted ground and surface water is routed more quickly to stream channels through a ditch system. This process is most prevalent in valley bottom and mid-slope roads on north-facing slopes. The effects of such a process are an alteration in the timing of storm runoff to streams, the duration of storm flow, and the magnitude of peak flows. Consequently, suspended sediment levels in stream systems may increase due to contributions from increased overland flow or from in-channel and bedload sources due to increased peak flow.

The presence of compacted skid trails and landings from previous management activities, or frozen ground conditions at the time of rainfall, can increase the volume and magnitude of overland flows, in which case these roads and their associated ditch systems would contribute runoff more quickly to the majority of intermittent stream channels. Although not quantitatively measured, this could alter the timing of storm runoff to stream channels, the duration of storm flows, and the magnitude of peak flows in downstream perennial reaches.

The following roads have greater than 33 percent of the road by length in the riparian zone: 77, 112, 112.A, 200, 202, 206, 208, 210.2A, 211, 211.B, 211.D, 211.F, 211.G, 211.J, 211.M, 211.O, 216, 220, 220.A, 223, 224, 225.F, 247.C, 249, 259.D, 274, 287, 296, 300.T, 300.V, 332, 332.B, 338.DB, 338.EA, 339.B, 339.C, 340, 341, 343, 346, 346.A, 346.B, 347, 347.A, 347.C, 347.E, 348, 348.A, 348.B, 348.F, 349, 350, 350.A, 351, 357.F, 360.C, 361, 361.A, 362.D, 364, 364.A, 367.1A, 375.A, 514.B, 515, 518, 520, 522, 522.A, 525, 528.A, 528.B, 528.G, 529, 530.B, 533, 533.B, 533.C, 540, 541, 544, 556, 558, 560, 562, 674, 704.E, 750.1A, 753, 754, 754.B, and 755. Approximately 35% of all roads in the project area are in the riparian zone.

AQ(2): How and where does the road system generate surface erosion?

Surface erosion occurs on most wildland roads because their surfaces, cutslopes, fillslopes, and associated drainage structures are usually composed of erodible material (Bilby et al, 1989). Rates of erosion vary greatly depending on the slope, soil porosity, and the erosive characteristics of the exposed surfaces, as well as on the quantity and energy of accumulated storm flows. The energy of these storm flows is strongly influenced by topography, geology, and local surface soil conditions such as porosity, organic litter levels, and vegetative cover.

Flows of increased magnitude are capable of detaching and moving sediment from road surfaces into stream channels, especially those comprised of finer-grained, native materials. Primary roads with coarser, graveled surfaces are less likely to contribute sediment to storm flows, although their associated ditch systems can provide a source of sediment during storm flow events. Roads listed as being located in the channel bottom or having hydrologic connectivity are of greatest concern when considering surface erosion sources and mechanisms.

The following roads have increased surface erosion problems: 201, 201.2C, 211, 211.C, 211.E, 220, 274, 290, 290.A, 290.B, 292, 292.A, 292.B, 340, 341, 343, 343.A, 343.A1. 343.A2, 343.B, 343.C, 346, 347, 348.A, 348.B, 348.BA, 348.C, 348.D, 348.E, 348.F, 348.G, 348.H, 351, 351.A, 360, 362.A, 362.B, 362.C, 362.D, 362.E, 364, 364.A, 525, 530.A, and 530.B.

In other locations within the project area, surface erosion may occur on isolated roads without consequence. In other words, the overland flow is typically short-lived, and any sediment that is eroded from the road network would not reach a stream network and therefore could not degrade water quality.

AQ(3): How and where does the road system affect mass wasting?

This hazard is influenced by a number of factors, including hill slope gradient, slope position, soil type, bedrock geology, geologic structure, type of road construction, road drainage, and groundwater characteristics. Mass wasting events such as debris torrents and debris flows often severely affect roadbed fills at stream crossings by transporting large amounts of sediment to higher-order channels. The presence of roads across steep slopes can increase the risk of mass wasting due to the damming effect of the roadbed on subsurface flows.

Within the analysis area, the potential exists for soil erosion and mass movement. The remainder of this response discusses those potential hazards in-depth. (See tables in Appendix D: "Potential for Soil Erosion and Mass Movement," which depict potential risk by watershed.)

Potential erosion hazard. Soil erosion is a function of a number of soil and environmental factors that affect soil particle detachment and movement down slope. Soil factors include the inherent soil erodibility (K-factor) in combination with length of slope and percent of slope. Environmental factors include surface vegetative cover and rainfall intensity. Generally, erosion increases with increased soil erodibility, rainfall intensity, lower amounts of surface cover, steeper slopes, and longer slope lengths. Water erosion is the principal form of erosion considered in the map unit erosion ratings, although wind erosion may be significant on areas where vegetation cover is sparse.

Each soil for each map unit is given an individual *soil erosion hazard rating*. This rating is useful for broad land-use planning purposes. The soil erosion hazard rating evaluates each soil component in a map unit for its susceptibility to erosion. The rating is based on the inherent erodibility of the surface soil (K factor) and the average slope of that soil. This rating is intended for use in the planning of management activities to indicate relative potential erosion hazards. Ratings of *moderate* and *high* may warrant an on-site investigation by soil and hydrology specialists where more specific soil and water data are necessary. On-site visits will occur for the Roads Environmental Analysis estimated for completion in 2004. The rating is not a rating of natural or current erosion occurring on a soil. Instead, it assumes that the surface cover of vegetation or leaf litter has been disturbed or destroyed and that bare surface soils are exposed to the elements of erosion. Such would be the case after a fire or on a skid trail.

A rating of *low* means that the soil has a mixture of sand, silt, and clay and has relatively high organic matter content, creating strong structure. These soils generally are on gentle to moderate slopes and do not usually require costly erosion-control measures. A rating of *moderate* means soils have moderate inherent erodibility and are generally on moderate to steep slopes. These soils are more easily dispersed by raindrop impact and may require more expense to control erosion and sedimentation. An on-site investigation may be needed by soil and water personnel for any planned projects on such areas. A rating of *high* indicates soils with moderate to high inherent erodibility and are usually on moderate to very steep slopes. Soil particles are readily moved by overland flow after disturbance. These soils may require considerable expense to control erosion and sedimentation as a part of management practices when activities are planned for such areas. An on-site investigation by soil and water personnel is highly recommended.

Mass movement potential (landslide hazard). The Northern San Isabel and Western Pike National Forests are relatively young mountain ranges and valleys and are still active geologically. Numerous faults throughout the survey area attest to this activity. As the mountains continue to rise, the forces of gravity, in combination with other environmental forces, may act together to influence the downward movement of materials. This process is referred to as mass movement.

Mass movements, whether natural or human-caused, are undesirable because of the adverse effects on soil productivity and water quality. To date, there have been no large mass movements in either mountain range in recent history, and few in ancient history. This is due to the competent nature of most of the sedimentary, igneous, and metamorphic rocks that comprise the analysis area.

Mass movement is a broad term that can apply to a variety of conditions and processes. Movements that displace bedrock include, but are not limited to, landslides and slumps. These may be triggered by earth tremors and quakes, active fault movement, or over-saturation of geologic strata by water. Debris, earth, and mudflows are caused by surface runoff accumulating soil and debris such as rocks and trees and moving down slope with considerable force. These are generally confined to the upper several feet of earth surface. Snow avalanches are another type of mass movement. Avalanches occur when snowpack and fresh snow move down a slope. They can be triggered naturally by the weight of the snow or by human-caused activities such as skiing or snowmobiling. Snow avalanches can be relatively minor with light powder snow cascading down a slope or may be major events when wet, heavy snowpack slides to ground level, often uprooting trees and even the soil surface.

Mass movement potential is a rating of the possibility of natural or human-caused mass movements occurring within a map unit. The possibility is directly translated to a risk to use and management. For example, the higher the mass movement potential rating, the higher the probability of mass failure and the higher the risk to management for activities planned for such areas. An on-site investigation is recommended if mass movement hazards are encountered or suspected during project planning or implementation.

During the course of soil survey fieldwork, observations were made of mass movements that were recent and active or old and apparently inactive. A geology map of the analysis area was used to locate landslide deposits, which are usually mapped as Ql. Air photo interpretation was also used to locate old or recent landslide deposits. These areas were compared with other similar landforms to provide the basis for determining potential mass movement. Each soil map unit is given a mass movement potential rating based on the following criteria.

Low mass movement potential: Map units with *low* mass movement potential are on consolidated geologic materials such as gneiss, schist, granite, and sandstone. These geologic materials generally occur on gently sloping to moderately steep landforms. Photo interpretation and fieldwork showed no evidence of recent or previous landslides. There is little mass movement risk to management for activities planned for such areas. The potential for damage to watersheds resulting from mass movement is minimal.

Moderate mass movement potential: Map units with *moderate* mass movement potential are on poorly consolidated geologic materials such as interbedded sandstones, siltstone, and shales. These geologic materials occur on moderately steep to steep landforms. On-site investigations and air photo interpretation have shown these areas to be relatively stable or to have few ancient landslide materials. These areas have long since healed, and little recent movement has taken place or is likely to occur under normal conditions. Periods of prolonged seasonal precipitation or undercutting soil and geologic material may increase the risk of mass movement activities. A rating of moderate represents a certain amount of risk to the use and management of such areas. Higher costs for construction and design can be expected.

High mass movement potential: Map units with high rating occur on soft or poorly consolidated geologic materials such as shale or sandstone over soft shale. These geologic materials occur on moderately steep to very steep landforms. On-site investigation and air photo interpretation have shown recent evidence of mass movement. These areas include freshly cut scarps, exposed geologic strata, and raw accumulation areas. "Jack-strawed timber"—an array of angled and tilted trees resulting from differential root tensions from mass movement—are often present. A rating of high represents a serious risk to use and management of such areas. An on-site soil, geo-technical, and hydrologic investigation is highly recommended. Higher costs for design and construction can be anticipated to achieve adequate resource protection.

AQ(4): How and where do road stream crossings influence local stream channels and water quality?

Road crossings of stream channels without culverts can contribute large quantities of sediment to the stream. Road crossings with culverts are also potential inputs of sediment to streams, either when culvert hydraulic capacity is exceeded or the culvert inlet is plugged and stream flows overtop the road fill. Erosion of the crossing fill and/or diversion of stream flow onto the road surface or inboard ditch can drastically alter channel morphology in the immediate downstream reaches of the affected stream and create a sediment input exceeding the bedload capabilities of the channel. Short-term water quality can also be affected due to increased turbidity and the creation of new cutbank sediment sources.

The following roads have stream crossings that may impair the stream water quality: 112, 200, 201, 202, 205, 206, 208, 210.2A, 211, 211.A, 211.D, 211.M, 211.O, 215, 216, 220, 220.A, 221, 223, 224, 225, 247, 247.C, 259, 259.D, 274, 287, 292, 294, 295.B, 296, 300.V, 332, 332.A, 332.B, 339, 339.A, 339.B, 339.C, 340, 340.B, 343, 343.A, 345, 345.D, 346, 347, 347.B, 347.C, 347.E, 348, 348.A, 348.B, 348.F, 348.G, 349, 350, 350.C, 351, 355, 358, 359.H, 359.M, 360, 360.C, 361, 361.A, 363, 364, 364.A, 375.A, 388, 515, 518, 520, 522, 522.A, 523.B, 524, 525, 526, 529, 530, 530.A, 530.B, 533, 534, 538, 540, 541, 542, 545, 556, 558, 560, 560.A, 704.E, 750.1A, 751, 753, 754, and 754.A.

AQ(5): How and where does the road system create potential for pollutants, such as chemical spills, oils, de-icing salts, or herbicides, to enter surface waters?

Roads in the project area have the potential to create potential pollutants in several ways. Chemicals such as surfacing oils, magnesium chloride, de-icing salts, herbicides, and fertilizers may be applied to roads for maintenance, safety, or other improvement. Vehicle contaminants such as oils, brake-pad linings, and hydraulic fluid, as well as accidental spills, may also contaminate surface waters. The county and state roads that border the forest—and the 200, 211 and the 9J roads—have the highest potential for sources of pollutants entering the stream system. These roads are heavily traveled year-around and during the winter may be sanded or de-iced, possibly polluting surface water.

AQ(6): How and where is the road system "hydrologically connected" to the stream system? How do the connections affect water quality and quantity (such as delivery of sediments and chemicals, thermal increases, elevated peak flows)?

There are several roads that are "hydrologically connected" to stream systems. These roads are listed in the Road Maintenance Recommendations Spreadsheet. Hydrologic connectivity between the road system and stream system occurs where roads intercept and collect runoff and convey it into established intermittent or perennial stream channels along their surfaces or within their associated ditch systems. Wherever a hydrologic road connection exists, rapid runoff, sediments, and road-associated chemicals generated on the road surface and cutslope are provided at route into the natural channel network.

AQ(7): What downstream beneficial uses of water exist in the area? What changes in uses and demand are expected over time? How are they affected or put at risk by road-derived pollutants?

All watersheds in the analysis area are designated for the following beneficial uses: Aquatic Life (Coldwater), Recreation 1A, Water Supply, and Agriculture. While these uses will not change much over time, the demand for Water Supply is expected to increase with rising population along the Front Range. The South Platte supplies water for Denver and Aurora. Sediment produced in the drainage impacts the operation of Cheesman Lake, Strontia Springs, and Chatfield reservoirs, thereby increasing the cost of water treatment. According to Rocky Wiley of the Denver Water Board, the cost for removing sediment from Strontia Springs due to the Buffalo Creek Fire will be in excess of 20 million dollars. The Hayman Fire will most likely have a higher cost associated with the removal of sediment from Cheesman Lake. Although the Buffalo Creek Fire and the Hayman Fire are responsible for rill or

sheet erosion that is independent of roads, roads are contributing to this overall erosion and it would be beneficial to the municipal water supply to reduce any erosion that we can.

AQ(8): How and where does the road system affect wetlands?

Roads can affect wetlands by direct encroachment of roadbed fill or by altering hydrologic function in areas adjacent to them. Changes in surface or subsurface drainage associated with wetlands can affect moisture regimes required by existing riparian communities and create conditions conducive for invasive species. These roads are listed in the Road Maintenance Recommendations Spreadsheet.

AQ(9): How does the road system alter physical channel dynamics, including isolation of floodplains, constraints on channel migration, and the movement of large wood, fine organic matter, and sediment?

Stream systems are dynamic and typically migrate within historic floodplains as they carry and re-deposit bedload materials. Streams also transport and deposit large pieces of woody debris and finer organic matter that provide physical structure and diverse aquatic habitat within the channel. Road alignment and road fills can isolate floodplains, increase flow energy by constricting the channel, constrain channel migration, and simplify riparian and aquatic habitat. Road encroachment on stream channels can also divert stream flows to the opposite bank from their natural position, creating a cutbank that destabilizes the hill slope and increases sediment input into the channel. Wood and sediment trapped behind stream crossings can limit the downstream transport of this material and increase the risk of a crossing failure.

AQ(10): How and where does the road system restrict the migration and movement of aquatic organisms? What aquatic species are affected and to what extent?

While much anecdotal evidence exists stating how culverts have restricted migration of fish, no data have been collected in the analysis area to characterize the extent of the problem. Suffice it to say that with 968 stream/road crossings—and many with undersized or perched culverts (where the outlet of the culvert is higher than the stream bed)—the problem most likely exists. Resident fish are highly site loyal. However, they do migrate seasonally due to environmental stresses such as summer and winter temperature extremes. These blockages could effect the survival of resident fish populations.

AQ(11): How does the road system affect shading, litterfall, and riparian plant communities?

Roads can affect shading and litterfall mostly by paralleling the stream and constricting continuous riparian corridor vegetation away from the stream bank. See response to AQ(9).

AQ(12): How and where does the road system contribute to fishing, poaching, or direct habitat loss for at-risk aquatic species?

The Colorado Department of Wildlife and the Forest Service report that most non-compliance instances occur in the more isolated, backcountry locations with road access. These are also the areas where direct habitat loss occurs due to off-highway and in-stream ATV use, dispersed camping in riparian areas, user-developed trails, and poaching. These activities denude stream banks of vegetation that provides shade, hiding cover and filter functions.

AQ(13): How and where does the road system facilitate the introduction of non-native aquatic species?

Whirling disease is a non-native aquatic species. Whirling disease is a parasitic infection of trout and salmon caused by a microscopic amoeba that produces a spore. The water-borne parasite (Myxobolus cerebralis) may not directly kill trout, but fish heavily infested can become deformed or exhibit the erratic tail-chasing behavior from which the disease gets its name. Eventually, heavily infected young fish may die.

The whirling disease parasite has a two-host lifecycle that involves trout and an alternate host, a common bottom-dwelling tubifex worm. When an infected trout dies, large numbers of spores are released and then ingested by the tubifex. The spores incubate within the worm's gut, multiplying rapidly. When released from the worm, these water-borne spores can infect susceptible fish by attaching to their bodies, or when fish eat infected worms. Whirling disease spores are hardy, resist freezing and drought, and can remain viable for decades.

Direct stocking of hatchery-reared fish for recreational angling occurs in several locations in the analysis area, including all reservoirs stocked by the Colorado Department of Wildlife as well as stream locations stocked by private landholders. The biggest introduction problems involve northern pike, which anglers move from lake to lake in livewells. Reservoir connections to stream crossings are facilitated by roads.

Whirling disease is thought to be a major factor in the declines of wild rainbow trout populations in certain Colorado waters. The parasite has been confirmed in 13 of Colorado's 15 major river drainages, including the Colorado, South Platte, Gunnison, Arkansas and Rio Grande rivers.

AQ(14): To what extent does the road system overlap with areas of exceptionally high aquatic diversity or productivity, or areas containing rare or unique aquatic species or species of interest?

The Inland West Watershed Initiative was conducted in 1997 to classify watershed condition. High-value stream segments were identified by the width of the riparian vegetation associated with the stream. These segments have been delineated and overlaid with the road system to determine proximity.

Terrestrial Wildlife (TW)

TW(1): What are the direct effects of the road system on terrestrial species habitat?

Roads result in the direct loss of available habitat and reduce habitat effectiveness for a number of wildlife species. The physical presence of a road and the potential for collisions with motorized vehicles have resulted in animals being killed when traveling between habitats. Roads disrupt habitat selection processes for home ranges, reduce habitat suitability, and alter migration movements. Roads also allow the incursion of non-native and "edge" species (i.e., those that prefer areas where forests and meadows meet).

The following are some excerpts from existing literature regarding the effects of roads and road-associated human activity:

- Road construction converts large areas of habitat to non-habitat (Forman, 2000; Hann et al., 1997); the resulting motorized traffic facilitates the spread of exotic plants and animals, further reducing quality of habitat for native flora and fauna (Bennett, 1991; Hann et al., 1997). Roads also create habitat edge (Mader, 1984); increased edges change habitat in favor of species that use edges, to the detriment of species that avoid edges or experience increased mortality near or along edges (Marcot et al., 1994).

- Roads often restrict the movements of small mammals (Mader, 1984). Consequently, roads can function as barriers to population dispersal and movement of some species of small mammals.

In the Hayman Roads Analysis Project area (approximately 293,000 acres), it is conservatively estimated that there is a direct reduction of approximately 3,100 acres of terrestrial wildlife habitat due to classified roads (620 classified road miles X 5 acres/mile) and a direct reduction of an additional

1,115 acres of terrestrial wildlife habitat due to unclassified roads (223 unclassified road miles X 5 acres/mile). Therefore, the total area of terrestrial wildlife habitat lost to classified and unclassified roads within the Hayman Roads Analysis Project area is approximately 4,215 acres. (Former forest hydrologist notes calculate that one mile of road is equal to approximately 2.5 acres. Due to loss of cover adjacent to roads resulting from the Hayman Fire as well as resultant disturbance from road traffic, these calculations assume that one mile of road is equal to approximately 5 acres rather than 2.5 acres.) This is a conservative estimate, since not all roads that actually exist in the forest have been mapped, and average road widths do not equate to actual habitat affected.

Roads posing the greatest threat of wildlife mortality caused by motor vehicle collisions are State highways, which allow greater vehicle speeds and higher traffic volume. In the analysis area, these include State Highways 67 and 126. In addition, portions of nine county roads within the analysis area may also pose a threat of motor vehicle collisions with wildlife. They are County Roads 211, 112, 94, 78, 77, 68, 54, 33, and 3. Common road-kill species on the Pike National Forest include mule deer, small mammals (e.g., Abert's squirrels), and to a lesser degree elk, coyotes, and birds.

Edge habitat is attractive to avian predators such as jays and ravens, which feed on the eggs of other species. Due to the combined impacts of loss of forest cover (52 percent of the Hayman Fire area burned with moderate or high severity) and the presence of roads and associated edge habitat, interior-forest nesting birds may be experiencing higher-than-normal impacts from nest parasitism and predation.

TW(2): How does the road system facilitate human activities that affect habitat?

Many species are sensitive to harassment or human presence at particular use sites, such as raptor nest sites, elk calving or deer fawning areas, fox dens, turkey roosting areas, and so forth. These activities are often affected by road access. Research has shown, for instance, that elk tend to avoid large areas near roads open to traffic (Lyon, 1983; Rowland et al., 2000), with the magnitude of elk avoidance increasing with rate of traffic (Wisdom et al., 1999). In the Hayman Roads Analysis area, there are approximately 421 miles of road within elk winter range, 25 miles within elk calving areas, 491 miles within mule deer primary winter range, and 527 miles within mule deer secondary winter range. Human disturbance can adversely affect these species on their winter range by causing increased activity and energy expenditure and decreased critical fat reserves needed to survive the winter.

Harassment of wildlife during a critical period can result in: 1) nest failure; 2) loss of young for that year, and more seriously, reduced breeding potential; 3) displacement from suitable habitat and habitat avoidance; 4) increased predation; 5) increases in energy expenditure and stress; and 6) direct mortality (legal and illegal hunting, collection of body parts of value, etc.). These factors cause lowered productivity, competition for home ranges among species, habitat loss, mortality, and lowered "fitness," the genetic contribution by an individual's descendants to future generations of a population.

Contiguous blocks of habitat have been fragmented by the Hayman Fire and the existing classified and unclassified road network. This fragmentation and an increasing level of human disturbance have negative effects on wildlife. The increasing human population base, the extent of urban-wildland interface, and new technologies have dramatically increased the number and type of vehicles using the Pike National Forest. This has resulted in higher traffic volumes on primary and secondary roads, increased violations of road and area closures, increased noise levels, and increased disturbance in previously inaccessible habitats by motorized and non-motorized recreationists.

Species that depend on large trees, snags, and downed logs, particularly cavity-using birds and mammals, are more vulnerable due to increased harvest of these trees and logs along roads (Hann et al., 1997). Motorized access facilitates legal and illegal firewood cutting as well as commercial harvest of species' protective cover.

The classified and unclassified road network for the Hayman Roads Analysis area facilitates numerous human activities that affect wildlife and wildlife habitats including, but not limited to, firewood collection,

off-highway vehicle (OHV) use and four-wheel driving, recreational driving, sightseeing, mountain biking, horseback riding, cross-country skiing, hiking, snowmobiling, hunting and fishing, camping, and collecting special forest products.

TW(3): How does the road system affect legal and illegal human activities (including trapping, hunting, poaching, harassment, road kill, or illegal kill levels)? What are the effects on wildlife species?

The road system provides access for activities identified in TW(2). Effects to wildlife include disruption of courtship, breeding, nesting and rearing of young, reduced habitat effectiveness, displacement from occupied habitats, and direct reductions in the amount of available habitat. Poaching of game species does occur, but the extent of this activity is unknown.

Furbearer trapping is not a major recreational activity on the Pike National Forest, and therefore adverse effects due to the forest road network are not significant. Ground squirrels and prairie dogs are often targets of recreational shooting, which is facilitated by road access (Ingles, 1965). The incidental occurrence of this activity is not a major concern to small mammal populations on the Pike National Forest. Many bird species are attracted to grains and seeds along roadsides, resulting in mortality from vehicle collisions (Vestjens, 1973). Of greater concern is mortality to Abert's tassel-eared squirrel from vehicle collisions. Abert's is a Forest Management Indicator Species, and mortality from vehicle collisions is frequent along major state highways where suitable habitat for the species occurs.

OHV use occurs primarily during the spring, summer, and fall months and can result in increased disturbance during critical periods such as courtship, nesting, rearing, or wintering. For example, one known goshawk territory was abandoned in the Hayman Roads Analysis area as a result of OHV disturbance on an unclassified road during the breeding season. A second goshawk territory was abandoned as a result of disturbance related to a classified road.

TW(4): How does the road system directly affect unique communities or special features in the area?

Many road segments within the analysis area are located immediately adjacent to streams, within the stream floodplain, or in other unique areas. Some have resulted in the separation of streams from their floodplain and in dissected wetlands, and some have created barriers to dispersal of aquatic species.

Bats are vulnerable to disturbance and displacement caused by human activities in riparian corridors, on rock faces, and to a lesser degree in caves (Hill and Smith, 1984; Nagorsen and Brigham, 1993). Disturbance may increase with human developments and road access (Hill and Smith, 1984).

The South Platte River is heavily used within the Hayman Roads Analysis area. Forest Service Roads 205, 206, 220, 221, 533 and 540 access this unique habitat. Hiking, fishing, camping, four-wheel driving, rock climbing, and wildlife viewing are common activities occurring on this river ecosystem during spring, summer, and fall. Human use tends to be concentrated in those areas that are unique and diverse, primarily riparian areas, along the South Platte River, and within winter ranges. The classified and unclassified road network facilitates increased use of these areas, often resulting in habitat degradation, disturbance to animals due to family pets and noise, and introduction of non-native species. Roads near campgrounds, summer home tracts, urban-wildland interface areas, and riparian corridors often cause the greatest effects.

Human presence during critical periods can have adverse impacts on wildlife. In the spring, critical behaviors include territory formation/pairing, nesting, brood-rearing, elk calving and deer fawning, and so forth. Dispersal of young occurs in the summer. In the fall, migration and hunting seasons become important. Wintering is another critical time period. However, human activity is generally much reduced during this time because of limited access due to snow. Disturbance by humans during any of these times can result in loss of young for that year, displacement from suitable habitat, increased predation, and increased stress levels resulting in reduced fitness.

Many road segments intersect habitats for Threatened and Endangered species. For example:

- 3.1 miles of road intersect suitable and designated critical habitat for Mexican spotted owl (T);
- 23.5 miles of road intersect Pawnee montane skipper habitat (T);
- 144.4 miles of road intersect Preble's meadow jumping mouse habitat; and
- 0.65 miles of road intersect Canada lynx habitat.

Important habitats for Forest Management Indicator Species are also affected by roads:

- 25.1 miles of road intersect elk calving areas;
- 421.2 miles of road intersect elk winter range;
- 491.0 miles of road intersect mule deer primary winter range; and
- 1.2 miles of road intersect bighorn sheep winter range.

Effects to these species are detailed by road in the Terrestrial Wildlife spreadsheet (see accompanying CD).

Ecosystem Functions and Processes (EF)

EF(1): What ecological attributes, particularly those unique to the region, would be affected by roading of currently unroaded areas?

Unroaded areas differ from roaded areas in many ways with regard to ecological integrity. The presence of roads can be associated with distribution and spread of exotic plants and changes in forest composition and structure, including the loss of old-forest characteristics and increased probability of human-caused fire. There can also be both direct and indirect effects on terrestrial species and habitats and effects on management activities, including fire suppression. Road density, road class, road location, and types of habitats traversed by roads may influence the severity of those effects. The presence of a road in a previously unroaded area will accelerate access for a variety of forest management activities that will change the amount, pattern, and composition of forest cover, and that may in turn lead to changes in terrestrial wildlife ecological processes.

The Hayman burn area is within the Northern Parks and Ranges Section of the Temperate Steppe Regime Mountains. This extends from southeastern Wyoming to north-central Colorado. Soils are derived from decomposed granite from the Pikes Peak batholith, which are Precambrian igneous rocks. These naturally have relatively sparse vegetative growth.

The Forest Land and Resource Management Plan and Final Environmental Impact Statement provides little direction concerning roads and maintaining plant communities. That direction includes the following: "Construction of new roads should keep the area undisturbed by keeping construction to a minimum. Make efforts to reduce the spread of noxious weeds. Manage habitats for rare species."

EF(2): To what degree do the presence, type, and location of roads increase the introduction and spread of exotic plant and animal species, insects, diseases, and parasites? What are the potential effects of such introductions to plant and animal species and ecosystem function in the area?

Roads may influence the spread of exotic organisms through the direct effects of vehicles transporting organisms (vehicles and other equipment are frequent vectors of weed seeds) or through the indirect effect of habitat alteration and creation of early-seral substrates that favor weedy species. These weedy species may in turn have undesirable effects on native species and ecosystems, since the establishment and spread of noxious weeds can reduce ecological values by displacing native vegetation, increasing soil erosion, reducing forage for wildlife and livestock, and degrading recreational values.

All roads carry a high risk of facilitating the spread and establishment of noxious weeds, including areas scheduled for road reconstruction and ongoing maintenance activities as well as new road construction. In addition, areas of higher road density and greater traffic exposure enhance the spread of noxious weeds.

Weedy species typically require soil surface disturbance to gain entry into an area. The 2002 Hayman Fire converted several thousand acres of a variety of forest types in the area to potential habitat for non-native invasive plants, including identified noxious weeds. There are already numerous populations of noxious weeds in the burn area, including orange hawkweed (*Hieraceum aurantiacum*), leafy spurge (*Euphorbia esula*), yellow toadflax (*Linaria vulgaris*), spotted knapweed (*Centaurea maculosa*), Canada thistle (*Cirsium arvense*), musk thistle (*Carduus nutans*), diffuse knapweed (*Centaurea diffusa*), and Dalmatian toadflax (*Linaria genistifolia ssp. dalmatica*).

EF(3): To what degree does the presence, type, and location of roads contribute to the control of insects, diseases, and parasites?

Because this area was burned, insects will naturally invade dead timber. Harvesting and salvage have been able to occur where roads provided entry. These areas will likewise be replanted with healthy seedlings. Within unburned and low intensity burned areas, roads will allow the Forest Service to use mechanical treatments to reduce insect and disease risk to these stands.

EF(4): How does the road system affect ecological disturbance regimes in the area?

See response to EF(1).

EF(5): What are the adverse effects of noise caused by developing, using, and maintaining roads?

See responses to TW(2), TW(3), and TW(4).

Economics (EC)

EC(1): How does the road system affect the agency's direct costs and revenues? What, if any, changes in the road system will increase net revenue to the agency by reducing cost, increasing revenue, or both?

The R2 Supplement guidance for this question determined that there are three basic categories of roads: 1) roads that will always be open, for obvious reasons, 2) roads that will have motorized vehicle restrictions due to serious resource damage or annual budgetary constraints, and 3) roads that don't fall into either of the first two categories (the largest category).

Most of the roads within this project area were created over the years for a variety of access needs, and considerable capital investments were incurred to construct these roads. Most of these roads were analyzed in some form, which likely included use needs, construction design standards, environmental considerations, and economic assessment.

An examination of funding levels needed to maintain and improve the Level 3, 4, and 5 roads shows that the annual road maintenance funding for this forest was still significantly less than adequate. The PSICC 2002 Construction and Maintenance budget funded projects for Level 3 through 5 road maintenance at about $131,000 and Level 3 through 5 road construction at about $61,000. (The figures for funding are estimated by the percentage of Hayman Watershed Roads Analysis area roads compared to the Pike and San Isabel National Forests and Cimarron and Comanche Grasslands roads.) The funding provides approximately two to three percent of the needed budget to complete

the deferred maintenance needs as shown for 2001 for maintenance Level 3 through 5 roads of $5 million, and 2002 reports show the needs increasing to $5.13 million.

Forest Road Agreements with four counties provide the forest some maintenance on Level 3 through 5 roads. The counties surface blade and occasionally replace drainage culverts.

The largest component of the forest road system is Level 1 and 2 roads. Current funding is producing maintenance cycles of one pass in 14 years compared to a cycle 10 years ago of one pass per seven years. Put another way, one mile in 17 gets some kind of annual maintenance. The deferred maintenance is estimated at $1.6 million for the fiscal year 2001 for Level 1 and 2 roads only. These items are those that reduce the erosion and degradation of the environment. The forest is using funding from various resources to decommission and restore roads. The approximate accomplishment is 11 to 13 miles per year.

EC(2): How does the road system affect priced and non-priced consequences included in economic efficiency analysis used to assess net benefits to society?

Most travel-ways provide access to permitted users of the forest in addition to providing access to the public for recreational pursuits and tourism. Permitted users include livestock permittees, timber purchasers, mineral developers, special-use cabins, electronic sites, outfitter guides, recreation, girl scout camp, Lost Valley Ranch, access for state agencies to administer wildlife, Cheesman Reservoir (Denver Water Board), and OHV programs. Roads are necessary for the development and maintenance of these projects, which provide tangible and intangible benefits to diverse populations.

EC(3): How does the road system affect the distribution of benefits and costs among affected people?

Distribution of costs and benefits:
Costs of road construction are generally borne by the project needing the roads (e.g. the timber sale or the water project or the minerals project).

Affected people:
Dispersed recreation: hunting, fishing, camping, car touring
Developed recreation: users of forest campgrounds, timber purchasers, jeep touring, guides and outfitters, livestock grazing
Minerals development: mines
Administration: Forest Service, BLM (minerals), Colorado Division of Wildlife, Colorado Department of Natural Resources, Colorado Division of Parks and Recreation, Water companies, power lines
Local in-holders and adjacent property owners

Timber Management (TM)

TM(1): How does road spacing and location affect logging system feasibility?, TM(2): How does the road system affect managing the suitable timber base and other lands?

The 2002 Hayman Fire greatly destroyed much of the timber base in the project area. There will be an increase in logging and timber production in the short term (two to three years) from fire salvage harvest, but future timber production for the project area will be greatly reduced for the next 30 to 40 years. The road system will not be needed for logging or timber production for quite some time. Prior to the Hayman Fire, there was very little timber industry on the Front Range.

TM(3): How does the road system affect access to timber stands needing silvicultural treatment?

The forest will have an abundance of vegetation management projects in the analysis area for the next 15 to 20 years. These projects may include site preparation, planting, release, pest management, stand surveys, and pre-commercial thinning. Most of the existing road system will be needed to implement these projects. This includes all Level 3, 4, and 5 roads, and 75 percent of the existing Level 2 roads.

Minerals Management (MM)

MM(1): How does the road system affect access to locatable, leasable, and salable minerals?

Access to most individual claims and sources depend on existing arterial and collector roads. Some claims require temporary unclassified roads. Road access for locatable minerals tends to be limited to access for trucks and pieces of small heavy equipment needed for prospecting, primarily in the Crystal Creek area. Road access for leasable minerals (oil and gas) is generally planned and developed based on a large grid and at this time there are no leases in place in the Hayman burn area. In addition, there is currently no known potential for lease requests from industry in this area. The contracting of salable minerals is subject to the authorized officer's discretion and at this time there are no plans for offering salable minerals for commercial sale from the Hayman area. The value of salable minerals (crushed rock, sand, gravel, or building stone) is sensitive to the transportation costs of moving the materials to a market.

Range Management (RM)

RM(1): How does the road system affect access to range allotments?

The road system provides easier access to several range allotments. Instead of trailing animals over the landscape and for longer distances, roads provide an easier way to move animals from home units to forest allotments. Roads also provide easier access for permittees and Forest Service personnel to monitor vegetation and animal movement. With the removal of large forested areas due to the Hayman Fire, grass areas will become more plentiful. As such, it could be the case that there will be increased opportunity and requests for grazing permits and road access would be needed for these activities. Roads also provide access to many of the range improvements such as water developments, which require routine and regular maintenance.

Water production (WP)

WP(1): How does the road system affect access, constructing, maintaining, monitoring, and operating water diversions, impoundments, and distribution canals or pipes?

Water uses on the National Forest may include diversions, impoundments, and distribution systems. Road access is usually needed to move in the equipment used to build and maintain these structures. Road access also facilitates the monitoring and operation of these water systems.

WP(2): How does road development and use affect the water quality in municipal watersheds?

Road development and use in watersheds used to supply domestic water may affect the water quality. Watersheds in the National Forest that provide domestic water to a municipality may be set aside from all forms of location, entry, or appropriation. See AQ(2) for response on the production of erodible materials that leads to increased costs to treat domestic water supplies.

All water sources in the analysis area are designated for the following beneficial uses: Aquatic Life (Coldwater), Recreation 1A, Water Supply, and Agriculture. While these uses will not change much over time, the demand for Water Supply is expected to increase with rising population along the Front Range. The South Platte supplies water for Denver and Aurora. Sediment produced in the drainage impacts the operation of Cheesman, Strontia Springs, and Chatfield Reservoirs, thereby increasing the cost of water treatment.

WP(3): How does the road system affect access to hydroelectric power generation?

There are no hydroelectric sites within the project area.

Special Forest Products (SP)

SP(1): How does the road system affect access for collecting special forest products?

Collecting special forest products often depends on using existing forest roads. These activities provide employment opportunities but typically do not support developing or maintaining roads.

A variety of products harvested from the North Temperate Zone Forest's abundant biotic resources are being transformed into medicinals, botanicals, decoratives, natural foods, and a host of other novel and useful products. These renewable, vegetative, natural resources harvested for personal or commercial use are called non-timber or special forest products. Access to these resources has important economic value to those rapidly growing industries. How access to non-timber forest products will affect these resources remains an important issue.

Illegal collection is considered a problem in many areas. Indirectly, roads play a role in illegal taking as well as in monitoring harvest activities. Other reports and inventories have maps indicating roads that offer access to non-timber forest products and often act as a means of pinpointing desirable harvesting areas.

There are very few special forest products known in this area. Mushrooms, which often become abundant following fires, are not likely to become abundant here because of the droughty conditions that prevail in coarse, granitic soils. However, the potential for firewood in this area is great.

Special-Use Permits (SU)

SU(1): How does the road system affect managing special-use permit sites (concessionaires, communications sites, utility corridors, and so on)?

A majority of the developed campgrounds and picnic areas located in the project area are managed by a private concessionaire under permit with the USDA Forest Service. Furthermore, there are also numerous commercial outfitters under permit who use the road system and could be affected if roads are closed or decommissioned. Closure of any classified and unclassified roads will remain an important issue to special-use permit holders.

General Public Transportation (GT)

GT(1): How does the road system connect to public roads and provide primary access to communities?

County and state highways traverse into or through the National Forest. These roads connect to arterial, collector, and some local roads at the forest boundary where traffic is dispersed into the forest for a variety of uses. This use provides access to communities, tourists, industries, and private lands. The main access to the Hayman project area is from State Highways 126 and 67. Accessible from these highways are County Roads 211, 112, 94, 78, 77, 68, 54, 33, and 3.

The routes within the Hayman Roads Analysis area not only connect communities, but also make for pleasurable drives and loop drives and can act as alternate routes when the main route is out of service.

GT(2): How does the road system connect large blocks of land in other ownership to public roads (ad hoc communities, subdivisions, inholdings, and so on)?

Forest Service policy is that access will be provided to a level that is reasonable and suitable for the uses occurring on the land. Access needs to inholdings are addressed on an individual basis as requests are received. When subdivision occurs on a larger private parcel, forest policy is to require the landowners to create an association or some type of consolidated organization to represent all of the landowner interests. This eliminates the need for the forest to enter into road use or special-use permits with each individual landowner. Access is normally limited to summer or non-snow periods, but on occasion, permits are issued for snow plowing during the winter.

The routes listed in GT(1) provide access to and from the communities of Lake George, Woodland Park, Manitou Lake, Westcreek, Rainbow Falls, Deckers, and Trumbull, Indian Creek, Moonridge, Sprucewood, Nighthawk, Pine Nook, Oxyoke, and other private inholdings. Rights of access by law, reciprocal rights, or easements should be recorded in forest files and county courthouse documents. The forest recognizes these rights and works with the owners to preserve access while protecting the natural resources and facilities on adjacent National Forest lands.

GT(3): How does the road system affect managing roads with shared ownership or with limited jurisdiction? (RS 2477, cost-share, prescriptive rights, FLPMA easements, FRTA easements, DOT easements)?

When desirable, cooperative agreements should be established to share road improvement and maintenance responsibilities when all partners can benefit. These responsibilities should be determined through a commensurate share process. If access is being provided by a public road agency such as the county or state, then the Forest Service may not be obligated to provide any additional access over federal lands. When larger developments or subdivisions occur and inholding traffic is expected to exceed that generated by the users of the National Forest, agency policy is to pursue turning jurisdiction of the forest road over to another public road authority such as the county or state.

These roads will be open and available to the traveling public on a regular and consistent basis. Public Forest Service roads will be maintained for passenger access and provide unrestricted access (except when there are seasonal snow closures, emergency closures, or scheduled closures such as for wildlife) to and through the National Forest. Portions of these forest highways are still under the jurisdiction of the forest. When funding is secured and improvements are made to bring these sections to Federal Highway Administration standards, they will be turned over to either the state or county.

At present coordination with Park, Jefferson, Douglas, El Paso, and Teller county officials is ongoing. Concessionaires that operate forest campgrounds perform maintenance on those campground roads. Some maintenance is performed under terms of the permits held by mineral developers.

GT(4): How does the road system address the safety of road users?

In 1975, the Forest Service developed a Memorandum of Understanding with the Federal Highway Administration that required the Forest Service to apply the requirements of the national highway safety program, established by the Highway Safety Act, to all roads open to public travel. In 1982, this agreement was modified to define "open to public travel" as "those roads passable by four-wheeled standard passenger cars and open to general public travel use without restrictive gates, prohibitive signs…" Most roads maintained at Levels 3, 4, and 5 meet this definition. Design, maintenance, and traffic control on these roads emphasizes user safety and economic efficiency.

Safety work such as surface maintenance, roadside clearing, and installation and maintenance of warning and regulatory signs are performed on an annual basis, but due to budget limitations many roads do not receive adequate yearly maintenance. During the winter, most of these roads are not plowed open and some are subject to seasonal restrictions to prevent road damage during the early spring when roads are drying out. Traffic control signing follows standards set forth in the Manual on Uniform Traffic Control Devices (MUTCD).

When accidents occur on forest roads, often the Forest Service is not immediately informed unless an employee is involved. Accidents involving only public motorists are reported to the local sheriff or state patrol, if reported at all. When the forest does become aware of an accident, an investigation is initiated to attempt to identify the cause. If a feature of the road is found to be unsafe, addressing the condition becomes a high priority. Presently, there is no comprehensive program on the Pike National Forest for identifying accident locations and for maintaining surveillance of those locations having high accident rates or losses as is required by the Highway Safety Act.

Road condition surveys conducted in 2001 and 2002 indicate an average backlog of more than $5 million in deferred health and safety work items on Level 3 through 5 roads in the Hayman project area. A large portion of this backlog is a result of deteriorated road surfacing on aggregate-surfaced roads. In the past, road-resurfacing projects were planned as part of commercial timber sale activities. The decline of the program has reduced the forest's ability to fund this work. Many arterials and collectors do not meet standards for alignment or roadbed width. Built originally for commercial use, design considerations did not emphasize the high volumes of public recreational traffic that the roads are experiencing today. Many roads are lacking sight distance, turnouts, and adequate lane width needed for the higher volume and speed of traffic now occurring. Another high-cost item is roadside brushing. Level 3, 4, and 5 roads need to be placed on a recurring schedule to maintain sight distance and a safe clear zone. While this work has been part of the annual maintenance program, it is often dropped in years when budget allocations are down. Finally, warning and regulatory signing contributes significantly to the backlog.

Maintenance Level 1 and 2 roads that intersect the higher standard roads need to be clearly distinguishable from those that are managed for passenger car use. This can be accomplished in a variety of ways. The surface type and condition of the lower standard road should convey the impression that a high-clearance vehicle is needed. The route marker used to identify should be placed back from the intersection so it does not readily attract attention to the road. It should be shaped so the number is vertically aligned and not of the distinctive or rectangular shaped signs used on Level 3, 4, and 5 roads. The closure device on roads that are maintained at Level 1 should be visible from the intersection or have a clear warning sign for traffic approaching the closure. Forest officials should give high priority to recommending decommissioning those roads that pose the greatest risk to public safety.

Travel management regulations are posted on the ground and described on the forest visitor's map. These regulations have been established by the forest to enable safe motorized travel while protecting natural resources and minimizing conflicts between users. Off-highway recreation vehicles such as trail

motorcycles and ATVs are discouraged on higher standard arterial and collector roads but are not prohibited. Colorado state law governs operation of off-highway vehicles. Off-highway vehicles must be registered in Colorado or (recognized in reciprocity) registered in another state. Colorado Revised Statute 33-14.5-108: Off-highway vehicle operation prohibited on streets, roads, and highways govern off-highway vehicle use. The statute provides an exception to lands of the United States. The public land agencies of the United States determine use on roads and trails or off-highway use. Current forest policy allows off-highway vehicles on roads under Forest Service jurisdiction.

Colorado law per CRS 42-4-1101 provides that: "the driver of a motor vehicle must at all times so operate it as to maintain reasonable control over it, at a speed no greater than is reasonable and prudent under the conditions then existing." The statute also provides a speed limit of 20 miles per hour on narrow, winding mountain highways or on blind curves, and for roads not posted with warning or speed limit signs.

Administrative Use (AU)

AU(1): How does the road system affect access needs for research, inventory, and monitoring?

Road access affects research, inventories, and field monitoring. Limited or no road access increases time and costs for field observations. Access to individual watersheds depends on the arterial and collector roads. There currently are two research projects within the analysis area that have long-term plots and require road access.

AU(2): How does the road system affect investigative or enforcement activities?

Forest Service law enforcement agents are faced with a growing workload paralleling the growth in forest recreation uses. This new workload adds to the traditional work related to natural resource theft or trespass. Expanded road access, particularly near towns, can add to problems with garbage dumping, vandalism, and other criminal activities. Because law enforcement use of roads most often applies to local access, it is best addressed at the watershed scale or finer. Information needs include traffic-accident investigative information, roadway condition, direction of travel, accident evidence, federal-violation investigative information, and evidence of timber theft. Public access by roads into an area creates greater creation of illegal routes and a greater law enforcement workload.

Protection (PT)

PT(1): How does the road system affect fuels management?

The fires in 2002 created a very large and unnatural dead fuel loading in the analysis area by killing trees without consuming them. This fuel loading needs to be reduced through mechanical treatments (salvage timber sales, felling trees to increase decomposition rate, chipping, etc.) and/or burning prescriptions (broadcast, machine pile, handpile, etc).

Without an adequate road system, these options are generally reduced to broadcast burning larger tracts of land at one time with aerial ignition. This is generally not acceptable to the public because of air quality concerns. The present system of arterial and collector roads, and approximately 50 percent of the local roads inside the project area, are essential to implement much-needed fuels treatments in the near future.

PT(2): How does the road system affect the capacity of the Forest Service and cooperators to suppress wildfires?

Roads are an integral tool for fire suppression in the urban interface or a wildland setting. Any road, whether a main arterial or a local road, can hold a fire at class A size until resources arrive to extinguish it. There is still a risk of wildfire in areas that burned at low to moderate severity in 2002. Risk of wildfire will increase on the rest of the project area during the next five to 10 years as brush, forbs, and grass re-vegetate the landscape.

PT(3): How does the road system affect risk to firefighters and to public safety?

Roads make firefighting safer by providing escape routes as well as barriers to fire spread. However, if there is no emergency, there may be a public safety issue when the public may become lost due to too many roads.

PT(4): How does the road system contribute to airborne dust emissions resulting in reduced visibility and human health concerns?

This will be analyzed at a forest-wide scale as a part of the Pike/San Isabel Forest Roads Analysis Project.

Unroaded Recreation (UR)

UR(1): Is there now or will there be in the future excess supply or excess demand for unroaded recreation opportunities?

As the Colorado Front Range grows in population and popularity, there will be increased demands for unroaded recreation opportunities.

The majority of the Hayman area is designated with the Recreational Opportunity Spectrum (ROS) setting of Roaded-Natural (RN) and Semi-Primitive Motorized (SPM). The ROS is used to describe the recreation opportunities available on the landscape according to different criteria including the presence of roads and the distance from roads. According to the PSICC Forest Plan, approximately 84 percent of the recreation use on the Pike and San Isabel National Forests occurs within the Roaded-Natural, Rural, and Urban ROS classes.

The Rural (R) setting class includes farmland, small communities, commercial facilities, or large campgrounds and trailheads along paved highways in the forest. This setting delineates the area around Westcreek and Deckers.

The Roaded-Natural (RN) class describes an area with Level 3 and 4 roads (arterials) that provide easy access to other, less developed areas. Sightseeing is dependent on maintenance of arterials and collector roads (Level 3 and 4 roads). RN areas have subtle modifications to the natural environment. Improvements are limited to roads, trails, campgrounds, and a few scattered structures. There is limited opportunity to get away from others. Timber harvest and fire rehab activities are visible. This setting delineates most of the roads analysis area, especially along the FSR 211 Road and Trail Creek Corridor.

The Semi-Primitive Motorized (SPM) ROS setting offers access on Level 1 and 2 roads and no facilities in a backcountry setting (usually greater than 2,500 acres). This setting delineates a large portion of the Hayman burn area along the South Platte River corridor, including the Wildcat Canyon area.

The remaining 16 percent of recreation use on the PSICC occurs within the primitive and semi-primitive ROS classes (USDA Forest Service 1984). Much of the forest's primitive and semi-primitive non-

motorized recreation use occurs within Wilderness and Wilderness Study Areas. The Semi-Primitive Non-motorized (SPNM) ROS setting offers solitude and quiet in a large (greater than 2,500 acres) area more than a mile from open roads. In the Hayman area there are contiguous acreages of semi-primitive non-motorized and unroaded areas (roadless areas), as well as a portion of the Lost Creek Wilderness, which managed to Forest Plan standard, can provide unroaded recreation opportunities.

UR(2): Is developing new roads into unroaded areas, decommissioning of existing roads, or changing the maintenance of existing roads causing substantial changes in the quantity, quality, or type of unroaded recreation opportunities?

Few official FS roads, if any, have been built in unroaded areas during the past decade, so this has not affected current recreation opportunities. Developing new roads into unroaded areas would reduce the quantity and quality of unroaded recreation. The increasing presence of illegally created motorized social trails/roads, or unclassified roads, is also reducing the quantity and quality of unroaded recreation. Due to a lack of funds and resources (see EC (1)), many roads haven't been maintained regularly. Increasing or decreasing regular maintenance can change the frequency and patterns of use, but this shouldn't cause any substantial changes in the quantity, quality, or type of unroaded recreation opportunities. Decommissioning roads or converting roads to non-motorized trails may create new unroaded recreation opportunities while decreasing roaded recreation opportunities.

UR(3): What are the effects of noise and other disturbances caused by developing, using, and maintaining roads on the quantity, quality, and type of unroaded recreation opportunities?

Developing, using, and maintaining roads in the project area can affect unroaded recreation by producing dust, noise, visual activity, and a sense of crowding (the feeling of too many people in one place). In addition, increasing the miles of roads or roaded use of previously unroaded areas can result in the degradation or loss of unroaded experiences and displacement of non-motorized recreationists. Where log-hauling activities and other fire rehab projects are underway, visitors are displaced into other parts of the forest. This could affect current users for an unspecified period. Motorized users (motorcycles, dirt bikes, and OHVs) can affect the solitude of visitors within earshot of roads or motorized trails. These activities need to be managed for their location relative to unroaded opportunities.

UR(4): Who participates in unroaded recreation in the areas affected by constructing, maintaining, and decommissioning roads?

All forest users travel the arterial/collector roads (maintenance Level 3 through 5). Level 2 roads provide dispersed recreationists with access into otherwise inaccessible areas. According to the 2002 National Visitor Use Monitoring (NVUM) Report, most visitors to PSICC designated wilderness were male (81%), Caucasian (98%), and between the ages of 31 to 40 (30%). Hunters, anglers, rock climbers, bikers, hikers, and horseback riders currently use areas without (and with) roads.

UR(5): What are these participants' attachments to the area, how strong are their feelings, and are alternative opportunities and locations available?

Attachment to the project area is very strong for local residents, regular users, and motorized/non-motorized recreationists, especially in the aftermath of the traumatic Hayman Fire. The project area is located on the Pike National Forest, which has the distinction of being one of 14 Urban National Forests because of its proximity to the estimated two million people living along the Colorado Front Range. For many, the area is considered to be part of their backyard because of this close proximity. Those participating in unroaded recreation opportunities would not welcome a road into any roadless area. Several environmental groups were very vocal in their comments during the Hayman Fire Timber Salvage Sale EA that no roads are built in roadless areas.

Alternate locations for unroaded recreation do exist on other Front Range National Forests; other federal, state, and locally managed lands; and on the Western Slope of Colorado. There are several

wilderness areas close by, including the Lost Creek Wilderness, the Evans Wilderness and the Buffalo Peaks Wilderness, which can provide higher-quality unroaded recreation experiences. However, many of these alternate locations may be a further distance away and completely unfamiliar to recreationists, which could negatively impact their experience.

UR(6): How does the road system affect the Scenic Integrity? How is developing new roads, decommissioning of existing roads, or changing the maintenance of existing roads into unroaded areas affecting the Scenic Integrity?

See responses to UR(2), UR(3), and RR(7).

Road-Related Recreation (RR)

RR(1): Is there now or will there be in the future excess supply or excess demand for roaded recreation opportunities?

As the Colorado Front Range continues to grow rapidly in population, and as OHV technology continues to become more affordable, there will be a corresponding increase in the demand for roaded recreation. The 2002 National Visitor Use Monitoring (NVUM) Report shows total recreation use (developed, dispersed, and wilderness) on the forest for fiscal year 2001 at 3.87 million visits. Based on demand trends given in the PSICC Forest Plan, dispersed recreation use alone is projected to increase to more than six million recreation visitor days by the year 2030. Approximately 64 percent of all recreation use on the PSICC is attributed to dispersed recreation activities outside of wilderness (USDA Forest Service 1984). The most popular activity is driving for pleasure, followed by hiking and camping in undeveloped sites (USDA Forest Service 1984). The 2002 NVUM Report also displays in the table below (Participation in Forest Recreation Activities) that the top five recreation activities on the PSICC were viewing natural features, relaxing, viewing wildlife, driving for pleasure, and hiking/walking.

Nearly all activities require a road for access. About 80 percent of the use occurring outside of developed sites and wilderness occurs on or near roads (USDA Forest Service 1984). Off-highway vehicle travel is one of the most important public issues and management concerns on the Forest and reflects the conflicts that develop between non-motorized and motorized recreation use activities (USDA Forest Service 1984). According to the PSICC Forest Plan, there is adequate capacity to meet demands for dispersed recreation opportunities. However, concentrations of use in the most popular areas can be expected to cause problems or conflicts requiring increased management effort to distribute the use or prevent resource damage (USDA Forest Service 1984). Prior to the Hayman Fire, this was occurring in such popular recreation areas as Wildcat Canyon, where several four-wheel drive roads (e.g., Hackett, Longwater, and Metberry) lead down to the South Platte River.

Participation in Forest Recreation Activities, 2002 National Visitor Use Monitoring Report

Activity	Percent participation	Percent who said it was their primary activity
Camping in developed sites (family or group)	8.6	4.3
Primitive camping	4.8	2.0
Backpacking, camping in unroaded areas	2.6	1.0
Resorts, cabins, and other accommodations on Forest Service managed lands (private or Forest Service run)	10.1	0.3
Picnicking and family day gatherings in developed sites (family or group)	16.9	1.1
**Viewing wildlife, birds, fish, and so forth on National Forest system lands	58.1	2.7
**Viewing natural features such as scenery, flowers, and so forth on National Forest system lands	69.6	18.0
Visiting historic and prehistoric sites/area	9.3	0.2
Visiting a nature center, nature trail, or visitor information services	16.1	0.6
Nature Study	5.3	0.1
General/other: relaxing, hanging out, escaping noise and heat, and so forth	57.2	4.4
Fishing—all types	11.1	5.2
Hunting—all types	2.4	2.2
Off-highway vehicle travel (4-wheelers, dirt bikes, etc.)	18.0	10.1
Driving for pleasure on roads	46.1	8.4
Snowmobile travel	0.0	0.0
Motorized water travel (boats, ski sleds, etc.)	0.2	0.0
Other motorized land/air activities (plane, other)	0.7	0.3
Hiking or walking	43.9	17.5
Horseback riding	1.6	1.1
Bicycling, including mountain bikes	3.1	1.9
Non-motorized water travel (canoe, raft, etc.)	1.4	0.7
Downhill skiing or snowboarding	5.4	5.4
Cross-country skiing, snow-shoeing	0.9	0.5
Other non-motorized activities (swimming, games, and sports)	9.7	7.3
Gathering mushrooms, berries, firewood, or other natural products	4.3	0.8

RR(2): Is developing new roads into unroaded areas, decommissioning existing roads, or changing maintenance of existing roads causing significant changes in the quantity, quality, or type of roaded recreation opportunities?

Roads are part of an infrastructure that link people to time, place, tradition, culture, and way of life throughout human history. Thus, roads do more than lead people from point A to point B to point C. Roads also allow access to and from various places, signify freedom for many recreationists, and provide a unique sense of place in human culture and tradition. Road access is therefore a highly desired and valuable asset that people rely on. Any proposed road management can take away from, or enhance, this desirable and valuable asset. Areas are closed or restricted to motorized use to achieve other multiple-use objectives, such as protecting soil resources or providing wildlife seclusion during critical birthing and nesting seasons. Closing areas to motorized use sometimes affects

traditional access patterns for recreation, hunting, and firewood gathering. Closure of any classified roads remains an important issue to residents and visitors.

An examination of funding levels needed to maintain and improve the Level 3, 4, and 5 roads shows that the annual road maintenance funding for this forest was still significantly less than adequate (comment in EC(1)). Accordingly, many roads haven't been maintained regularly. Over time, increasing or decreasing regular maintenance can change the frequency and patterns of use. Roads that provide the opportunity for pleasure driving should be pleasurable to drive on. Decreasing maintenance due to funding shortfalls means the intended comfort level may no longer be experienced on these roads, and over time, the roads might become unusable for certain vehicle types. The result could be that many users will choose the better-maintained roads, thereby increasing use pressure on those roads and the surrounding areas.

Increasing maintenance on Level 3 roads changes the use and increases user access and use levels. The potential to increase opportunities for roaded and unroaded recreation is dependent on funding and public input. Traditionally roads have been paid for and built to access timber sales or mining activities. If the public no longer supports these management activities, funding for road construction and maintenance would have to come from another source—recreation, for example. In other cases, existing road systems can be rehabilitated to help facilitate recreation by providing loop opportunities or access to trailheads.

The greatest potential impact that could result from implementation of recommendations in this roads analysis in a future Roads plan and NEPA document is the reduced roaded access to dispersed recreation sites along riparian areas, especially in the Wildcat Canyon country (i.e., Corral Creek, Metberry, Long Water, etc.). Current uses are contributing to resource impacts, and it is expected that primary actions will be to pull roaded access further back from riparian zones and to reduce road miles in riparian zones. For a majority of the project area, it is not expected that this action would reduce the capacity for dispersed recreation, but it would reduce the ability for vehicles to access the edge of creeks, rivers, and streams.

Opportunities to Address Potential Roaded Recreation Problems. Motorized users and mountain bikers can travel farther than hikers, but mountain bikers would travel shorter distances than motorized users on the same corridor. These distance factors need to be considered when converting roads to trails for recreation. Motorcycle trails are narrow, and riders prefer not to ride on old roads unless the roads have been turned into a single-track with ripping and/or rock placement. According to the American Motorcycle Association, a motorized trail needs to be at least 50 miles in length.

Prior to designating roads as single-use, it is important to understand that recreation requirements are not the same. There are numerous trail uses that can occur on both roads and single-track trails. Motorcycle riding, mountain biking, hiking, bird watching, and hunting are not dependent on dedicated single track trails, but each of these activities require varying degrees of safety, challenge, trail length, loop opportunities, and scenery.

Motorized recreation is a fast way to get through the backcountry, but users need to have a destination, such as a fishing hole or a variety of viewpoints. There are some users, however, who are content just driving around the forest at their own leisure on existing motorized roads and trails. The challenge of the ride is important. This is a use type where user ages vary from early teens to late sixties. Many OHV users spend time in favorite areas, especially where they are familiar with the road system and other nearby opportunities.

Motorized trails. Guidelines for designing a motorized trail system out of the Level 1 and 2 roads include:

- Consider the users and their preferences for features along the trail and at the end of the trail.
- Consider motorcycle riders' preferences for single-track trails, which can be developed by placing rocks or ripping through one of the lanes on a two-track road.

- Develop adjacent or connecting trail systems so users aren't loading and unloading multiple times during one day.

Non-motorized trails. Guidelines for opening and signing Level 1 and 2 roads for mountain biking, horseback riding, and hiking include:

- Look for opportunities to provide loop trails (long and short).
- Consider enhancing the opportunity with a view or a variety of terrain.
- Enlist the help of trail users when designing for these opportunities.
- Develop at least a pull-out parking lot, and sign with a map at the trailhead.
- Make mountain bike and horseback trails slightly longer (by two-thirds) than hiking trails.

RR(3): What are the adverse effects of noise and other disturbances caused by constructing, using, and maintaining roads on the quantity, quality, or type of roaded recreation opportunities?

Developing, using, and maintaining roads in the project area can affect roaded recreation by producing dust and noise. Though motorized recreationists tend to be more tolerant of these impacts than do non-motorized recreationists, these byproducts of road development and maintenance can still degrade the recreation experience. Where log-hauling activities and other fire rehab projects are underway, visitors are displaced into other parts of the forest. This could affect current users for an unspecified period.

RR(4): Who participates in roaded recreation in the areas affected by road constructing, maintaining, or decommissioning?

All forest users travel the arterial/collector roads (maintenance Level 3 through 5). Level 2 roads provide dispersed recreationists with access into otherwise inaccessible areas. According to the 2002 NVUM Report, most visitors to PSICC were male (65%), Caucasian (93%), and between the ages of 31 and 50 (51%). Roaded recreationists include the same type of users who access the unroaded areas: hunters, anglers, rock climbers, bikers, hikers, and horseback riders, as well as those who simply access the developed and dispersed recreation sites, such as campers and picnickers. OHV riding, four-wheeling, and dirt-bike riding are also extremely popular roaded recreation activities within the project area.

RR(5): What are these participants' attachments to the area, how strong are their feelings, and are alternative opportunities and locations available?

Attachment to the project area is very strong for local residents, regular users, and motorized/non-motorized recreationists, especially in the aftermath of the traumatic Hayman Fire. The project area is located on the Pike National Forest, which has the distinction of being one of 14 Urban National Forests because of its proximity to the estimated two million people living along the Colorado Front Range. For many, the area is considered part of their backyard because of this close proximity. Much of the area is known regionally and statewide for having challenging roaded terrain for Off-highway vehicles and four-wheel driving (4WD). Several of these "extreme" roads, including Hackett and Longwater, have been adopted for maintenance and education purposes by 4WD clubs from the Colorado Front Range. The Rampart Range Motorized Recreation Area is also known throughout the state for the many roaded recreation opportunities presented there. There are additional motorized recreation opportunities on other areas of the Pike National Forest, the San Isabel NF, the Arapaho and Roosevelt NF, and on the Rio Grande NF.

RR(6): How does the road system affect the Scenic Integrity? How is developing new roads, decommissioning of existing roads, or changing the maintenance of existing roads into unroaded areas affecting the Scenic Integrity?

See responses to RR(3) and RR(7).

RR(7): How does road management affect wilderness attributes, including natural integrity, natural appearance, opportunities for solitude, and opportunities for primitive recreation?

Roads and road use may negatively affect non-motorized recreationists, and some people have expressed an interest in wanting roads closed or decommissioned. Although they use roads to access trailheads into unroaded areas or wilderness areas, many users perceive roads to be a deterrent to healthy wildlife habitat or unacceptable contributors to stream sedimentation. They see these unroaded areas as critical to their individual, community, or ecosystem health.

High road density and open motorized access have always been public issues and concerns on the Pike National Forest. The project area includes a portion of the Lost Creek Wilderness and several roadless areas. The closure, presence, or addition of new roads and their management in proximity to wilderness areas can change the natural integrity and opportunities for solitude because of differences in vistas, amounts of noise and dust, and crowding. As mentioned in UR(2), the increasing presence of unclassified roads can also decrease wilderness attributes such as natural integrity, natural appearance, and opportunities for solitude and primitive recreation.

Social Issues (SI)

SI(1): Who are the direct users of the road system and of the surrounding areas? What activities are they directly participating in on the forest? Where are these activities taking place on the forest?

The direct users of the road system include government agency personnel, public recreationists, counties, commercial entrepreneurs, scientists, students, hobbyists, collectors, and most anyone who enjoys the atmosphere of a forest setting. People who use the Pike National Forest are not only local in proximity, but also come from across the country and around the world.

Administrative activities include construction and maintenance of forest facilities; BAER treatments in the burn area; management of forest land, including fire management, habitat improvement, watershed and fisheries improvement, and scientific study; land ownership allocations; law enforcement; and contract and permit administration, including special uses, outfitter guides, mineral extraction, timber harvest, grazing, and access to inholdings.

Recreation activities (activities on roads and trails) include pleasure driving, four-wheel driving, OHV riding, motorcycling, bicycling, hiking, cross-country skiing, snowmobiling, horseback riding, pack-animal hiking, destination recreation, picnicking, birding, collecting, backpacking, camping, hunting, fishing, and sightseeing.

Commercial activities include timber harvest, salvage harvest, thinning and planting of suitable lands, and special uses such as grazing on allotments, mining, and outfitter and guide activities.

People also use the road system to access specific places or sites that hold value culturally, spiritually, or historically. The ability to access these places is important, as is protection for sites.

Destination activities can occur anywhere on the forest (with snowmobiling limited to motorized winter areas). The other uses occur on the travel system.

The 1984 Forest Plan includes management area prescriptions with specific standards and guidelines for particular areas. Infrastructure standards and guides are listed for most prescriptions. Some limit certain modes of travel, while others allow all modes of travel. All summer motorized and mechanized forms of travel are restricted to designated routes for the entire forest.

SI(2): Why do people value their specific access to national forest and grasslands? What opportunities does access provide?

As stated in Forest Roads: A Synthesis of Scientific Information (USDA Forest Service, p. 60): "Almost all of the varied types of public recreational uses of National Forests depend in one way or another on roads for access. Whether, when, and where various recreational uses occur depend on the availability of access to—and the extent and location of—the road system. Altering this system is likely to have widespread and differing effects across different types of uses."

Of high value to people is the ability to recreate on the forest. In order to participate in most activities, people have to be able to get to certain places on the forest. Most recreation activities require road access to get to trails, access points, or places to recreate. Some forms of recreation require roads to actually partake in the activity (e.g. four-wheel driving, driving for pleasure). While access is valued, so are roadless and wilderness areas. (Forest Roads, p. 79)

For some, the value of access on the forest is directly related to personal income and jobs. Timber and non-timber production, grazing, outfitter-guide services, and special-use permits such as ski areas, are all ways people make money by using the National Forest. Many local businesses rely on tourists coming to the area to recreate on the Pike National Forest. This indirect effect is significant to some communities surrounding the Hayman burn area.

SI(3): What are the broader social and economic benefits and costs of the current forest road system and its management?

See responses to EC(1), EC(2), EC(3), SP(1), SU(1), RR(2), RR(5), SI(1), SI(2), and CH(3).

SI(4): How does the road system and road management contribute to or affect people's sense of place?

See responses to UR(3), UR(5), RR(2), RR(3), RR(7), and SI(2).

SI(5): What are the current conflicts between users, uses, and values (if any) associated with the road system and road management? Are these conflicts likely to change in the future with changes in local population, community growth, recreational use, resource developments, etc.?

See responses to UR(1), UR(2), RR(1), RR(2), RR(5), RR(7), CH(1), and CH(2).

Cultural and Heritage (CH)

CH(1): How does the road system affect access to paleontological, archaeological, and historic sites?

There are no known paleontological deposits located within the Hayman Roads Analysis area. In the event that a paleontological site(s) is discovered, the effects of roads, access, protection, and significance will be taken into account.

There are both prehistoric and historic sites located within the project area. The recording of these sites is associated with Cultural Resource project inventories. As sites are recorded, recommendations are made as to the site's eligibility for inclusion in the National Register of Historic Places (NRHP). The following designations are recommended: *not eligible* and *eligible*. (The eligible category also includes *need data, not determined,* and *never evaluated*.)

The Hayman Roads Analysis Project area was divided into 10 watersheds. In turn, each watershed was researched for known prehistoric and historic sites. The following table indicates the number of known sites that fall within the *not eligible* and *eligible* categories. The "Road" column indicates the number of known sites that are associated with or in close proximity to a road segment.

Watershed	**Not Eligible**	**Eligible**	**Road**
Cheesman Lake	10	23	9
Fourmile/Deckers	5	23	1
Goose Creek	2	6	2
Lower Lake George	16	5	4
Lower Trout Creek	10	15	1
Manitou Park		63	23
Tappan Mountain	21	7	5
Waterton/Deckers	11	45	2
West Creek	11	18	2
Wigwam Creek	7	14	1

Each site (historic, prehistoric) is unique to the cultural element that makes it eligible for inclusion in the National Register of Historic Places (NRHP). Associated negative elements such as roads, access, and distance from road and human impacts, are taken into consideration when recommending site protective measures. For instance, a developed road that goes through or adjacent to a site, with no visible cultural manifestations to the untrained eye, will most likely have no road or road access concerns. However, road maintenance outside of the roads corridor (e.g., replacement of culverts, drainage ditches) has the potential to impact sites. In those instances where cultural materials are visible to the untrained eye, protective measures may include the following recommendation: road closure, limiting access, signing restrictive area, or interpretation. As the complexity of road development decreases, the likelihood of impacting a site through road maintenance increases. In addition, monitoring NRHP-eligible sites will also assist in determining impacts and assist with making site protection recommendations.

CH(2): How does the road system affect cultural and traditional uses (such as plant gathering, and access to traditional and cultural sites) and American Indian Treaty Rights?

Traditional use (gathering and access to traditional and cultural sites) within the Hayman Roads Analysis area is not documented and is unknown. The indigenous people occupied this area up to 1880. It is probable and likely that small family groups pursue plant collecting and access traditional and cultural sites within the project area. However, these activities are not documented. It is also possible that at a later date this information may become available through consultation and data sharing.

The Ute Indians are the indigenous inhabitants of the Hayman Roads Analysis area. Other Indian groups lived on the plains at different times and made excursions into the Front Range of the Rocky Mountains. The 1600s found the Comanche living north of the Utes, separating them from the Wind River Shoshone. The Apache were located on the eastern plains. By the early 1700s, the Comanche were settled on the eastern plains, pushing the Apache to the south. The western movement of Euro-Americans displaced many Native American populations. For instance, by 1810 the Arapahoe and Cheyenne had established themselves on the eastern plains of the Front Range, displacing the Comanche to the south. It is also likely that during this time other nomadic or displaced Native American groups traversed and made incipient excursions into the Hayman Road Analysis area.

As Euro-American settlement continued, the eastern Ute Indians were beginning to be displaced. Eastern Ute lands were ceded by the treaty of 1868, which included about the western half of the state of Colorado and a portion of land located in the northeast corner of Utah. With the discovery of precious metals, which prompted the treaty of 1873, the Ute territory was once again forced to change. The Meeker Massacre of 1879 dramatically altered Ute lands and restricted their movement to three Ute Reservations: Uintah and Ouray, the Ouray Reservations in Utah, and the Southern Ute and Ute

Mountain Ute reservations in the southwest corner of Colorado. Ute lands were ceded by treaty and did not include treaty rights giving them access to resources within their traditional homeland.

Other Native American groups that traversed or made excursions into the analysis area do not have treaty rights within the Hayman Roads Analysis area.

CH(3): How are roads that constitute historic sites affected by road management?

Existing roads within the Hayman Roads Analysis area were developed prior to the establishment of the National Environmental Policy Act (NEPA) and the National Historic Preservation Act (NHPA) and were often grand-fathered in to forest system roads. Therefore, environmental and archaeological concerns were not taken into account prior to planning and construction. Many of the existing roads are associated with historic mining, logging, homesteading, and ranching. A few of these historic travel routes have been documented and recorded. The following is a list of roads that are associated with historic travel routes:

State Highway 126
State Highway 67, 5DA0364
FDR 560, 211, 5JF0364, South Platte Road
FDR 300, 5DA0961/.1, 5TL0347, Rampart Range Road
Co Rd 40, Nighthawk Hill Road
State Hwy 97, 5DA0364
Jeep Road
Metberry Gulch Road

These roads were loosely constructed within the boundaries of a previous route, leaving intact original segments of its historic predecessor. The maintenance of these roads, within their existing corridor, should have little effect on historic values. However, if the maintenance takes place outside of the road corridor (roadbed), the activity has the potential to affect historic and prehistoric cultural resources.

The National Historic Preservation Act (NHPA) directs that heritage resource concerns must be taken into account whenever there is expenditure of federal funds, issuance of licenses, permits, or contracts. In order to comply with this directive, the PSICC has a project request form ("Request for Cultural Resources Survey or Evaluation and Request for Biological Evaluation") that is submitted during the planning phase. This request sets in motion background research, determination of undertaking, heritage resource survey/documentation, and finding of concurrence by Programmatic Agreement or written concurrence by the State Historic Preservation Officer/Office of Archaeology and Historic Preservation (SHPO/OAHP).

Civil Rights and Environmental Justice (CR)

CR(1): Is the road system used or valued differently by minority, low-income, or disabled populations than by the general population? Would potential changes to the road system or its management have disproportionate negative impacts on minority, low-income, or disabled populations?

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires federal agencies to identify and address "…disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations …" In addition, Department of Agriculture agencies are required, per the Secretary of Agriculture's 1978 decision, to identify and address the civil rights implications of proposed agency actions in their management decisions.

The counties surrounding the Hayman burn area—Douglas, Jefferson, Park and Teller—have low minority representation and few households at or below the poverty level as described by 2000 Census information. It is unlikely that any transportation management decisions made for the burn area would have disproportionate negative effects on any low-income or minority population. Specific consultation with federal tribes would be conducted for any actions taken and would highlight concerns and issues that may impact tribal use of the area.

The Pike National Forest does not discriminate against any group of persons based on color, creed, abilities, nationality, or background. All persons are treated equally in policy and management of the National Forest. Travel management is no exception. The rules, standards, and laws that govern how the travel system is developed and used apply equally to all who use it.

The policy holds true for persons with disabilities. According to direction set forth in Section 504 of the Rehabilitation Act of 1973 (Janet Zeller, Interim National Accessibility Program Manager on Issue: Legal requirements re: accessibility and UDSA Forest Service Programs): "No otherwise qualified person with a disability in the United States shall, solely by reason of his disability, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance or under any program or activity conducted by any Federal Executive agency or by the United States Postal Service."

"Further the person with the disability must be able to achieve the purpose of the program or activity without modifications to the program or activity that fundamentally alters the nature of that program or activity' " (7CFR 15e.103(iii)(2)).

It should be noted that the term "reasonable accommodation" is only used in reference to employment. There is no such requirement for program access. There is no legal requirement to permit a person with a disability to use an OHV in any area that restricts or prohibits OHV use under the Forest Plan or the Forest Travel Plan/Transportation Plan.

Step 5 Describing opportunities and setting priorities

As a result of identifying key issues and associated analytical questions, the ID Team was able to examine the major uses and effects of the road system, including the environmental, social, and economic effects of the existing road system and the values and sensitivities associated with unroaded areas. What follows is a recap of the benefits, problems, and risks of the current road system and the anticipated risks and benefits of building roads into unroaded areas.

Can the maintenance requirements of the existing system be met with current and projected budgets?

One of the primary drivers of road reform is to bring the road system into balance with projected budgets. If maintenance needs exceed the funds projected to be available, the opportunities to reduce mileage in the system, reduce maintenance, increase the cost-efficiency of maintenance, or have someone else perform the maintenance (i.e., users) must be considered.

As noted in response EC(1) in Step 4 above, most of the roads within this project area were developed over the years for a variety of access needs and with considerable capital investments incurred to construct them. Funding levels needed to maintain and improve the Level 3, 4, and 5 roads is significantly less than adequate. The Pike National Forest needs to take advantage of options to increase revenue to address the shortfall of road maintenance funding.

Are some roads not needed to meet projected access needs?

Some roads currently part of the system may not be necessary to meet the access needs projected in current or revised forest plans. Most likely these are where land allocations have changed substantially since the road system was developed or where roads developed along routes of traditional use. Where excess roads exist they will be considered for decommissioning, or where effects are acceptable, they will be considered hydrologically self-maintaining to allow some use by forest visitors to continue.

If new access is proposed, what are the expected benefits and risks?

Existing Forest Plan direction may identify the need for road construction in additional areas to facilitate planned resource uses (e.g., proposed campground relocation). In 2004, an environmental assessment will be conducted to assess needs and evaluate locations for new campgrounds to replace those destroyed by the Hayman Fire.

Does this analysis indicate problems, risks, and opportunities that could lead to reconsideration of existing decisions? What opportunities exist to change the road system to reduce the problems and risks or to be more consistent with forest plan direction and strategic intent of the roads system?

Changing some road systems will be considered as a form of active ecosystem restoration rather than simply correcting existing problems. For example, seasonal or year-round road closures across a large area could create new refuge for species that require large habitat areas with minimal human disturbance. Alternatively, new road access might be used to attract forest visitors to less sensitive areas and reduce visitor pressure on more sensitive areas. Recreation priorities could also be served through such strategies. For example, new primitive or semi-primitive recreational opportunities could be created by implementing large area road closures.

Are additional roads or improved roads needed to improve access for forest use or protection, or to improve the efficiency of forest use or administration?

Access needs identified in existing or revised forest plans or in this analysis may not be fully met by the existing transportation system. New or reconstructed roads may be needed to meet access needs for National Forest management, range management, recreation, forest protection, fuels reduction, or monitoring.

What changes to the road system could be used to respond to the priorities identified?

Changes in response to identified priorities and opportunities could include, but are not limited to:

- changes in road maintenance level or schedule;
- upgrading or downgrading of road characteristics to match current objectives and uses;
- relocation of roads in high-problem or high-risk locations;
- individual road closures or area-wide road closures;
- traffic management;
- road decommissioning; and
- new road construction or reconstruction.

Where possible, individual opportunities should be aggregated into an integrated set of recommendations for changing the road system and its management. Opportunities identified in this analysis can be fed into planning, budgeting, and scheduling of forest programs of work, project-scale analyses, and land-management planning.

Road Management Strategy Recommendations

Given the specific benefits, problems, and risks noted, the ID Team and line officers have identified management opportunities and formulated technical recommendations that should prove helpful to those who will establish priorities for future projects. In addition to individual resource ratings (see appendices I through L on accompanying CD), overall ID team recommendations are identified in the "Road Maintenance Recommendations Spreadsheet" (Appendix G). These maintenance level recommendations are depicted visually on Map 2.

Appendix H is the road maintenance recommendations spreadsheet that was adjusted by the line officers to reflect new information provided by the districts. Additional local access needs for private lands, public utilities, mining interests, and other special uses permitted to be on National Forest Lands have been identified and are included here. Appendix H includes the final recommendations of the Hayman Roads Analysis Project.

In broad terms, the ID Team's recommendations for the 620 total miles of road evaluated within the Hayman Roads Analysis Project area are as follows:

Recommendation*	**Miles of Road**
Maintain as is:	341
Increase maintenance level:	40
Decrease maintenance level:	0
Implement seasonal travel restrictions:	31
Close year-round:	14
Decommission or convert to other uses:	193

**See Appendix B for definitions.*

Where maintenance work is required, recommendations call for either major or minor improvements.

- **Requires major improvement:** Work may include surfacing, realignment, relocation, installing bridges or major culverts, and so forth.
- **Requires minor improvement:** Work may include brushing, blading, spot rocking, adding or enhancing drainage structures such as drivable dips, water bars, ditches, ditch-relief culverts, and so forth.

Step 6 Reporting

In addition to identifying existing concerns and portraying current management opportunities, this roads analysis report provides supporting information important for making decisions about the future characteristics of the road system. As such, this information sets the context for developing proposed actions to improve the road system for future amendments and revision of forest plans. Likewise, it is hoped that the outcomes from this Hayman Roads Analysis Project will be useful for informing future projects, including NEPA-related assessments.

As for the process of this analysis project, ID Team members would like to make the following recommendations for future projects of this type:

- GIS should be used to acquire data and produce maps as quickly as possible.
- District Rangers should identify specialists to be responsible for all questions prior to the first team meeting.
- The project should be kept on the forest for local contacts and on-the-ground knowledge. Do not contract the project out.

- Where available, use regional specialists for methodology questions.

Appendices

Appendix A: Hayman Roads Analysis ID Team
Appendix B: Road Management Strategies
Appendix C: Risk/Value Rating Factors for Hayman Roads Analysis
Appendix D: Potential for Soil Erosion and Mass Movement
Appendix E: Glossary of Terms
Appendix F: Hayman Roads Analysis References
Appendix G: Road Maintenance Recommendations Spreadsheet
Appendix H: Road Maintenance Recommendations after Line Officer and District Review
Appendices I through L: Resource-specific rating spreadsheets (see accompanying CD)

Maps

Map 1: Hayman Burn Area Roads Analysis Locator Map
Map 2: Interdisciplinary Resource Team Classified Road Recommendations
Map 3: Hayman Roads Analysis Project Classified Road Density
Map 4: Hayman Roads Analysis Project Classified & Unclassified Road Density
Map 5: Hayman Roads Authorized Unclassified Roads

APPENDIX A: Hayman Roads Analysis ID Team

The core ID Team included the following individuals:

Member	**Responsibilities**
Dana Butler	Team Leader/Hydrology/Aquatic
Theresa Nallick	GIS Coordinator
Karen Mighell	Transportation Planner
Pat Hessenflow	Range
Steve Tapia	Wildlife
Curtis Fair	Traditional uses/Archeology
Bill Jackson	Recreation
Marla Merkel	Landline/Special Uses
David Donahue	Timber/Fuels/Vegetation Management
Teresa Wagner	Aquatic/Fisheries

In addition, the following individuals provided significant input for the project:

Steve Olson	Botany/Weeds
Terry McCann	Public Affairs
Ken Kanaan	Geology/Soils
Pete Gallagher	Fisheries
Kevin Laves	Wildlife
Gary Morrison	Road Engineer

APPENDIX B: Road Management Strategies

MANAGEMENT STRATEGIES

A. Maintain as is: Existing maintenance efforts are generally in balance with access needs; no resource impacts are identified that would warrant a change in maintenance levels.

B. Increase maintenance level: Access needs identified exceed existing maintenance efforts and/or resource impacts have been identified that indicate a need to perform maintenance at a higher level.

C. Decrease maintenance level: Access needs identified do not support maintaining road at current level. Resource impacts are low and do not require maintenance to continue at present level.

D. Implement seasonal travel restrictions: Access is generally needed during the snow-free season, but resource concerns indicate a need for implementing travel restrictions to mitigate negative impacts.

E. Close year-round: Access needs are low and are only necessary for administrative or project use. Road can be closed between projects. Resource concerns or maintenance budget limitations indicate a need to close road between project activities.

F. Decommission or convert to other uses: Full-sized vehicle access is no longer needed; road can be removed from the transportation inventory. Road can either be stabilized and returned to resource production or converted to other uses such as a motorized or non-motorized trail.

WORK REQUIRED

1. **Maintain on regular "annual" maintenance cycle:** Some maintenance items may be done once or more per year and some may be done every other year. The key is that maintenance is done on a regular recurring cycle.

2. **Maintain on "as needed" basis:** These roads are maintained "as needed" to correct safety and environmental deficiencies. They will generally only receive maintenance work once every five to 10 years.

3. **Requires major improvement or deferred maintenance project work:** Work may include surfacing, realignment, relocation, installing bridges or major culverts, and so forth.

4. **Requires minor improvement or deferred maintenance project work:** Work may include brushing, blading, spot rocking, adding or enhancing drainage structures such as drivable dips, water bars, ditches, ditch-relief culverts, and so forth.

APPENDIX C: Risk / Value Rating Factors for Hayman Roads Analysis

What follows are descriptions detailing the basis by which each resource specialist rated road segments according to the risk or value those road segments present for a particular resource.

RISK RATINGS

Aquatic Risk:

High (H)

The road segment is located on a confined valley bottom that frequently or continuously restricts channel migration, affects upland habitat and riparian habitat conditions, alters movement of water, accelerates erosion processes, interferes with recruitment of large woody debris, and/or provides access for motorized off-highway dispersed use within the floodplain, wetland, or riparian reserve. A high risk is one in which these factors affect riparian habitat conditions to the degree that riparian habitat will be degraded. The road is constricting streams so that floodplain connectivity and/or off-channel habitat are at risk. Road surface and/or fill slopes exhibit either erosion into streams, visible ditch erosion, cutslope erosion into ditches and sediment directly enters fish-bearing stream from ditch, fill slopes beginning to fail, evidence of accelerated mass wasting due to the sediment, and/or crossings with high potential for failure where failure of the prism will result in a large amount of sediment into at-risk fish habitat. Or, if culvert capacity is exceeded during storms, it is likely that the stream will travel down the road and deliver sediment to at-risk fish habitat, crossing or altering stream channel type downstream and/or causing downstream bank erosion.

Moderate (M)

The road segment is located on a moderately confined valley or unconfined bottoms with localized areas of road encroachment on stream channel and wetlands. Road segment is occasionally intercepting runoff, especially during peak events but generally not groundwater. Road segment is native surfaced or graveled, but no visible erosion; ditch relief culverts are not causing erosion of fill into streams; crossings are perpendicular to the stream and sufficient to pass the 100-year flood, or designed so that if they do fail only the road segment at the crossing fails. Crossings are not impacting channel morphology downstream or causing downstream bank erosion. There is no evidence of accelerated mass wasting due to the road segment. Road system is a contributor to fine sediment but is not believed to be a major contributor. Downstream stream reaches may be susceptible to damage from increase peak flows.

Low (L)

The road is not greatly impacting watershed function. Road segment is paved, not located in valley bottom, or is located on toe slope in confined valley bottom outside the 100-year floodplain and not interfering with floodplain functions. Crossings are bridged or sufficient to pass the 100-year flood and associated debris. Cut and fill slopes are vegetated and not eroding. Crossings are not impacting channel morphology downstream. Watershed is functioning appropriately for fine sediment.

Terrestrial Wildlife Risk:

High (H)

Wildlife risk is rated high where the road segment within the management area exhibits one or more of these characteristics:

- Pawnee Montane Skipper habitat (T)
- Proposed critical habitat for Preble's Meadow Jumping Mouse (T)
- With roads, elk calving area is below 40 percent potential habitat*
- With roads, elk winter range is below 40 percent potential habitat*
- With roads, mule deer primary winter range is below 40 percent potential habitat*

Moderate (M)
Wildlife risk is rated moderate where the road segment within the management area exhibits one or more of these characteristics:

- Mexican Spotted Owl suitable and designated critical habitat (T)
- Preble's Meadow Jumping Mouse suitable habitat (T)
- Canada lynx habitat
- With roads, elk calving area is greater than or equal to 40 percent potential habitat*
- With roads, elk winter range is greater than or equal to 40 percent potential habitat*
- With roads, mule deer primary winter range is greater than or equal to 40 percent potential habitat*
- Bighorn sheep winter range

Low (L)
Wildlife risk is rated low where the road segment within the management area exhibits one or more of these characteristics:

- Mule deer secondary winter range
- No intersection with TES (threatened or endangered species) or MIS (management indicator species)

*For Forest Management Indicator Species (e.g., elk, mule deer, bighorn sheep), the Forest Plan *minimum standard* is to manage at 40 percent of the potential habitat/carrying capacity of those species.

Botany Risk:
High (H)
One or more special habitats occur along the road segment, and there is a elevated concern about the future of this/these habitats because of one or a combination of the following factors:

- The special habitat is rare and therefore should be maintained for overall biodiversity and ecosystem health.
- Noxious weeds are present along the road segment that crosses or parallels the special habitat. Noxious weeds are known to exist within the special habitat and are considered "high risk" species.
- The value rating for recreation is high. The area receives an abundance of dispersed and/or developed recreation use to the point where habitat degradation is likely to be occurring or is known to occur. Dispersed and developed recreational use of the special habitat is high and is causing habitat degradation, such as soil compaction and vegetation trampling.
- The road segment travels through a relatively significant portion of the special habitat. The road may parallel the special habitat or travel through it to the point where it is likely that road impacts may be occurring.
- There are or may be cumulative impacts to the special habitat due to a variety of different recreational uses (e.g., the area is used by bicyclists, off-highway vehicles, horses, hikers, campers, etc.).
- Each TES plant population is considered important to maintain the long-term viability of the species. There may be several factors that contribute to this determination. For example, there may be a low number of known populations for the species, or the majority of known sites are at risk.
- The TES plant populations are small, fragmented, and vulnerable to habitat loss that may be occurring due to a combination of factors that can be linked to roads, such as noxious weeds, high recreation use, high road density, and so forth.

Moderate (M)
One or more special habitats occur along the road segment, and there is a slightly elevated concern about the future of this/these habitats because of a combination of factors:

- Noxious weeds are not known to occur within the special habitat but occur either along the road segment or occur along roads feeding into this road. Therefore, there is an elevated concern that the special habitat may be at risk from noxious weeds.
- The value rating for recreation is moderate. Dispersed and developed recreation use is occurring and is of some concern.
- The special habitat occupies a relatively large area along the road segment.
- The road segment contains a diversity of special habitats and therefore the concern is elevated due to this increased diversity.
- The road segment travels through a relatively significant portion of the special habitat.
- The TES plant population is a "protected" population in a Conservation Strategy and/or the population is considered important genetically for maintaining long-term viability of the species. However, the road is not necessarily degrading species habitat. There is a higher concern than low because it is an important population, but not enough to warrant a high-risk rating.
- Some level of habitat degradation is occurring that can be attributed to the road, but not enough to be considered a high risk.

Low (L)
One or more special habitats occur along the road segment, but it occupies a relatively small area along the road and/or the special habitat is not considered at risk because of one or a combination of the following factors:

- The special habitat is unique but relatively common in the watershed so that concern about road effects is reduced.
- Noxious weeds are currently not present; therefore, risk to the special habitat is low. The road segment is far enough away from high-density weed infestations to reduce the risk of noxious weed spread and establishment.
- The special habitat occupies a small area relative to overall road length. The habitat may be impacted by roads, but these impacts are relatively localized and small in scope.
- The road segment crosses through or near a very small portion of the special habitat.
- The value rating for recreation is low. Dispersed and developed recreation use is low or non-existent.
- The majority of known populations of TES in other locations are protected and therefore there are no long-term viability concerns for the species.
- The area has not been surveyed for TES plants, and there is some possibility and low-level concern that TES plant populations may occur along the road segment.

<u>Noxious Weeds Risk:</u>
High (H)
Risk is determined to be high due to one or a combination of the following factors:

- High-risk noxious weed species occur along the road segment.
- The road segment may not have weeds but is located relatively close to high-infestation areas; therefore it is likely that weeds will spread into this road segment.
- Recreation use is high.
- The road is a major arterial road with high traffic flow, resulting in a higher risk of spreading weeds.
- The road segment travels through an area that has a high fire risk in combination with a high-risk weed problem. If the area does burn, weeds will spread rapidly along the roads.
- The road segment has undergone previous disturbance, and weed populations already exist.
- The area has not been surveyed, and the risk is not known. However, the area has received a high amount of ground disturbance and contains private lands that have not been surveyed and are assumed to be uncontrolled; or, it is known that the private land noxious weed populations are not being treated and the land contains high-risk noxious weed species.
- There is high concern that noxious weeds exist in the area and will spread along the road system.

Moderate (M)
Risk is determined to be moderate due to one or a combination of the following factors:

- Weeds occur along the road segment, but the population is reduced and considered contained due to years of treatment.
- Medium traffic flow occurs along the road segment.
- Weeds do not occur along the road segment, but high-risk species are established on roads feeding into this road.
- The area has not been surveyed, and the risk is not known. However, the area has received a high amount of ground disturbance and contains private lands that have not been surveyed and are assumed to be uncontrolled; or, it is known that the private land noxious weed populations are not being treated. There is moderate concern that noxious weeds exist in the area and will spread along the road system.

Low (L)
Risk is determined to be relatively low due to one or a combination of the following factors:

- The road segment is relatively far away from large infestation areas.
- The species along the road segment or closest to the road segment is of relatively low risk.
- Recreation use and overall traffic is low or limited seasonally such that there is a relatively lower risk of weeds spreading and becoming established.
- A relatively small noxious weed infestation occurs along the road, is fairly stable and contained, and is not expected to spread (assuming that yearly treatment continues).
- There is low or limited potential habitat for the noxious weed species; therefore, the population is not expected to expand its size and range along the road segment.

Archaeology / Cultural Risk:
Each site (historic, prehistoric) is unique to the cultural element that makes it eligible for inclusion to the National Register of Historic Places (NRHP). Associated negative elements such as roads, access, and distance from road and human impacts, are taken into consideration when assessing risk and recommending site protective measures.

High (H)
As the complexity of road development decreases, the likelihood of impacting a site through road maintenance increases. In general, a higher risk of impact to historic and prehistoric cultural resources exists where those sites are associated with or adjacent to maintenance Level 1 and 2 roads.

Moderate (M)
As road development increases, risk of impact to historic and prehistoric cultural resources generally decreases, as long as development and maintenance stay within existing road corridors. However, where road maintenance is required outside of a road corridor (e.g., replacement of culverts, drainage ditches), the potential impact to a site increases. In those instances where cultural materials are visible by the untrained eye, recommendations for protective measures may include road closure, limiting access, signing restrictive area, or interpretation.

Low (L)
A developed road that goes through or adjacent to a site, with no visible cultural manifestations to the untrained eye, will most likely have no road or road access concerns. In general, a lower risk to historic and prehistoric cultural resources is associated with maintenance Level 3, 4, and 5 roads.

VALUE RATINGS

Recreation Value:

High (H)
Road provides primary access to recreational facilities/sites identified on the Pike National Forest Visitor's Map. Also includes popular dispersed sites/routes.

Moderate (M)
Road provides primary access to known dispersed camping sites, hunting areas, off-highway vehicle (OHV) routes, rock-climbing sites, day-use sites, or trailheads not listed on the Pike National Forest Visitor's Map. Moderate values were assigned to other dispersed recreation areas along roads with moderate summer and fall use.

Low (L)
Any open or closed road not included above. Additionally, low values were often assigned to roads that provided only seasonal dispersed recreation use.

Range Value:

High (H)
Road provides primary access into and within grazing allotments on the Pike National Forest. High values were assigned to roads that provided necessary access for permittees into and within grazing allotments.

Moderate (M)
Road provides secondary or additional access into and within grazing allotments on the Pike National Forest. Moderate values were assigned to roads that provided additional, but not necessary, access for permittees into and within grazing allotments.

Low (L)
Any open or closed road not included above. Additionally, low values were often assigned to roads that provided only seasonal access into grazing allotments.

Special-Uses Value (Non-Recreation):

High (H)
Public law requires that road access be provided.

Moderate (M)
Authorizations exist with few or no feasible alternatives to meet identified needs.

Low (L)
Short-term commitments exist that will expire, or authorizations can be replaced with suitable alternatives.

With regard to how the road system affects managing special-use permit sites, this assessment also includes roads currently permitted by special use authorization, areas where Alaska National Interest Lands Conservation Act (see glossary, Appendix E) applies, and Revised Statute (RS) 2477 roads (see glossary, Appendix E). The above criterion for non-recreation special uses was applied to all roads within the analysis area. Not all utility lines were considered in the analysis due to time constraints. Authorized unclassified roads have been identified on a separate map and were rated moderate, using the above criteria.

Vegetation Management Value:

High (H)
Arterial, collector, and local forest roads that provide primary access to forest lands inside the fire perimeter that are scheduled for fire restoration projects, including planting, release, and pre-commercial thinning. These are generally Level 2, 3, 4, and 5 roads.

Moderate (M)
Local forest roads that provide access to significant tracts of forest lands inside the fire perimeter that are scheduled for fire restoration projects, including planting, release, and pre-commercial thinning. These are generally Level 2 and 3 roads.

Low (L)
Any open or closed forest or unclassified road not included in the high or moderate ratings.

Timber Value:

High (H)
Arterial and collector forest roads that provide primary access to forest lands (both inside and outside the fire perimeter) and that have potential for future timber sales are considered of high value. These are generally Level 3, 4, and 5 roads.

Moderate (M)
Local forest roads located on main ridges and along main drainages that provide access to forest lands outside the fire perimeter, or forest lands with low burn severity that have potential for future timber sales are considered of moderate value. These are generally Level 2 and 3 roads.

Low (L)
Roads of low value include any open or closed forest or unclassified road not included in the high or moderate ratings.

Fuels Value:

Roads are one of our greatest fire suppression tools. Roads allow for rapid access for equipment and, in many instances, are used as fire breaks.

High (H)
Roads of high value include all roads under private, state, or county jurisdiction and all arterial, collector, and local forest roads that provide primary access to forest lands inside the fire perimeter and which are scheduled for fire restoration projects, including planting, release, and pre-commercial thinning. These are generally Level 3, 4, and 5 roads and Level 2 roads on ridges or with main access.

Moderate (M)
Roads of moderate value include local forest roads that provide access to significant tracts of forest lands inside the fire perimeter and which are scheduled for fire restoration projects, including planting, release, and pre-commercial thinning. These are generally Level 2 and 3 roads and Level 1 and 2 roads that provide primary access or better access than alternate routes and that provide access for prescribed fire management and/or are strategically located for potential fuel breaks.

Low (L)
Roads of low fuels value include any open or closed forest or unclassified road not included in the high or moderate ratings. These are generally Level 1 and 2 roads that are not needed for primary access or for prescribed fire access or use.

APPENDIX D: Potential for Soil Erosion and Mass Movement

TABLE 1: Potential Erosion Hazard Within Hayman Roads Analysis Project Area
The following table indicates the percentage of each of the 10 affected watersheds within the Hayman Roads Analysis Project area that fall into the *low, moderate,* and *high* potential erosion risk categories. (See AQ(3) in Step 4 of the report for erosion risk category descriptions.)

HUC 6	Potential Erosion Hazard	Miles	Percentage of HUC 6	Road Density*
Cheesman Lake	low	8.83	15%	
	moderate	26.82	47%	
	high	21.87	38%	
		Total: 57.52		**1.20**
Fourmile/Deckers	low	1.54	20%	
	moderate	2.67	35%	
	high	3.50	45%	
		Total: 7.71		**.73**
Goose Creek	low	2.29	12%	
	moderate	15.60	84%	
	high	0.73	4%	
		Total: 18.63		**1.43**
Lower Lake George	low	20.93	28%	
	moderate	31.13	42%	
	high	21.58	29%	
		Total: 73.63		**1.60**
Lower Trout Creek	low	15.58	20%	
	moderate	20.84	27%	
	high	41.98	54%	
		Total: 78.40		**1.48**
Manitou Park	low	41.10	52%	
	moderate	25.42	32%	
	high	12.67	16%	
		Total: 79.19		**1.58**
Tappan Mountain	low	24.02	50%	
	moderate	22.37	47%	
	high	1.60	3%	
		Total: 47.99		**1.48**
Waterton/Deckers	low	5.61	5%	
	moderate	45.66	40%	
	high	62.45	54%	
	unclassified	0.87	1%	
		Total: 114.59		**1.42**
West Creek	low	27.59	25%	
	moderate	63.13	57%	
	high	19.72	18%	
		Total: 110.44		**1.32**

Wigwam Creek	low		6.82	27%	
	moderate		15.27	61%	
	high		2.82	11%	
		Total:	**24.91**		**1.13**

GRAND TOTAL: 613.02

**Average density of roaded area within the watershed.*

APPENDIX E: Glossary of Terms

Alaska National Interest Land Conservation Act (ANILCA) of December 20, 1980: ANILCA provides for owners of non-federal land within the National Forest System to be provided adequate access to their land.

Arterial Road: Primary travel route that provides service to a large land area, usually connecting with public highways or other Forest Service arterial roads.

Classified Roads: Roads wholly or partially within or adjacent to National Forest System lands that are determined to be needed for long-term motor vehicle access, including State roads, county roads, privately owned roads, National Forest System roads, and other roads authorized by the Forest Service (36 CFR 212.1).

Collector Road: Road that serves small land areas and usually connects with Forest Service arterials or public highways. They collect traffic from local roads and terminal facilities.

Deferred Maintenance: Work that can be deferred without loss of road serviceability until such time as the work can be economically or efficiently performed.

Forest Roads: As defined in Title 23, Section 101 of the United States Code (23 U.S.C. 101), any road wholly or partially within, or adjacent to, and serving the National Forest System and which is necessary for the protection, administration, and utilization of the National Forest System and the use and development of its resources.

Local Road: Single-purpose road connecting terminal facilities to collectors or arterials.

Maintenance Levels. The level of service provided by a specific road and the maintenance required for that road, consistent with road management objectives and maintenance criteria.

- ***Maintenance Level 5:*** Roads that provide a high degree of user comfort and convenience. Normally are double lane, paved facilities, or aggregate surface with dust abatement. This is the highest standard of maintenance.
- ***Maintenance Level 4:*** Roads that provide a moderate degree of user comfort and convenience at moderate speeds. Most are double lane and aggregate surfaced. Some may be single lane. Some may be dust abated.
- ***Maintenance Level 3:*** Roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities. Typically low speed, single lane with turnouts and native or aggregate surfacing.
- ***Maintenance Level 2:*** Roads open for use by high-clearance vehicles. Passenger car traffic is discouraged. Traffic is minor administrative, permitted, or dispersed recreation. Non-traffic generated maintenance is minimal.
- ***Maintenance Level 1:*** These roads are closed. Some intermittent use may be authorized. When closed, they must be physically closed with barricades, berms, gates, or other closure devices. Closures must exceed one year. When open, it may be maintained at any other level. When closed to vehicular traffic, they may be suitable and used for non-motorized uses, with custodial maintenance.

Minimum Road System: The road system necessary to meet resource and other management objectives adopted in forest plans, to meet applicable statutory and regulatory requirements, and, to the extent practicable, to minimize the adverse environmental impacts associated with road construction, reconstruction, decommissioning, and maintenance. When identifying the minimum road system, responsible officials also must consider and be responsive to expected long-term road funding.

National Forest System Road: A classified forest road under the jurisdiction of the Forest Service. The term "National Forest System Roads" is synonymous with the term "forest development roads" as used in 23 U.S.C. 205.

Private Road: A road under private ownership authorized by an easement to a private party, or a road that provides access pursuant to a reserved or private right

Public Road: Any road or street under the jurisdiction of and maintained by a public authority and open to public travel (23 USC 101(a)).

Revised Statute (RS) 2477: Under the Act of July 26, 1866 (Revised Statute (RS) 2477; 43 U.S.C. 932), Congress granted rights-of-way for public highways and county roads constructed across public domain before the lands received National Forest status. Although the 1866 act was repealed by the Federal Land Policy and Management Act in 1976 (43 U.S.C. 1715), rights, which preexisted the establishment of the National Forest, are preserved.

Road: A motor vehicle travelway over 50 inches wide, unless classified and managed as a trail. A road may be classified, unclassified, or temporary (36 CFR 212.1).

Road Decommissioning: Activities that result in the stabilization and restoration of unneeded roads to a more natural state (35 CFR212.1)(FSM 7703).

Road Maintenance: The ongoing upkeep of a road necessary to retain or restore the road to the approved road management objective.

Road Management Objective: The purpose, use, operational, and maintenance level of a road based on resource management objectives and access and travel management objectives.

Road Reconstruction: Activity that results in improvement or realignment of an existing classified road as defined below:

- ***Road Improvement:*** Activity that results in an increase of an existing road's traffic service level, expansion of capacity, or a change in 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 (36 CFR 212.1).

Roads Subject to the Highway Safety Act: National Forest System roads that are open to use by the public for standard passenger cars. This includes roads with access restricted on a seasonal basis and roads closed during extreme weather conditions or for emergencies, but which are otherwise open for general public use.

Sixth-field Watershed: The Rocky Mountain Region (Region 2) of the Forest Service has adopted the hydrologic unit code (HUC) system developed by the U.S. Geological Survey that divides watersheds into a series of progressively smaller nested fields, with the first field representing the largest land area relative to higher-numbered fields in that watershed. Sixth-field watersheds are also called subwatersheds.

Temporary Roads: Roads authorized by contract, permit, lease, other written authorization, or emergency operation, not intended to be a part of the forest transportation system and not necessary for long-term resource management (36 CFR 212.1).

Unclassified Roads: Roads on National Forest System lands that are not managed as part of the forest transportation system, such as unplanned roads, abandoned travelways, and off-highway vehicle tracks that have not been designated and managed as a trail; and those roads that were once under permit or other authorization and were not decommissioned upon the termination of the authorization (36 CFR 212.1). The regulations at 36 CFR 223.37 require revegetation within 10 years.

APPENDIX F: Hayman Roads Analysis References

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APPENDIX G: Road Maintenance Recommendations Spreadsheet

Pages 55-62 include ID Team recommendations for maintenance to road segments within the Hayman Roads Analysis Project area.

The following keys may be helpful for interpreting these recommendations.

With regard to the "Road Ratings" columns:

- See Appendix C: "Risk / Value Rating Factors for Hayman Roads Analysis" for resource-specific descriptions of road ratings.

With regard to the recommendations column ("Recom"):

- **A** = maintain as is
- **B** = increase maintenance level
- **C** = decrease maintenance level
- **D** = implement seasonal travel restrictions
- **E** = close year-round
- **F** = decommission or convert to other uses

With regard to the work required column ("Work Req."):

- **1** = maintain on regular "annual" maintenance cycle
- **2** = maintain on "as needed" basis
- **3** = requires major improvement or deferred maintenance project work
- **4** = requires minor improvement or deferred maintenance project work

For full definitions of recommendations and work required categories, see Appendix B: "Road Management Strategies."