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Environmental Assessment

North Kaibab Ranger District Travel Management Project

Kaibab National Forest Coconino and Mohave Counties, Arizona



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Introduction

This Environmental Assessment (EA) has been prepared in compliance with the National Environmental Policy Act (NEPA) regulations contained in 40 CFR 1500-1508 and Agency policy in Forest Service Handbook 1909.15. Additional documentation that supports this EA may be found in the project record located at the North Kaibab Ranger District office in Fredonia, Arizona.

The EA describes the proposed project to improve the management of motorized vehicle use on National Forest System lands on the North Kaibab Ranger District (NKR D or district) of the Kaibab National Forest (KNF) in accordance with the Travel Management Rule (36 CFR 212, 251 and 261). The project will result in the publication of a Motor Vehicle Use Map (MVUM) showing those roads, trails and areas designated for motor vehicle use. After the MVUM has been released to the public, travel off the designated system will be prohibited unless authorized by permit or as allowed by the Travel Management Rule and the designated Responsible Official for the NKR D.

Document Structure

The district has prepared this EA in compliance with NEPA and other relevant federal and state laws and regulations. This EA discloses the direct, indirect, and cumulative environmental impacts of the proposed action and alternatives. The document is organized into four parts:

- **Chapter 1 - Purpose and Need:** The chapter includes information on the project area, the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the district informed the public of the proposal and how the public responded.
- **Chapter 2 – Alternatives:** This chapter provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on an interdisciplinary planning effort and issues raised by the public and other agencies during project scoping efforts. This discussion also includes possible mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.
- **Chapter 3 - Environmental Effects:** This chapter describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource area. Within each section, the affected environment is described first, followed by the effects analysis, including direct, indirect, and cumulative effects. The No Action Alternative provides a baseline for evaluation and comparison for the other alternatives to be compared to.
- **Chapter 4 - Consultation, Coordination and Literature Cited:** This chapter provides a list of preparers, persons and agencies consulted during the development of the environmental assessment.
- **Glossary of Terms & References:**
- **Appendices:** The appendices provide more detailed information to support the analyses presented in the environmental assessment.

Additional documentation and analyses of project-area resources are located in the project planning record located at the Kaibab National Forest, North Kaibab Ranger District Office and are available pursuant to the Freedom of Information Act.

Chapter 1 – Purpose and Need / Proposed Action

Background

On November 9, 2005, the Forest Service published final travel management regulations governing off-highway vehicles (OHV) and other motor vehicles on national forests and grasslands. These regulations amended part 212, subpart B of part 251, subpart A of part 261, and removed part 295 of Title 36 of the Code of Federal Regulations (CFR). Together, these regulations are referred to as the Travel Management Rule (rule). The rule was developed in response to the substantial increase in use of OHVs on National Forest System lands and related damage to forest resources caused by unmanaged OHV use over the past 30 years. The regulations implement Executive Order (EO) 11644 and EO 11989 regarding off road use of motor vehicles on Federal lands.

The rule provides for a system of roads, trails, and areas that are designated for motor vehicle use. The rule prohibits the use of motor vehicles off the designated system as well as use of motor vehicles on routes and in areas not consistent with the designations (36 CFR 212.50). Therefore, under the rule, forests that do not already restrict motorized travel to designated roads, trails, and areas must do so. The restriction on motor vehicle use off the designated system goes into effect once a forest has a designated system of roads, trails, and areas open to motor vehicle use and has published a Motor Vehicle Use Map (MVUM).

Regulation 36 CFR 212.51(a) states that the following vehicles and uses are exempted from these designations: (1) aircraft; (2) watercraft; (3) over-snow vehicles; (4) limited administrative use by the Forest Service; (5) use of any fire, military, emergency, or law enforcement vehicle for emergency purposes; (6) authorized use of any combat or combat support vehicle for national defense purposes; (7) law enforcement response to violations of law, including pursuit; and (8) motor vehicle use specifically authorized under a written authorization issued under federal law or regulations. Exemption 8 includes (but is not limited to) uses authorized under Forest Service written authorizations (i.e., permits) and includes uses such as access for range improvements, firewood cutting, gathering other forest products, maintenance of utility corridors (e.g., power lines, pipelines), etc.

Regulation 36 CFR 212.51(b) states that the responsible official may include in the designation the limited use of motor vehicles within a specified distance of certain designated routes, and if appropriate with specified time period, solely for the purposes of dispersed camping or retrieval of a downed big game animal by an individual who has legally taken that animal.

The KNF does not currently restrict off road motorized travel (except in a few areas) and there are no developed motorized trails or areas on the district. To implement the rule, the Kaibab National Forest Land Management Plan (Forest Plan or KNF Plan; 1988 as amended) must be amended to reflect the 2005 final travel management regulations.

This EA presents the results of the analysis of the direct, indirect, and cumulative environmental effects of the proposed action and alternatives to the proposed action.

This EA is not a decision document. It is a document disclosing the environmental effects of implementing the proposed action and alternatives to that action. This analysis is intended to assist the Responsible Official in making an informed decision on how best to implement the Travel Management Rule. That decision will be documented in a Decision Notice signed by the KNF Forest Supervisor and will be available to the public upon its completion.

Project Area Description

The NKRDR encompasses approximately 655,078 acres in Coconino and Mohave Counties in north-central Arizona, and is one of three ranger districts on the KNF. The NKRDR is not contiguous with other districts of the KNF. The district is bounded on the south by the North Rim of Grand Canyon National Park, and on the remaining sides by Bureau of Land Management areas. Kaibab Camper Village, a private RV campground, is the only private in-holding within the district boundary, though there are isolated tracts of Arizona state land and several permitted improvements on the district. The closest community to the NKRDR is Fredonia, AZ, 25 miles from the district boundary, with a population of approximately 1,300 people. Kanab, UT, eight miles north of Fredonia, has approximately 3,800 people. The closest large town is St. George, UT, about 85 miles away.

The district is situated in Townships 34, 35, 36, 37, 38, 39, 40, and 41 North, Ranges 1, 2, 3, 4 and 5 East, and Ranges 1, 2, 3, and 4 West (Gila and Salt River Base Meridian). Figure 1 shows the location of the district within the state as well as its neighboring forests and other ownerships. The Travel Management project analyzed in this assessment applies to the entire NKRDR.

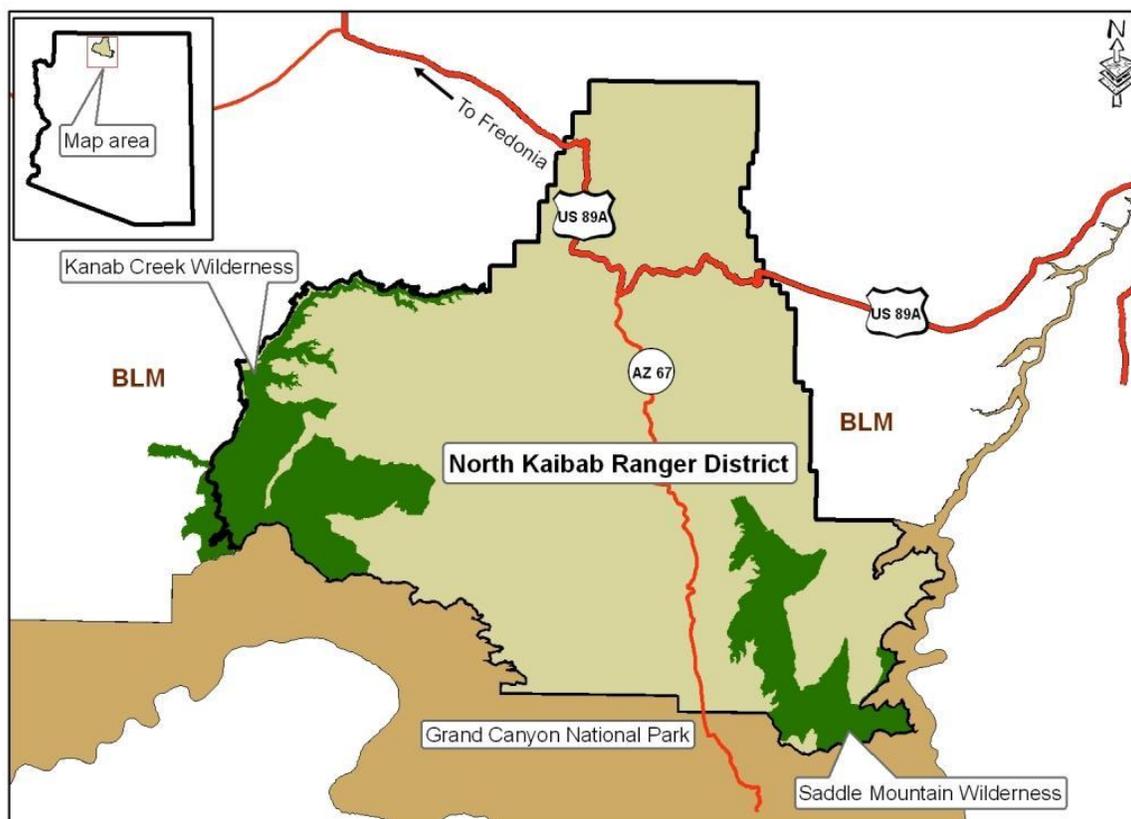


Figure 1. Vicinity Map of the North Kaibab Ranger District

The KNF Plan classifies the forest into distinct Geographic Areas (GAs), and Land Use Zones (LUZs). These designations identify resource objectives and guide management activities by establishing standards and guidelines for each of these areas. Additionally, the Plan includes Special Areas (SAs) that entail special management designations, some of which have been established by Congress or at various executive branch levels (e.g., wilderness areas). The district includes GAs 11, 12, 13, 16, 19, 20, 21, and 22. Figure 2 displays the classification of the NKRDR into these GAs, LUZs and SAs. Brief descriptions of these designations are provided below. For a full description and the management implications of these designations, please refer to the KNF Plan (Forest Service 1988, as amended).

Land Management Plan Areas North Kaibab Ranger District

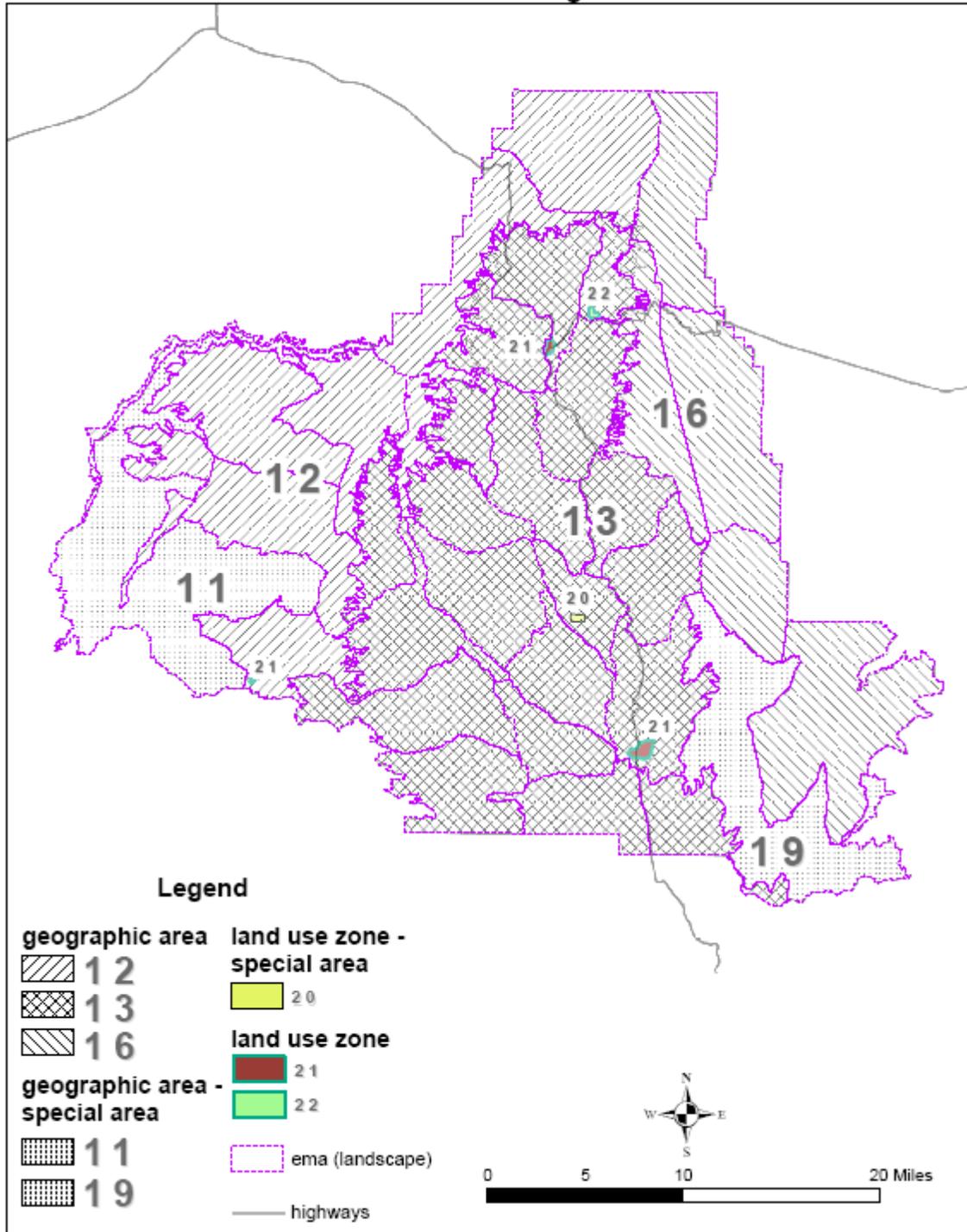


Figure 2. Geographic Areas, Special Areas and Land Use Zones of the NKR

Geographic Area 12: Western North Kaibab Woodland

This 146,480-acre management area includes portions of the western, northern, and eastern sides of the NKR and includes the west half of the woodland zone. This area is in the Kanab Creek, Coyote Wash,

and Houserock-Marble watersheds. It is an elevated plain dissected by numerous drainage systems and displaying karst topographical features such as solution basin, sinkholes, etc. Elevations range from 5,200 feet to 6,800 feet. Drainage systems are well-defined and flows are ephemeral. The annual precipitation ranges from 14 to 18 inches. Most of this area is dominated by woodland vegetative species and characterized by pinyon pine, cliffrose, and Utah juniper, with Gambel oak at higher elevations. The understory is mainly big sagebrush, snakeweed and rabbitbrush. The area is critical winter range for approximately 65 percent of the North Kaibab mule deer herd which depends heavily on the cliffrose, big sagebrush and the early spring grasses and forbs.

Geographic Area 13: Kaibab Plateau Forestland

This area includes 268,719 acres in the middle of the NKR. It is part of an elevated plain dissected by numerous drainage systems. Elevations range from 7,000 feet to over 9,000 feet. Drainage systems are well-defined and flows are ephemeral. Annual precipitation ranges from 18 to 30 inches. Ponderosa pine predominates in most of this management area, except at higher elevations and on cooler sites. Understory species include mutton bluegrass, blue grama, squirreltail, junegrass, *Carex* sp., and mountain muhly. Mixed conifer and spruce-fir vegetation cover a major portion of this area. Aspen is scattered throughout in pure stands and as a component of both the overstory and understory vegetation. In openings and thinned stands important forage producers are pine dropseed, mountain muhly, tall oatgrass, weeping brome, and smooth brome. The forb component includes yarrow, ragweed, columbine, sandwort and cinquefoil. In dense conifer stands, *Carex* sp. and the forb component is essentially the only understory vegetation.

Geographic Area 16: Eastern North Kaibab Woodland

This 131,221-acre management area includes the Buffalo Ranch and the extreme eastern side of the North Kaibab Ranger District. It includes portions of the Coyote Wash and Houserock-Marble watersheds. It is an elevated plain dissected by numerous well defined drainages. Water flows are ephemeral, except for several springs in the area. Elevations range from 5,200 feet to about 8,200 feet at Tater Point. Precipitation ranges from 14 to 18 inches per year. The majority of this area is dominated by woodland vegetation consisting largely of pinyon pine and Utah juniper. At higher elevations there are ponderosa pine stringers. The understory typically includes big sagebrush, snakeweed and rubber rabbitbrush. On rocky slopes, cliffrose is also common.

Geographic Area – Special Area 11: Kanab Creek Wilderness

Kanab Creek Wilderness consists of 68,340 acres in the western part of the NKR. The management area is typical of canyonland formations with steep scarp slopes and narrow drainage bottoms. Almost 80 percent of this area has slopes in excess of 40 percent. Elevations range from 3,500 feet to 6,000 feet. Climate in this area is semi-arid. It is characterized by hot dry summers, and cool moist winters. The hottest months are June and July and the coldest are December and January. Mean annual precipitation ranges from eight inches to 12 inches. Vegetation is dominated by the desert shrub blackbrush. Forage species are sand drop-seed, needle-and-thread and Indian ricegrass. In the drainage bottoms, riparian species are present, including cottonwood, desert almond, red bud and single-leaf ash.

Geographic Area – Special Area 19: Saddle Mountain Wilderness

This is the 40,610-acre Saddle Mountain Wilderness, located in the southeast section of the North Kaibab Ranger District. This area is within the Houserock-Marble watershed which is characterized by narrow drainage bottoms adjacent to steep and very steep ascending scarp slopes. Elevations range from 6,000 feet to over 8,000 feet. Annual precipitation varies from 16 inches at the lower elevations, to about 30 inches at the higher elevations. Vegetation is diverse, because of aspect, soils, elevation, and slope. In the lower areas pinyon pine-Utah juniper is dominant. Other species there include big sagebrush, cliffrose, blue grama, junegrass, squirreltail, and mutton bluegrass. In the higher elevations, mixed conifer prevails, including aspen, smooth brome, weeping brome, and pine dropseed. On steep south aspects the overstory component is dominated by Gambel oak with white fir, Douglas fir and ponderosa pine.

Land Use Zone - Special Area 20: Franks Lake Geologic-Botanical Area

The Franks Lake Geologic-Botanical Area consists of 145 acres at 8,550 feet elevation. It is located within the subalpine and montane conifer forest and represents a relatively undisturbed example of limestone sinks, or karsts. There are three such sinks within the geologic-botanical area. The easternmost sink is known as Franks Lake and contains a grassy meadow and small pond. Within the water, typical plants are bulrush, cattail, and pondweed. Grasses and grasslike plants are sedges, rushes and Kentucky bluegrass. The tree community is characterized by blue spruce, Englemann spruce, ponderosa pine, and quaking aspen.

Land Use Zone 21: Existing Developed Recreation Sites

This management area includes 1,556 acres that make up the 15 major existing public and private sector developed recreation sites and other smaller sites (trailheads, interpretive sites, etc.) on the Kaibab National Forest. Ponderosa pine is the predominate vegetation in this management area. Aspen and Gambel oak are present in some developed recreation sites usually as understory vegetation.

Land Use Zone 22: Proposed Developed Recreation Sites

This zone consists of 2,228 acres. The private sector has the capability to accommodate increased recreation demand associated with visitation to Grand Canyon National Park. Ponderosa pine is the dominant vegetation in most proposed recreation development sites.

Purpose and Need for Action

The purpose of this action is to improve the management of motorized vehicle use on National Forest System (NFS) lands on the NKRD of the KNF in accordance with the Travel Management Rule (36 CFR 212, 251 and 261). The action is needed to:

- **Amend the KNF Plan to prohibit motor vehicle use off the designated system of roads, trails, and areas on the district, except as displayed on the MVUM.** Currently, the KNF Plan allows for motorized travel off of forest roads. Amending the plan will bring travel management policies in compliance with the rule.
- **Reduce adverse resource impacts caused by roads and motorized cross country travel in order to maintain and restore the health of ecosystems and watersheds.** Some existing system roads are creating unacceptable resource damage while cross country travel has resulted in the creation of unauthorized roads, many of which can damage and/or provide unwanted motorized access to sensitive resources on the NKRD.
- **Specify the appropriate uses of motor vehicles on the designated road system and provide opportunities for motorized dispersed camping and motorized retrieval of legally taken big game animals.** These popular activities each present social and environmental implications that need to be addressed in the implementation of the rule. Road designations and the accommodation of recreation opportunities must meet the social, environmental, and safety criteria outlined in the rule. Cooperation with state agencies in achieving game and habitat management objectives while protecting forest resources is directed by the KNF Plan and other regional and national guidance.

Existing and Desired Conditions

Existing Conditions describe the current management situation and environmental conditions for each topic area. Desired Conditions describe the goals for travel management as defined by Forest Plan guidance, the Travel Management Rule and other regulations, as well as the public’s needs. The topic areas below represent broad-scale features associated with a district transportation system. Additional, resource specific existing and desired condition discussions can be found in *Chapter 3 – Environmental Effects*.

Road System

Existing Condition

Motor vehicles are used to access the forest and engage in a wide variety of activities on the NKRK. Additionally, forest visitors use the existing transportation system to support their lifestyle with activities such as firewood collection and hunting/game retrieval. Currently, motor vehicles may drive on any open road as well as access the forest interior by driving “cross-country” or off of forest roads, except where prohibited by existing off-road closure areas. These “motorized travel restricted” areas are closed to cross country travel to protect sensitive soil and vegetation, wetlands, wilderness areas, and non-motorized recreational opportunities. These areas have been closed by previous official Forest Orders and/or legislative actions (e.g., congressionally designated wilderness). Refer to the NKRK Travel Analysis Process report (Forest Service, TAP 2010) for details about existing off road closure areas.

The Forest Service uses five maintenance levels (ML) to classify roads, ranging from ML 1 indicating intermittent service roads closed to vehicular use, to ML 5, indicating roads that provide a high degree of user comfort and convenience (see Glossary). ML 3, 4, and 5 roads are those suitable for passenger cars. Some of these roads are dirt, some are gravel, and some are paved. ML 3, 4, and 5 roads are subject to the Highway Safety Act; therefore, they generally receive more maintenance than level 1-2 roads. This report will refer to passenger car roads (ML 3, 4, and 5 that a typical sedan could drive down) and high clearance roads (ML 2) that are maintained for high clearance vehicles.

Currently, there are approximately 3,343 miles of roads on the NKRK that are managed under Forest Service jurisdiction (see Table 1 below). Of these, approximately 1,491 miles of road are ML 1 closed to all vehicular use. The remaining roads total approximately 1,852 miles and are available for motorized use (i.e., ML 2, 3 and 4 roads) and are split out as follows: There are 1,588 miles of ML 2 roads and 214 miles of ML 3 roads currently on the NKRK. ML 4 roads total approximately 50 miles, including Forest Service Road 22 and paved areas within developed recreation sites. The NKRK does not have or manage any ML 5 roads. The majority of forest roads were originally established to support logging or ranching operations. Additionally, there are approximately 114 miles of roads that cross the NKRK that are not under Forest Service jurisdiction, and are managed by the State of Arizona. Table 1 below breaks down the existing road system on the NKRK by maintenance level classification, mileage and by percent of the total system. It should be noted that while roads not under Forest Service jurisdiction (i.e., will be important for describing the social and environmental impacts of the district road system, they will not be considered for management actions in this analysis.

Table 1. Existing Road System Mileage by Maintenance Level

Road Maintenance Level	Mileage	% of Total
Non-FS Jurisdiction ¹	114	n/a
Level 1	1,491	45
Level 2	1,588	48
Level 3 ²	214	6
Level 4 ²	50	1
TOTAL (FS – Jurisdiction)	3,343	100

¹ Non-FS Jurisdiction roads (i.e., paved highways AZ HWY 67 & US 89A) are managed by the Arizona Department of Transportation.

² For simplicity of analysis, roads which can accommodate passenger cars (i.e., ML3 and 4 roads subject to the Highway Safety Act) were grouped or treated the same regarding the Analysis of Alternatives.

In addition to the forest roads described above, the NKRD has seen the proliferation of unauthorized, or “user-created,” routes³. In most cases, these roads appear as “two track” roads that access popular areas for dispersed recreation (camping, hunting, horseback riding, etc.). These roads are not kept in the Forest Service roads inventory, and do not receive maintenance to ensure environmental impacts are minimized. The number of unauthorized routes continues to grow as more and more visitors use the area and drive vehicles off road.

Desired Condition

The rule directs the Forest Service to provide for a system of NFS roads, NFS trails, and areas on NFS lands that are designated for motor vehicle use and by class and time of year (if appropriate) (36 CFR 212.50). Part of the desired condition is that the district road system is the minimum system necessary to provide safe and efficient travel for the administration, utilization, and protection of NFS lands considering long-term funding expectations while ensuring that the identified system minimizes adverse environmental impacts (36 CFR 212.5 (b)). The Motor Vehicle Use Map (MVUM) greatly enhances visitor understanding and expectations related to motor vehicle uses on the district. The desired condition is a designated system of roads that is managed and sustainable, which accommodates motorized access needs consistent with the KNF Forest Plan and the 2005 Travel Management Rule. The Forest Plan contains the following guidance relevant to the road system:

- Protect and maintain wilderness character and quality by focusing administrative effort in heavily used areas and along wilderness boundaries (p.12).
- Provide and manage a serviceable road transportation system that meets needs for public access, land management, resource protection, and user safety (p.19)
- Identify and obliterate unneeded roads (p.51, 54)⁴

Motorized Trails and Areas

Existing Condition

There are no designated motorized trails on the district. However, there are 1,588 miles of ML 2 (high clearance) roads that provide challenging riding opportunities.

Per Arizona State Law beginning January 1, 2009 (Arizona SB 1167, 2008), forest roads managed at Maintenance Levels 3, 4, and 5 are subject to the Highway Safety Act and are considered maintained roads. These roads are open to travel by passenger cars. The State of Arizona requires that OHVs operating on such roads must be “highway-legal” (registered in the State of Arizona, drivers must be licensed and insured)⁵. Both unlicensed drivers on non-highway legal OHVs, as well as highway-legal vehicles, can be operated on high clearance roads (ML 2). This is referred to as Motorized Mixed Use.

Desired Condition

The OHV transportation system is within the district’s ability to manage (operate and maintain) and provides a variety of users with a safe and diverse experience while minimizing resource impacts (36 CFR 212.55 (b)). The Forest Plan also contains the following relevant guidance:

³ 36 CFR 212.1 Defines an unauthorized road or trail as: A road or trail that is not a forest road or trail or a temporary road or trail and that is not included in a forest transportation atlas.

⁴ Road obliteration projects are not proposed in this analysis. Identified unneeded roads may be proposed for obliteration in future planning efforts and will be subject to appropriate NEPA regulations.

⁵ For more information about the Arizona OHV program, contact local Arizona Game & Fish Department or go to <http://www.pr.state.az.us/partnerships/ohv/OHVindex.html>

- Maintain a variety of Forest Trails, considering people's needs and desires for horseback and foot travel, winter sports, and motorized and challenge and adventure opportunities for the handicapped (p.17).
- Manage OHV use to provide OHV opportunities while protecting resources and minimizing conflicts with other users (p.18).

Motorized Travel Exemptions

Regulation 36 CFR 212.51 (a) states that the following vehicles and uses are exempted from the travel designations under the rule: (1) aircraft; (2) watercraft; (3) over-snow vehicles; (4) limited administrative use by the Forest Service; (5) use of any fire, military, emergency, or law enforcement vehicle for emergency purposes; (6) authorized use of any combat or combat support vehicle for national defense purposes; (7) law enforcement response to violations of law, including pursuit; and (8) motor vehicle use specifically authorized under a written authorization issued under Federal law or regulations. Exemption 8 includes uses such as access for range improvements, firewood cutting, gathering other forest products, ceremonial gathering by tribes, outfitter and guide services, maintenance of utility corridors, administrative use by other state or federal agencies, and special use permit events.

Existing Condition

Approximately 83% of the district is currently open to cross country vehicle travel. The uses described under the exemptions (above) currently occur where travel has not been restricted by previous decisions, legislation, and Special Orders (e.g., firewood cutters can travel cross country anywhere travel is not restricted); some uses occur on a limited basis by permit only.

Desired Condition

The district provides access for those vehicles and uses exempt from the designation under 36 CFR 212.51. In general, authorizations under Exemption 8 would emphasize motorized use on existing roads and motorized trails as much as possible. The gathering of forest products is managed by the KNF product permit system (e.g., fuelwood permits). Tribal access is facilitated through free permits or other written authorization. This analysis for TMR designations will not address activities under permit and other authorizations.

Motor Vehicle Use for Dispersed Camping

The use of motor vehicles off system roads to access campsites is a popular activity on the district. The rule allows that the Responsible Official "...may include in the designation the limited use of motor vehicles within a specified distance of certain designated routes, and if appropriate within specified time periods, solely for the purposes of dispersed camping..." (36 CFR 212.51 (b)). This allowance is optional and at the discretion of the Responsible Official.

Existing Condition

Motorized dispersed camping occurs throughout the district, particularly during hunting season and summer holiday weekends. A majority of this camping occurs in areas along main NFS roads that have a close proximity to recreation opportunities, views, trails and/or water. Motorized dispersed camping typically occurs in the same areas year after year because they are in desirable locations and are easily accessed. Most motorized dispersed camping sites are within 300 feet of existing roads.

Desired Condition

The district provides motorized dispersed camping opportunities consistent with the Travel Management Rule (and other direction), where safety issues, resource impacts, user conflicts or other management objectives are not of concern. Forest Plan guidance for managing motorized dispersed camping includes:

- Manage a wide spectrum of desired settings that provide opportunities for the public to engage in a variety of developed and dispersed recreational activities, in concert with other resource management and protection needs (p.17).

Motorized Big Game Retrieval

The rule allows that the Responsible Official may allow the limited use of motor vehicles within a specified distance of certain designated routes, and if appropriate, within specified time periods solely for the purposes of...“retrieval of a downed big game animal by an individual who has legally taken that animal” (36 CFR 212.51 (b)). This allowance is optional and at the discretion of the Responsible Official. It applies only to the retrieval of a downed animal; motorized off-road travel for other hunting activities such as scouting or accessing a favorite hunting site would be prohibited by the rule. Any game retrieval that is not specifically allowed in the decision would require non-motorized methods.

Existing Condition

In areas that are not “motorized travel restricted,” motorized vehicles are allowed to travel off-road for the purpose of retrieving any downed game animal. The NKRD includes Game Management Units 12A East and 12A West and offers a range of hunting opportunities for a variety of game species. Of these, mule deer are most popular and are closely tracked by game managers. Table 2 summarizes Arizona Game and Fish Department’s (AZGFD) big game harvest data from 2009. Shown in the table are the total big game animals (by species) harvested from the Game Management Units located on the district and the estimated number of those harvests that used motorized cross country travel for retrieval. It should be noted that, although no elk were harvested in Unit 12A in 2009, elk permits are available annually.

Table 2. Summarized total big game harvests from the NKRD in 2009 and the estimated number of harvests using motorized means of retrieving game⁶

Big Game Species	Total number of animals harvested in Units 12A East and 12A West	Estimated number of motorized big game retrievals on the NKRD
Mule Deer	1020	918
Bison	38	34
Elk	0	0
Total	1058	952

Desired Condition

The district provides for the limited use of motor vehicles within a specified distance of certain designated system roads for the purposes of retrieval of a downed big game animal by an individual who has legally taken that animal consistent with the rule, and other state and federal laws and regulations. Forest Plan direction concerning hunting and game retrieval is as follows:

- Provide a wide mix of outdoor recreation opportunities, including hunting and fishing, which range from primitive to urban, and that can respond to local and regional demands for water, forage, wildlife habitats and wood products (p.17).

⁶ The total estimated number of retrievals assumed that 90% of hunters used motorized cross country travel to retrieve their game and accounted for the proportion of the hunting unit that falls on the NKRD. For example: Total deer harvest from Unit 12A is 1,020; 1,020 *.90 = 918 deer harvests used motorized game retrieval on the NKRD. Source: AZGF 2010.

- Cooperate with AZGFD to achieve management goals and objectives specified in the Arizona Wildlife and Fisheries Comprehensive Plan. Support the Arizona Game and Fish Department in meeting its objectives for the state (p.18).

Proposed Action

To meet the Purpose and Need for Action (see page 6 above), the North Kaibab Ranger District proposes the following actions⁷:

- Amend the KNF Forest Plan to prohibit motorized travel off of designated routes on the district, except as identified on the MVUM. (Note: Under the Proposed Action approximately 1,476 miles of road would be open to the public.)
- Close 376 miles of system roads to motorized use.
 - Eliminate vehicular traffic on 337 miles to all traffic, including administrative use.
 - Change the use and restrict 39 miles, of the 376 miles of open roads being closed, to administrative use only (i.e., for use by the Forest Service to monitor and carry out day-to-day resource management activities, as needed).
- Add 16 miles of unauthorized routes to the system as ML 2 roads. These are short spur routes that have historically served as access to recreation opportunities such as dispersed camping on the district (see Alternative 2 map).
- Allow the limited use of motor vehicles on all system roads (except where prohibited), 1 mile off either side, to allow motorized cross-country travel in order to retrieve a legally harvested elk or bison during any hunting season.
 - ✓ Legally harvested elk or bison may be retrieved during the appropriate season as designated by the AZGFD, and for 24 hours following each season.
 - ✓ Only one vehicle would be allowed for retrieval of each harvested animal.
 - ✓ One trip would be used to accomplish the retrieval, and the route taken is to be safe and relatively direct, minimizing negative resource impacts.
 - ✓ Motorized big game retrieval (MGBR) would not be allowed in any existing off-road travel restricted area, or when conditions are such that travel would cause negative resource impacts.
- Designate corridors of 300 feet from either side of 99 miles of specified roads for the sole purpose of motorized dispersed camping (see Table 3)⁸.
- Designate corridors of 100 feet from either side of 104 miles of specified roads for the sole purpose of motorized dispersed camping (See Table 3)⁸.

Kaibab Forest Plan Direction

In addition to the specific directives listed above, the Kaibab National Forest Land Management Plan (Forest Plan, as amended, 1988) provides general guidance on managing the district transportation system and natural resources:

- Protect and enhance the scenic and aesthetic values of the KNF (p.12).
- Identify and protect areas that contain threatened, endangered and sensitive species of plants and animals (p.18).

⁷ Updates were made to the road system databases since the release of the proposed action. This analysis is consistent with those roads and segments identified in the original proposed action, but mileage values have been updated to more accurately reflect current conditions.

⁸ Corridors are proposed in areas that have complete surveys by all relevant resource specialists. The 100-foot and 300-foot corridors are a reflection of those surveys; in areas where 300-foot widths have cleared surveys, the FS has proposed 300-foot corridors. Where only 100 feet of survey have been completed on each side of a road, the FS has proposed 100-foot corridors.

- Maintain soil productivity and watershed condition. Protect wetlands and floodplains (p.19, 50, & 53).
- Manage specially designated areas according to the enabling orders and protect their special qualities (p.23).
- Prevent any new noxious or invasive weed species from becoming established (p.20).
- Road or trail building in Mexican spotted owl protected activity centers should be avoided (p.23).
- Provide integration and coordination for transportation in land and resource management planning and with other Federal, State, County and other transportation authorities (p. 51 & 54).
- Establish off-road vehicle [ORV] closures as needed to maintain other resource objectives. Manage ORV use to provide ORV opportunities while protecting resources and minimizing conflicts with other users (p.18).
- Provide and manage a serviceable road transportation system that meets needs for public access, land management, resource protection, and user safety. Provisions are made for the construction and reconstruction, maintenance, seasonal and special closures of Forest roads, and obliteration of unnecessary roads (p.19).
- Manage road densities at the lowest level possible to minimize disturbance in Goshawk nest areas (p.31).
- Close project-specific areas to off-road vehicle traffic; refer to ORV Map for location of closure areas, and ROS Map for location of SPNM [semi-primitive non-motorized] areas (p.73).
- Monitor off-road vehicle (ORV) use during scheduled patrols and revise the ORV plan to prevent resource damage and user conflicts. Provide adequate off road vehicle (ORV) signing to advise the public of motorized restrictions (p. 69-70)

Decision Framework

As the Proposed Action includes a Forest Plan Amendment, the Responsible Official for this project is the Forest Supervisor. Based on the purpose and need for action, the findings of this analysis and the consideration of the best available science, the Forest Supervisor will decide:

- Whether to select the proposed action or one of the alternatives;
- Whether to, and to what extent, allow the limited use of motorized vehicles within a specified distance of certain designated routes for the purposes of dispersed camping and/or big game retrieval;
- What mitigation and/or monitoring measures will be required during implementation of the proposed action or any alternative selected;
- The language and content changes to the Kaibab National Forest Plan, or;
- Whether further analysis is needed through the preparation of an Environmental Impact Statement (EIS).

Public Involvement

Prior to initiating this Environmental Analysis, the NKRDR prepared a Travel Analysis Process report (TAP) to analyze the existing road system and make recommendations for travel management planning. The TAP compiled resource specialist analyses of the risks and values associated with the district transportation system. During the analysis process, we held a public meeting on October 29, 2009, in Kanab, UT to solicit public input on transportation planning. In addition to that meeting, we held meetings with several interest groups, local government officials, and interested individuals. Most of these meetings were open to the public.

The district gathered input from the public, Tribal governments and immediately-affected Tribal communities, and other agencies. Based on the input received, we adjusted the preliminary road system, and this became the Proposed Action (PA) for the NKRDR Travel Management project.

The public involvement efforts in the TAP revealed a desire for more than just the recommended changes to the road system to be addressed in this environmental analysis. It became evident that many members of the public wanted the district to allow motorized dispersed camping as part of the proposed action. The Forest Service identified areas and roads that historically serve as access to dispersed campsites and incorporated them into the proposed action. It also became evident that many members of the public wanted the district to allow motorized big game retrieval (MBGR) as part of the proposed action. Opinions on this topic were wide-ranging, though. Some people wanted it for all species, some wanted it for only a couple of species, and some felt that MBGR should not be allowed at all. In an effort to provide a compromise on the topic, the Responsible Official included the allowance for MBGR for elk and bison only in the proposed action. This was based on consideration of the ability to pack an animal out (elk and bison pose the greatest challenge), on the need to reduce the impacts from cross-country travel, and on the need to meet management objectives outlined in the Forest Plan.

On October 1, 2008, the NKRD Travel Management Project was first published in the Forest Service's Schedule of Proposed Actions (SOPA); it has been listed and updated in each quarterly report since then. Public scoping on the EA was initiated with the release of the Proposed Action on March 22, 2010. The proposed action was mailed to interested public, stakeholder groups, state and local agencies, various user and environmental groups, and Native American Tribes. Written (mail/email) and verbal (in person/phone) comments were accepted through April 23, 2010. During this time, we held public workshops in Fredonia, AZ, Kanab, UT, and Page, AZ, to provide the public with information about proposed travel management actions and receive comments and address concerns. In addition, we participated in seven meetings with local governments that were open to the public and 11 meetings with interested groups. Public input received through scoping and the previous public input efforts were used to identify issues and concerns with Travel Management Planning.

For a summary of the Tribal consultation and a description of Tribal concerns see Chapter 4.

Issues

Issues serve to highlight effects or unintended consequences that may occur from the proposed action and alternatives, giving opportunities during the analysis to reduce adverse effects and compare trade-offs for the decision maker and public to understand (FSH 1909.15, 12.4). An issue is not an activity in itself; instead, it is the projected effects of the activity that create the issue.

The Forest Service reviewed the 22 comments received with regard to the Proposed Action. Each comment received during scoping was considered and evaluated to determine whether the concern(s) were already resolved through land use designations, implementation of Forest Plan standards and guidelines and Best Management Practices (BMP's), project-specific design criteria or mitigation measures, through processes or analyses routinely conducted by the Interdisciplinary Team (IDT or ID Team), or beyond the scope of the project. All concerns that fell within these categories were considered resolved. Tribal concerns identified through the consultation process were resolved (See Chapter 4).

Concerns that would have to be addressed through spatial location of activities or concerns that would drive (or partially drive) an alternative were considered unresolved. These unresolved concerns were developed into key issues. Key issues are used to develop and compare alternatives, prescribe mitigation measures, and analyze the environmental effects.

Four key issues were identified. They are presented below, along with the indicator(s) of each issue. Indicators that are quantifiable and linked to cause-and-effect relationships are used to compare the effects among alternatives.

Issue #1: The proposed action would allow for motorized dispersed camping corridors in several areas across the district, potentially leading to additional resource damage in those areas.

The analysis for this project clearly delineates the effects of motorized dispersed camping corridors on social and ecological resources. Alternative 3 was developed in part to address this issue. It responds to concerns regarding the extent of motorized access on the district within the proposed action. Alternative 3 would not allow for motorized dispersed camping corridors.

Indicators: a) Acres available to motorized dispersed camping, b) Motorized dispersed camping and recreation access opportunities

Issue #2: The proposed action would prohibit motorized big game retrieval for mule deer, thus restricting motorized recreation opportunities for hunters.

The proposed action would allow for motorized retrieval of elk and bison only. The environmental analysis considers the effects of motorized big game retrieval for legally harvested animals. Alternative 4 was developed to address concerns regarding the absence of mule deer retrieval in the proposed action.

Indicator: Allows for motor vehicle use to retrieve a legally taken and tagged mule deer

Issue #3: The proposed action would allow motorized big game retrieval, creating opportunities for additional resource damage away from roads in large areas across the district.

The proposed action could potentially allow for impacts to sensitive resources as individuals leave roads in order to retrieve legally harvested elk or bison. The analysis includes descriptions of effects of motorized big game retrieval. Alternative 3 does not include motorized big game retrieval in any form, in order to address this issue.

Indicator: Provides for motorized big game retrieval opportunities

Issue #4: The proposed action does not close enough miles of road to protect wildlife and plant habitats.

The analysis for this project explains the comparative effects of maintaining open road systems of varying miles. Included among comments was a list of additional recommended closures along with the reasons for these recommendations. Roads from this list whose stated reasons meet the purpose and need of this project are analyzed as closed under Alternative 3.

Indicators: a) Miles of closed roads, b) Average forest-wide open road density

Chapter 2 – Description of Alternatives

Introduction

This chapter describes the alternatives developed to meet the purpose of and need for action and address the key issues identified in Chapter 1. The proposed action and alternatives, including the no action alternative, are described and compared. A total of four alternatives were developed in detail for this analysis. This chapter also provides a summary of the environmental consequences of the alternatives as described in Chapter 3.

Process Used to Develop the Alternatives

An interdisciplinary team (listed in Chapter 4) considered the elements listed below when they developed the Alternatives for this analysis:

- The purpose of and the need for this project identified in Chapter 1.
- Key issues identified in Chapter 1.
- The goals, objectives, and desired conditions for the analysis area as described in the Forest Plan for the Kaibab National Forest.
- Comments and suggestions made by the public, tribes, the state, and other agencies during the scoping process.
- The laws, regulations, and policies that govern land management on National Forests.
- Site-specific resource information.

Alternatives Analyzed in Detail

Four alternatives were developed in detail for this environmental analysis process. Each “action alternative” (i.e., Alternatives 2, 3, and 4) was designed to be a viable alternative. An additional alternative was considered but eliminated from detailed study. It is presented at the end of this chapter, with the reasons for not developing it in detail.

The alternatives presented below represent a range of reasonable alternatives, given the purpose and need and key issues for the proposed action.

The open road system proposed under Alternatives 2, 3, and 4 was developed in accordance with the TAP report developed for the NKR (Forest Service, TAP 2010). The TAP identified the minimum road system needed for the administration, utilization and protection of the NKR and incorporated a wide range of public input (Refer to “Public Involvement” and “Issues”, EA, pp 12-14). This identified system was used to form the basis for the road system proposed in Alternatives 2, 3, and 4, though some changes were made based on further resource analysis and public input on the Proposed Action (PA).

The road system identified in each of the action alternatives is aimed at meeting the requirements of the Travel Management Rule while providing access to a range of recreational opportunities required by a variety of user groups and protecting sensitive natural and cultural resources.

Alternative 1 – No Action

The “no action” alternative was developed as a benchmark from which we can evaluate the proposed action and alternatives. The no action alternative would continue the current management of the district transportation system. This alternative would not implement the TMR, nor would it restrict motor vehicle use or make any changes to the transportation system. Motorized cross-country travel would continue to be allowed, except in the areas currently closed to off road vehicle travel; existing roads would remain open and unchanged. Motorized dispersed camping and motorized big game retrieval would continue to be allowed across the district. Unauthorized routes would continue to be available for

public use, and would likely increase in number. A Forest Plan amendment would not be included under the no action alternative to prohibit cross country travel, and plan language would remain unchanged. Directions to view maps showing the existing road system that would be maintained under the no action alternative are listed in Appendix 3.

The no action alternative serves as a baseline for comparison of the other alternatives.

Alternative 2 – Proposed Action

To meet the purpose and need for change, the following actions are proposed under Alternative 2:

- Amend the KNF Forest Plan to prohibit motorized travel off of designated routes on the district, except as identified on the MVUM. (Note: Under the Proposed Action approximately 1,476 miles of road would be open to the public.)
- Close 376 miles of system roads to motorized use.
 - Eliminate vehicular traffic on 337 miles to all traffic, including administrative use.
 - Change the use and restrict 39 miles, of the 376 miles of open roads being closed, to administrative use only (i.e., for use by the Forest Service to monitor and carry out day-to-day resource management activities, as needed).
- Add a total of 16 miles of unauthorized routes to the system as roads. These are several short routes that provide access to campsites and other activities. (Note: include in the 1,476 miles of road to remain open to the public.)
- Permit one trip in and out, (up to 1 mile off either side of an open road) for the sole purpose of motorized retrieval of a legally harvested elk or bison during any designated hunting season. This does not apply to areas where cross country motorized travel is prohibited such as designated roadless areas or sensitive areas (i.e., meadows).
- Designate corridors of 300 feet from either side of 99 miles of specified roads for the sole purpose of motorized dispersed camping (see Table 3).
- Designate corridors of 100 feet from either side of 104 miles of specified roads for the sole purpose of motorized dispersed camping (see Table 3).

Table 3. Roads with proposed dispersed camping corridors

Roads with Proposed 300 ft. Dispersed Camping Corridors				Roads with Proposed 100 ft. Dispersed Camping Corridors			
200F	258	417	640	200B	225H	274C	429F
225	258A	417B	640C	203	228	274D	454
225A	258B	418P	640H	205B	255	274E	462A
225F	258C	422P	641U	207	272A	274F	753
246	258K	461G	757	209	272C	275	769
246T	260	461H	761	218	274	416	769A
247	261	482	800	218A	274A	425A	773
248F	262C	487	800K	225	274B	425B	4189
252B	265	522	4169				
257	272D	628	4171				
257E	279	633D	4188				
257G	415F						

Alternative 3

Alternative 3 responds to Issues 1, 3, and 4. To meet the purpose and need for change, the following actions are proposed under Alternative 3:

- Amend the KNF Forest Plan to prohibit motorized travel off of designated routes on the district, except as identified on the MVUM. (Note: Under Alternative 3 approximately 1,386 miles of road would be open to the public.)
- Close 466 miles of system roads to motorized use.
 - Eliminate vehicular traffic on 427 miles to all traffic, including administrative use.
 - Change the use and restrict 39 miles, of the 466 miles of open roads being closed, to administrative use only (i.e., for use by the Forest Service to monitor and carry out day-to-day resource management activities, as needed).
- Add 16 miles of unauthorized routes to the system as roads. These are short spur routes that provide access to campsites and other recreation opportunities. (Note: include in the 1,386 miles of road to remain open to the public.)

Alternative 4

Alternative 4 responds to Issue 2. To meet the purpose and need for change, the following actions are proposed under Alternative 4:

- Amend the KNF Forest Plan to prohibit motorized travel off of designated routes on the district, except as identified on the MVUM. (Note: Under Alternative 4 approximately 1,476 miles of road would be open to the public.)
- Close 376 miles of system roads to motorized use.
 - Eliminate vehicular traffic on 337 miles to all traffic, including administrative use.
 - Change the use and restrict 39 miles, of the 376 miles of open roads being closed, to administrative use only (i.e., for use by the Forest Service to monitor and carry out day-to-day resource management activities, as needed).
- Add 16 miles of unauthorized routes to the system as roads. These are short spur routes that provide access to campsites and other recreation opportunities. (Note: include in the 1,476 miles of road to remain open to the public.)
- Designate corridors on all system roads, 1 mile off either side, to allow motorized cross-country travel in order to retrieve a legally harvested mule deer, elk, or bison during any hunting season.
- Designate corridors of 300 feet from either side of 99 miles of specified roads for the sole purpose of motorized dispersed camping (see Table 3).
- Designate corridors of 100 feet from either side of 104 miles of specified roads for the sole purpose of motorized dispersed camping (see Table 3).

Element Common to Alternatives 2, 3, and 4

Roadside Parking

Vehicle parking will be permitted up to 30 feet on either side of an open road unless otherwise identified. This provision is common to alternatives 2, 3, and 4.

Fuelwood/Special Forest Products Management Strategy

Scoping efforts revealed that fuelwood and special forest product (SFP) collection on the NKRD is a popular and necessary activity for many local users of the national forest. Fuelwood gathering occurs as a permitted activity. The Travel Management Rule at 36 CFR Part 212 exempts permitted activities. Section 212.51 states that motor vehicle use that is specifically authorized under a written authorization issued under Federal law or regulations are exempted from route and area designations. Motorized uses that occur under permitted authority may allow for motorized use on non-designated routes or areas if it occurs under the terms of the permit. Therefore, the selection of any action alternative would not prohibit motorized travel occurring under an authorized permit for the purposes of collecting fuelwood, livestock management or other activities allowed by permit.

Comparison of Alternatives Analyzed in Detail

Alternative 1 – No Action was developed as a benchmark from which the agency can evaluate the proposed action and action alternatives. It would continue the current management of the district transportations system and would not implement the Travel Management Rule. Table 4 below provides a comparison and summary of the features of each alternative analyzed in detail. Alternative 2, 3, and 4 differ in the degree to which they designate the limited use of motor vehicles away from the road system.

Table 4. Comparison of Alternatives – Key Design Features

Feature	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3	Alternative 4
Changes to Designated Road System	No Change	<p>Close 376 miles:</p> <ul style="list-style-type: none"> - Close 337 miles to <u>all</u> traffic. - Change 39 miles to Administrative Use only. <p>Add 16 miles of unauthorized road to system as roads open to <u>all</u> traffic.</p>	<p>Close 466 miles:</p> <ul style="list-style-type: none"> - Close 427 miles to <u>all</u> traffic. - Change 39 miles to Administrative Use only. <p>Add 16 miles of unauthorized road to system as roads open to <u>all</u> traffic.</p>	<p>Close 376 miles:</p> <ul style="list-style-type: none"> - Close 337 miles to <u>all</u> traffic. - Change 39 miles to Administrative Use only. <p>Add 16 miles of unauthorized road to system as roads open to <u>all</u> traffic.</p>
Designated Open Road System Mileage⁹ (under FS Jurisdiction)¹⁰	ML2 ~1,588 ML3 ~ 214 ML4 ~ 50 TOTAL: 1,852	ML2 ¹¹ ~1,287 ML3 ~ 139 ML4 ~ 50 TOTAL: 1,476	ML2 ¹⁰ ~1,197 ML3 ~ 139 ML4 ~ 50 TOTAL: 1,386	ML2 ¹⁰ ~1,287 ML3 ~ 139 ML4 ~ 50 TOTAL: 1,476
Corridors for Motorized Dispersed Camping	Vehicles can travel anywhere on the district to access recreational opportunities (except current travel restricted areas)	Designates 100 foot or 300 foot wide corridor on either side of 203 miles of open system roads	No corridors	Designates 100 foot or 300 foot wide corridor on either side of 203 miles of open system roads
Motorized Trails	No designated motorized trails	No motorized trails designated	No motorized trails designated	No motorized trails designated
Motorized Big Game Retrieval	Vehicles are allowed to retrieve any downed game animal on the district except in current travel restricted areas	Allows 1 trip for retrieval of legally downed elk or bison, up to 1 mile either side of all designated open roads except in current travel restricted areas	No travel off road for motorized big game retrieval	Allows 1 trip for retrieval of legally downed mule deer, elk or bison, up to 1 mile either side of all designated open roads except in current travel restricted areas

⁹ For simplicity of analysis, roads which can accommodate passenger cars (i.e., ML3 and 4 roads) were grouped or treated the same regarding the Analysis of Alternatives.

¹⁰ Non-FS Jurisdiction roads (i.e., paved highways AZ HWY 67 and US 89A under Arizona Department of Transportation management or control) total approximately 114 miles on the NKRD, and are not included in any totals shown.

¹⁰ ML 2 mileage includes the addition of 16 miles of spur roads added under each action alternative.

A comparison of the Key Issues addressed by each alternative analyzed in detail is shown in Table 5. Key Issues were previously listed in Chapter 1.

Table 5. Comparison of Alternatives - Key Issues Addressed

Key Issue	Indicator(s)	ALTERNATIVES			
		1 (No Action)	2 (Proposed Action)	3	4
1. The proposed action would allow for motorized dispersed camping corridors in several areas across the district.	<i>a) Acres available to motorized dispersed camping</i>	a) 540,869 acres	a) approx. 20,382 acres	a) approx. 10,516 acres	a) approx. 20,383 acres
	<i>b) Motorized dispersed camping and recreation access opportunities</i>	b) Anywhere outside restricted areas (e.g., wilderness)	b) 203 mi. of corridors	b) no corridors	b) 203 mi. of corridors
2. The proposed action would prohibit motorized big game retrieval for mule deer.	<i>Allows for motor vehicle use to retrieve a legally taken and tagged mule deer</i>	Unlimited	Not allowed	Not allowed	One trip per legally harvested mule deer
3. The proposed action would allow motorized big game retrieval.	<i>Provides for motorized big game retrieval opportunities</i>	Unlimited	One trip for elk and bison only	Not allowed	One trip for mule deer, elk, and bison
4. The proposed action does not close enough miles of road to protect wildlife and plant habitats.	<i>a) Miles of closed roads</i>	0	376 miles	466 miles	376 miles
	<i>b) Average forest-wide open road density</i>	1.81 mi/mi ²	1.44 mi/mi ²	1.35 mi/mi ²	1.44 mi/mi ²

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Table 6 provides a comparison summary of each Alternative’s effects on natural resources, described in full in Chapter 3.

Table 6. Comparison of Alternatives - Summary of Effects on Resources

Resource Area	Alternative			
	1 (No Action)	2 (Proposed Action)	3	4
SCENERY	Road density and parallel roads detract from scenery. Unrestricted cross country travel and proliferation of dispersed campsites have the greatest negative impacts on scenic quality and integrity.	Scenic integrity, landscape character, sense of place maintained or improved. Decreased scenic integrity along roads with camping corridors. Negligible effect to scenic integrity from Motorized Big Game Retrieval (MBGR) and designation of unauthorized routes for recreation access.	Highest degree of scenic integrity improvements. Negligible effect from addition of unauthorized routes to forest transportation system.	Scenic integrity, landscape character, sense of place would be maintained or improved. Decreased scenic integrity along roads with camping corridors. Negligible effect from addition of unauthorized routes to forest transportation system. Moderate effects from MBGR.
RECREATION	Motorized users have ample opportunity for driving cross country. User conflicts increase between motorized and non-motorized users. Lowered quality of recreation settings over time. No change from current hunting and dispersed camping opportunities.	Improvement in quality of semi-primitive motorized, non-motorized Recreation Opportunity Spectrum areas on the district. Improves mix of recreation opportunities and reduces user conflicts. Decrease in range of motorized recreation opportunities. Some decrease in hunter satisfaction, though increased outfitting opportunities and decreased hunter conflicts would result.	Improvement in quality of recreation opportunities similar to Alt. 2. However, some OHV rider dissatisfaction may occur from reduced road availability. Reduces user conflicts between motorized and non-motorized users. Some reduction in ability to use motor vehicles for dispersed camping, but conflicts may also be reduced. Decreased satisfaction among some hunters due to no MGBR.	Similar to Alternative 2, but with higher degree of satisfaction among some hunters owing to allowance for retrieval of mule deer, elk and bison.
SOILS AND WATERSHED	Continuation of current management would lead to a continuing decline in soil and watershed stability, condition and productivity.	Reduces the damage to soil and watershed stability, condition and productivity more than Alt. 1. Eliminates new unauthorized routes and associated soil compaction and reduces the amount of fugitive dust. Minimal impacts from MBGR.	Reduces damage to soil and watershed resources the most of any alternative. Soil compaction would be minimal due to no camping corridors and no MBGR.	Reduces the damage to soil and watershed stability, condition and productivity more than Alt. 1. Eliminates new user-created routes and associated soil compaction and reduces the amount of fugitive dust. Slightly higher degree of impacts from MBGR.

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Resource Area	Alternative			
	1 (No Action)	2 (Proposed Action)	3	4
SENSITIVE PLANTS	Unmanaged off road travel degrades habitat and may damage or destroy rare plants. Individual plants or their habitat may be affected and this could contribute to a loss of viability for these populations or species.	A reduction in off road travel will reduce the chances of physical damage to individuals and/or their habitat. Camping corridors would not affect sensitive plants, as corridors are located away from sensitive plant habitats. MBGR for elk and bison is unlikely to affect sensitive plants.	No camping corridors and no MBGR will improve viability of sensitive plants, but because of spatial distribution of the proposed corridors (which lack any sensitive plant species) and big game species, effects are similar to Alternative 2.	A reduction in off road travel will reduce the chances of physical damage to individuals and/or their habitat. Camping corridors would not affect sensitive plants, as corridors are located away from sensitive plant habitats. MBGR for mule deer would negatively affect sensitive plants.
INVASIVE WEEDS	Noxious and invasive weed spread/ introduction would continue at least at present rates, and likely at an increased rate.	Restricting off road travel and closing 376 miles of roads would reduce the rate of introduction and spread of invasive and noxious weeds. Camping corridors could be vulnerable to infestation, but would limit weed spread overall. MBGR would have minimal effect.	Restricting off road travel and closing 466 miles of roads would have the strongest positive effect to potential weed spread. Concentration of use in campsites could make those sites vulnerable to weeds, but net effect would be less weed spread.	Restricting off road travel and closing 376 miles of roads would reduce the rate of introduction and spread of invasive and noxious weeds. Camping corridors could be vulnerable to infestation, but would limit weed spread overall. Additional mule deer retrieval would have minimal effect.
WILDLIFE	No reduction in negative effects associated with open roads and motorized cross-country travel. Negative effects include human disturbance associated with motorized travel, habitat degradation caused by motorized cross-country travel. MBGR would be available for all hunts.	Increased habitat quality and reduced disturbance to wildlife as a result of closing roads and eliminating cross-country motorized travel. Possible impacts to individuals or their habitat, but no change in forest-wide populations or habitats.		

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Resource Area	Alternative			
	1 (No Action)	2 (Proposed Action)	3	4
CULTURAL RESOURCES	All cultural resources on the district remain susceptible to impacts, predominantly from unmanaged off road travel. Impacts to sites would likely increase over time.	Closing roads and prohibiting off road travel will likely lessen but not eliminate effects to cultural resources. Camping corridors have been surveyed and some mitigation would be necessary. Potential for damage from MBGR for elk and bison would be negligible.	Smaller number of open roads will lessen impacts to known sites and areas with a high density of cultural sites. Lack of camping corridors and MBGR would help minimize impacts to existing sites.	Closing roads and prohibiting off road travel will likely lessen but not eliminate effects to cultural resources. Camping corridors have been surveyed and some mitigation would be necessary. MBGR for mule deer, elk, and bison would pose a significant risk of adversely affecting cultural resource sites.
RANGE MANAGEMENT	Motorized cross country travel and unauthorized routes would negatively affect soil productivity and possibly interfere with permittees' activities. Permittees would be free to access range allotments by current routes.	Problems with gates being left open would be reduced, as would vandalism of range structures. Permittees would be authorized to use roads open to administrative use only as authorized in their Operating Instructions. MBGR would have no effect.	More roads with potential gate problems would be closed under this alternative than any other. Permittees would be authorized to use roads open to administrative use only as authorized in their Operating Instructions.	Problems with gates being left open would be reduced, as would vandalism of range structures. Permittees would be authorized to use roads open to administrative use only as authorized in their Operating Instructions. MBGR would have no effect.
FIRE SUPPRESSION AND FUELS MANAGEMENT	The current road system provides adequate access for fire and fuels management needs. However, human caused fires in remote areas may increase and the desirable spread of management fires can be hindered by the abundance of roads.	Reduction in road density will have little impact on fire and fuels management. Fire patrol and prevention may be improved as motorized dispersed campers would be concentrated. Managed fires may eventually be improved by the reduction in fuel breaks and the re-vegetation of closed roads. MBGR has little to no implication for fire and fuels.	Similar to Alternatives 2 and 4, except that dispersed campers would be further concentrated to roads, making fire prevention and patrol easier.	Similar to Alternatives 2 and 3. Fires resulting from MBGR have been rare, and therefore effects on fire and fuels are negligible.
VEGETATION MANAGEMENT	Unmanaged cross country travel may have some slightly negative effects on soil productivity over time.	Each of the Action Alternatives will not have direct effects on the Vegetation Management program on the district. Any needed temporary or new road construction would be subject to further environmental analysis and approval.		

Resource Area	Alternative			
	1 (No Action)	2 (Proposed Action)	3	4
ECONOMICS ¹²	Economic contribution to the community remains, possibly increasing over time. Road maintenance funding requirements total approx. \$2.6 million dollars.	Some indirect effects on visitor spending or motorized recreational activities may result from reducing the open road system and limiting game retrieval. However, as the Kaibab NF contributes a relatively small percentage to the overall economy, direct effects are difficult to ascertain. Some localized effects to local communities may result, but quantifying these impacts is speculative.		
		Necessary annual road maintenance funding is reduced by \$592,727. Maintenance costs would be approximately \$2 million.	Necessary annual road maintenance funding is reduced by \$620,683. Maintenance costs would be approximately \$2 million. Alternative 3 is approximately \$28,000 less than Alternative 2 or 4	Necessary annual road maintenance funding is reduced by \$592,727. Maintenance costs would be approximately \$2 million.

Mitigation Measures

This section provides mitigation measures that are applicable to this project and the Alternatives Analyzed in Detail (EA, p. 15). These measures are intended to ensure environmental effects remain at acceptable levels during implementation of the project.

- Prohibit the use of motor vehicles for dispersed camping or for the purpose of retrieving legally taken big game when it results in damage to natural and cultural resources and/or compromises the ability of the Forest Service to meet management objectives.
- Prohibit the use of motor vehicle cross-country driving to gather fuelwood in areas within the pinyon-juniper vegetation type in order to minimize damage to cultural resources, sensitive plants, and soils. Specific areas where fuelwood gathering may be allowed in the pinyon-juniper vegetation type either have been or will be analyzed under NEPA.
- Implement Appendix B “Design Features, Best Management Practices, and Mitigation Measures” in the “Final Environmental Impact Statement for Integrated Treatment of Noxious or Invasive Weeds on the Coconino, Kaibab, and Prescott National Forests within Coconino, Gila, Mojave, and Yavapai Counties, Arizona” (Forest Service 2004).
- Provide operator information and ethics guidance for OHV riders at portals located at main access points on the district, on the Motor Vehicle Use Maps, and in printed materials developed about Travel Management on the Kaibab NF.

Monitoring

Monitoring entails the gathering of information and observation of management activities to ensure that Forest Plan Standards and Guidelines as well as the objectives of the project are being met. Forest Plan monitoring and evaluation items will be implemented where appropriate. Additional monitoring needs were also compiled for this project to validate assumptions used in this planning process, and to verify that the project is being implemented as intended. This analysis includes the following project-specific monitoring:

¹² See Table 39 for Road maintenance costs by alternative. Also see Transportation Section in EA.

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- Corridors with limited use of motor vehicles for the purposes of dispersed camping and big game retrieval will be monitored to assess for damage to natural and cultural resources and/or frequently occurring actions that compromise the ability of the Forest Service to meet management objectives.
 - ✓ If soil damage and/or excessive damage to vegetation are discovered, the Forest Service will take the necessary action to move the corridors into compliance with the Forest Plan. This may include temporarily or permanently closing corridors to motorized vehicle use. All permanent closure proposals will follow the required NEPA process.
- Designated roads as well as closed roads will be monitored periodically for ruts, erosion, or sedimentation of water bodies. This monitoring will occur in conjunction with other project or management activities.
 - ✓ If damage, erosion, or sedimentation of water bodies is discovered, the Forest Service may repair or upgrade the roads. Temporary or permanent closures of roads may be necessary. Decommissioning or obliteration of closed roads (i.e., block access, rip compaction, re-vegetate) may be necessary. Decisions regarding decommissioning or obliteration are outside the scope of this project; all closure, decommissioning, or obliteration proposals will follow the required NEPA process.
- District staff will continue to do annual invasive exotic weed inventory and monitoring in conjunction with other project or management activities. Areas targeted for weed surveys will include all roads and dispersed camping corridors.
 - ✓ If weed populations are discovered, the Forest Service may temporarily close specific roads, corridors for motorized dispersed camping or motorized big game retrieval, until the weeds are controlled.
- Known rare plant populations will be monitored periodically for impacts. Surveys for new populations of rare plants will be conducted periodically in conjunction with other project and management work in the area.
 - ✓ If new rare plant populations are discovered, the Forest Service may close specific roads, road segments, and dispersed camping corridors, or prohibit the use of motorized vehicles for the retrieval of legally taken big game in the area. Road or area closures or road decommissioning may be needed if motorized vehicle travel is harming or has the potential to harm rare plants. All closure proposals will follow the required NEPA process.
- Monitor motor vehicle use for compliance with the Motorized Vehicle Use Map and forest closures. Adjust management strategies as needed to increase compliance.

Alternatives Considered but Eliminated from Detailed Study

One additional alternative was considered but eliminated from detailed study. An alternative was proposed that would close more roads than those reflected in any of the alternatives (See CBD et al., April 24, 2010 letter, and its May 6, 2010, amendment, available in the project record). Most of the roads that were listed in the amended letter were incorporated into Alternative 3. However, some of the roads listed in the letter were not considered in detail for closure. The rationales for closing these roads fell outside the scope of this project. In these cases, the reasons stated for wanting a closure included:

- roads labeled as “road to nowhere;”
- roads that were already considered for closure in one or more alternatives;
- roads that were evaluated, but deemed necessary for continued administration of the NKRK;
- roads labeled “road of concern;” and
- roads that were suggested to encourage off road use in sensitive areas.

The concern to close more roads for resource protections is reflected in Key Issues 1 and 4; however, the analysis provided in Chapter 3 indicates that the single action which will provide the most benefit to wildlife species and other resources is the prohibition of cross country travel.

Chapter 3 – Environmental Effects

This chapter summarizes the physical, biological, social and economic environments of the project area (the NKRD). It discloses the potential effects of implementing the alternatives presented in Chapter 2 and provides the scientific and analytical basis used to compare the alternatives (summarized in Chapter 2, Table 4). The best information available was used to discuss the affected environment and environmental consequences of the alternatives and the “best available science” was considered throughout the discussions presented within this chapter. For some resources, the information presented in this chapter is a summary of the specialists’ report located in the project record.

Recreation and Scenic Resources

Affected Environment

The summary to the Travel Management Rule states that: “The clear identification of roads, trails, and areas for motor vehicle use on each National Forest will enhance management of National Forest System lands; sustain natural resource values through more effective management of motor vehicle use; enhance opportunities for motorized recreation experiences on National Forest System lands; address needs for access to National Forest System lands; and preserve areas of opportunity on each National Forest for non-motorized travel and experiences.” The travel management rule provides criteria for recreation considerations in §212.55 “Criteria for designation of roads, trails and areas.” The responsible official shall consider effects on the following:

- Provision of recreational opportunities
- Conflicts between motor vehicle use and existing or proposed recreational uses of National Forest System lands or neighboring Federal lands
- Conflicts among different classes of motor vehicle uses of National Forest System lands or neighboring Federal lands

Providing outdoor recreation opportunities with minimized impacts to natural resources is also a primary goal in the Forest Service strategic plan (Forest Service 2007). Two objectives of the strategic plan are to emphasize (1) improving public access and (2) improving the management of OHV’s to protect natural resources, promote safety, and minimize conflicts among users. OHV use occurred on national forest lands prior to the 1970’s and is one of the fastest growing recreational activities on public lands today (Cordell et al. 2009).

Through the scoping process, recreation emerged as an important issue for most respondents. This included both motorized and non-motorized recreation. There is a desire for a variety of recreation opportunities, while addressing potential conflicts between motorized impacts and desired user experiences. Issues identified are:

- The proposed action would allow for motorized dispersed camping corridors in several areas across the district, potentially leading to additional resource damage in those areas.
- The proposed action would prohibit motorized big game retrieval for mule deer, thus restricting motorized big game retrieval opportunities for hunters.
- The proposed action would allow motorized big game retrieval, creating opportunities for additional resource damage away from roads in large areas across the district.

The NKRD is adjacent to Grand Canyon National Park, North Rim. This unique location places it as a gateway to one of the most famous national parks in the country. While some recreation use on the district is incidental to a visit at the national park, local and regional visitors use the district as a recreation destination as well.

The NKRD is not contiguous with other districts of the Kaibab National Forest. It is located primarily in Coconino County, with a narrow section of Mohave County along the far west part of the district. The NKRD is bounded on the north, west and east sides by the Bureau of Land Management, on the south by Grand Canyon National Park. There is one private land in-holding on the district at Jacob Lake. While the Grand Canyon National Park, North Rim does not receive the same number of visitors as the South Rim, over 100,000 vehicles traveled to the North Rim in 2009 (National Park Service)—all travelling across the NKRD. There are a few year-round occupants on the NKRD; these include residents at Grand Canyon National Park, North Rim, Kaibab Lodge, and Jacob Lake Inn. Nearby communities include Fredonia, AZ, Marble Canyon, AZ and Kanab, UT.

Visitation, Recreation Use, Seasons of Use

Visitor Use: While the Forest does not track visitation by district, the 2005 National Visitor Use Monitoring (NVUM) survey (Forest Service 2005) estimated KNF visitation as shown below:

Table 7. Kaibab National Forest visitation in 2005.

Item	Quantity
National Forest visitation	224,600
Developed site visitation	297,300
Designated Wilderness visitation	19,100

NVUM indicates visitors come from the local area, the surrounding region (Arizona, Colorado River, Las Vegas), from across the nation and abroad.

The top recreation activities of visitors to the Kaibab National Forest have not changed although the numbers participating in activities fluctuate as shown in Table 8 (NVUM 2000 and 2005). This survey included the entire Kaibab National Forest, and is not specific to the North Kaibab Ranger District.

Table 8. Top five recreation activities on the Kaibab National Forest.

Activity	Percent participation, 2000 Final Report	Percent participation, 2005 Final Report
Viewing Natural Features	67.1	54.7
Hiking / Walking	50.4	47.2
Viewing Wildlife	0	44.8
Driving for Pleasure	27.1	44.2
Relaxing	46.2	26.1
Sightseeing	76.3	N/A

2005 NVUM surveys included a question addressing motorized recreation. These results are displayed in Table 9.

Table 9. Percent of National Forest visits indicating use of special facilities and areas on Kaibab National Forest.

Facility Type	Percent Of NF Visits Using The Facility*
Motorized Single Track Trail	5.0
Motorized Dual Track Trails	8.4
Designated ORV Area	2.8
Forest Roads	19.2
Scenic Byway	47.5

*Only motorized activities selected.

The 2008 Arizona Statewide Comprehensive Outdoor Recreation Plan (SCORP) provides an indication of anticipated increases in recreation use. Of state residents who were asked what recreation activities they participated in, six categories were tracked for current participation versus the amount they expected to increase their participation in the future. Table 10 summarizes the results for recreation activities that commonly occur on National Forests. In every instance, residents expected to increase the amount of time they spend in the future recreating.

Table 10. Arizona resident current and expected recreation participation (selected activities).

Recreation Activity	Current Days or Visits per year	Expect to increase in the future (amount of increase in percent)
Hunting	1.67	10.9%
RV Camping	2.3	25.6%
Tent Camping	3.0	32%
Ride OHV	8.93	24%
Drive for Pleasures	22.9	34.1%
Hike or jog	27.7	38.4%

Source: 2008 Arizona SCORP

Finally, national trends in recreation indicate that traditional activities such as hunting and fishing that were once consider primary recreation activities have declined in popularity. Now viewing and photographing birds has become the fastest long-term growing activity, growing 287 percent since 1982-83 and having more participants now than both hunting and fishing combined (Cordell et al. 2009). Next fastest growing in terms of percentage increase is day hiking at almost 210 percent since 1982-83. The subsequent four fastest percentage growth activities include backpacking (+161%), off-road motor vehicle driving (+142%), walking outdoors (+111%), and canoeing/kayaking (+106%).

As recreation use increases, the types of recreation activities visitors engage in are likewise increasing and diversifying as the state's population grows and demographics shift. District personnel have observed that recreational activities on the district occur in both developed and dispersed settings, and occur in all seasons.

Existing Conditions

Forest Road System: Roads impact scenery because they create linear elements which are superimposed on non-linear elements across the landscape. Further visual impacts are brought about by limited gradients of road profiles, constant road widths, and a hard travel surface which creates contrast with the color and texture of the surrounding landscape. Forest roads are assigned maintenance levels based on the level of service provided by, and maintenance required for a specific road. Factors considered when determining the road maintenance level include: a) Resource program needs, environmental and resource protection requirements, visual quality objectives, and recreation opportunity spectrum classes; b) Road investment protection requirements; c) Service life and current operational status; d) User safety; e) Volume, type, class, and composition of traffic; f) Surface type; g) Travel speed; h) User comfort and convenience; i) Functional classification; and j) Traffic service level (Forest Service 2005).

Forest roads are used directly by users driving for pleasure, riding OHV's, wildlife viewing, and sightseeing, as well as indirectly to get to an access point to engage in both motorized and non-motorized recreation activities including hunting and game retrieval, forest product gathering, hiking, mountain biking, camping and other recreation opportunities. Many of the same roads are also used for commercial operations including logging, ranching, outfitting and guiding services, and to access electronic sites and private land. There is one designated motorized route, the Great Western Trail, which crosses the district using existing forest roads.

As noted above, there are currently forest roads open to passenger car travel and forest roads open to high clearance vehicles. Arizona State law allows street legal vehicles to be ridden on passenger car roads, as well as high clearance forest roads. Non-street legal vehicles may be ridden only on high clearance forest roads. Use of forest roads by both street-legal and non-street legal vehicles is termed "motorized mixed use."

There are approximately 1,852 miles of national forest system roads on the district that are open to public travel. Of these 1,852, about 1,588 are managed for high clearance vehicles. The remaining approximately 264 miles are managed for passenger cars. OHV riders have many opportunities for loop routes on these high clearance roads, as well as finding different levels of road condition and challenge. OHV riding is a popular activity and is also important to the state economically. OHV riding in Arizona contributes over \$3 billion to the economy, according to Arizona State Parks (2003).

Developed Recreation: Developed recreation facilities are heavily visited sites on the North Kaibab Ranger District. There are two developed campgrounds and group area: Jacob Lake Campground and Group Campground and DeMotte Campground, as well as developed scenic overlooks such as East Rim, many trailheads, and lookout towers.

Recreation special use permits on the district include bicycle riding, OHV and jeep tours on Forest Roads, and horseback riding. There are also two resorts and a grocery/gas station on the district.

In addition to Forest Service provided facilities, there is a full range of commercial facilities and services at Grand Canyon National Park, North Rim, including gas stations, markets, sporting goods, gift shops, restaurants, rental cabins and hotels, as well as an RV park provided on private land at Jacob Lake.

Dispersed Recreation: Dispersed camping and picnicking, fuelwood and forest product gathering, wildlife and scenery viewing, OHV riding, mountain bike riding, horseback riding, and other recreation

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activities currently occur on the district. There are few restrictions on driving cross country to pursue recreation activities except in motorized travel restricted areas (including administrative units, campgrounds and other recreation developments, Congressionally-Designated Wilderness, and un-roaded sections of Inventoried Roadless Areas).

In a recent national study, the Forest Service (2008) found that natural resource damage occurred from repeated cross country OHV riding resulting in user created trails. This included the removal or destruction of vegetation including forest-floor litter, the exposure and destruction of plant-root networks and exposure of bare soil. In addition, OHV test sites showed that when vegetation was reduced by a minimum of 40 percent or completely eliminated, soils were compacted, displaced, or loosened making them susceptible to erosion. In addition, the soil's ability to absorb rainfall was reduced, and high-intensity rainfall on freshly disturbed soils on user-created trails produced on average 10 times more sediment than undisturbed soils. There are some locations on the NKRD where vegetation has been reduced or eliminated, bare soil is visible and the soils are compacted, or rutting has occurred as a result of motorized cross country travel during wet conditions.

One of the most popular uses of National Forest System lands has been for dispersed or "throw-down" camping in locations chosen by the forest user. (This is in contrast to camping at a developed campground where amenities such as restrooms, water, and defined camping spurs are provided.) Dispersed camping is an important use of the district, and for many people is an inherent part of their recreation expectation and experience. About 13 percent of Kaibab National Forest users reported participating in dispersed camping activities in the 2005 National Visitor Use Monitoring (NVUM) survey (Forest Service).

Motorized dispersed campers on the NKRD drive off of a forest road to establish their camp in the general forest area. Motorized dispersed campsites are characterized by a two-track unauthorized (user created) route with a turn around and associated campsite. In existing motorized campsites, the vegetation has been trampled and destroyed in both the route and campsite, and bare soil is showing. A newly established camp may just have trampled vegetation in the route and campsite. Many users regularly return to the same locations using existing unauthorized routes, while others enjoy establishing a new route in a different area. Many of the existing unauthorized routes on the district are less than 100 feet long, although some go farther into the forest. In some locations groups have camped together, and there may be several unauthorized routes to large camping areas. While motorized dispersed camping occurs across the district, concentrations have been noted throughout the ponderosa pine vegetation belt, at viewpoints into Marble Canyon and Kanab Creek/Grand Canyon, and at the south end of the district closer to Grand Canyon National Park.

Big-game hunting is another popular activity on the NKRD. Many hunters use OHVs and drive cross country to scout for animals, access their favorite hunting spot, access their campsite, and to retrieve their downed animals. Other hunters prefer to use non-motorized means for similar activities. For both of these hunter groups, motorized game retrieval for deer, elk and bison is a common practice. In some popular hunting locations across the district, unauthorized routes are found and in other places ruts have been formed due to driving across the forest during wet conditions. These unauthorized routes are characterized by two-track routes where the vegetation has been trampled or destroyed and in some places bare ground is visible.

The district is well known for its trophy deer herd. A more unique hunting opportunity is also provided in House Rock Valley where a bison herd is maintained by the Arizona Game and Fish Department. Dispersed recreation activities are valued activities and are locally important for the economy. Watchable wildlife related recreation contributed almost \$820 million to the Arizona State economy in 2001 (Arizona Game and Fish Department 2003). The hunters are important to the concessionaires and other businesses on the district and local communities, where many purchase supplies, dine, and stay at hotels. Hunting is a valued recreation activity and locally important for the economy. Hunting expenditures contribute

almost \$12 million annually to Coconino County (Arizona Game and Fish Department 2001). In addition, some hunters use outfitter-guide services for their hunting expeditions. Hunting and trapping activities are facilitated by the existing road system. Roads make it easy to access much of the forest and distribute hunting activities over the area.

Recreation trail opportunities are provided on the district including the motorized Great Western Trail (GWT) which crosses the east and north parts of the district. This segment of the GWT uses existing forest roads. There is also a seasonally available snow mobile trail on the west side of the district. The remaining trails are designated as non-motorized and are generally available for hiking, mountain bike riding, cross-country skiing, and equestrian use. Some non-motorized trails have experienced motorized intrusions resulting in trail widening and destruction of trailside vegetation, as well as creation of noise and dust.

District personnel have noted that additional OHV damage on the NKRD results from driving off of forest system roads to access viewpoints or across meadows. Other motorized cross-country travel is associated with fuelwood and forest product gathering just off of forest roads. These activities can also result in creation of unauthorized routes, trampled or destroyed vegetation and bare ground.

Conflicts are increasing between recreationists engaging in motorized recreation activities and non-motorized activities. Some hunters complain that motorized users disrupt their animal scouting and hunting activities, campers complain about noise and dust from OHV riding in and near campsites, and hikers/bicyclers have complained of unwanted vehicle intrusions on the designated non-motorized trail system.

Wilderness and Special Areas: There are two Congressionally-Designated wildernesses on the district: Saddle Mountain and Kanab Creek. There would be no change in wilderness status or prohibition of motorized or mechanized use in these wildernesses.

There are four Inventoried Roadless Areas (IRAs) on the NKRD: Willis Canyon, Burro Canyon, Big Ridge, and Red Point. There will be no change in IRAs designation with this project.

Forest Accessibility: It is necessary to clarify how the Travel Management Rule affects access to National Forests for people with disabilities. Under section 504 of the Rehabilitation Act of 1973, no person with a disability can be denied participation in a federal program that is available to all other people solely because of his or her disability. In conformance with section 504, wheelchairs are welcome on all National Forest System (NFS) lands that are open to foot travel and are specifically exempted from the definition of motor vehicle in §212.1 of the final rule, even if they are battery powered, as long as they are suitable for use in an indoor pedestrian area. However, there is no legal requirement to allow people with disabilities to use OHV or other motor vehicles on roads, trails, or areas closed to motor vehicle use because such an exemption could fundamentally alter the nature of the Forest Service's travel management program (7 CFR 15e.103).

Enforcement : Implementation of the Travel Management Rule through the North Kaibab Ranger District Travel Management project will pose some challenges. This project is similar to any change in forest management in that requires the individual forest unit to provide adequate information to the public and in turn for the public to take responsibility for its actions and become knowledgeable about the changes. This partnership has been successful in past changes; already many people are familiar with travel management since it is being implemented across the country on national forest system lands.

Beyond the information piece of enforcement, Forest Protection Officers and Law Enforcement will provide enforcement. The forest also has cooperative law enforcement agreements with other agencies, Coconino County sheriff department, and Arizona Game and Fish Department.

When the TMR is implemented, the district (and forest) would provide copies of the district Motor Vehicle Use Map free of charge. In addition, field visits with forest users will be targeted to higher use periods to help with map distribution and visitor education.

Recreation Opportunity Spectrum

Visitors choose specific settings for their recreation activities in order to enjoy desired experiences. These settings vary by geographic area and are further refined by the Recreation Opportunity Spectrum (ROS). ROS is a classification system that describes different outdoor recreation settings across the Forest using seven standard classes that range from primitive, undeveloped settings to urban, highly developed settings. Attributes typically considered in describing the settings are size, scenic quality, type and degree of access, remoteness, level of development, social encounters, and the amount of on-site management. By describing existing recreation opportunities in each class, ROS helps match visitors with their preferred recreation setting.

OHV use is restricted within ½ mile of developed campgrounds, at administrative sites, in Congressionally-Designated wilderness, and in some unroaded portions of Inventoried Roadless Areas. In addition, there are 5,259 acres of other restricted areas on the district (Forest Plan, as amended, 2008). Aside from motor travel restricted areas, the district is currently open to cross-country motorized travel. Most areas of the district are accessible by Forest roads and forest settings are managed to provide for recreation opportunities. The level of development or disturbance allowed is determined by the ROS class.

Table 11 describes the general settings and opportunities provided by ROS classes for the NKRD. The ROS classes for NKRD are illustrated in Figure 3. Note that the majority of the district is classified as roaded natural. Developed resorts such as Kaibab Lodge and Jacob Lake Inn have been classified as rural. Congressionally-Designated Wilderness has semi-primitive non-motorized, primitive and pristine classes.

Table 11. Recreation Opportunity Spectrum acres by class (source: KNF Management Plan, 2008).

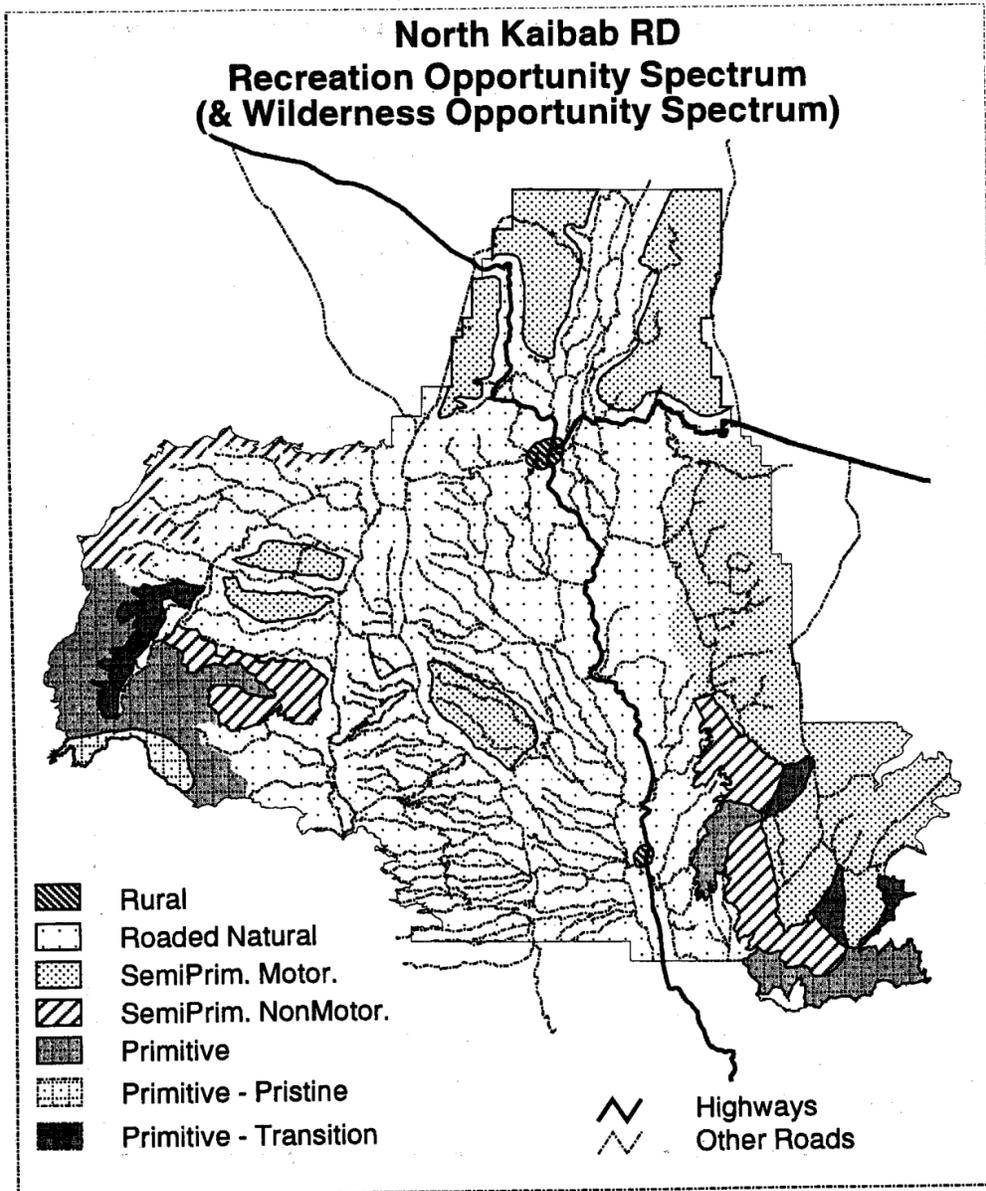
ROS Class	Acres per ROS Class (Forest Plan)	General Setting Description*
Rural	1,936	Landscapes may be highly modified and managed, and managed to maintain general scenic attractiveness. May contain highly developed recreation sites, and use may be high. Generally a natural appearing backdrop.
Roaded Natural Appearing	390,846	Landscapes are carefully managed to maintain or enhance recreation and scenic values, sites and features, to be natural-appearing, with changes designed to appear in harmony with natural setting. May contain highly developed recreation sites and travel routes.
Semi-primitive Motorized	156,641	Maintain predominantly undeveloped landscapes and scenic vistas as viewed from travel routes, with limited recreation developments.
Semi-primitive Non-motorized Wilderness	44,551	Predominantly undeveloped landscapes and scenic vistas. Recreation uses are non-motorized and non-mechanized. Management according to Wilderness Act and Agency

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ROS Class	Acres per ROS Class (Forest Plan)	General Setting Description*
		regulations. Use is low.
Primitive Wilderness	61,101	Management according to Wilderness Act and Agency regulations. Use is low. Wilderness-dependent uses are favored. Non-motorized and non-mechanized opportunities.

*Per Kaibab NF ROS-SMS Guidebook

Figure 3. Forest Plan ROS classes on North Kaibab Ranger District.



Scenery Management

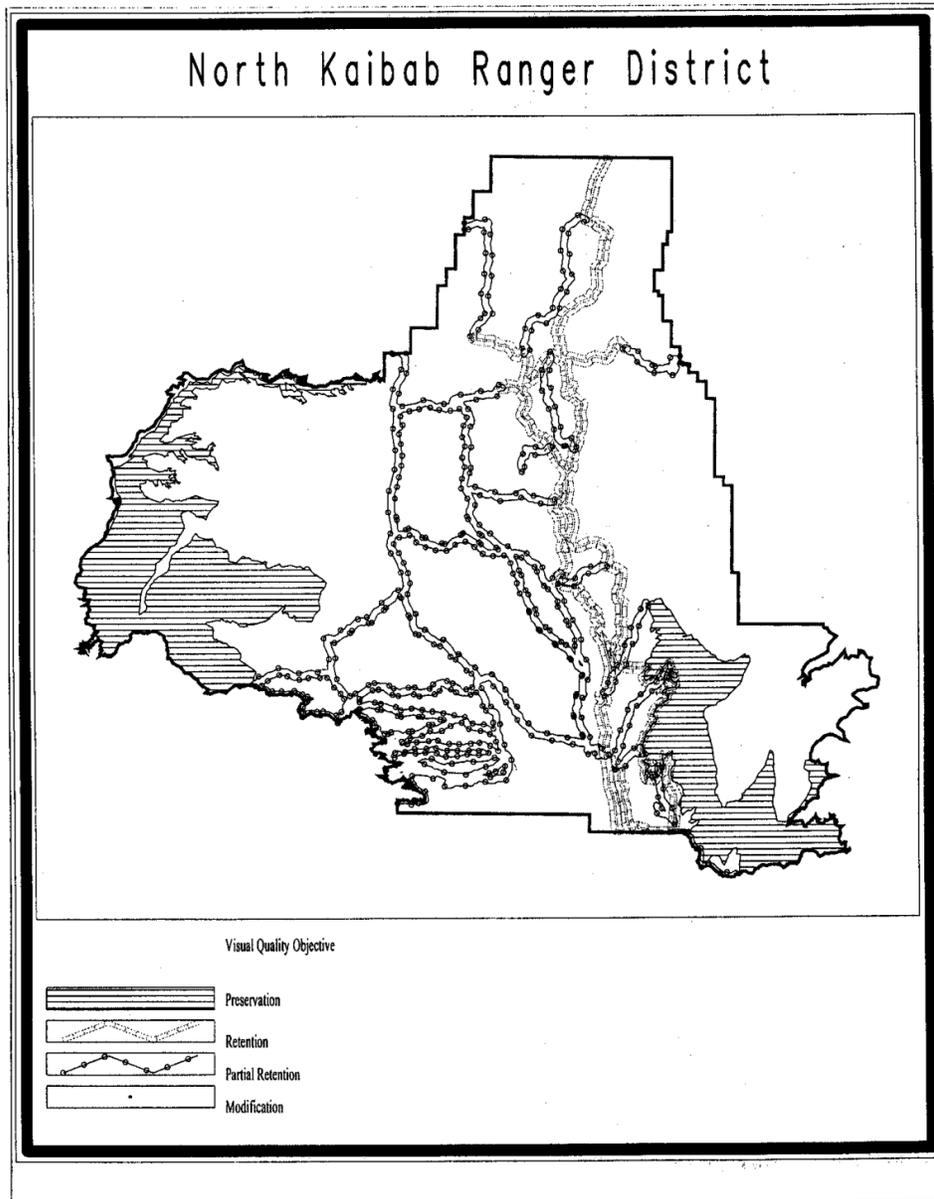
The North Kaibab Ranger District is a recreation destination and important scenic area. In addition to the internationally important Grand Canyon National Park, North Rim, there are also important “special places” on the district which hold high value and meaning for visitors, local residents and tribes (spiritual, aesthetic, nostalgic, or other). Kanab Creek, Marble Canyon, Grand Canyon and Kanab Creek Viewpoints, and many other areas have been identified as “special places”. While these were specifically identified; there are additional areas that may be considered “special” to individuals or local tribes.

Visual Management is a tool for integrating the benefits, values, desires and preferences regarding scenery into land management planning, and it is an integral part of ecosystem management. Visual quality objectives (VQO) for the project area have been defined in the Forest Plan. Table 12 provides definitions for the VQO found on the district. Figure 4 illustrates the visual quality objectives. Primary travel corridors and Congressionally-Designated wilderness have VQO assigned; the remaining areas are managed for the VQO of modification. A list of roads by retention and partial retention VQO from the Kaibab Forest Plan is found in the project record, in the recreation specialist report.

Table 12. Visual Quality Objective (VQO) Definitions.

Visual Quality Objective	VQO Acres per Forest Plan	Definition per Visual Management System
Preservation	104,299	Allows for ecological changes only. Management activities, except for very low visual-impact recreation facilities, are prohibited.
Retention	43,426	Management activities which are not visually evident. Activities may only repeat form, line, color, and texture which are frequently found in the characteristic landscape.
Partial Retention	181,810	Management activities remain visually subordinate to the characteristic landscape. Activities may repeat form, line color, or texture common to the characteristic landscape. Activities may also introduce form, line, color, or texture which are found infrequently or not at all in the characteristic landscape, but they should remain subordinate to the visual strength of the characteristic landscape.
Modification	325,545	Management activities may dominate the original characteristic landscape. Activities of vegetative and land form alteration must borrow from naturally established form, line, color, or texture so completely and at such a scale that its visual characteristics are those of natural occurrences within the surrounding area or character type.

Figure 4. Forest Plan visual quality objectives for North Kaibab Ranger District.



Land and Resource Management Plan Direction

Direction for recreation management in the Kaibab Forest Plan includes:

Forest Plan Goals, p 11

“The existing acreage in each Recreation Opportunity Spectrum class is maintained. Additional areas are closed to off-road vehicles use to protect sensitive soils, vegetation, and important aquatic habitats.”

Forest Plan Goals, p 17

“Provide a wide mix of outdoor recreation opportunities, including hunting and fishing, which range from primitive to urban, and that can respond to local and regional demands for water, forage, wildlife habitats, wood products and fire protection.”

“Manage a wide spectrum of desired settings that provide opportunities for the public to engage in a variety of developed and dispersed recreational activities, in concert with other resource management and protection needs.”

“Protect and enhance the scenic and aesthetic values of the Kaibab NF.”

“Maintain a variety of Forest trails, considering people's needs and desires for horseback and foot travel, winter sports, and motorized and challenge and adventure opportunities, as well as opportunities for the handicapped.”

Forest Plan Goals, p 18

“Establish off-road vehicle [ORV] closures as needed to maintain other resource objectives. Manage ORV use to provide ORV opportunities while protecting resources and minimizing conflicts with other users.”

“Coordinate the management of recreation resources and activities with the Grand Canyon National Park, Coconino County, and the State of Arizona to complement their roles in providing outdoor recreation.”

Forest Plan Goals, p 49 & 53

“Provide off-road vehicle area closures and manage ORV use that occurs on other areas to maintain recreation, visual, heritage, soil, water, wildlife, and other resource values.”

Effects Analysis

Effects Common to All Alternatives

There would be no effects to developed recreation as a result of the project. There would be no change in areas where motorized travel is currently prohibited (campgrounds, administrative sites, Congressionally-Designated Wilderness, Inventoried Roadless Areas, and those listed in Appendix A to the Recreation and Scenic Resource specialist report (See Resource Specialists Reports under References). There would be no effects to the Great Western Trail as a result of implementation of any of the alternatives.

Direct and Indirect Effects

Alternative 1 - No Action

Designated Road System: The existing condition is 1,852 miles of forest roads open to motorized public travel (approximately 1.92 miles per square mile of national forest system land).

There is an inherent inconsistency between roads and visual management. As noted under affected environment and existing conditions, roads create linear elements that are in contrast to the surrounding landform, and color and texture of the landscape. Roads cause some decline in visual quality of an area where they pass through. In some instances roads are located in close proximity to each other leading to the same destination. When redundant roads occur, the overall visual quality along a road corridor is further lowered because the roads are inter-visible from each other and the contrast created is increased. Retaining all roads in the existing condition would diminish the visual quality most among the alternatives. In contrast, roads provide access to the forest in order to view scenery and other forest attributes.

Developed Recreation: There will be no change in the provision of developed recreation opportunities or sites.

Dispersed Recreation: Motorized cross-country travel has the greatest effect on visual quality and the overall visual integrity or completeness of the scenic resource on the district. As noted in the existing conditions, natural resource damage has occurred from repeated cross-country OHV riding resulting in unauthorized trails, rutting and resource damage. In the no action alternative this type of use will continue. Creation of OHV trails is most common at scenic view points and across meadows. Effects include the removal or destruction of vegetation including forest-floor litter, the exposure and destruction of plant-root networks and exposure of bare soil. Creation of unauthorized routes increases the contrast of bare ground to vegetation, and creates additional un-natural linear routes through the forest. The characteristic landscape declines due to the impacts of motorized cross-country travel and cannot be fully expressed. Over time, the visual quality of the entire district is lowered by the existing and newly created unauthorized routes.

Recreation access (to park or camp) can cause resource damage. District recreation managers have observed that much of the motorized use is via existing short unauthorized routes leading to a parking place or campsite. While use of existing sites does not affect or change the existing visual quality, if existing sites continue to grow larger or additional routes are created to these sites, this will result in a decline in visual quality due to increasing contrast of bare ground to surrounding vegetation.

The Great Western Trail alignment on the NKRDR would not be affected by Travel Management. The non-motorized trail system is affected when some motorized users drive on the trail tread. This unauthorized use results in trail widening, destruction of adjacent vegetation and increases dust formation. These changes do not meet the trail designations or management objectives, and cause conflicts with non-motorized users who complain of motorized intrusions. While this is contrary to the trail designation, a motorized user who is riding cross-country may encounter a system trail and make the assumption it is open to motorized use. The visual quality along the trail is reduced when vegetation is trampled or removed, and dust is created that obscures views.

Current hunting practices such as motorized cross-country travel to scout for animals, access a favorite hunting area or hunting camp and retrieve a downed animal cause some impacts to visual quality. If a motorized user repeatedly drives on the same route, vegetation can be trampled and destroyed. In addition, if a motorized user drives cross-country during wet weather, tracks and ruts are formed that cause contrast to the surrounding vegetation. Ruts can also occur in fragile crypto biotic soils even under dry conditions. In this alternative, there would be no change in motorized cross-country travel and creation of unauthorized routes and rutting is expected to continue and increase in frequency. Potential effects resulting from motorized big game retrieval would include creation of unauthorized routes through repeated driving back and forth from a game retrieval site, removal or destruction of vegetation, and creation of ruts if game retrieval occurs during wet conditions or in association with fragile soils. There is no restriction in the number of vehicles driving in to retrieve animals, or the number of trips that can be

taken. The creation of linear routes, increased contrast of bare soil to adjacent vegetation, and creation of ruts all lower the visual quality on the district.

Direct and Indirect Effects – Scenic Resources

Alternative 2 - Proposed Action

Designated Road System: The quantity of forest roads open to motorized travel is reduced with this alternative to 1,476 miles. This is about 20 percent fewer miles of open roads in the road system than the existing condition. There would be many opportunities remaining to view scenery from the designated road system with this alternative.

Of the 376 miles of roads that would not be designated for motor vehicle use, 337 miles will be closed to all traffic [i.e., moved to Maintenance Level 1 (ML-1)] and 39 miles will be removed from the system and designated “Administrative Use only” as ML-2. The ML-1 roads have the following attributes (Forest Service 2005):

- Vehicular traffic is eliminated, (except for Administrative Use or Emergency traffic only).
- Physically blocked or entrance is disguised.
- Not subject to the requirements of the Highway Safety Act.
- Maintenance is done only to minimize resource impacts.
- No maintenance other than a condition survey may be required so long as no potential exists for resource damage.

The effects of converting roads to ML-1 roads would reduce contrast with surrounding vegetation improving visual quality over time if the roads remain unused and natural revegetation/rehabilitation occurs. Examples of these roads (Forest Service 2005) show a naturalized road surface, which is still recognizable, but has understory plant cover, pine needle litter, and no evidence of vehicular traffic.

The 39 miles of roads remaining at ML-2 for administrative use only, would show no change from the existing condition. There would be no change in visual quality due to their continuing contrast with the surrounding landscape and these roads will still receive some motorized use.

Dispersed Recreation: The most important component of Alternative 2 (as well as Alternatives 3 and 4) is the prohibition of motorized cross country travel. This prohibition would restrict creation of unauthorized routes through the forest and would greatly reduce the effects of linear routes and contrast with the surrounding landscape that result from repeated cross-country motorized travel. Over time, as the existing routes recover, the visual quality would improve as would overall visual integrity across the district.

This alternative would designate about 99 miles of 300 foot-wide motorized camping corridors and 104 miles of 100 foot-wide motorized camping corridors. Potential direct effects would include use of existing unauthorized routes to access the forest within the designated corridor, concentrating camping in corridors, creation of new linear routes into the foreground of roadsides, and removal or destruction of vegetation resulting in new areas of bare soil contrasting to the surrounding vegetation. Most camping currently occurs in existing campsites. With increases in camping activities, there would be new campsites established. The majority of camping corridors are found in areas mapped with the modification visual quality objective. Creation of new linear routes and ground disturbance from driving and camping activities within these corridors would not borrow from natural occurrences within the surrounding area or character type but would remain subordinate to the characteristic landscape in size, scale and intensity. In the worst case scenario, if all areas were affected, there could be a decline in visual quality on 20,382 acres or about 6% of the total district acreage of Modification VQO as a result of designated camping corridors. About 6 miles along Forest Road 257 is designated as Partial Retention foreground. In this area, activities would not repeat form, line, color or texture of the surrounding

landscape, but the size, scale and intensity of disturbance would remain visually subordinate. In the worst case scenario, there could be a decline in visual quality on less than one percent of the foreground of the partial retention VQO across the district.

There would be some indirect improvement to scenery along the existing non-motorized trail system resulting from restricting motorized travel to designated forest roads. If motorized intrusions are reduced or eliminated, the visual quality would be improved or maintained along the non-motorized trail system.

There would be an improvement in visual quality resulting from the reduction or elimination of hunting related motorized cross-country travel. Motorized vehicles would be restricted to using the designated system of forest roads for animal scouting.

Alternative 2 would permit motorized cross-country travel for game retrieval up to one mile from open forest roads in order to retrieve elk or bison. The Arizona Game and Fish Department reports 38 animals were legally harvested in 2009. There would be short term effects such as vegetation trampling from a hunter using one vehicle, and making one trip in and out to retrieve their legally downed animal. There would be no effects to visual quality from these minimal trips.

Direct and Indirect Effects – Scenic Resources

Alternative 3

This alternative responds to the key issue of resource damage resulting from designation of motorized dispersed camping corridors, as well as the issue of resource damage resulting from motorized big game retrieval.

Designated Road System: This alternative would provide 1,386 miles of roads open to public use. This is about 25 percent fewer miles of open roads in the road system than the existing condition, and 5 percent fewer open roads than Alternatives 2 and 4. Under Alternative 3, approximately 466 miles of roads would be removed from the open road system. Of the 466 miles of roads that would not be designated for motor vehicle use, 427 miles will be closed to all traffic [i.e., moved to Maintenance Level 1 (ML-1)] and 39 miles will be removed from the system and designated “Administrative Use only” as ML-2. The effects would be similar to those described for Alternatives 2 and 4, except that about 90 more miles of roads would be moved to ML-1. Thus, there is a potential for these 90 more miles of roads to become naturalized and to improve visual quality if they remain unused over time. However, if the roads are reopened, there would be little additional improvement in visual quality.

Dispersed Recreation: The effects of prohibiting motorized cross-country travel are the same as Alternatives 2 and 4.

The designation of about 16 miles of existing unauthorized spur roads for recreation access would not result in a change in visual quality. In this alternative, the existing access routes would be added to the open road system and managed so that impacts to vegetation, and the resulting visual contrast and linear routes would be limited to existing locations. No camping corridors are proposed. This alternative would improve visual quality because it limits the quantity and scale of the short road segments added to the road system.

The effects are the same as Alternatives 2 and 4 for the non-motorized trail system and for hunting.

Motorized Big Game Retrieval: There would be no provision for motorized big game retrieval with the implementation of Alternative 3. There would be no effect to visual quality as a result from non-motorized game retrieval activities. Existing resource damage and rutting that have occurred from past hunting activities would recover over time and would slightly improve the existing visual quality across the district.

Direct and Indirect Effects – Scenic Resources

Alternative 4

This alternative was developed in response to the key issue of motorized recreation opportunities for hunters.

Designated Road System: The effects of the road system are the same as with Alternative 2.

Dispersed Recreation: The effects to dispersed recreation activities are the same as Alternative 2 regarding motorized cross-country travel, trails and hunting.

Motorized Big Game Retrieval: Alternative 4 would provide for motorized cross-country travel for game retrieval for deer, elk and bison. Alternative 4 would have the most adverse effects for scenery when compared to game retrieval in Alternative 2 or 3. The Arizona Game and Fish Department reports 1058 animals were legally harvested in 2009. If all hunters retrieve their legally harvested deer, elk or bison, this would result in limited resource damage as a result of one vehicle using one trip in and out to drive cross-country to retrieve each animal. There would be short term effects such as vegetation trampling from these activities. It would be unlikely that an actual route would be created on the ground, because of the low likelihood that multiple vehicles would pass over the same route used to retrieve a downed animal. The impacts of these activities would disappear within one growing season after they were created. Exceptions to this would occur under wet conditions or in association with fragile soils.

Direct and Indirect Effects –Recreation Resources

Alternative 1 - (No Action)

Designated Road System: Figure 3 (page 34) illustrates the Recreation Opportunity Spectrum (ROS) classes on the North Kaibab Ranger District. There are few conflicts between ROS designations and the existing road system. Conflicts occur when unauthorized routes are created in more primitive settings where a predominately natural appearing environment is expected.

Dispersed Recreation: Natural resource damage has occurred from repeated cross-country OHV riding resulting in unauthorized (user created) routes (Forest Service 2008). Motorized cross-country travel is permissible (except in motorized travel restricted areas) and the amount of participation in OHV riding and resulting natural resource damage is expected to continue and increase as noted under affected environment. Natural resource damage includes vegetation damage or removal, compaction of soils and increased dust. User expectations are not met when the natural vegetation expected in recreation settings is destroyed. Some user conflicts between motorized recreationists and non-motorized recreationists are occurring. Many people seeking non-motorized recreation activities complain about noise, dust, and unwanted vehicle intrusions into their activities as a result of increasing numbers of motorized users.

The existing condition provides the greatest opportunities for motorized recreation access. Existing closure areas and non-motorized/non-mechanized recreation opportunities in Congressionally-Designated wilderness would not be changed, although some illegal motorized intrusions are occurring. Motorized users can drive to almost any location and create new campsites and routes across the forest. For recreationists, there are declines in recreation settings due to a decrease in naturalness cause by a proliferation of camp sites, destruction of natural vegetation, creation of unauthorized routes, and dust and noise from motorized cross-country travel.

There would be no change in opportunities to travel along the Great Western Trail route across the district. The designated non-motorized trail system is affected by illegal motorized riding on the trail tread which results in creation of a two track trail (versus the constructed single trail tread surface), trampling and death of trail side vegetation, reduction of wildlife and scenery viewing opportunities due to the noise

from motors, increased dust from motorized vehicles and reduced user experiences due to unwanted (and illegal) motorized intrusions.

Hunters can currently use motorized vehicles to scout for game, access their favorite hunting locations by driving cross-country, and can create campsites in most locations across the district. This can effect natural resources including trampling of natural vegetation and evidence of sights and sounds of humans in almost all locations across the district.

There are no restrictions to motorized game retrieval with the existing condition. Hunters who are accustomed to using motorized big game retrieval could continue to drive as many vehicles as desired to pick up a legally downed animal. Unrestricted motorized travel for game retrieval can cause resource damage such as creation of unauthorized routes, destruction of natural vegetation, soil compaction, and increased noise and dust. In addition, some hunters retrieve game during wet conditions which creates tracks and ruts through the forest. Some hunters use motorized vehicles for game scouting and location; others prefer non-motorized means for these same activities and complain that motorized users decrease their hunting success. It is expected that these conflicts would continue and possibly increase as the number of OHV users increases over time.

Alternative 2 - (Proposed Action)

Designated Road System: This alternative provides approximately 1,476 miles of roads in the forest road system open to motorized travel. It reduces the designated road system by about 20 percent. This alternative would result in a decline in opportunities for motorized users who desire maximum driving experiences.

Dispersed Recreation: Opportunities for motorized users who ride cross-country would be eliminated. These users would be restricted to riding on the open forest road system. Prohibition of motorized cross-country travel improves semi-primitive and roaded natural recreation settings and opportunities across the district because natural vegetation that has been trampled or destroyed along an increasing number of unauthorized routes would recover over time and these settings would exhibit the characteristic natural appearing environments and reduction of the sights and sounds of humans. Recreationists seeking non-motorized or quiet recreation opportunities would find these in abundance in areas away from roads, since motorized travel would be restricted to the designated system of roads open to motorized use.

This alternative would designate about 99 miles of 300 foot-wide motorized camping corridors and 104 miles of 100 foot-wide motorized camping corridors. Campers would enjoy the ease of locating a place to camp, and the ability to conveniently group camp. Potential direct effects of the designation of camping corridors would include concentrating dispersed camping activities, removal or destruction of natural vegetation within a camping corridor, and proliferation of linear routes to camp sites. Additional effects would include increased resource damage along road corridors and loss of natural appearing recreation settings. Effects to natural resources would include removal or destruction of vegetation and increased dust due to exposure of bare soil on approximately 20,382 acres of proposed camping corridors.

There would be no change in opportunities to drive on the Great Western Trail. Non-motorized trail settings would show a decrease in trail widening, trail side vegetation trampling, dust and noise cause from the illegal use of motorized vehicles.

Hunters who are accustomed to driving cross-country to scout for animals, driving to their favorite hunting location or creating a new camp would be restricted to driving on the designated road system and camping in designated corridors. Alternative 2 would provide for motorized game retrieval for elk and bison. Hunters accustomed to retrieving their elk and bison using motorized vehicles would be able to retrieve their legally hunted animals, but would have restrictions on the distance traveled and number of trips. Other hunters will be dissatisfied since they will no longer be able to use motor vehicles to retrieve

their legally hunted mule deer. There would be some beneficial effects to hunters who have experienced conflicts with motorized cross-country OHV riders disrupting their hunting experience and success. In 2009, the Arizona Game and Fish Department reported there were 38 elk or bison harvested. The resource damage to recreation settings from 38 hunters using one vehicle, and making one trip in and one trip out to retrieve their downed animal would be minimal. There would be little or no change in recreation settings as a result of implementing this alternative since game retrievals would be dispersed at different locations throughout the district.

Alternative 3

Designated Road System: Alternative 3 provides about 1386 miles in the forest system of roads open to motorized travel, and closes 466 miles of existing forest roads, or about 25% percent of the current road system. Alternative 3 includes the addition of about 16 miles of existing unauthorized routes for recreation access. It would decrease the road system open to motorized recreationists more than Alternatives 2 and 4.

Dispersed Recreation: The effects of prohibiting motorized cross-country travel are the same as in Alternative 2. In this alternative, about 16 miles of existing short unauthorized routes would be added to the road system for recreation access. There would be no additional effect from this increase in roads since these unauthorized routes have already experienced resource damage such as vegetation trampling or removal. These newly added roads would receive maintenance appropriate for ML-2 roads. No camping corridors are provided in this alternative; forest users would use these 16 miles of short roads and roadside parking to engage in recreation activities including dispersed camping. There would be a decrease in camping opportunities on the district, and some campers may be disappointed that they cannot drive cross-country to establish a new campsite wherever they desire. Recreation settings would be improved with this alternative since no motorized cross-country travel of any sort is allowed.

Effects are the same as in Alternative 2 for trails and hunting opportunities.

There would be no corridors for motorized game retrieval in Alternative 3. Hunters accustomed to motorized game retrieval may experience a decrease in their satisfaction. Some hunters would have to have assistance packing out their animals and loading them into their vehicles. Hunters who prefer non-motorized game retrieval will be more satisfied with this alternative.

There would be positive effects to recreation settings since motorized cross-country travel of any sort would be prohibited. The instances of unauthorized route creation and rutting that have decreased the quality of recreation settings in the past would be reduced and would diminish over time.

Direct and Indirect Effects –Recreation Resources

Alternative 4

Designated Road System: The effects are the same as with Alternative 2.

Dispersed Recreation: The effects are the same as with Alternative 2 for prohibition of motorized cross country travel, trails and hunting opportunities.

Motorized Big Game Retrieval: Alternative 4 would provide for motorized game retrieval for deer, elk and bison. The Arizona Game and Fish Department reports 1,058 animals were legally harvested in 2009 on the NKR. If all hunters retrieve their legally harvested deer, elk or bison, this would result in limited resource damage as a result of one vehicle making one motorized cross-country trip in and out to retrieve each animal. Based on 2009, the maximum effects to recreation settings would be trampling of vegetation resulting from 1,058 motorized trips dispersed across the entire district. These effects would be short term

and would not result in creation on unauthorized routes from repeated trips in the same location. Vegetation trampling would likely recover after one growing season.

Cumulative Effects

The cumulative effects area includes North Kaibab Ranger District over a 20 year period from 2000 to 2020. Potential cumulative actions are found in Appendix 2.

Alternative 1

Scenic Resources

Past experience has shown that implementation of best management practices and careful project design has helped minimize the effect from past activities on scenic resources. These effects (e.g. ground disturbance, un-natural form, line or color, and dust) have been and are anticipated to continue to be temporary and localized to the project area. For example, over time the understory vegetation is invigorated and health of remaining trees is improved and this helps to improve the scenic integrity of a timber stand with ground disturbance. The effects of past, present, and reasonably foreseeable activities when combined with the direct and indirect effects of implementing Alternative 1 (i.e., creation of linear routes, rutting, etc.) would likely increase the negative effects on scenic resources. However, the cumulative effect is negligible because activities such as vegetation management and prescribed burning do not all occur at the same time and are spatially distributed across the district. This results in a fluctuating trend of effects on scenic resources defined by effects that are short in duration and localized to the project area. In addition, the district could experience a slight negative increase in illegal motorized intrusions into restricted and non-motorized recreation settings which would likely slow or impede the attainment of Forest Plan scenic integrity objectives.

Recreation Resources

Recreation user displacement, noise and dust, and temporary lowering of recreation setting characteristics are effects from past, present, and reasonably foreseeable projects that have affected the recreation resources on the district. Past experience has shown that these effects are short in duration and localized to the project area. When combined with the direct and indirect effects of implementing Alternative 1, the cumulative effects on recreation resources are negligible given that activities (such as vegetation management and prescribed burning) do not all occur at the same time and are spatially distributed across the district. However, the district could experience a slight negative increase in illegal motorized intrusions into restricted and non-motorized recreation settings which would likely impede the attainment of the goals set forth in the Forest Plan.

Alternative 2

Scenic Resources

Past experience has shown that implementation of best management practices and careful project design has helped minimize the effect from past activities on scenic resources. These effects (e.g., ground disturbance, creation of un-natural form, line or color, and dust) have been and are anticipated to continue to be temporary and localized to the project area. For example, over time the understory vegetation is invigorated and the health of remaining trees is improved and this helps to improve the scenic integrity of a timber stand with ground disturbance. The effects of past, present, and reasonably foreseeable activities when combined with the direct and indirect effects of implementing Alternative 2 (i.e., creation of linear routes, rutting, etc.) would decrease the negative effects on scenic resources. However, the cumulative effect is negligible because activities such as vegetation management and prescribed burning do not all occur at the same time and are spatially distributed across the district. This results in a fluctuating trend of effects on scenic resources defined by effects that are short in duration and localized to the project area. In addition, the district could experience a slight negative impact from illegal motorized use in the short term until motorized users are familiar with the open road system. However, these effects would be less

noticeable than what could be anticipated upon implementation of Alternative 1. Any cumulative effects associated with Alternative 2 are anticipated to be minor and short term, and are not likely to impede the attainment of Forest Plan scenic integrity objectives.

Recreation Resources

Recreation user displacement, noise and dust are effects from past, present, and reasonably foreseeable projects that have affected the recreation resources on the district. Past experience has shown that these effects are short in duration and localized to the project area. When combined with the direct and indirect effects of implementing Alternative 2, the cumulative effects on recreation resources are negligible given that activities (such as vegetation management and prescribed burning) do not all occur at the same time and are spatially distributed across the district. The district will likely experience some negative effects from illegal motorized use and the allowance for motorized big game retrieval. However, these effects would be less noticeable than what could be anticipated upon implementation of Alternative 1. The cumulative effects are anticipated to be minimal and are not likely to impede the attainment of the goals set forth in the Forest Plan.

Alternative 3

The cumulative effects of implementing Alternative 3 would be the same as Alternative 2 except there would be a slight decrease in negative effects due to differences in motorized big game retrieval and corridor camping.

Alternative 4

The cumulative effects of implementing Alternative 4 would be the same as Alternatives 2 except there would be an increase in negative effects due to more trips off road associated with retrieval of mule deer.

Soils, Watershed, and Air Quality

Affected Environment

Forest Plan Direction

Relevant direction from the Kaibab National Forest Land Management Plan (1988, as amended) includes:

Goals:

- Maintain soil productivity and watershed condition.
- Rehabilitate non-productive lands on a planned basis to eliminate unsatisfactory watershed condition by 2020.
- Maintain a high quality sustained water yield for Forest users and others.
- Identify and protect wetlands and floodplains.

Forest-wide Guidelines for Air and Watershed Resource Operations and Improvements:

1. Define, geographically identify and locate best management practices for the landscape during landscape planning and analysis. Apply best management practices to mitigate adverse effects of activities and maintain site soil productivity. These practices include:
 - a. Installation of water control structures or seeding lands in poor and very poor condition where the revegetation potential is moderately high to high and the slope is less than 40 percent.
 - b. Designate stream courses during landscape planning and analysis process.
 - c. Rehabilitate areas impacted by wildfire.
2. Exclude domestic livestock from treated areas for not less than two growing seasons.

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3. Maintain not less than three age classes of woody riparian species with ten percent of the woody plant cover in sprouts, suckers, seedlings, and saplings.
4. Maintain not less than 90 percent of the potential stream shading from May to September along all perennial cold or cool water streams. Provide shade with tree and other vegetational cover.
5. Maintain not less than 90 percent of the potential shrub cover in riparian areas.
6. Maintain not less than 90 percent of total linear stream bank in stable condition.
7. Woody riparian communities in addition to riparian communities which are dominated by shrub and herbaceous species are rated in satisfactory or better condition.
8. Select riparian areas for treatment based on relative scorecard condition rating with the lowest rating assigned to first treatment.

Management Direction for Ecosystem Management Areas of the NKRD

The NKRD includes five ecosystem management areas, some of which include specific management direction for soils and watershed resources. Table 13 below summarizes applicable soils and watershed management direction for these ecosystem management areas.

Table 13. Ecosystem Management Areas of the NKRD and associated management direction for soils and watershed resources.

Ecosystem Management Area	Acreage	Description	Management Direction for Soils and Water Resources
Management Area 11 – Kanab Creek Wilderness	68,340	Located in the western part of the NKRD. The management area is typical of canyonland formations with steep scarp slopes and narrow drainage bottoms. Almost 80 percent of this area has slopes in excess of 40 percent. Elevations range from 3,500 feet to 6,000 feet	None specified
Management Area 12 – Western North Kanab Woodland	146,480	Includes portions of the western, northern, and eastern sides of the NKRD and includes the west half of the woodland zone. This area is in the Kanab Creek, Coyote Wash, and Houserock-Marble watersheds. It is an elevated plain dissected by numerous drainage systems and displaying karst topographical features such as solution basin, sinkholes, etc. Elevations range from 5,200 feet to 6,800 feet. Drainage systems are well-defined and flows are ephemeral	Provide for intensive management of soil and watershed resources. Make soil and watershed resource inventories and analyses to ensure the conservation of soil and water resources and to avoid significant and permanent impairment of site productivity. Provide soil and water resource integration and coordination in land and resource management planning. Formulate and execute land treatment measures to (1) close, revegetate, and thereby obliterate, system roads not needed for resource actions and (2) establish groundcover improvements in degraded, unsatisfactory watersheds to return

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Ecosystem Management Area	Acreage	Description	Management Direction for Soils and Water Resources
			<p>them to satisfactory condition. Provide for the long-term maintenance of vegetative ground-cover improvements. Maintain soil and water inventory and information systems.</p>
<p>Management Area 13 – Kaibab Plateau Forestland</p>	<p>268,719</p>	<p>Located in the middle of the NKRK. It is part of an elevated plain dissected by numerous drainage systems. Elevations range from 7,000 feet to over 9,000 feet. Drainage systems are well-defined and flows are ephemeral. Annual precipitation ranges from 18 to 30 inches. Ponderosa pine predominates in most of this management area, except at higher elevations and on cooler sites. Understory species include mutton bluegrass, blue grama, squirreltail, junegrass, Carex sp., and mountain muhly.</p>	<p>Formulate and implement control measures where and when the following damage occurs:</p> <ul style="list-style-type: none"> a. Soil compaction. b. Loss of vegetative cover. c. Tree damage and mortality. d. Deterioration of water quality. <p>1. Define, geographically identify and locate best management practices for the landscape during landscape planning and analysis. Apply best management practices to mitigate adverse effects of activities and maintain site soil productivity. These practices include:</p> <ul style="list-style-type: none"> a. Installation of water control structures or seeding lands in poor and very poor condition where the revegetation potential is moderately high to high and the slope is less than 40 percent. b. Designate stream courses during landscape planning and analysis process. c. Rehabilitate areas impacted by wildfire. <p>2. Exclude domestic livestock from treated areas for not less than two growing seasons.</p> <p>3. Maintain not less than three age classes of woody riparian species with ten percent of the woody plant cover in sprouts, suckers, seedlings, and saplings.</p>

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Ecosystem Management Area	Acreage	Description	Management Direction for Soils and Water Resources
			<p>4. Maintain not less than 90 percent of the potential stream shading from May to September along all perennial cold or cool water streams. Provide shade with tree and other vegetational cover.</p> <p>5. Maintain not less than 90 percent of the potential shrub cover in riparian areas.</p> <p>6. Maintain not less than 90 percent of total linear streambank in stable condition.</p> <p>7. Woody riparian communities in addition to riparian communities which are dominated by shrub and herbaceous species are rated in satisfactory or better condition.</p> <p>8. Select riparian areas for treatment based on relative scorecard condition rating with the lowest rating assigned to first treatment.</p>
<p>Management Area 16 – Eastern North Kaibab Woodland</p>	<p>131,221</p>	<p>Includes the Buffalo Ranch and the extreme eastern side of the North Kaibab Ranger District. It includes portions of the Coyote Wash and Houserock-Marble watersheds. It is an elevated plain dissected by numerous well defined drainages. Water flows are ephemeral, except for several springs in the area. Elevations range from 5,200 feet to about 8,200 feet at Tater Point. The majority of this area is dominated by woodland vegetation consisting largely of pinyon pine and Utah juniper. At higher elevations there are ponderosa pine stringers. The</p>	<p>Provide for intensive management of soil and watershed resources. Make soil and watershed resource inventories and analyses to ensure the conservation of soil and water resources and to avoid significant and permanent impairment of site productivity. Provide soil and water resource integration and coordination in land and resource management planning. Formulate and execute land treatment measures to (1) close, revegetate, and thereby obliterate, system roads not needed for resource actions and (2) establish groundcover improvements in degraded, unsatisfactory watersheds to return them to satisfactory condition. Provide for the long-term</p>

Environmental Assessment North Kaibab Ranger District Travel Management Project

Ecosystem Management Area	Acreage	Description	Management Direction for Soils and Water Resources
		understory typically includes big sagebrush, snakeweed and rubber rabbitbrush. On rocky slopes, cliffrose is also common.	maintenance of vegetative ground-cover improvements. Maintain soil and water inventory and information systems.
Management Area 19 – Saddle Mountain Wilderness	40,610	This is the Saddle Mountain Wilderness, located in the southeast section of the NKRD. This area is within the Houserock-Marble watershed which is characterized by narrow drainage bottoms adjacent to steep to very steep ascending scarp slopes. Elevations range from 6,000 feet to over 8,000 feet.	None specified

Climate Change

The U.S. Environmental Protection Agency (EPA) has asserted that scientists know with virtual certainty that human activities are changing the composition of the Earth’s atmosphere. It is also documented that “greenhouse” gases, including carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and hydrofluorocarbons have been increasing (EPA, 2010). The atmospheric increase of these gases is largely the result of human activities such as the burning of fossil fuels. Greenhouse gases absorb infrared energy that would otherwise be reflected from the earth. As the infrared energy is absorbed, the air surrounding the earth is heated (CARB 2007).

The Southwestern Region of the Forest Service recently released “Southwestern Region Climate Change – Trends and Forest Planning February 2010. The following information is summarized from excerpts of this publication:

“In the Southwest, climate modelers agree there is a drying trend that will continue well into the latter part of 21st century (IPCC 2007; Seager et al. 2007). Climate modelers predict increased precipitation, but believe that the overall balance between precipitation and evaporation would still likely result in an overall decrease in available moisture. Regional drying and warming trends have occurred twice during the 20th century (1930s Dust Bowl, and the 1950s Southwest Drought). Current drought conditions “may very well become the new climatology of the American Southwest within a time frame of years to decades”. According to recent model results, the slight warming trend observed during the last 100 years in the Southwest may continue into the next century, with the greatest warming to occur during winter. Climate models predict temperatures to rise approximately 5 to 8 degrees Fahrenheit by the end of the century (IPCC 2007). This trend would likely increase demand on the region’s already limited water supplies, as well as increase energy demand, alter fire regimes and ecosystems, create risks for human health, and affect agriculture (Sprigg 2000).

Average ambient air temperatures are rising, and it is possible that continued warming will increase the temperature difference between the Southwest and the tropical Pacific Ocean, enhancing the strength of westerly winds that carry moist air from the tropics into the Southwest region during the monsoon season. This scenario may increase the monsoon's intensity, or its duration, or both, in which case floods would occur with greater frequency (Guido 2008). While the region is generally expected to dry, it is possible that extreme weather patterns leading to more frequent destructive flooding would occur. Along with monsoons of higher intensity, hurricanes and other tropical depressions are projected to become more intense overall. Arizona typically receives 10 percent or more of the annual precipitation from storms that begin as tropical depressions in the Pacific Ocean. In fact, some of the largest floods in the Southwest have occurred when remnant tropical storms intersect frontal storms from the north or northwest (Guido 2008).

Most global climate models are not yet accurate enough to apply to land management at the ecoregional or National Forest scale. This limits regional and forest-specific analysis of the potential effects of climate change.

Due to the spatial and temporal limitations of climate models, as stated above, site-specific analysis of climate change at the Forest level with regard to implementing the travel management rule remains impractical. Several unknown factors further limit discussion and analysis of climate change at the Forest level. These include: lack of data regarding traffic numbers and projected increases or decreases in motorized visitors to the Forest, limited data and knowledge of current effects of motorized travel to ecosystem resiliency at the Forest level, and limited knowledge of the contributions of surrounding areas to current and future climate impacts at the Forest level necessary to analyze cumulative effects. Impacts to the NKRK from climate change are therefore discussed in a qualitative manner.

Projected future climate change could affect Arizona in a variety of ways. Public health and safety could be compromised due to an increase in extreme temperatures and severe weather events. Agriculture would be vulnerable to altered temperature and rainfall patterns, increasing plant stress and susceptibility to insects and diseases. Forest ecosystems could face increased occurrences of high severity wildfires and may also be more susceptible to insects and diseases. Snowpack could decrease and snowmelt may occur earlier.

While the future of climate change and its effects across the Southwest remains uncertain, it is certain that climate variability will continue to occur across the NKRK. Forest management activities should strive to promote ecosystem resilience and resistance to impacts of climate change. Implementation should focus on maintenance and restoration of resilient native ecosystems, thereby reducing the vulnerability of ecosystems to variations in climate patterns. Ecological diversity remains an integral component in native ecosystems. Projects should promote connected landscapes and endeavor to restore significantly altered biological communities, thus restoring their resilience to changes in climate.

Effects Analysis

Direct and Indirect Effects

Each of the alternatives are analyzed in the following sections to determine if there is potential for motorized disturbance on the NKRK to impact critical ecological functions that affect watershed condition and health. The components reviewed in this analysis include soil resources, riparian and wetland resources, and water quality. Other factors related to road and trail conditions were examined to evaluate the relative risk of motorized uses to disrupt hydrologic function and potentially impact watershed health.

Soils

The effects to soils by motorized uses on native surface routes are directly related to the impact caused by the vehicle footprint on the ground. This project will result in a change in the levels of use of particular roads and cross country motorized travel on the NKRK. However, road decommissioning or obliteration to return roads to a more natural state is not in the scope of this project and is therefore not considered in this analysis. A brief summary of these effects is provided below:

- This project does not address road decommissioning or obliteration; all road scars will remain, Until decommissioned, the roads will remain in passive storage, with compacted soils, decreased soil productivity, concentrated runoff resulting in erosion and sediment production, and lacking protective vegetative ground cover. Due to compaction and loss of soil productivity of these roads, natural revegetation would occur more slowly than if they were decommissioned or obliterated. Freeze and thaw cycles and other weathering processes would continue to occur naturally, resulting in decompaction of road surfaces and gradual revegetation over time.
- In reviewing only motorized routes and the reduction in relative risk to soils resources, Alternative 3 would provide the largest reduction in acres impacted on soils with moderate or severe erosion hazard and unsatisfactory or unsuited conditions. Alternative 2 provides the next largest reduction, followed by Alternative 4. The No Action Alternative provides the lowest reduction in relative risk to soils resources.
- Alternatives 2, 3, and 4 provide considerable reduction in potential acres of soil disturbance as a result of motorized big game retrieval. With no allowance for motorized cross-country travel to retrieve legally harvested animals during any hunting season, Alternative 3 would provide the greatest overall protection of soils resources. Alternative 2 would provide the next highest level of soils resource protection by limiting motorized cross country travel to 1 mile off either side of existing roads, except where restricted, to allow for the retrieval of a legally harvested elk or bison during any designated hunting season. Alternative 4 would provide somewhat less protection of soils resources than Alternatives 2 and 3, but more than the No Action Alternative by allowing motorized cross country travel for up to 1 mile off either side of existing roads, except where restricted, for the retrieval of legally harvested elk, bison, or mule deer during any designated hunting season. Alternatives 2 and 4 would result in potential soil disturbance of 509,789 acres. However, since Alternative 4 would also allow the retrieval of legally harvested mule deer, it would result in somewhat greater soil disturbance than Alternative 2, depending on the number of mule deer harvested and retrieved using motorized means. The No Action Alternative would provide the least protection of soils resources by allowing unrestricted motorized cross country travel for all hunting related purposes, except where existing restrictions to motorized travel apply. Table 14 displays potential impacts to soils resources from MBGR under each alternative. Table 15 displays erosion hazard ratings and associated acreages for areas extending for one mile on either side of designated motorized routes on the NKRK.
- Alternatives 2, 3, and 4 would provide substantial reduction in potential acres of soil disturbance over the No Action Alternative by eliminating cross-country motorized fuelwood gathering in the pinyon-juniper vegetation type. The three Action Alternatives would reduce adverse impacts to soils resources on approximately 276,685 acres or 42.2% of the NKRK. Cross-country motorized travel for the purpose of fuelwood gathering would continue to be permitted within the ponderosa pine and mixed conifer vegetation types (approximately 268,861 acres) under all three Action Alternatives. Table 16 displays potential impacts to soils resources from motorized fuelwood gathering under each alternative.

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- Alternatives 2, 3, and 4 would provide substantial reduction in potential acres of soil disturbance over the No Action Alternative by reducing motorized dispersed camping across the NKRK. The No Action Alternative would continue to allow motorized dispersed camping on approximately 540,869 acres or 82 percent of the NKRK. Alternatives 2 and 4 would continue to allow motorized dispersed camping on approximately 23,591 acres or 3.6 percent of the NKRK. Alternative 3 would not designate any corridors for dispersed camping. Dispersed camping would only be permitted within one vehicle length (i.e., 30 feet) off of motorized routes. There are a total of 20,047 acres that could potentially be impacted by motorized dispersed camping under Alternative 3. Table 17 displays potential impacts to soils resources from motorized dispersed camping under each alternative.

Table 14. Acres on NKRK with potential to exhibit negative impacts caused by soil disturbance as a result of motorized big game retrieval.

Alternative	Acres	Change in Acres from No Action	% Decrease from No Action
Alternative 1 – No Action	552,457	0	No Change
Alternative 2	509,789	-42,668	- 7.7%
Alternative 3	0	-552,457	- 100%
Alternative 4	509,789	-42,668	- 7.7%

Table 15. Erosion hazard ratings and associated acreages for areas subject to MBGR.

	Erosion Hazard		
	Slight	Moderate	Severe
Acres	132,951	255,064	225,058
Percent of NKRK	20%	39%	34%

Table 16. Acres on NKRK with potential to exhibit negative impacts caused by soil disturbance as a result of motorized fuelwood gathering.

Alternative	Acres	Change in Acres from No Action	% Increase or decrease from No Action
Alternative 1 – No Action	517,103	0	No Change
Alternative 2, 3 and 4	268,861	- 248,242	- 48%

Table 17. Acres on NKRD with potential to exhibit negative impacts caused by soil disturbance as a result of motorized dispersed camping.

Alternative	Acres	Change in Acres from No Action	% Increase or decrease from No Action
Alternative 1 – No Action	540,869	0	No Change
Alternative 2	20,382	- 520,487	- 96%
Alternative 3	10,516	- 530,353	- 98%
Alternative 4	20,382	- 520,487	- 96%

General Direct and Indirect Effects of Motorized Routes Common to All Alternatives

Effects that will occur throughout all alternatives are related to soil compaction, loss of soil productivity, concentrated runoff resulting in erosion and sediment production, and loss of vegetative ground cover of existing routes. The presence of roads across the NKRD has already resulted in negative impacts to soils resources. With the implementation of any of the action alternatives, there will be a continued commitment of soils resources and associated negative impacts, with effects remaining the same, increasing, or decreasing. Impacts to the soils resources will vary to some degree by alternative, with the potential for negative impacts varying by the number of roads that will remain open for motorized use, acres available for motorized cross country travel, acres of motorized dispersed camping and motorized areas affected by parking one vehicle length off of roads in each proposed alternative. Adverse effects are not limited to the road prism alone, but include direct and indirect effects to areas adjacent to motorized routes. Roads are a major source of sediment and contribute more off-site sediment than any other land management activity.

Soil compaction is a direct result of the weight of a motor vehicle and its wheels coming into contact with the surface of the ground. The heavier the vehicle the more contact pressure (pounds per square inch, or psi) is exerted by the tire on the ground surface. As tire width increases in relation to the weight of the vehicle, less contact pressure (psi) is exerted by the tire on the ground surface. Soil compaction occurs when soil particles are compressed together reducing the amount and size of pore spaces between soil particles. The higher the clay content of a soil the more susceptible they are to compaction. When soils are wet they are much more susceptible to compaction to a greater depth than when dry. Additional direct impacts occur as a result of soil compaction, including, but not limited to decreased soil porosity, increased soil bulk density, reduced infiltration rates, reduced percolation rates, increased surface runoff, increased surface erosion, reduced nutrient cycling, and reduced plant growth.

Compacted soils can persist for many years and variables such as how severely a soil was compacted and to what depth compaction occurred dictate recovery time. Compaction of soils by motorized use results in a series of indirect effects that can be detrimental to soil productivity, watershed condition, and water quality.

Loss of soil productivity occurred when routes were established, and is still occurring to varying degrees. In addition, loss of soil productivity to areas adjacent to motorized routes has and is still occurring. Factors that contribute to loss of soil productivity of the motorized route, or to areas adjacent to motorized routes include: inadequate road surface maintenance, inadequate drainage of road surfaces, poor route

design, and poor route location. Loss of soil productivity of areas adjacent to motorized routes occurs as sheet, rill, and gully erosion, and soil compaction.

Concentrated runoff is the primary agent of erosion and sediment production on native surface motorized routes and areas adjacent to, or connected, to the route. Factors that influence the degree of concentrated runoff include: drainage features, route design, route location, and maintenance levels.

Wind erosion and fugitive dust are the release of soil particles into the air as a result of the high velocity winds contacting bare soil surfaces or the interaction of tires on the native road surface and the mechanical displacement of soil particles. These are typically smaller soil particles, but as wind velocity increases larger soil particles become more susceptible to being removed from the route.

Loss of vegetative ground cover has occurred on all motorized routes. Maintenance level 3 and 4 roads are frequently bladed (i.e., approximately every year) and are generally denuded of vegetative ground cover. Maintenance level 1 and 2 routes receive less frequent maintenance, have lower use levels, and have varying degrees of vegetative ground cover associated with the road prism. Vegetative ground cover assists in reducing the effects of erosion from concentrated runoff and wind on motorized routes and areas adjacent to them.

General Direct and Indirect Effects of Motorized Off-Road Travel Common to all Alternatives

Effects of motorized off road travel (for the purposes of camping, parking, game retrieval and fuelwood gathering) to soil productivity include soil compaction, loss of vegetative ground cover, decreased soil porosity, increased soil bulk density, displacement of litter or duff layers leaving bare soil exposed, soil displacement, reduced infiltration rates, reduced percolation rates, decreased plant growth, disturbance to soil biotic crusts and reduced nutrient cycling. All of these effects lead to increased and concentrated overland flow, erosion, and sediment transport to downslope areas and connected stream courses following storm events, which pose a risk to long term soil productivity, downstream water quality and overall watershed condition. Impacts from motorized off road travel are most pronounced when soils are wet, and are minimized under dry soil conditions. Typically, a single motorized pass over an area has minimal effects to vegetation and soils resources. It is when there are repeated passes or when new routes are established that negative effects to vegetation and soils resources become more pronounced. Slope also plays a critical role with regard to the magnitude of the effects that cross country travel has on vegetation and soil productivity. As slope of the area being traveled increases ground disturbance increases due to wheel slip or churn caused by the forces of gravity and uneven terrain. As a result, more vegetation, litter and soil are displaced. This increases the amount of exposed mineral soil that can potentially be moved off site, leading to accelerated erosion, and consequently decreased soil productivity, soil stability, and overall watershed condition. Off-road travel on soils with moderate or high erosion hazard is more likely to channelize water and increase surface runoff, resulting in accelerated erosion, and sediment delivery into stream courses. On soils with slight erosion hazard, the direct impacts of motorized cross country travel are not expected to result in accelerated soil erosion but will cause loss of soil productivity when vegetative ground cover is removed, soils are compacted, or rutting occurs. Cross country travel on soils with unsatisfactory or unsuited soil condition ratings are more likely to exhibit negative impacts in the form of loss of soil productivity and erosion than travel on soils with satisfactory soil condition ratings.

Alternative 1, No Action

Effects to soil resources as a result of current routes and unlimited cross country travel on the NKRD are detailed above in the *General Direct and Indirect Effects of Motorized Routes Common to All Alternatives* and *General Direct and Indirect Effects of Motorized Off-Road Travel Common to all Alternatives*. With this alternative there are 1,852 miles of motorized routes under Forest Service jurisdiction and approximately 3,143 acres of disturbance associated with these routes. Cross country travel by motor

vehicles is permitted in all areas, except designated Wilderness, roads, trails, or areas specified in Forest Orders, and restricted off-road vehicle areas identified in the Forest Land Management Plan. Motorized cross country travel includes access for big game retrieval, motorized dispersed recreation, camping, and personal and commercial fuelwood gathering. Under this alternative, 552,457 acres could potentially be impacted by motorized cross country travel. Fuelwood gathering would only be permitted in the ponderosa pine and mixed conifer vegetation types (i.e., approximately 268,861 acres). Under the No Action alternative, continued, unrestricted motorized dispersed camping would continue in areas adjacent to approximately 1,852 miles of routes (except current travel restricted areas).

Recreation and other land uses are expected to increase over current levels, especially in light of the increasing popularity of all terrain vehicles. More forest visitors will use the current Forest System roads, leading to additional impacts to these roads. Assuming funding available for road maintenance stays at current levels, most roads may not receive needed maintenance on a regular basis. Many natural surface roads, especially those that are located on erodible soils or along drainages, could cause accelerated erosion and sedimentation.

Motorized cross country travel would continue. More unauthorized cross country routes and dispersed camping areas would continue to be developed by Forest users at the current rate or higher, especially in areas near scenic views, water sources, and popular recreational and/or hunting areas. The number of stream crossings and the number of user-created routes that follow drainages is likely to increase. Cross country tracks and dispersed camping areas would continue to be created by forest users on soils with a moderate to severe erosion hazard, on soils in unsatisfactory condition or impaired soils with low revegetation potential. These disturbances could cause additional accelerated erosion and run-off, increased sedimentation of water bodies, and the loss of soil, watershed, and vegetative health and productivity.

Continuation of motorized cross country travel under this alternative does not meet the intent of the Travel Management Rule. Motorized cross-country travel typically occurs in an unplanned manner without regard to the capability of the land to withstand such impact. Long-term soil productivity is compromised in areas where surface soil is damaged or removed through cross country travel. Soil erosion, loss of soil productivity, and adverse impacts to surface water quality would be the greatest under this alternative and would not be mitigated on most of the area where it occurs. Many of the soils on the district are not suitable for such cross country travel impacts. Alternative 1 would adversely affect soil condition and productivity to a greater extent than all other alternatives because motorized cross-country travel would continue throughout much of the district.

Currently, use of OHVs for hunting and MBGR is permitted for all big game species legally harvested throughout the NKRD during legal hunting seasons. There are no restrictions on motorized cross-country travel related to hunting activities except existing off road travel restricted areas. Unrestricted motorized cross-country travel has resulted in damage to soils and watershed resources through indiscriminate stream crossings by OHV users, multiple motorized passes on unstable soils, rutting, compaction, and puddling of soils not suited for OHV use, and removal of effective vegetative ground cover.

Compared to Alternatives 2, 3, and 4, Alternative 1 provides the least protection or improvement to soil and watershed resources. Alternative 1 would have difficulty meeting Kaibab National forest plan goals for maintaining soil productivity and watershed condition and of protecting wetlands and floodplains.

Continuation of motorized cross-country travel under this alternative would result in continued rutting, compaction, puddling, water diversion, gully and rill formation, and localized fugitive dust as soil surfaces are disturbed and vegetative cover is removed, leaving these areas prone to water and wind erosion. Minor, localized rutting, compaction, puddling, water diversion, gully and rill formation, and

fugitive dust would also occur as National Forest System roads are traveled by motor vehicles throughout the NKRD.

Effects common with alternatives 2, 3, and 4

Alternatives 2, 3 and 4 would allow motorized cross country travel for fuelwood gathering, allowing one trip in and one trip out and only in the ponderosa pine and mixed conifer vegetation types (approximately 268,861 acres). Motorized cross country travel for fuelwood gathering would not be permitted in the pinyon-juniper vegetation type (approximately 248,242 acres). These alternatives would eliminate the continuation of user created roads. Approximately 39 miles of roads would be changed to administrative use only (i.e., Maintenance Level 2 – for official use only). Adverse impacts to these roads caused by motorized travel would be decreased since recreational use would be excluded. Approximately 17.5 miles of these roads occur on soils that are currently characterized as unsatisfactory. These road segments would have increased risk of soil rutting, compaction, puddling, and erosion. Table 18 below lists the unsatisfactory terrestrial ecological units (TEUs) and the associated road lengths and acreages that would be retained in these map units.

Table 18. Unsatisfactory TEUs containing road segments to be designated Maintenance Level 2 – for official use only.

Road Segment	Unsatisfactory TEU	Distance (miles)	Acreage
235A	251	4.12	5.99
249A	264	1.75	2.55
249D	264	1.61	2.34
278	264	3.24	4.71
284DD	633	1.51	2.20
289	264	2.60	3.78
652	251	0.76	1.11
894	264	1.05	1.53
Total		16.64	24.21

Alternatives 2, 3, and 4 would result in closure of roads that would no longer be available for Forest access. Road decommissioning/obliteration is not planned for these roads at this time and is beyond the scope of this analysis. Since all motorized travel would be eliminated from these roads, many are expected to de-compact, stabilize, and revegetate naturally over time, depending on the location and current condition, instead of receiving regular use that inhibits the ability these sites to stabilize. Some of the roads that occur on moderate to severe erosion hazard soils will take longer to stabilize and would likely require mitigation measures to facilitate complete recovery. The subalpine meadows of the higher elevations would recover naturally over the course of 3-5 years, assuming average precipitation since these area generally have greater soil moisture and vegetative cover than drier upland sites. Many of the lower elevation areas are expected to stabilize and revegetate naturally in 5-10 years. Closed roads in locations with high erosion hazards and low revegetation potential will require additional effort and mitigation through Forest Service stabilization projects.

No new user created roads would be allowed to occur under Alternatives 2, 3, and 4. This would lead to overall benefits of reduction in rutting, compaction, bare ground, puddling, erosion, run-off, sedimentation, and water diversion.

Some areas that may have been utilized as random dispersed campsites under the no action alternative may no longer be accessible by motorized vehicle for camping. Many of the potential adverse impacts that can occur from camping in these areas would be reduced since motor vehicle access to these areas would be eliminated through road closures and restriction of motorized cross-country travel, thus improving resource conditions on all of these areas when compared to the No Action Alternative.

Under Alternatives 2, 3, and 4 approximately 16 miles of currently unauthorized road spurs would be added to the system. These spurs range in length from less than 0.01 miles to 0.31 miles. Approximately 8.4 miles (12.21 acres) of these road spurs occur on soils with slight erosion hazard, 5.8 miles (8.43 acres) occur on soils with moderate erosion hazard, and 1.4 miles (2.04 acres) occur on soils with severe erosion hazard.

Minor, localized fugitive dust would continue to occur under alternatives 2 and 4 as National Forest System roads are traveled by motor vehicles throughout the NKR D.

Effects common with Alternatives 2 and 4

Alternatives 2 and 4 are similar with regard to miles of road closure (376 miles), addition of approximately 16 miles of currently unauthorized routes, continued authorization of cross country motorized travel for purposes of fuelwood gathering in ponderosa and mixed conifer vegetation types, and continued authorization of MBGR up to one mile on either side of designated motorized routes. However, in addition to MBGR for legally harvested elk and bison, alternative 4 would authorize MBGR for legally harvested mule deer. Motorized cross country travel authorized under these alternatives would be for one trip in and one trip out for each occurrence of big game retrieval. There would be some adverse impacts to soils including rutting, compaction, puddling, water diversion, and removal of vegetative ground cover, with the degree depending on the soil type, erosion hazard, soil moisture content, distance of travel, and type of retrieval vehicle utilized. In most cases, these adverse impacts would be minor and localized since motorized passes over the same areas would be minimized in comparison to the No Action Alternative. As a result, these areas would be expected to stabilize rapidly after use. The numbers of expected harvested elk and bison would be low, and long term impacts would be rare and generally localized to the area traveled.

Continuation of motorized cross-country travel for the purpose of MBGR under Alternatives 2 and 4 would result in continued minor, localized fugitive dust as soil surfaces are disturbed and vegetative cover is removed. These areas would be at risk of erosion by wind and water. Alternative 4 is expected to result in slightly greater potential fugitive dust than Alternative 2 since mule deer would be included under MBGR. However, the level of motorized cross-country travel is expected to decline considerably under Alternatives 2 and 4 since motorized cross-country travel for purposes other than MBGR would be eliminated. Minor, localized fugitive dust would continue to occur under alternatives 2 and 4 as National Forest System roads are traveled by motor vehicles throughout the NKR D.

Alternatives 2 and 4 would reduce the current road system by 376 miles, decreasing the number of roads to be maintained over current management. Most of these roads have been identified as roads creating potential resource concerns with some issues being associated with erosion hazard. Many of the roads that would be closed to public use in lower elevations are in areas with impaired soil conditions that would benefit from road closures.

Road corridors for dispersed camping would be created along 203 miles of roads. These corridors would be primarily in the ponderosa pine vegetation type, where some of the more productive soils on the

district occur. Most of the road corridors are located in areas with low soil erosion hazards, with mostly low and occasional moderate slope gradients, and high soil productivity and vegetative response. Some of these corridors would extend up to 300 feet on each side of designated roads and others would extend 100 feet on each side of designated roads. The corridors that would be 300-foot-wide would amount to approximately 7,200 acres of land available for dispersed camping while the corridors that would be 100-foot-wide would amount to approximately 7,564 acres. A total of 44.72 acres (i.e., less than 1 percent) of these road corridors would occur on soils that are currently in unsatisfactory condition. Table 19 lists corridor acreages that occur on soils that are currently in unsatisfactory condition due to erosion rates that exceed tolerance erosion limits.

Table 19. Corridor acreages that occur on soils currently in unsatisfactory condition.

Route Number	Corridor Width (each side of road)	TEU	Corridor Acreage occurring in TEU
225A	300	271	9.93
225F	300	271	11.05
272D	300	271	15.30
461G	300	271	2.22
487	300	271	6.01
761	300	271	0.19
Total			44.72

Alternative 3

Alternative 3 would reduce the current road system by 466 miles. This would be a larger reduction of roads to be maintained than proposed under Alternatives 2 and 4. Approximately 90 miles of additional roads would be closed under Alternative 3 than under Alternatives 2 and 4. Most of the additional roads to be removed are on soils with moderate erosion hazard. Overall, Alternative 3 would result in fewer roads receiving adverse impacts through motorized travel (i.e., rutting, compaction, puddling, and soil displacement) and contributing to additional run-off and potential sedimentation of ephemeral channels and surface waters. Table 20 lists erosion hazard and associated acreages of additional roads to be removed under Alternative 3 as opposed to Alternatives 2 and 4.

Table 20. Erosion hazard and associated acreages of additional roads that would be removed under Alternative 3 as opposed to Alternatives 2 and 4.

	Erosion Hazard		
	Slight	Moderate	Severe
Acres	14.55	33.31	6.62
Length (miles)	21.1	48.3	9.6

There would be no designated camping corridors under Alternative 3. As a result, designated road corridors may experience considerably higher use. Under current management, most dispersed camp sites are utilized occasionally and many impacts recover prior to the next use. The level of recovery depends on the site and the degree of impact. Under Alternative 3, the designated road corridors could be utilized for dispersed camping more often and become permanently degraded and compacted. The degree of adverse impact to each site would depend on the level of recreational use and site-specific conditions such as soil types and plant communities. For example, areas in the pinion juniper vegetation type on impaired to unsatisfactory soils that would get utilized more regularly may sustain little to no vegetation and may exhibit increased run-off and erosion. There would be an additional 16 miles (23.27 acres) of spur roads added to the NKRD road system under this alternative. Approximately 0.34 miles (0.50 acres) of these spur roads would occur on soils currently in unsatisfactory condition. These soils would potentially be subject to soil compaction, rutting, vegetation removal and accelerated erosion as a result of dispersed recreational use.

Under Alternative 3, there will be no big game retrieval for any species. This will eliminate potential adverse impacts that could be created by vehicles traveling off-road.

Cross country motorized travel for fuelwood gathering in ponderosa pine and mixed conifer vegetation types (approximately 268,861 acres) would continue under this alternative.

Alternative 4

As discussed above, Alternative 4 is very similar to Alternative 2 with the only difference being the authorization of big game retrieval for mule deer. There are considerably more mule deer hunted than bison and elk. This will also create impacts across the entire non-wilderness portions of the district. The earlier hunts are typically concentrated in the higher elevations where more productive soils occur. The late hunts will be in the lower elevations where less productive soils and higher erosion hazards are more common.

The cross country travel created by this Alternative would be one trip in and one trip out for each mule deer retrieval. There would be some adverse impacts to soils including compaction, rutting, and removal of vegetative ground cover, with the degree depending on the soil type, erosion hazard, soil moisture content, distance of travel, and type of retrieval vehicle utilized. In most cases, these adverse impacts would be minor and localized since motorized passes over the same areas would be minimized in comparison to the No Action Alternative. As a result, these areas would be expected to stabilize rapidly after use. In the higher elevations, adverse impacts to soils are expected to stabilize rapidly due to the highly productive nature of these soils. These areas are therefore expected to have limited, short term impacts.

The lower elevations in the pinion-juniper and shrubland communities can expect to receive greater adverse impacts that will take longer to recover. Where MBGR occurs on the more productive soils and times when the soils are dry, then minimal adverse impacts can be expected. However, rutting can occur on easily compacted soils during wet periods. There would be some adverse impacts to soils including compaction, rutting, and removal of vegetative ground cover, with the degree depending on the soil type, erosion hazard, soil moisture content, distance of travel, and type of retrieval vehicle utilized. In most cases, these adverse impacts would be minor and localized since motorized passes over the same areas would be minimized in comparison to the No Action Alternative. As a result, these areas would be expected to stabilize in a relatively short timeframe after use.

Adverse impacts to soils and watershed resources that can be expected from this alternative would be considerably less than no action, while being equal to or slightly greater than those expected from Alternative 2.

Effects to Riparian and Wetland Vegetation

Each of the alternatives was analyzed to determine if there is potential for motorized vehicle travel on the NKR D to impact riparian and wetland vegetation. There is an estimated total of 2,033 acres of perennial streams, riparian areas and wetlands on the NKR D. Most of these acres occur in the Kanab Creek (1,168.64 acres) and Saddle Mountain (49.43 acres) Wilderness Areas. There are no locations on the NKR D where roads intersect riparian areas or perennial streams. Approximately 0.72 miles (1.04 acres) of maintenance level 2 roads and 0.20 miles (0.73 acres) of maintenance level 3 roads occur within seasonally wet meadows on the NKR D. These roads are not proposed for removal from the road system under any of the proposed alternatives.

The effects to wetland vegetation by motorized uses are related to the impacts of the road prism across wet surfaces, disturbance of vegetation, rutting, compaction, puddling, accelerated erosion, and potential sediment delivery to surface waters. Soil moisture and high organic matter content in seasonally wet meadows provides an increased level of resilience to irreversible, adverse impacts, and often increases the recovery potential to a greater degree than drier, upland sites. These areas will often recover to a more natural state in a shorter period of time.

Effects to Watershed Health from Road Condition

Each of the alternatives was analyzed to determine if there is potential for motorized uses on the NKR D to affect the integrity of watersheds. The indirect effects to watershed conditions from motorized routes are primarily related to the level of disturbance created by roads on the landscape and the resulting disruption of hydrologic function. Roads can alter hydrologic function by diverting and concentrating storm flows, increasing or changing sediment transport patterns, increase surface water turbidity and nutrient loads, all of which are important considerations of watershed health. While implementation of the Travel Management Rule would decrease the number of routes open for motorized use, it does not propose to decommission or obliterate any routes that will be closed. Decommissioning of a road is defined as “activities that result in the stabilization and restoration of unneeded roads to a more natural state” (36 CFR 212.1, Forest service Manual 7705-Transportation System [USDA FS 2003]). The Watershed Condition Classification Technical Guide states that “properly closed roads should be hydrologically disconnected from the stream network. If roads have a closure order but are still contributing to hydrological damage they should be considered open for the purposes of road density calculations” (USDA 2010).

For this portion of the analysis, closed roads are still considered as land disturbance that have the potential to impact watershed health across the Forest. Miles and acres associated with closed roads are included in the following tables of calculations. This is viewed from a landscape level and does not discount negative effects that may be more quickly reversed in riparian areas and wetlands, and water quality improvements that may occur from closed routes. It is just one of many factors that must be considered when assessing watershed condition.

Table 21 provides a summary of effects from motorized routes that have the potential to impact watershed conditions throughout the NKR D, by alternative as compared to the No Action Alternative. A brief summary of these effects, based on changes from the No Action Alternative are described below:

- This project does not address road decommissioning; all road scars will remain, with the addition of a few roads added to the system (i.e. addition of approximately 16 miles of currently unauthorized user-created routes to the NKR D road system). For the majority of motorized routes in the uplands, the changing of designation of roads to maintenance level 1 will result in minor change on the landscape until the road is decommissioned or removed from passive storage. At a landscape level, there is little to no change from existing road and trail condition, as result of changes in route designation under any alternative. There will be little to no change

in road densities under any alternative as routes will remain hydrologically connected until decommissioned.

- All alternatives to the No Action alternative would reduce acres of potential disturbance caused by recreational motorized cross country travel. Alternative 3 would significantly reduce the acres of potential disturbance caused by motorized big game retrieval and motorized dispersed camping over all proposed alternatives by not allowing motorized big game retrieval and not designating dispersed camping corridors. Alternatives 2 and 4 would reduce acres of potential disturbance caused by motorized big game retrieval and motorized dispersed camping, but to a lesser degree than Alternative 3. Alternative 2 would reduce acres of potential disturbance caused by motorized big game retrieval more than Alternative 4 since mule deer retrieval would not be included under Alternative 2. Alternatives 2, 3, and 4 would reduce acres of disturbance caused by fuelwood gathering by eliminating this activity in the pinyon-juniper vegetation type.

Table 21. Miles and acres of motorized route disturbance with potential to affect watershed condition by Alternative.

Alternative	Miles	Change in Miles from No Action	Total Acres of Roads	Change in Acres from No Action	Change from No Action (%)
Alternative 1 – No Action	1,852	0	2,918	No Change	No Change
Alternative 2	1,476	- 376	2,326	- 592	- 20%
Alternative 3	1,386	- 466	2,181	- 737	- 25%
Alternative 4	1,476	- 376	2,326	- 592	- 20%

Cumulative Effects

The cumulative effects analysis discussion concentrates on the geographic boundary of the NKR. This area encompasses the vast majority of the effects of TMR implementation within the fifth-level HUC watersheds that contain, at least partially, NKR lands. Impacts that may cascade downstream of the fifth-level HUCs are expected to be of minor consequence and difficult to quantify. Past, ongoing, and reasonably foreseeable activities on the NKR and adjoining lands that could have a cumulative effect on soils and watershed resources when combined with implementation of TMR include: vegetation manipulation and restoration projects, timber management, timber and fuelwood harvesting, fuels management including prescribed burning, livestock grazing, fence construction and repair, water tank construction and maintenance, wildfire suppression, non native and invasive weed species mitigation, recreational activities, road maintenance, management of designated wilderness areas, mining and mineral extraction, and growth of local communities. Many of the reasonably foreseeable activities on other land ownerships are difficult to predict with regard to timing, location, and scale of such activities.

Vegetation Projects

Vegetation management and restoration projects, including timber harvesting will be ongoing. Each project will require specific analysis. All proposed travel management alternatives would provide sufficient access to most project areas on the NKR. Temporary roads would be constructed as needed for project implementation with the intent to decommission such roads upon project completion. Temporary road construction and use would lead to short-term adverse impacts to soils and watershed

resources such as rutting, compaction, puddling, accelerated erosion, vegetation trampling or removal, and potential sediment delivery to surface waters, with the levels of these impacts directly related to road length, traffic, project duration and timing of activities. Upon project completion, rehabilitation and/or mitigation measures, including Best Management Practices would be implemented as needed to ensure long term soil productivity and watershed protection.

Cross country motorized travel for fuelwood harvesting will be ongoing to continue to meet local demand. There would be temporary increases in soil rutting, compaction, puddling, accelerated erosion, vegetation trampling and removal, and potential sediment delivery to surface waters as a result of personal and commercial fuelwood gathering. It is unlikely that these impacts would be mitigated since fuelwood gathering is permitted throughout the ponderosa pine and mixed conifer vegetation types. However, since cross country motorized travel would be limited to one trip in and one trip out, multiple passes across the same area are expected to be infrequent, allowing opportunity for traveled areas to recover.

Fire

Wildland fire plays a large role in vegetation management in the Southwest. Wildland fires are categorized in two distinct types: a) wildfires, which are unplanned ignitions, including escaped prescribed fires that are declared wildfires, and b) prescribed fires, which are planned management ignitions. Wildfires may be ignited by natural causes, namely lightning, or human caused. Under the current management, some sort of suppression action is taken on all human caused wildfires.

Wildfire occurrences are difficult to predict with reasonable certainty. However, some generalizations can be made regarding cumulative effects of fire suppression activities. Currently, increased fuel loads as a result of decades of fire suppression have caused wildfires to often become larger and burn at a higher intensities. High severity wildfires lead to adverse impacts to soils and watershed conditions through soil sterilization, hydrophobicity, loss of native seed banks in the soil, soil erosion, and sediment delivery to surface waters. Suppression activities often result in areas of bare mineral soil where firelines and other suppression efforts are implemented. Firelines may be installed off-contour, resulting in potential channelization or diversion of surface water flow. Fire suppression vehicles have potential to introduce non-native invasive and noxious weeds that can displace native vegetation, resulting in adverse impacts to soils and watersheds through decreased ground cover. Firelines and other areas that support fire suppression efforts are typically rehabilitated through implementation of Best Management Practices to prevent soil erosion and loss of soil productivity. Wildfire suppression therefore results in minimal adverse cumulative effect to soils and watershed conditions when combined with implementation of the Travel Management Rule on the NKRD.

Wildland fire has a critical role in maintaining forested and grassland ecosystems on the NKRD. Use of prescribed fire to restore historic fire regimes and decrease fuel loads that have resulted from decades of fire suppression is common practice on the NKRD. Prescribed fire and managed natural fires provide opportunities to reintroduce low intensity fire that partially consumes fuels and restores nutrient cycles, particularly carbon, nitrogen, and other nutrients critical to graminoid and forb production. The combination of partially burned and unburned areas creates a landscape mosaic that increases understory biodiversity and increases long-term protective ground cover. The cumulative effect of prescribed fire and natural fire use when combined with implementation of Travel Management Rule would result in improved soil and watershed conditions throughout the NKRD.

Livestock Grazing

Livestock grazing on the North Kaibab will be ongoing. The overall stocking rates on the grazing allotments are relatively low and many allotments are stocked appropriately for drought conditions. Typically, concerns related to livestock grazing impacts to soils and watershed resources include trampling and removal of vegetative cover, soil compaction in livestock trailing areas and around

livestock waters, and soil erosion caused by removal of protective vegetation and litter cover. These conditions can occur when livestock remain in a given area for prolonged durations or are grazed in high numbers. Continuing low stocking rates and adequate livestock distribution across pastures minimize adverse impacts to soils and watershed resources. Reduced livestock numbers combined with decreased road densities and elimination of recreational motorized cross country travel would improve vegetative and litter ground cover to protect soils and watershed resources.

Fence construction and maintenance occurs within most of the watersheds on the NKRK. These projects can remove understory vegetation and tree cover and compact soils in the immediate vicinity of these activities. Erosion rates may increase in these areas for short durations (1-2 years). Long term adverse effects to soils and watershed resources from fence construction and maintenance are rare.

Improved livestock distribution reduces grazing intensity, improves protective vegetative ground cover, and maintains soil stability and productivity. The long-term net cumulative effect of rangeland management activities (including best management practices and mitigation measures) in combination with decreased road densities and elimination of recreational motorized cross country travel is improved soils and watershed conditions throughout most of the NKRK.

Non-Native Invasive Species

Non-Native Invasive species continue to occur through many areas of the NKRK, particularly in burned areas following high severity wildfires. Some non-native species can impact watershed conditions by displacing native vegetation that more effectively protects soil surfaces from raindrop impact and erosion. An anticipated effect of the action alternatives would be fewer locations that invasive species can be spread to. This benefits watershed resources by there being fewer places that can be infested by weed species, thus reducing the areas where the watershed can be altered.

Rare and Sensitive Plant Species

Affected Environment

Plants are affected by roads, cross country travel, and dispersed camping in several ways. Soil compaction affects plant growth by reducing moisture availability and precluding adequate taproot penetration to deeper soil horizons. In turn, the size and abundance of native plants may be reduced. Above-ground portions of plants also may be reduced through breakage or crushing, potentially leading to reductions in photosynthetic capacity, poor reproduction, and diminished litter cover. Likewise, blankets of fugitive dust raised by traffic can disrupt photosynthetic processes, thereby suppressing plant growth and vigor. In turn, reduced vegetation cover may permit invasive and/or non-native plants—particularly shallow-rooted annual grasses and early successional species capable of rapid establishment and growth—to spread and dominate the plant community, thus diminishing overall endemic biodiversity.

A review was conducted to determine if any threatened, endangered, proposed, candidate, conservation agreement, Forest Service sensitive, or Kaibab National Forest Management Indicator plant species and/or habitats were known to occur on the North Kaibab Ranger District. To determine the list of species to be analyzed, the following sources were referenced:

- NKRK sensitive plant database.
- US Fish and Wildlife Service website (<http://arizonaes.fws.gov>).
- 1996 Paradine Plains Cactus Conservation Assessment and Strategy.

The table below describes species under the status of Forest Service Sensitive (S), Candidate, or Conservation Agreement (CA).

Table 22. List of species to be analyzed:

Scientific Name	Common Name	Status	Habitat and Status
<i>Arenaria aberrans</i>	Mt. Dellenbaugh sandwort	S	Grows in or near meadows in pine forest, one known location on NKRD.
<i>Astragalus ampullarius</i>	Gumbo milkvetch	S	Grows in restricted habitat of clay, saline, seleniferous soils; one known location on NKRD in desert scrub vegetation.
<i>Astragalus ccremophylax</i> <i>var. myriorrhaphis</i>	Cliff milkvetch	S	Grows in crevices and depressions on rimrock benches; one known location on the northern end of NKRD.
<i>Astragalus cremnophylax</i> <i>var. hevronii</i>	Marble Canyon milkvetch	S	Potentially suitable. May occur on NKRD along Marble Canyon.
<i>Castilleja kaibabensis</i>	Kaibab paintbrush	S	Grows in the driest most exposed sites of subalpine meadows.
<i>Eriogonum mortonianum</i>	Morton's wild buckwheat	S	Potentially suitable, yet un-surveyed habitat; may occur on NKRD in wilderness area.
<i>Eriogonum thompsonae</i> <i>var. atwoodii</i>	Atwood's wild buckwheat	S	Potentially suitable, yet un-surveyed habitat; may occur on NKRD in wilderness area.
<i>Lesquerella baibabensis</i>	Kaibab bladderpod	S	Grows in the driest most exposed sites of subalpine meadows.
<i>Pediocactus paradinei</i> ¹	Paradine plains (Kaibab pincushion) cactus	CA	Grows in grassy openings in pinyon-juniper woodland and shrub grassland plant communities.
<i>Pediocactus peeblesianus</i> <i>var. fickeiseniae</i> ¹	Fickeisen pincushion cactus	C	Grows on canyon rims in shallow, gravelly soil on west and east sides of NKRD.
<i>Rosa stellata</i> ssp. <i>abyssa</i>	Grand Canyon rose	S	Grows on or near canyon rims or on the tops of cliffs at edges of mesas or plateaus.

¹ Actions have been made to protect this species through a Conservation Agreement with USFWS.

Existing Conditions for Sensitive Plant Species by Similar Habitats or Specific Species

Meadows

Kaibab paintbrush, Kaibab bladderpod, and possibly Mt. Dellenbaugh sandwort occur in subalpine meadows where cross-country vehicle travel is already prohibited. There are forest user roads created via past cross-country travel that can have an adverse impact on these species as discussed above.

Wilderness

Morton's buckwheat and Atwood's buckwheat are believed to occur in or at least have suitable habitat in Congressionally-Designated Wilderness areas of the NKRK. Vehicle use in the Wilderness areas is prohibited and thus the current road system should have no impacts to habitat of these species.

Canyon Rims

Populations of Grand Canyon Rose and Fickeisen pincushion cactus have been found along canyon rims in remote locations on the west and south east edges of the NKRK.

The Fickeisen pincushion cactus is a small solitary or clustered globose cactus with corky spines. The species retracts into the soil during periods of drought. Fickeisen has been listed as a candidate species for addition to the Endangered and Threatened Wildlife and Plants List.

Grand Canyon Rose has been detected on the western edge of the North Kaibab, on the rim of Kaibab Canyon.

With both species, they typically occur on canyon rims beyond where current system roads end and in locations where effects from dispersed recreational use would be rare.

Paradine plains cactus (*Pediocactus paradinei*)

Paradine plains cactus is a small single, green globose cactus usually no more 1.5 inches tall above ground, with half of its stem underground. During periods of drought, individual plants retract into the soil, and are covered with soil and pebbles (Phillips et al. 1996). Paradine plains cactus is a sensitive species and is currently managed under a 1998 Conservation Agreement between the U.S. Fish and Wildlife, USDA Forest Service, and Bureau of Land Management (USDI Fish and Wildlife Service et al. 1998).

Paradine plains cactus is known exclusively from the eastern slopes of the Kaibab Plateau (East Kaibab monocline) and small portions of adjoining House Rock and Coyote valleys. Paradine plains cactus occurs in open, mostly level sites on alluvial fans, valley bottoms, and ridge tops in the pinyon-juniper woodland and shrub/grassland ecosystems.

Existing and potential concerns for Paradine plains cactus that are addressed in the Conservation Assessment and Strategy prepared for the species include livestock grazing, road maintenance, fuelwood harvesting, plant collection, cross-country travel, dispersed camping, and other human-caused impacts. The plants occur on open, flat sites making them susceptible to disturbance by camping and road construction. Many of these issues have created direct, negative impacts to individual cactus and the overall habitat.

Measures were implemented in the Conservation Agreement and Strategy to reduce impacts to the species across its habitat area which is referred to as the Conservation Area. These items include but are not limited to:

- Alteration of livestock grazing allotment management plans to defer grazing during the primary growth stages of the species and take management measures that will reduce grazing pressure around known populations.
- Restrict fuelwood harvesting inside the conservation area.
- Authorization of Special Use Permits that are consistent with the goals outlined in the Conservation Strategy.
- Look for opportunities to reduce negative impacts on the populations most affected by recreational use.

Milk Vetches

Cliff Milkvetch (*Astragalus crenophylax* var. *myriorrhaphis*) has been located on the extreme northern edge of the NKRD. The plants occur on flat barren points of limestone canyon rims. This known location is more than a mile from the nearest forest system road.

Hevron or Mable Canyon Milkvetch (*Astragalus cremnophylax* Barneby car. *Hevronii* Barneby) occurs in crevices and depressions with shallow soil on Kaibab Limestone along Canyon Rims. This species has been found on the East Rim of Marble Canyon on the Navajo Nation. While there have not been direct findings of the species on the North Kaibab Ranger District, there is suitable habitat along Marble Canyon on the southeastern portion of the district.

Effects Analysis

Effects Common to all alternatives

There is no motorized vehicle use in Congressionally Designated Wilderness. There will be no change in effects from any alternatives to the species in wilderness which includes Morton's buckwheat and Atwood's buckwheat.

This will also be consistent with Grand Canyon Rose, Fickeisen pincushion cactus, and the Milkvetches that occur on the canyon rims. There are no anticipated changes in effects across all of the alternatives.

Direct and Indirect Effects

Alternative 1-No Action

Subalpine Meadow species

Cross-country travel is currently prohibited in the subalpine meadow locations where Kaibab paintbrush, Kaibab bladderpod, and possibly Mt. Dellenbaugh sandwort occur. There are a few user created roads that cross these meadows. Use of these roads would continue under the No Action Alternative. The continued use of these roads will continue to alter potential habitat, allow incidental crushing or damage to the species, continue the effects of dust covering the species from vehicle traffic, and serve as a vector for invasive species that could out-compete these sensitive species.

Paradine Plains Cactus

Under the No Action Alternative, impacts to Paradine Plain Cactus will continue to occur at current rates. Cross-country travel can have a large impact to the species as vehicles can damage individual plants by crushing or soil compaction. Vehicles can also serve as vectors for invasive weeds species. Introduced invasive species can impact the cactus by out-competing for nutrients.

All of the current National Forest System roads or user created roads would be legal to drive on, as would cross-country travel. Some of these roads either alter potential habitat or provide access to the species that can lead to additional impacts.

Effects Common for Alternatives 2, 3, and 4

Subalpine Meadow species

Alternatives 2, 3, and 4 would have very similar impacts to the habitat for Kaibab paintbrush, Kaibab bladderpod, and Mt. Dellenbaugh sandwort. All three alternatives would eliminate off road travel. All three alternatives provide a road system away from sensitive areas such as meadows. Alternatives 2 and 4 authorize motorized big game retrieval for elk and bison while Alternative 3 does not. Alternative 4 also authorizes game retrieval for mule deer which will be analyzed separately.

The key benefits to the species include significantly reduced damage to the plants that could occur from vehicle trampling. Crushing that could occur but will be greatly reduced. Dust raised by motorized traffic would be reduced. Introduction of invasive species from vehicles would be reduced.

Reducing these threats to the habitat area will allow these species to grow, survive, and reproduce, thus promoting the abundance of the species and the biodiversity of the subalpine meadows.

Paradine Plains Cactus

Alternatives 2, 3, and 4 are very similar in effects to the Plains cactus. In these three alternatives, many of the same roads will be removed from the system. All current system roads or user created roads within the conservation area were closely analyzed. Roads that did not access a structure or significant recreation area that travels to or near known cactus populations are proposed to be removed from the road system in each of these alternatives. These roads to be removed consist of spur roads that branch off of the primary access roads and represent 40 percent of the current roads in the conservation area but less than 10 percent of the overall miles of road in the conservation area.

There are no camping corridors authorized in the Paradine Plains Cactus Conservation Area in Alternatives 2 and 4, and no corridors district-wide in Alternative 3, thus creating the same effects. Within the habitat area, spur roads were identified and then evaluated for resource concerns. These locations were reviewed for their distance to known cactus populations or suitable habitat. There would be no spur road within a ½ mile of known cactus populations or within suitable habitat in any of the action alternatives.

The differences between Alternatives 2, 3, and 4 are the authorization of motorized big game retrieval for elk and bison in Alternatives 2 and 4, and the additional motorized big game retrieval for mule deer in Alternative 4. Based on current hunt information, no elk or bison have been found inside of the conservation area. No anticipated issues are tied to motorized big game retrieval in the conservation area. Effects from mule deer retrieval will be discussed below.

The benefits to the cactus from a reduced forest road system proposed in these alternatives include the greatly reduced impacts from damage, crushing, and introduction of invasive species. Known populations of the cactus would have an increased ability to grow and reproduce under these three alternatives.

Alternative 4

Subalpine Meadow species

Alternative 4 authorizes motorized big game retrieval for mule deer, as well as elk and bison. Mule deer retrieval is likely to occur in the subalpine meadows. The cross-country travel that would occur for the retrieval will vary, diminishing long term effects of tracks.

There will be impacts created by motorized vehicle tires to the plants from crushing, compaction, and dust coating. There is also potential for the spread of invasive weed species. This would only represent a small increase in impacts over Alternatives 2 and 3. Given that there have been no noticeable impacts to subalpine meadows from past mule deer retrievals, this is not expected to be an issue.

Paradine Plains Cactus

Alternative 4 would authorize motorized big game retrieval within one mile of an open road, unless designated otherwise. The conservation area has been popular for hunting mule deer. This would increase the level of off-road motorized vehicle travel over Alternative 2. The low precipitation and poor soils of this habitat make it more difficult to recover from impacts when compared to other popular hunting locations on the NKRD. The creation of ruts and reduced vegetation is possible from one round trip on every motorized game retrieval.

By the time that the second rifle hunt in late November occurs, the cactus typically has retracted back into the soil. Exceptions depend on climatic conditions like temperatures and precipitation. The cactus is less susceptible to damage from vehicles when it has retracted, but can still be crushed or compacted when driven over. Invasive species spread can occur from seed clinging to the vehicle. The motorized game retrieval would be random and potential impacts could only be created in the locations where motorized vehicles would drive on the more fragile soils. Any tracks created will rehabilitate over time, but it will take longer than other locations.

Cumulative Effects

The cumulative impacts that could also affect sensitive plants across NKRD over the next ten years when combined with a National Forest Road System as proposed in the action alternatives include climate change, wildfires, invasive species, and livestock grazing.

Climate Change

Current studies on global climate change indicate a trend toward higher temperatures, lower precipitation, more frequent and severe droughts, and increased frequency of high intensity wildfires. Past droughts have had dramatic impacts to the Paradine Plains Cactus populations, leading to large declines. Ideal climatic conditions promote seed production for the recruitment of new species. Changes in climate can reduce a species' ability to reproduce or could cause plant die-off when long term conditions are outside its optimal range.

Impacts created by off road motorized vehicle use have compounded the effects as the cactus species were less able to bounce back from these impacts during the drought years. Reducing the impacts created by motorized vehicle use of the conservation area will reduce impacts to the species during changing climatic conditions.

Fire

Years of fire suppression combined with climate change has led to an increasing number of high intensity wildfires in recent years. While fire historically played a key role in maintaining healthy ecosystem function, high intensity wildfires can dramatically alter an ecosystem by damaging or destroying plants and any potential seed in the soil. The disturbances created by these events leave burned areas lacking native seed in the soil and increases the potential for new species to become established. This includes non-native invasive species that can rapidly establish and dominate a site within a few years after a fire.

Restoring forests to fire adapted ecosystems will be an ongoing effort for the foreseeable future. Managed fires in conjunction with mechanical treatment can reduce heavy fuels, preventing catastrophic fires from occurring. By reducing the potential for negative impacts by fire to sensitive plant species and combining a National Forest Road System that is also reducing impacts; the long term survival of many plant species can be increased.

Non-Native Invasive Species

Non-native invasive species continue to invade and establish on federal lands. These species are adapted to out-compete native species for nutrients and can rapidly establish and dominate sites. Invasive species pose a high risk to sensitive plant species and can displace them if left untreated.

The implementation of noxious and invasive weed control efforts has reduced the number of exotic plant species within the North Kaibab Ranger District. The containment, control, and eradication of species like Scotch Thistle, Spotted Knapweed, and Cheatgrass is expected to continue for the foreseeable future. Best Management Practices for managing invasive species is provided by the Coconino, Kaibab, and Prescott National Forest Environmental Impact Statement for Integrated Treatment of Noxious and Invasive weeds. With these practices are guidelines for performing project activities that will reduce the risk of introduction of new invasive species and prevent the spread of undetected existing populations.

These practices include methodologies for invasive species survey, treatment, and reducing seed spread via equipment performing administrative activities.

The reduction of road miles in the action alternatives will reduce the ability of weed species to be introduced. Reducing possible invasive seed vectors, combined with aggressive survey and control of existing infestations will greatly reduce the potential for invasive species to out-compete sensitive plant species.

Livestock grazing

With poor management, domestic livestock grazing can have an adverse effect on sensitive plant species. Specifically, high grazing utilization on areas containing sensitive species that are not adapted to sustain grazing pressure can lead to the decline of a species. As management continues to research and adapt to meet multiple use objectives, allotment management plans are also adapted to best meet the needs of all species and resources.

Recent allotment management plans have greatly reduced grazing pressure in areas containing sensitive plants. Grazing pressure in subalpine meadows has been reduced by lowering livestock stocking rates and livestock exclusion from water sources in or near meadows containing sensitive species.

For the Paradine Plains Cactus, measures have been taken including changing the season of use in which livestock can graze, strategic use of water and mineral supplement, and multiple other measures to reduce livestock grazing effects to the species.

The incorporation of these measure into livestock grazing management on the NKRD, combined with implementation of the TMR, can contribute towards the promotion and survival of sensitive plant species on the NKRD. Over the next ten years, implementation of any of the action alternatives will continue to reduce impacts to sensitive plants.

Non-Native and Invasive Species

Affected Environment

Invasive species can displace native vegetation and dominate a site. If an infestation is left uncontrolled, the ecosystem function can be altered. One of the many dispersal mechanisms in which invasive species are spread is via roads and forest visitors. Seeds can attach to a vehicle, forest visitors, or personal possessions that are brought onto the forest. The more locations a forest visitor can travel leads to the greater potential for invasive species spread. The more use that a road receives creates the greater risk that invasive species’ seed will be spread along that particular road.

The Coconino, Kaibab, and Prescott National Forests Integrated Treatment of Noxious or Invasive Weeds Environmental Impact Statement (2004) gave the forest the ability to treat invasive species of concern. Identified invasive species are treated in the most efficient manner possible to contain and eradicate each population. Currently, projects focus on treating known infestations across the district, prioritizing the species and locations that pose the greatest threats. Surveying allows the district to control and eradicate new infestations before they have the opportunity to spread. These methods have proven successful in eradicating or reducing potentially serious noxious species threats.

Table 23. Non-native invasive species of concern on the NKRD.

Species	Location of Known Population
Musk Thistle (<i>Carduus nutans</i>)	Several small populations around the Jacob Lake area and along State Highway 89A.

Species	Location of Known Population
Spotted Knapweed (<i>Centaurea masculosa</i>)	Small populations in numerous places along State Highways 67 and 89A and a few isolated occurrences along roads in the Warm Fire.
Scotch Thistle (<i>Onopordum acanthium</i>)	Five populations on western side of NKRD.
Leafy Spurge (<i>Euphorbia esula</i>)	One population near Big Springs Field Station.
Cheatgrass (<i>Bromus tectorum</i>)	Numerous populations across NKRD. Large populations currently exist in the vicinity of 1996 Bridger Knoll Fire.
Oxeye Daisy (<i>Chrysanthemum leucanthemum</i>)	Small populations occurring in the Demotte Park area.
Bull Thistle (<i>Cirsium vulgare</i>)	Several populations along State Highways 89A and 67 and in the Warm Fire area.
Salt Cedar (<i>Tamarix ramosissima</i>)	Large populations in the Kanab Creek Wilderness.
Dalmatian Toadflax (<i>Linaria genistifolia</i>)	No known populations on NKRD, but species can be found on federal lands in Northern Arizona.
Yellow Starthistle (<i>Centaurea solstitialis</i>)	No known populations on NKRD, but species can be found on federal lands in Northern Arizona.

There are several species of invasive weeds that have been found on the NKRD and fall inside the project area along existing roads. Each species listed on Table 15 has the ability to invade, establish, and dominate the project area. Of these species Musk Thistle, Bull Thistle, and spotted Knapweed have been identified in the Jacob Lake area along the State Highways and a few adjacent forest roads in the Warm Fire area. There is a population of Leafy spurge near Big Springs and close to Forest Road (FR) 422. Populations of Scotch Thistle exist on the western side of the district near or along Forest Roads 235, 423, 422, 644, and 267. Once these species become established, it takes years to eradicate the population. A Musk Thistle seed can survive and be viable for germination up to 15 years. One healthy Musk Thistle plant is capable of producing over 100,000 seeds in its life cycle. Treatment in the form of manual hand grubbing or herbicide application has been ongoing since 2003. The specific treatment of each species on each site is determined by the most efficient treatment that follows the guidance of the previously mentioned Invasive Species EIS. Monitoring and removal of located plants is ongoing at each site throughout the annual growing season to ensure newly germinated species are eradicated prior to seed production. Treatment will be ongoing for the foreseeable future. Surveys for new populations in areas with high potential for infestation are ongoing.

Cheatgrass is a winter annual grass species that germinates in the winter or spring. Cheatgrass plants produce many seeds, depending on the environment, spacing and size of the plants. Individual plants growing in high densities may produce about 25 seeds each, while a large, open-grown plant can produce about 400 seeds (Zouhar 2003). The design of the seed allows it to be easily transported by clothing, animals, and vehicles.

This species is very successful at maximizing available moisture and nutrients from the upper layer of soil, and is capable of growing in years of drought and in poor soil conditions. Cheatgrass' ability to grow and produce seed before other species, high seed production, and the ability to grow in places other

grass species cannot, allows this species to rapidly overtake a site. Cheatgrass can be found in many locations across the NKRDR. While most of the larger, denser populations are found in pinyon-juniper woodlands that have experienced disturbance, numerous populations have been found in ponderosa pine ecosystems. With its abundance across the entire forest, this species poses the greatest risk of having a negative effect on the project area. Mapping and treatments of cheatgrass began in the pinyon-juniper woodlands in 2007, prioritizing highest risk locations for treatment. The intent of this effort is to greatly reduce the large populations of cheatgrass and return the sites infested to native vegetation species.

There are other highly invasive species that occur outside of the project area including several thistle and knapweed species that could still be transported in from other areas of the forest and surrounding lands.

Effects Analysis

Direct and Indirect Effects

Alternative 1 – No Action

The current rate of spread of existing noxious and invasive weeds and the current rate of introduction of new invasive species will continue. As recreational use on the NKRDR increases, the rate of spread of weeds would probably increase as well. Increasing populations of weed species can displace native vegetation, reduce forage production for livestock and wildlife, and in some cases even increase erosion and the risk of wildfire.

Effects Common to Alternatives 2 and 4

These two alternatives will reduce the number of roads that can be traveled on by 376 miles. This will lower the amount of invasive species seed introduced or spread across the NKRDR.

These alternatives would also designate dispersed recreation corridors along 203 miles of Forest System Roads and provide for spur roads to recreational opportunities on remaining areas of the district. When an area is disturbed, this could increase the threat for possible invasive species introduction. The forest user may also be serving as the vector of invasive species seed. Increased use of a road, spur road, or corridor can lead to increased disturbance and higher potential for introduction of invasive species.

The authorization of motorized big game retrieval will have an increased threat of invasive species spread as every vehicle that travels cross-country has the ability to serve as a vector and create disturbance. Alternative 2 authorizes motorized big game retrieval for only elk and mule deer. This is expected to lead to only a small increase in the potential for invasive species spread and disturbance when compared to Alternative 3 and should not generate any realistic impacts.

Alternative 4 authorizes motorized big game retrieval for mule deer in addition to elk and bison, which increases the potential for invasive spread when compared to Alternative 2. While the potential for invasive spread and disturbance is greater in Alternative 4, motorized big game retrieval for mule deer is not expected to be significant enough to increase the level of invasive species across the project area when compared to the other action alternatives and the overall recreational use on the NKRDR.

Alternative 3

This alternative closes 466 miles of roads, compared to 376 for Alternatives 2 and 4. No camping corridors would be established, but 16 miles of spur roads would be designated in the forest road system. This alternative will greatly reduce the areas into which invasive seeds can be introduced from other areas. This will keep possible infestations created by forest users concentrated and easier to survey for.

Spur roads identified to access recreation opportunity areas that would normally receive limited use in Alternatives 1, 2, and 4, would typically have the opportunity for any damaged vegetation to recover. By

limiting recreational activities to only these spur roads in Alternative 3, use of these spur roads will become more frequent. With potentially increases in concentrated use, the vegetation in these locations could be degraded. This could lead to a greater possibility of new infestations.

Motorized big game retrieval would not be permitted in this alternative. This will reduce the potential for invasive species spread when compared to Alternatives 1, 2 and 4.

Cumulative effects

There are many vectors that can spread invasive species across NKRK. Besides use by forest visitors on the road system, grazing and fire management on NKRK can have a cumulative effect on invasive species when considering potential effects in the next ten years.

Grazing

This project will have little effect on grazing management, with benefits coming from reduced grazing management concerns tied to forest visitors. With regards to cumulative effects to invasive species and livestock, many of the livestock that graze on the North Kaibab will also graze on adjoining BLM lands. When weed infestations are undetected and not treated, livestock can be another vector to spread the weed seed. By reducing the locations that new weed infestations can occur by a reduced roads system, early detection and control is increased and the potential for livestock to spread invasive species decreases.

Fire

Fire management plays a vital role in ecosystem management. Fire also can create a disturbance that can allow for invasive species to enter the burned area and become an infestation. The greater the density of roads inside a recently burned area, the higher potential becomes for invasive seed to be distributed, establish, and become an infestation. Reducing the density of open roads can be a way to reduce weed establishment after a fire reducing the possible vectors into the burned area.

Wildlife

Effects Analysis

Direct and Indirect Effects

Many of the direct and indirect effects of roads on wildlife are negative; there is an opportunity to reduce impacts to wildlife by restricting cross-country motorized travel and reducing the density of open roads on the district. Restricting cross country motorized travel would result in reduced levels of human disturbance to wildlife and increased habitat quality for various wildlife species. On the NKRK cross country travel occurs from three major activities: dispersed camping, hunting (including scouting and antler collection), and the gathering of forest products (including fuelwood and Christmas trees). Similarly, reducing open road density would result in reduced levels of human disturbance because there would be more areas inaccessible to motor vehicle travel. Habitat quality would be greater for a variety of wildlife species in these areas made less accessible to motor vehicle travel because there would be reduced road-associated habitat impacts.

Corridors

The impacts from cross-country travel associated with dispersed camping will change. Camping corridors will be designated in Alternative 2 and Alternative 4, along approximately 203 miles of the open road system (Table 24), there will be two corridor lengths (100 feet and 300 feet) that will allow for camping/parking from either edge of the road. Corridors were designated to capture the most popular camp sites and areas. Most dispersed corridor camping occur in the ponderosa pine type (Table 25), with fewer corridors being located in the mixed conifer habitat. There are no identified corridors in pinyon-juniper/grassland habitat. This would result in removal of ground cover, accelerated erosion and soil

compaction within the corridors. Noise disturbance within corridors is expected to be of greater frequency since corridors will be mapped and are limited to specific areas.

There could be some increase in dispersed camping (parking within one vehicle length, defined as 30 feet) along roads that will remain open outside of corridors. This is anticipated since some campers that previously camped along roads that are being closed will not want to camp in designated corridors, primarily because they are seeking a more primitive camping experience. Impacts at any one site are expected to be of short duration, and low intensity.

The other change is the addition of approximately 16 miles of existing spur roads that lead to previously used campsites. Popular dispersed camping sites where people have been camping in recent years were inventoried and are proposed for addition as designated short spurs under Alternatives 2, 3 and 4. No new disturbance is likely from the addition of the associated spur roads (Table 26), since the roads already exist to access the existing camp sites. Since these unauthorized two-track roads already exist on the ground, they would not increase fragmentation of habitat at this time, but by adding the roads to the system, they would not be reclaimed or be returned to habitat. They may promote other activities in the area (such as camping and hiking) around the spur roads that might reduce the habitat effectiveness of the area. But since these areas are usually short spurs and spread across the district they would only affect small isolated areas of habitat. The spur roads are identified for all habitat types, for all three action alternatives. Overall these identified corridors and spur roads should limit overall species disturbance compared to the No Action Alternative.

Table 24. Road Density by habitat type.

Cover Type	Acres of Cover Type ¹	Current Open Road Density (miles)	Proposed Action and Alternative 4 Open Road Density (miles)	Alternative 3 Open Road Density (miles)
Mixed Conifer	28366	192	174	145
Ponderosa Pine	190278	915	756	704
Pinyon-juniper	212846	407	272	271
Shrub/Grassland	65959	162	115	111

¹Excludes wilderness areas

Table 25. Corridor density by cover type.

Cover Type	Miles of roads with no corridor width restriction (No Action)	Miles of roads with 100' corridor (Alternatives 2 and 4)	Miles of roads with 300' corridor (Alternatives 2 and 4)
Mixed Conifer	426	0.21	1.6
Ponderosa Pine	880	90	92

Table 26. Dispersed campsite access by cover type.

Cover Type	Miles of roads to access dispersed campsites
Mixed Conifer	3.4
Ponderosa Pine	8.7
Pinyon-juniper	3.9

Motorized Big Game Retrieval

Motorized big game retrieval opportunities would be restricted under Alternatives 2 and 3 compared to Alternative 1 and Alternative 4. Because motorized cross-country travel is currently allowed everywhere on the district outside of travel-restricted areas, motorized big game retrieval is allowed for all game species under Alternative 1. Although cross-country travel would not be allowed, motorized big game retrieval would be allowed up to 1 mile from all open roads for all big game species under Alternative 4. In contrast, only legally harvested elk and bison would be retrieved under Alternative 2 and no big game retrieval would be allowed for any hunts under Alternative 3.

Big game harvest data published by Arizona Game and Fish Department was used to estimate the maximum frequency of motorized big game retrievals that could occur on the NKRD. Most of the motorized big game retrievals on the district are for retrieval of mule deer; between 2005 and 2009, an average of 1564 permits were issued annually with harvest levels averaging 954 deer per year (AZGFD 2010). Whereas compared to deer, although multiple permits are issued, hunter success is low, and NKRD only has an estimated 6-12 elk (Tom McCall AZGFD, personal communication, 2010).

The majority of the deer hunts occur September through November, when the deer are on the winter range on the east and west sides of the district. This area is predominately pinyon-juniper with crypto biotic soils (see Soils section for more information) which is vulnerable from cross-country travel, including big game retrieval. Impacts to this habitat and associated species would be much greater under Alternatives 1 and 4 than Alternatives 2 and 3. The impacts from cross-country travel associated with hunting will significantly decrease with the implementation of the Proposed Action. Cross-country travel would not be allowed for scouting, antler collection or other hunt related activity except for the retrieval of elk and bison in Alternative 2 or elk, bison and deer in Alternative 4.

Other Permitted Activities

The Travel Management Rule exempts permitted activities. Section 212.51 states that motor vehicle use that is specifically authorized under a written authorization issued under Federal law or regulations are exempted from route and area designations. Thus, motorized uses that occur under permitted authority may allow for motorized use on non-designated routes or areas if it occurs under the terms of the permit. Therefore, the selection of any alternative would not prohibit motorized travel occurring under an authorized permit for the purposes of collecting firewood or livestock management or other activities allowed by permit. This rule however will not apply to the pinyon-juniper and grassland habitat; these areas have been mitigated to protect heritage, soils, sensitive plants and wildlife habitats. Impacts to wildlife from cross-country travel associated with activities under permit in the mixed-conifer and ponderosa pine habitats would not change from the current condition (No Action).

The following assumptions for this analysis were made.

1. All vehicle types result in similar levels and amount of disturbance effect to wildlife, unless there is local information enabling a separate analysis by vehicle type.

2. Location of a trail/road is equal to disturbance effects from that route (e.g., assume all trails/roads provide the same level of disturbance), unless otherwise stated.
3. The focus of this analysis is on suitable habitat; suitable habitat is assumed occupied unless it has been surveyed to a standard that determines absence.
4. The number of miles of routes for Alternative 1 (No Action) includes all currently mapped unauthorized routes; this is based on the assumption that these routes would continue to be used under this alternative.
5. Continued cross-country motorized travel under Alternative 1 (No Action) will continue to have negative consequences for species and their habitats.

Federally Listed Species

Mexican Spotted Owl

The NKRK is located in the Colorado Plateau Recovery Unit (RU) as defined in the Recovery Plan (USDI 1995). Within this RU, Mexican spotted owls (MSO) are known to nest within the Grand Canyon of Arizona and the slot canyon country of Utah (USDI 1995). In southern Utah, extensive surveys have shown that breeding owls have been found only in canyons, and have yet to be found nesting in mixed-conifer or other forest types with less than 40% slope in this area (USDI 1995). All known breeding and roosting sites of Mexican spotted owls in Grand Canyon are in canyon habitat as described for southern Utah. Further, Bowden et al. (2008) found owls in rocky caves or on steep cliffs where canyon width at roost height averaged 46.2 meters (± 40.9 SD). Owl primary use area is definitely within the canyons but it seems they do, on occasion, come up onto the plateau to forage or define territory boundaries. However, Bowden et al. (2008) found that most detections are within 0.5 miles of the rim.

MSO surveys began on the NKRK in 1988; however, surveys meeting Region 3 protocol did not start until 1989. In the early years of surveys, there were reports of MSO detections, but after considerable evaluation by district wildlife biologists (D. Garcia de la Cadena, R. Hoverman, and M. Siders) most were removed as questionable reports. A majority of the forested portions of the NKRK have been surveyed at least once; with many areas surveyed multiple times (see Table 27). No protected activity centers have been established and no known nests have been found on the NKRK as a result of these surveys.

Table 27. Summary of Mexican Spotted Owl Habitat and Surveyed Habitat on the NKRK.

Area and Surveys	Acres	Percent (%) of Total MSO Habitat Surveyed
Total MSO habitat:	64,599	
Total surveyed habitat:	62,097	96.13%
Habitat surveyed prior to 1996:	39,073	60.49%
Habitat surveyed from 1996-1999:	21,180	32.79%
Habitat surveyed from 2000-2003:	34,544	53.47%
Habitat surveyed from 2003 – present:	57,047	88.31%

Critical habitat is designated by the U.S. Fish and Wildlife Service (FWS) to provide for the survival and recovery of listed species. Critical habitat for the Mexican spotted owl was originally designated in 1995, and has been re-designated in 2001 and 2004. The current designation was published in a final rule on August 31, 2004, effective as of September 30, 2004 and includes the all of the mixed-conifer habitat type on NKRK within Colorado Plateau (CP) Unit 10. Critical Habitat Unit.

In determining which areas to propose as critical habitat, the FWS is required to consider those physical and biological features (primary constituent elements) that are essential to conservation of the species and that may require special management considerations or protection. The FWS determined the primary constituent elements for Mexican spotted owl from studies of their habitat requirements and the information provided in the Mexican spotted owl Recovery Plan (Fish and Wildlife Service 2004).

Direct and Indirect Effects of Alternative 1

The No Action Alternative would maintain road densities at existing levels and there would be continued unrestricted cross-country travel. This alternative would keep 266 miles of roads open in MSO critical habitat. Although there are no known nesting owls, motorized travel would continue to directly cause localized disturbance to dispersing owls that may be in the area. User-created roads and motorized trails would continue to increase, increasing the level of recreation activities in these important habitats over time. Unrestricted cross-country travel would cause localized soil compaction, rutting, loss of vegetative ground cover, accelerated soil erosion, and lack of soil productivity in MSO habitats (See Soils, Watershed, and Air Quality section for more detail). This potential loss of vegetative ground cover would impact Mexican spotted owl prey species that rely on plant material for food and cover.

Direct and Indirect Effects of Alternatives 2, 3 and 4

Under each of the action alternatives, motorized cross-country travel would be reduced with the greatest restriction under Alternative 3 (see Table 4). Restricting motorized cross-country travel under Alternatives 2 and 3 would result in fewer impacts to habitat of spotted owl small mammal prey and thus result in some level of increased quality of spotted owl foraging habitat within designated Critical Habitat.

Under Alternatives 2 and 4 the concentration of camping in corridors may increase disturbance to MSO habitat, but only a minimal number (approximately 1.7 miles) of the roads will be used for corridor camping; these are located in open grassy areas decreasing the potential for disturbance throughout the habitat. All three action alternative include the continued use of 3.44 miles of spur roads that lead to areas identified as popular camping locations. These campsites have been used historically and will not add to the overall effects to MSO habitat conditions.

Overall, Alternatives 2, 3 and 4, although less so in Alternative 4, would result in some level of increased habitat quality for Mexican spotted owl compared to Alternative 1, with Alternative 3 resulting in a greater increase in habitat quality. Alternatives 2, 3, and 4 may affect Mexican spotted owl and Mexican spotted owl designated Critical Habitat, but none of these action alternatives would adversely affect spotted owls or spotted owl Critical Habitat, since there will be no removal of primary constituent elements.

California Condor

The California condor was reintroduced into the Vermillion Cliffs and Hurricane Cliffs areas of the Arizona Strip, Bureau of Land Management. Both locations are adjacent to the NKRD. Current numbers are at 68 in Arizona (Chris Parish, Peregrine Fund, personal communication 2009). Condors were released and will be managed as an experimental, nonessential population under Section 10(j) of the Endangered Species Act (ESA). This non-essential, experimental designation provides increased opportunities for assuring that the release and the management of the condors do not disrupt or conflict with other activities.

Condor use of the NKRD is now year-round, including breeding and nesting; however, no eggs have been hatched on the district through the 2010 nesting season. Depending on the time of year and food availability, the number of condors on the district at any one time may vary. Condors have been extensively radio-tracked and have been detected flying over, foraging and roosting throughout the district. All condors are closely monitored by researchers sponsored by the Peregrine Fund, Forest Service and the Arizona Game and Fish Department.

Direct and Indirect Effects of Alternative 1

Most effects to condors are direct human disturbances while the condors are foraging on carrion and indirect effects caused by ingestion of debris. The No Action alternative would not decrease potential effects to condors.

Direct and Indirect Effects of Alternatives 2, 3 and 4

Under Alternatives 2, 3, and 4, there would be decreased risk of human disturbance of scavenging condors as a result of a reduced open road system and substantially restricted motorized cross-country travel. Potential long-term benefits to condors would be slightly greater under Alternative 3 than under Alternatives 2 or 3 because Alternative 3 would result in a greater reduction in miles of open roads and a slightly greater restriction in motorized cross-country travel. In all action alternatives, the use of corridors or spur roads for recreational activities should have no effect on condors.

Condors scavenge on large mammal carrion a result of road kill, natural death or hunting. Alternatives 2, 3, and 4 would have no measurable effects on the frequency of road kill. Large mammals are frequently killed by vehicle collisions along State Highways 89A and 67, but are less frequently killed by vehicle traffic on other non-paved forest roads on the district because of the relatively low vehicle speeds and traffic volumes on these roads. Lead poisoning caused by ingestion of lead bullet fragments in gut piles and carcass parts of hunter-killed ungulates and other mammals is known to affect bald and golden eagles, California condors, and other scavengers such as ravens (Hunt et al. 2009, Green et al. 2009). Lead bullet fragments consumed by avian scavengers are typically concentrated in the gut pile that is left behind in the field after field dressing. Changes in motorized big game policy may affect hunter behavior and influence the amount of game carcass parts left in the field. Currently, nearly all hunters field dress their harvested animal and leave the gut piles in the field. Because lead poisoning is such a problem for California condors in northern Arizona and southern Utah (Sieg et al. 2009), AZGFD recommends that hunters in game management units that overlap condor range use non-lead ammunition or if they use traditional lead ammunition, that they remove the entire game carcass including the gut pile from the field (Arizona Game and Fish Department 2010:58). The AZGFD has had many incentives to increase compliance of these recommendations in Unit 12. A 2003 survey conducted by AZGFD discussed four actions that hunters can take to help reduce condors' exposure to lead. An overwhelming majority of respondents (94%) would be very willing to retrieve all animals killed from the field, and a large majority (59%) would be very willing to hide or cover carcasses or gut piles. Just less than a majority (48%) said that they would be very willing to remove bullets and impacted flesh from carcasses or gut piles that they leave in the field, and the same percentage said that they would be very willing to use lead-free ammunition (Byrne 2003). It is unknown how MBGR in Alternatives 2 and 4 would affect the results of these survey responses or hunter actions. However, on the Kaibab there is high compliance and participation by hunters participating in Arizona Game and Fish non-lead ammo program (87% in 2010 and 90% in 2011, FWS 2012).

Alternatives 2, 3, or 4 would not jeopardize the continued existence of the California condor.

Sensitive Species

Northern Leopard Frog

Current distribution of leopard frogs on the NKR D is unknown. Historical records indicate that frogs have been found in Kanab Creek, and the plateau includes areas at the highest known elevational range of leopard frogs in Arizona (Blomquist and Sredl 2002). Northern leopard frogs have been reintroduced in tanks within House Rock Valley by Arizona Game and Fish (Susan MacVean, AZGFD, personal communication 2010).

Direct and Indirect Effects of Alternative 1

Forest roads pose a greater hazard to slow moving animals such as amphibians, making them highly vulnerable as they cross even narrow forest roads (DeMaynadier and Hunter 2000). Unrestricted cross-country travel, use of roads, and camping can affect the frogs by increasing access to occupied sites, increasing disturbance to dispersal habitat and dispersing frogs, causing damage to aquatic habitat, and increasing the potential for spreading nonnative species and diseases.

Direct and Indirect Effects of Alternatives 2, 3 and 4

The closure of roads and the reduction of cross-country travel will benefit frogs by reducing access to sites, reducing disturbance to dispersal habitat and dispersing frogs, reducing damage to aquatic habitat by vehicles and reducing the potential spread of nonnative species and diseases. Game retrievals associated with the Proposed Action and Alternative 4 may impact individuals but none of the three action alternatives are likely to cause a trend towards future listing.

Northern Goshawk

The northern goshawk is a common breeding resident on the Kaibab Plateau within ponderosa pine, mixed conifer and spruce-fir forests. The goshawk utilizes a variety of forest age classes, structural conditions, and successional stages (Reynolds et al. 1992). Research indicates that it prefers stands of intermediate canopy cover for nesting, while more open areas are used for foraging (Reynolds et al. 1992, Crocker-Bedford and Chaney 1988, DeStafano and McCloskey 1997). All ponderosa pine and mixed conifer forest is considered to be goshawk habitat on the NKRD. There are 147 Post Fledgling Areas (PFAs) within the project area

Gaines et al. (2003) identified several road and trail associated factors that potentially affect northern goshawks. These included collection, habitat loss and fragmentation, disturbance at a specific site, and edge effects. A network of roads and trails can fragment goshawk habitat by reducing canopy closure (Beir and Drennan 1997) and by reducing forest interior patch size.

Direct and Indirect Effects of Alternative 1

Under the No Action Alternative, unrestricted cross-country travel would continue. This would cause localized soil compaction, rutting, loss of vegetative ground cover, accelerated soil erosion, and lack of soil productivity (Soil and Water Specialist Report 2008). This potential loss of vegetative ground cover would impact northern goshawk prey species that are ground feeders relying on plant material (i.e., mourning doves, cottontails); and insects which other goshawk prey such as hairy woodpeckers and American robins feed on.

Direct and Indirect Effects of Alternative 2, 3 and 4

Under Alternatives 2, 3, and 4, there would be decreased risks of human disturbance to individual goshawks as a result of reducing open road density and restricting motorized cross-country travel, and there would be decreased impacts to goshawk foraging habitat as a result of restricting motorized cross-country travel. Of the 389 miles of open roads that intersect 134 goshawk PFAs, 75 miles would be closed under Alternatives 2 and 4 and 89 miles would be closed under Alternative 3. Long-term benefits to goshawks would be slightly greater under Alternative 3 than under Alternatives 2 or 4 because Alternative 3 would result in a greater reduction in miles of open roads and a slightly greater restriction in motorized cross-country travel from big game retrievals. There may be an increase in human disturbance from the continued use of approximately 16 miles of spur roads that lead to areas identified as popular camping sites and from the approximately 76 miles of road identified as corridors for recreational opportunity. However most goshawk nests that are located near roads are down in drainage where recreational activities including dispersed camping are unlikely. In addition, preliminary noise study data conducted by NKRD in 2010 noted that goshawks with established nests next to roads (as close as 75meters or 0.05 miles) were not disturbed by passing vehicles including logging trucks. Observations in the field indicate that goshawks show more agitation to disturbance by individuals walking within the nest

area; however, only 0.14% (56 miles) of the miles that intersect a PFA intersects a nest area in Alternative 2 and 4 and 0.13% (53 miles) in Alternative 3.

Alternatives 2, 3, or 4 may result in impacts to individual goshawks or their habitat, but none of these alternatives would cause a trend toward future listing or loss of goshawk population viability.

Bald Eagle

On the NKRDR, the bald eagle occurs as an occasional winter migrant or visitor; no bald eagle nests have been documented. A limited number of individuals are typically seen each year, usually within open meadow habitat or along the highways where they find and feed on dead livestock or road-killed deer or are sighted hovering over mule deer winter ranges where presumably they feed on hunter and winter killed deer. Occasionally, individual eagles are also observed during the winter at Big Springs Administrative Site, where they feed on rainbow trout from the ponds. Bald eagles typically select the larger and more accessible trees for winter roosting. Winter roost sites vary in their proximity to food resources. Given the very limited water resources on NKRDR, there may be very limited suitable winter foraging habitat. Nankoweap in Grand Canyon to the southeast of NKRDR is a known winter congregation of bald eagles feeding on fish.

Direct and Indirect Effects of Alternative 1

Cross-country travel, as currently allowed, may cause bald eagles to change perch locations more frequently and influence some foraging opportunities, but is not recognized as a substantial detriment to their persistence. Existing bald eagle roost and perch locations have been documented to occur in a variety of locations around the district and are not considered a limiting factor.

Direct and Indirect Effects of Alternatives 2, 3 and 4

The potential for disturbance from motorized travel will be reduced, as well the potential for harassment. The management of big game retrieval could have similar effects from lead exposure to that experienced by condors (see Condor Section above). The Proposed Action and Alternatives 3 and 4 may impact individuals but will not cause a trend towards future listing.

Peregrine Falcon

The US Fish and Wildlife Service de-listed the peregrine falcon as an endangered species in 1999. Trends and status are still under post de-listing review and the species continues to be monitored until 2015. Essential habitat for peregrine falcon includes rock cliffs for nesting and a large foraging area. On the NKRDR, there are 13 known cliff territories, only one of these known territories is outside of wilderness boundaries. The Proposed Action and Alternatives 3 and 4 will have no effect to peregrine falcons.

Kaibab Squirrel

The Kaibab squirrel is a geographically isolated subspecies of the Abert's squirrel and an obligate resident of ponderosa pine forests (Dodd et al. 2003). The squirrel occurs only on the Kaibab Plateau within ponderosa pine habitat. They nest in the trees and feed on bark, staminate flowers, buds, and seeds, and use the interlocking crowns as travel corridors and escape routes.

Direct and Indirect Effects of Alternative 1

Second to cottontail rabbits, Kaibab squirrels are the most common species of road kill seen along Forest Service roads (Personal observation). The current open road system allows widespread motorized access across the district. Numbers of Kaibab squirrels killed by vehicles on open roads would not be reduced under Alternative 1.

Direct and Indirect Effects of Alternatives 2, 3 and 4

Camping corridors identified in Alternative 2 and 4 in the ponderosa pine habitat may increase the amount of Kaibab squirrels killed by vehicles, since squirrels may be attracted to food left by campers, congregated along corridors. Reducing the open road system from 860 miles in the ponderosa pine habitat to 554 miles under all action alternatives, would likely result in decreasing the potential for squirrels to be hit by vehicles along open roads. The potential for mortality could still exist from cross-country travel associated with MBGR in Alternatives 2, and more so in 4. The Proposed Action and Alternative 3 and 4 may impact individuals but will not cause a trend towards future listing.

Kaibab Least Chipmunk

The Kaibab least chipmunk, a subspecies, occurs as a disjunct population on the Kaibab Plateau. These small diurnal chipmunks prefer spruce-fir forests but occur in many habitat types. They are found in rocky areas within moist or damp situations and usually in open places in the forest. Summer dens are typically in hollow logs or stumps, in rock piles, or under debris. Least chipmunks feed on and store a variety of small seeds that they can reach from the ground or by climbing bushes.

Direct and Indirect Effects of Alternative 1

The current open road system allows widespread motorized access across the district. Numbers of Kaibab least chipmunks that could be killed by vehicles on open roads and from cross-country travel would not be reduced under Alternative 1.

Direct and Indirect Effects of Alternatives 2, 3 and 4

Reducing the open road system under all action alternatives would likely result in decreasing the potential for chipmunks to be hit by vehicles along open roads. The potential for mortality could still exist from cross-country travel associated with MBGR in Alternatives 2 and more so in 4. The Proposed Action and Alternative 3 and 4 may impact individuals but will not cause a trend towards future listing.

Bats: Pale Townsend's big-eared bat, spotted bat and Allen's lappet-browed bat

Townsend's big-eared bat is strongly correlated to the use of caves, mines, and other cave-like roosting habitat (Sherwin 1998). While Townsend's big-eared bats prefer cave environments they may opportunistically utilize large snags as a day roost when foraging significant distances from their primary roost area. The Western red bat prefers edges or habitat mosaics that have trees for roosting, and commonly roost in the foliage of the tree. Spotted bats commonly roost in rock cliffs. During August 1995 and July 1996, Rabe et al. (1998a) captured and placed radio transmitters on twelve spotted bats on the NKRD; the bats were captured over small ponds in sub-alpine meadows. One spotted bat was radio tracked to its day roost in the cliffs above the Colorado River and repeatedly foraged in open areas on the plateau surrounded by ponderosa pines. Allen's lappet-browed male bats often roost in cliffs and rocky slopes; females roost in large, older ponderosa pine snags with exfoliating bark for roosting sites (Rabe et al. 1998b). These bats are insectivorous, feeding mostly by gleaning moths and stationary insects from surfaces but insects are also taken in flight. Although this species was rarely captured during extensive mist netting surveys on the district from 1994 through 1998, those radio tracked were tracked to cliffs in Kanab Creek Wilderness. All of these species forage over a variety of habitats, primarily at night. Preferred locations for foraging are meadows and grassy areas associated with, natural lakes, tanks and other water structures.

Direct and Indirect Effects of Alternative 1

Under the No Action Alternative, cross-country travel in meadows (see Meadow section in Wildlife and Botany Specialist Reports which are part of the project record) will continue to degrade bat habitat by reducing vegetative cover. Loss of vegetative cover removes food and shelter for insects that provide food for bats. Campsites next to water resources could disrupt bats that have travelled across the district for those resources.

Direct and Indirect Effects of Alternatives 2, 3 and 4

Benefits to bats would occur due to the reduction of cross-country travel and its effect on bat foraging habitats. The Proposed Action and Alternatives 3 and 4 will not negatively impact individuals and will not cause a trend towards future listing.

Kaibab Northern Pocket Gopher, Long tailed vole, Merriam's shrew and Dwarf shrew

The Kaibab northern pocket gopher occurs only on the Kaibab Plateau of north central Arizona. This subspecies occurs in the soils of the high elevation meadows surrounded by spruce-fir or ponderosa pine. Grasses, weeds and shrubs that occur in those meadows provide most of the pocket gophers' food requirements. The long-tailed vole occurs throughout much of the western U.S, British Columbia and into Alaska. They occur in isolated populations in Arizona including on the Kaibab Plateau in the north central part of the state. In Arizona they live in meadows, grassy valleys and grassy clearings in forests, sagebrush flats and rocky slopes near or in coniferous forests. Long-tailed voles on the district are most commonly found in grassy areas around springs or in swamps adjacent to lakes (Hoffmeister 1986). Their diet consists of fruits, seeds, and herbaceous plant material. Both shrews have been captured on the NKRD in grassy meadows surrounded by spruce and fir (Hoffmeister 1986). Shrews eat a variety of insects and other arthropods.

Direct and Indirect Effects of Alternative 1

Under the No Action Alternative, continued cross country travel, use of roads and camping in gopher habitat would continue. Of most impact are roads and cross-country travel in meadows that are reducing soil function and increasing vulnerability to degradation (see Meadow section in Wildlife and Botany Specialist Reports which are part of the project record). Roads could continue to restrict the movements of gophers and function as barriers to population dispersal as seen in other small mammal population (Merriam et al 1989). There would be no protection of burrows from off-road vehicle travel. Cross-country travel will continue to degrade gopher habitat by reducing vegetative cover. Loss of vegetative cover removes food and shelter for insects that provide food for gophers.

Direct and Indirect Effects of Alternatives 2, 3 and 4

Unrestricted cross-country travel would be limited. This reduction would benefit the pocket gopher by reducing fragmentation and potential for runways and burrows to be destroyed. Over time, roads identified for closure would heal and herbaceous vegetation would increase, providing more food and cover for gophers. Burrows could still be impacted from cross-country travel associated with MBGR in Alternatives 2 and more so in 4. The Proposed Action and Alternatives 3 and 4 may impact individuals and will not cause a trend toward future listing.

Houserock Valley Chisel-toothed Kangaroo Rat

The preferred habitat of this subspecies of kangaroo rat is primarily shrub-dominated communities of the Great Basin Desert scrub biome (Spicer and Johnson 1988). It prefers sparser grass; Rowland and Turner (1964) found an inverse correlation between abundance of grasses and rats, confirmed by Spicer and Johnson (1988).

Direct and Indirect Effects of Alternative 1

Rats tend to burrow in the softened shoulders of roads, especially of roads that have not been paved. The current open road system allows widespread motorized access across the district, although it has not been observed (Gatto personal observance). Numbers of kangaroo rats that could be killed by vehicles leaving roads for the purpose of cross-country travel and hence impacting rat burrows would not be reduced under Alternative 1.

Direct and Indirect Effects of Alternatives 2, 3 and 4

Limiting cross-country travel under all action alternatives would likely result in decreasing the potential for kangaroo rat burrows to be collapsed by vehicles leaving the road system. Alternatives 2, 3 and 4 will not impact individuals and will not cause a trend towards future listing.

Management Indicator Species

Management Indicator Species and the habitats they represent are listed in the most recent Kaibab National Forest Management Indicator Species (MIS) report (Forest Service 2010). Information on species biology, management effects, population trends, and habitat trends are presented in the MIS report.

The Kaibab National Forest Plan identified 17 wildlife species as MIS to monitor the conditions of the forest’s ecosystems. All 17 MIS were considered for this analysis (Table 28); however, because of limited habitat (vegetation) types found within the analysis area, only two species (Table 29) were found to have the potential of being affected by implementation of the activities associated with this project.

The following MIS are not analyzed in further detail due to the lack of affects to the habitat components. They are an indicator for or lack of habitat in the area.

Table 28. MIS species not considered NKRD TMR Analysis Area.

Management Indicator Species	Key MIS Habitat Component Indicator for	Comments
Aquatic macro invertebrates	Riparian	Only an indicator of stream quality in North Canyon Creek in Wilderness.
Cinnamon teal (<i>Anas cyanoptera</i>)	Late-seral Wetland	This habitat does not occur on the district.
Lincoln’s sparrow (<i>Melospia lincolnii</i>)	Late-seral, high-elevation, riparian	There is no riparian habitat within the project area.
Lucy’s warbler (<i>Vermivora luciae</i>)	Late-seral, low-elevation, riparian habitat	There is no riparian habitat within the project area.
Yellow-breasted chat (<i>Icteria virens</i>)	Late-seral, low-elevation, riparian habitat	There is no riparian habitat within the project area.
Northern Gosawk (<i>Accipiter gentiles</i>)	Late-seral ponderosa pine	The proposed travel management changes would not affect late-seral ponderosa pine.
Pygmy nuthatch (<i>Sitta pygmaea</i>)	Late-seral ponderosa pine	The proposed travel management changes would not affect late-seral ponderosa pine.
Wild Turkey (<i>Meleagris gallopavo</i>)	Late-seral ponderosa pine	The proposed travel management changes would not affect late-seral ponderosa pine.
Hairy Woodpecker (<i>Picoides villosus</i>)	Snags in ponderosa pine, mixed conifer and spruce-fir	The proposed travel management changes would not affect the number of snags in the analysis area.

Management Indicator Species	Key MIS Habitat Component Indicator for	Comments
Tassel-eared squirrels (<i>Sciurus aberti</i>)	Early-seral ponderosa pine	The proposed travel management changes would not affect early –seral ponderosa pine.
Juniper titmouse (<i>Baeolophus ridgwayi</i>)	Late-serial pinyon-juniper, and snags in pinyon-juniper	The proposed travel management changes would not affect late-seral pinyon-juniper or the number of snags in the analysis area.
Red-naped sapsucker (<i>Sphyrapicus varius</i>)	Late-seral aspen and snags in aspen	The proposed travel management changes would not affect late-seral aspen and snags in aspen in the analysis area.
Mexican spotted owl (<i>Strix occidentalis lucida</i>)	Late-seral mixed conifer and spruce fir	The proposed travel management changes would not affect late-seral conifer and spruce fir in the analysis area.
Red Squirrel (<i>Tamiasciurus hudsonicus</i>)	Late-seral mixed conifer and spruce fir	The proposed travel management changes would not affect late-seral conifer and spruce fir in the analysis area.

Table 29. Management Indicator Species Habitat within the NKRD TMR Analysis Area.

Management Indicator Species	Key MIS Habitat Component for Quality Habitat	Habitat within analysis area
Mule Deer (<i>Odocoileus hemionus</i>)	Early-seral aspen and pinyon-juniper	Aspen and pinyon-juniper
Pronghorn (<i>Antilocapra americana</i>)	Early and late seral grasslands	Grasslands

Mule Deer

Mule deer were selected to represent species using early-seral stages of aspen and pinyon-juniper habitats. Mule deer occur across the Kaibab National Forest, but are especially important on the North Kaibab, much of which is within the boundaries of the Grand Canyon Game Preserve. The North Kaibab deer herd is famous for providing quality hunts and has a long history of management aimed at promoting large numbers of deer. Data from the North Kaibab indicate an increasing trend since the early 1990’s. The project area includes winter and summer and transitional ranges. Mule deer are known to be affected by human disturbance associated with motorized travel. Mule deer have been shown to shift their habitat use and movement patterns away from open roads (Rost and Bailey 1979).

Direct and Indirect Effects of Alternative 1

Under this alternative, unrestricted cross-country travel, use of roads and camping would continue in mule deer habitat. Deer would continue to be moved from foraging, bedding areas and important water sources.

Direct and Indirect Effects of Alternatives 2, 3 and 4

Under all action alternatives human disturbance associated with motorized travel would be reduced. The motorized cross-country travel that would be allowed under Alternative 4 for retrieval of legally harvested deer would occur during the fall, outside of mule deer fawning season. The effects of a reduced open road system would result in increased habitat quality for mule deer, and Alternative 3 would result in a slightly greater increase in habitat quality. The area of aspen forest and pinyon-juniper woodland mapped on the NKRD represents approximately 33% of the total area of aspen forest and pinyon-juniper woodland mapped on the Kaibab National Forest. Alternatives 2, 3, or 4 may result in impacts to individual mule deer or their habitat, but none of these alternatives would result in a change in the Forest-wide population or habitat trend for mule deer.

Pronghorn

Pronghorn was selected as an indicator species for early- and late-seral grassland. Pronghorn populations in Arizona have declined substantially from historic times. Pronghorn occur within House Rock Valley on the east of the district. Currently the habitat trend for grassland habitat is considered stable on the forest (Forest Service 2010). There is approximately 216,000 acres of grassland cover type on the forest. There is approximately 51,840 suitable acres of grassland for pronghorn within the analysis area (2.5% of total grassland acres). The forest-wide population trend for pronghorn is considered to be declining. The House Rock Valley population appears to be stable but is a small population and thus susceptible to limiting factors.

Direct and Indirect Effects of Alternative 1

Pronghorn are known to be affected by human disturbance associated with motorized travel. One study showed that pronghorns had increased vigilance and decreased foraging times along roads, especially roads with higher traffic volumes (Gavin and Komers 2006). Similar to mule deer, pronghorn may be affected by current travel management because motorized cross-country travel increases disturbance to pronghorn and could be affecting foraging habitat.

Direct and Indirect Effects of Alternatives 2, 3, and 4

There would be reductions in miles of open roads within grassland cover types and the key pronghorn habitat areas of House Rock Valley under Alternatives 2, 3, and 4. Primary effects of a reduced open road system and restricted motorized cross-country travel under Alternatives 2, 3, and 4 would be reduced levels of human disturbance associated with motorized travel. These effects would result in increased habitat quality for pronghorn, and Alternative 3 would result in a slightly greater increase in habitat quality compared to Alternatives 2 or 4. Effects of Alternative 2, 3, or 4 on pronghorn would be primarily beneficial. Alternative 2, 3, or 4 may result in impacts to individual pronghorn or their habitat, but none of these alternatives would cause effects sufficient to alter the Forest-wide population or habitat trend for pronghorn.

Other Laws and Congressional Designations

Migratory Birds

The project area is within spruce-fir, mixed conifer, ponderosa pine, and pinyon – juniper, as defined in Arizona Partners in Flight. Priority Species of Concern selected include: Swainson's thrush, pine grosbeak, golden-crowned kinglet, three toed-woodpeckers, northern goshawk, Mexican spotted owl, olive-sided flycatcher, cordilleran flycatcher, purple martin, gray flycatcher, pinyon jay, gray vireo, black-throated gray warbler, and juniper titmouse (see Wildlife Specialist Report which is part of the project record).

Direct and Indirect Effects of Alternative 1

Under the No Action Alternative, no road closures will occur. Cross-country travel will continue to be allowed and user-created roads will likely increase as population growth will result in increasing demands

for forest recreation. Unintentional take from vehicle strikes or driving over ground nests will continue to occur.

Direct and Indirect Effects of Alternatives 2, 3 and 4

Restricted motorized cross-country travel under Alternatives 2, 3 and 4 would result in decreased risk of vehicles running over and destroying nests of ground-nesting bird species. The limited frequency of motorized cross-country travel that would be allowed under Alternatives 2 and 4 for retrieval of legally harvested game would occur during the fall, outside of migratory bird nesting season. Although all action alternatives could result in some unintentional take of migratory birds, the amount of vehicle strikes and recreation impacts is not likely to occur to an extent that there would be a measurable negative effect on migratory bird populations.

Important Bird Areas

There are no designated or nominated Important Bird Areas (IBA) within or adjacent to the Kaibab National Forest. Thus, there are no IBAs within the project area. No further discussion of IBAs will follow.

Overwintering areas

Important overwintering habitat generally consists of large wetlands. Because the North Kaibab Ranger District does not contain any large wetlands, significant concentrations of birds do not winter on the District; neither do unique species or a high diversity of species. However, water sources such as the smaller natural lakes, dirt tanks, and other developed waters on the NKRD may provide suitable overwintering habitat in small areas.

National Natural Landmark

The Proposed Action and Alternatives 3 and 4 will have no lasting impact on the habitat of Kaibab squirrels on the NKRD within the Kaibab Squirrel National Natural Landmark (NNL). The conditions of the Kaibab Squirrel NNL have been satisfied by the design and provisions of this project to provide protection for the squirrel and its habitat by assuring habitat conditions continue for reproduction as provided by the Secretary of the Interior (see Sensitive Species section above for further analysis of the Kaibab squirrel).

Grand Canyon Game Preserve

The Proposed Action and Alternatives 3 and 4 will have no lasting impact on the population or habitat of huntable game species on the NKRD within the Grand Canyon Game Preserve (GCGP). The conditions of the GCGP Act have been satisfied by the design and provisions of this project to provide protection for these species by assuring habitat conditions continue for reproduction, and that legal hunting is under the direction of AZGFD as provided by the Secretary of Agriculture (Painter 2009).

Cumulative Effects

Past, present, and reasonably foreseeable actions on NKRD are described in Appendix 2. Large vegetation management projects approved during the past 20 years are identified. The primary land use practices and actions on NKRD that affect wildlife habitat are livestock grazing, different types of tree thinning projects, and fire management. Most of the roads were constructed decades ago for historic logging and ranching operations. Many of the more recent vegetation management projects listed in Appendix 2 involved closures of open system roads. Temporary roads may have been established for some of these projects but temporary roads have been or will be decommissioned.

The NKRD does not receive nearly as much motorized recreational use as Forest Service lands located closer to larger population centers such as the Dixie National Forest. Still, motorized recreational activities on the district have grown during the last 10 years. Much of the motorized recreational use on

the district comes from tourists travelling to or from Grand Canyon National Park and is concentrated within several miles of State Highway 67.

Other day to day permitted activities that are not listed in Appendix 2 include fuelwood and other forest product collection. These activities are likely to be the most contributing factor to continued effects caused by cross-country travel over time.

The beneficial effects of actions authorized under Alternatives 2, 3, or 4, even when added to the effects of past, present, and reasonably foreseeable future actions described in Appendix 2, would not result in adverse effects to any of the species analyzed above. Actions would not 1) adversely affect or threaten the continued existence of any Threatened or Endangered species, 2) cause a loss of population viability or trend toward listing under the Endangered Species Act for any Forest Service Sensitive species, 3) cause a decline in forest-wide population or habitat trend for any of the Management Indicator Species, 4) cause a measurable negative effect on any migratory bird population as a result of unintentional take, or 5) cause a loss of population viability for any native or desired nonnative animal species.

Cultural Resources

Affected Environment

The North Kaibab Ranger District comprises approximately 655,078 acres. Elevations range from 3,200 feet in the bottom of Kanab Creek to 9,000 feet on the Kaibab Plateau. Vegetation includes riparian assemblages along the creek bottoms, sagebrush and grasslands transitioning into pinyon-juniper along the flanks of the Kaibab Plateau, and ponderosa pine, aspen, and mixed conifer forests and meadow systems at higher elevations. A diversity of landscapes and natural resources has allowed for a rich and varied assortment of cultural resource sites.

Heritage or cultural resources include prehistoric and historic remains left by people of the past, as well as special locations important to the traditions of living cultures. Remains found on the district represent limited activity sites such as hunting and gathering camps, prehistoric agricultural areas, rock art, and historic resource extraction areas; habitation sites including pueblos, prehistoric residential camps, and historic cabins; linear features like roads, trails, and fences; and special use sites including traditional cultural properties of significance to area tribes. No traditional cultural properties or access issues have been identified by tribes within the portions of the district affected by the travel management rule.

Approximately 25% of the District has been inventoried for cultural resource properties. Inventories vary from small acreages to large blocks. Additional acreage is surveyed each year, increasing the overall percentage of area inventoried. Around 3100 properties have been officially documented. This number increases annually as additional inventories locate new sites. Twelve sites are listed on the National Register of Historic places. An estimated 40% of the recorded sites are eligible to the National Register, 2% are ineligible, and the remaining are unevaluated at this time.

Human occupation on the North Kaibab Ranger District (NKRD) dates to the Paleo-Indian period (11,000-9,000 years ago). Physical evidence indicates that human use occurred throughout all environmental zones on the district. The earliest inhabitants were hunter-gatherer groups who utilized the area for thousands of years. Around 2,500 years ago prehistoric people began to utilize domesticated plant species including corn, beans, and squash and by 1,400 years ago, domesticated plant varieties were well incorporated into the diet of area residents. They built permanent residential and storage structures and utilized a variety of farming techniques that can still be seen on the landscape today. This way of life appears to have been abandoned during the thirteenth century. The last native people to settle the area were the Southern Paiutes. The Paiutes were hunter-gatherers whose lifestyle, language, and material culture suggest they migrated from the Great Basin area sometime between the twelfth and thirteenth

centuries. They were a highly mobile people who utilized the NKRD for game, pinyon nuts and other plants, and lithic resources.

The first documented visitation to the area by Europeans was in 1776 by Spanish priests Dominquez and Escalante while exploring a potential trade route from Santé Fe, New Mexico to California. Actual settlement occurred during the 1850's and again in the 1870's, with the arrival of Mormon pioneers, who established farming communities near the forest, using forest resources to build homes and graze livestock. The NKRD was heavily grazed by sheep and cattle during the open range era of the late nineteenth century. Stock numbers were substantially reduced following the establishment of the Kaibab National Forest in 1908. A number of ranger cabins were constructed across the district at this time, allowing rangers a permanent presence within the forest much of the year.

Limited prospecting and mining occurred on the district during the late nineteenth and early twentieth centuries. Copper was the primary mineral extracted from mining operations; however, most of the Kaibab Plateau was withdrawn from mineral entry following the establishment of the Grand Canyon National Game Preserve in 1906. Logging played a more substantial role on the Plateau than mining. Early logging consisted of small scale horse-logging in drainages near springs that could support steam powered sawmills. Logging intensified and became an important industry on the district during the second half of the twentieth century with the establishment of large lumber mills and an extensive road system across the district that facilitated truck transportation of lumber. With the development of better road systems, tourism and recreation became increasingly important in the twentieth century as the public sought to access the north rim of the Grand Canyon. Several historic lodges are found on the District catering primarily to tourists visiting the Grand Canyon.

Kaibab Paiute, Hopi and Zuni tribes claim cultural affiliation with prehistoric sites located on the t. "Kaibab" is the Paiute name for the plateau, which forms the north rim of the Grand Canyon and comprises much of the District. It translates to English as "mountain lying down," and is reflective of the significance of the area to the tribe. Navajo utilization of the North Kaibab occurred primarily in the twentieth century following the construction of the Navajo Bridge that crosses the Colorado River gorge.

Laws, Regulations, and Policy

Federal land managers are responsible for the protection and enhancement of significant heritage resources under 36 CRF 800, as per Sections 106 and 110 of the National Historic Preservation Act (NHPA), as amended. These include both physical manifestations of past human activities and specific locations that are traditionally important to area tribes. Federal agencies are charged with avoiding or minimizing impacts to significant archeological and historical sites, as well as to traditional cultural properties. Therefore, locations and condition of existing heritage resources are identified and documented prior to implementing any Federal undertaking. Significant resources are protected primarily through site avoidance. Other protective measures include various design criteria established by the agency in consultation with the State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Places (ACHP). The Arizona SHPO concurred that the proposed action will have no adverse effect on cultural resource sites on September 27, 2011 (Reid 2011C). The NHPA and the American Indian Religious Freedom Act (AIRFA), along with various other laws and regulations, require that agencies consult with culturally affiliated tribes to determine the effects of agency decisions and activities on sites and areas culturally significant to the tribes. The NKRD typically consults with the Kaibab Band of the Southern Paiute Indians, the Hopi Tribe, the Navajo Nation, and the Zuni Tribe to identify and address issues and concerns. The Hopi Tribe responded to the draft environmental assessment by letter (July 5, 2011 correspondence), indicating that they supported the North Kaibab Ranger District Travel Management Plan.

NKRD Methods for Applying Protocols for Section 106 Compliance

Developing the MVUM

North Kaibab Heritage specialists used a GIS based approach to analyze each alternative. Over 67% of the recorded sites on the district are within a ¼ mile of an open roadway and 41 % are within 300 feet of a road (Table 1). Initially, system roads passing through known sites or sites located within a 300 foot corridor adjacent to the route were identified as potential high risk locations. Un-surveyed routes located in high to medium probability areas were also considered potential high risk locations.

Cultural resource site location probability zones on the NKRD are identified in *A Proposed Survey Strategy for the North Kaibab Ranger District* (Reid and Hanson 2006). The survey and site location methodologies presented in this strategy were accepted by the Arizona State Historic Preservation Office as the standardized approach for surveying and locating cultural resource properties on the NKRD. The probability zones in Reid and Hanson (2006) were utilized to identify suitable areas on the district for dispersed camping corridors open to cross-country motorized travel.

Probability zones for prehistoric sites have been broken into high, medium and low categories, based on vegetation, landform setting, and proximity to water. These environmental characteristics also influence the location of historic sites. However, records such as historic maps, land status documents, mining claims and others that identify the location of historic land use activities are also utilized to locate historic sites. It should be noted that within each of these zones, are locations that do not meet the overall probability designation. For example, there may be land features within a high probability area that are unlikely to contain a site (i.e., an extremely steep slope or a wash bottom). Conversely, there are locations in a low probability vegetation zone that have a high potential for sites such as an area adjacent to a lake. These exceptions are considered on a case by case basis when applying the methodology.

The following considerations were used in assigning risk value to each road segment and developing recommendations for road closures.

- Does a road or motorized trail cross or directly impact a heritage resource site, or occur in an area that has multiple sites that may be affected by access on that road or trail? If so, should use of that route continue? Is there another route that can provide similar access for the public that would decrease or eliminate potential impacts to heritage resource sites? If use is continued, can the forest provide adequate monitoring of site condition?
- What is the potential for sites located in areas lacking adequate heritage resource inventory to be adversely affected by motorized vehicle use? In absence of inventory data, routes located in high probability areas are considered to be high risk locations. Low probability areas are considered low risk.

All documented cultural resource sites crossed by system roads or motorized trails were considered. Many of the roads that bisect these sites predate laws requiring heritage resource inventory. Some were built by the Forest Service, but others were created by users and incorporated in the FS road system over time. In the last two decades, the agency has made a sustained effort to inventory roads across the district. These figures in part reflect those focused inventories.

Existing site records of sites within 300 feet of open roads were examined to determine the nature of the site and potential for damage by continued motorized use, and whether field monitoring of the site was necessary (Betenson 2009). In locations where a road crossed the site, it was assumed that site integrity within the roadbed had been compromised by historic use and maintenance activities (as per Appendix I Section II.A. of the R3 Programmatic Memorandum of Agreement). The noted exception to this was known sites with the potential to contain deep subsurface features such as pit houses, pueblos or storage features, and roasters that might be adversely affected by continued motorized use and route maintenance. These sites were field checked to assess whether or not any concerns existed. Where intact features were

found, the road segment was recommended for closure, or suitable mitigation measures proposed (USDA 2011; Reid 2011A, 2011B).

In developing a minimum road system, Kaibab archaeologists worked closely with Interdisciplinary Team (IDT) members to identify system roads located within high site density areas that all members agreed were not necessary for the minimum system. These roads were typically user generated roads that had been brought into the FS road system over time, but were neither constructed nor maintained by the Forest Service. None of these roads were well traveled routes and either crossed or accessed a cultural resource site (in most instances multiple sites) or were located in a high probability area that had not been inventoried. These roads were dropped from the proposed minimum system.

Identifying Dispersed Camping Corridors

In high probability areas, corridor camping is not suitable. Site types, overall densities and fragile soil conditions do not support cross-country motorized travel. Short access routes to recreational opportunity areas are more appropriate in these locations. Only areas with lower site densities were considered potentially suitable for corridor camping. This includes areas in the ponderosa pine zone and mixed conifer forests where adequate archaeological survey coverage had been completed based on the NKRK survey strategy (Reid and Hanson 2006). Routes with a high concentration of cultural resource sites were excluded from consideration.

IDT discussions further established that corridor camping was generally more suitable for areas within the ponderosa pine vegetation zone in contrast to the mixed conifer forest where dense vegetation often limited cross-country travel. Forest users most often use existing system spur roads to access cleared camp sites in the mixed conifer rather than driving cross-country.

Cultural resource field monitoring reveals that sites typically found in the pine and mixed conifer forests on the Kaibab Plateau are less susceptible to damage from intermittent vehicular activity than sites found in sandy or clay areas common to the pinyon-juniper and grassland zones flanking the Plateau, or in upland meadow areas. Shallow soils characterized by high limestone content, more commonly found in the pine and mixed conifer are resilient to vehicle damages. Additionally the dense litter cover in most locations tends to protect sites from the occasional motorized vehicle crossing the area. Frequent repeated use of popular camp sites, however, can create impacts.

Approximately 203 miles of corridors (100 and 300 foot wide) were designated under the Proposed Action and Alternative 4. Emphasis was placed on road systems that were known to be popular with the public for camping. Each corridor was identified as having adequate survey coverage and an overall low site density.

Sites previously determined not eligible to the National Register of Historic Places in formal consultation with the Arizona SHPO were excluded from consideration. Unevaluated or eligible sites located within the corridors were assessed on a case by case basis to ascertain whether OHV damage was present or would be likely to occur under corridor designation. Sites unlikely to be damaged by corridor designation include properties such as standing cabins, road features, corrals and fences, lookout towers and trees, tree carvings and sites situated topographically or administratively in locations that are not expected to have vehicle travel even though the location lies within the broader corridor (i.e., cliff face). Sites most susceptible to damage include historic and prehistoric artifact scatters.

Locations within corridors containing site types susceptible to impacts from cross-country vehicle travel were identified as areas that would, in most instances, require signage prohibiting cross-country travel in the vicinity. This would accommodate corridor camping along the greater road system, while protecting the occasional site within the corridor. Signage and length of closure will be designed on a case by case

basis to avoid drawing attention to the site location or the specific reason for the cross-country travel restriction.

Spurs, Previously Closed and Unauthorized User Created Roads

A large scale inventory was conducted during the 2009-2010 field seasons to identify non-system or closed roads/spurs currently in use (Betenson 2011; Neal 2011). Many of these routes were created to access dispersed camping sites or limited activity areas or include temporary roads built by the Forest Service to access timber sales or fire areas. While officially closed, many are still in use by the public. The 2009-2010 field season surveys were focused on locations in lower elevation pinyon-juniper and grassland areas where corridor camping was determined unsuitable. Routes that accessed existing dispersed camping sites were surveyed for cultural resource sites. If no sites were found within or adjacent to the road or dispersed camp site(s), these routes were proposed for incorporation into the designated road system.

Additional routes within the ponderosa pine and mixed conifer zones were field inventoried during the 2010 field season to identify user generated roads and spurs off the system roads that access popular dispersed camping areas (Betenson 2011; Neal 2011). The same cultural resource assessment criteria were used throughout the inventory to determine which routes were suitable for inclusion into the designated open road system. In total, approximately 16 miles of road were found suitable for inclusion.

Motorized Big Game Retrieval

Cross-country motorized travel, whether to retrieve game or for other purposes, can adversely affect cultural resource sites if a vehicle is driven across a site. This is particularly true when a site contains surface artifacts or features and/or is located in an area with sensitive soils or conditions are wet. In these instances, tires and the undercarriage of the vehicle can create ruts, destroy vegetation and promote erosion. Vehicles can also crush or displace artifacts and features impacting the physical integrity of the site and impairing or destroying scientific information that may contribute to the understanding of the history and prehistory of an area. Damage to a site can render the site ineligible to the National Register of Historic Places.

Arizona Game and Fish Department harvest data from 2009 indicates that during the 2005-2009 hunting seasons an average of 1564 permits for big game animals were issued annually in unit 12A (NKRD) , with a success rate of 954 big game animals taken each year (AGFD 2010). In 2009, 38 bison and 0 elk were taken. It is unknown how often OHV damage to a particular site can be attributed to hunter game retrieval. Quantifying the potential for damage from big game retrieval is difficult. The results vary depending on the number of game retrieval trips annually, the location of those retrievals (high site probability areas versus low probability), site types found in the area, soil characteristics, routes used to access the game and weather conditions at the time of retrieval. However, the fewer number of motorized trips that occur, the lower the likelihood of encountering and impacting a site.

Motorized Access Authorized by Permit

The Travel Management Rule exempts permitted activities. Section 212.51 states that motor vehicle use that is specifically authorized under a written authorization issued under Federal law or regulation is exempted from route and area designations. Thus, motorized uses that occur under permitted authority may allow for motorized use on non-designated routes or areas if it occurs under the terms of the permit. Therefore, motorized travel occurring under an authorized permit for the purposes of collecting firewood or other authorized activities can be allowed by permit. Permit stipulations typically specify how and where off road travel may occur, and prohibit resource damage by the permit holder. Cross-country travel for the purposes of gathering fire wood is currently authorized by permit throughout wooded areas across the district, excluding Congressionally-Designated Wilderness areas or other excepted locations. Future North Kaibab fuelwood permits will exempt cross-country motorized travel in the pinyon-juniper zone where high site densities, soil types, lack of understory vegetation, and site types combine to yield

conditions that are particularly susceptible to vehicle damage. Exceptions to this will occur only in areas that have been completely inventoried for cultural resource sites, and site avoidance measures are in place.

Effects Analysis

Direct and Indirect Effects

Alternative 1 No Action

The No Action Alternative is the existing condition. Currently there are no limitations placed on cross-country motorized travel outside of specially designated areas that prohibit motorized travel such as Congressionally-Designated Wilderness areas or signed meadow systems.

Cultural resources, including archaeological remains or traditional plant gathering areas can be susceptible to impacts created by motorized vehicle driving across a site. This is particularly true when a site is located in an area with sensitive soils and/or when conditions are wet. In these instances, tires and the undercarriage of the vehicle can create ruts, destroy vegetation and promote erosion. Vehicles can also crush or displace artifacts and features impacting the physical integrity of the site and destroying or impairing its scientific value. These effects are direct and are generally irreversible. Damage to a site can render the site ineligible to the National Register of Historic Places.

Motorized vehicles, especially OHVs, can indirectly affect cultural resources by allowing easier access to remote areas, facilitating greater public visitation. Artifact collecting and site vandalism are more common at sites frequented by the public. Studies have shown that the closer a site is to a motorized route, the higher the probability that artifacts have been collected or the site has been vandalized (Spangler et al., 2010, 2006; Spangler 2006).

Approximately 25% of the NKR D has been inventoried for cultural resource sites, with most of the survey occurring in medium to low probability areas. Table 30 reveals the proximity of known cultural resource sites to roads on the district. Approximately 91% of the known sites are located within 1 mile of a road, with over 45% of these within 300 feet of a road. The latter figure reflects a survey bias towards road inventories and project areas located adjacent to roads. Current road surveys associated with travel management will increase these figures when data collection is finalized. The overall figures reveal the scale of potential damages that may occur to cultural resource sites with unfettered cross-country motorized travel.

Table 30. Alternative 1 Existing Open Road System (2011 Data).

Location of Sites	Number of sites
Sites bisected by roads	423
Sites 50 ft. from road	658
Sites 100 ft. from road	859
Sites 200 ft. from road	1118
Sites 300 ft. from road	1261
Sites 1/4 mi from road	2062
Sites 1/2 mi from road	2361
Sites 1 mi from road	2554

Total Sites =3090

Alternative 2- Proposed Action

The proposed action will prohibit cross-country travel and designate an existing road system comprising approximately 1,476 miles of open roads plus approximately 16 additional miles of spur roads. Exceptions to the cross-country prohibition include motorized travel within approximately 203 miles of designated camping corridors (100 and 300 feet), authorized off road game retrieval for elk and bison within 1 mile of a designated road, and restricting off road motorized access for fuelwood cutting to the ponderosa pine and mixed conifer forests where authorized by permit. This alternative will minimize impacts to cultural resource sites by significantly limiting cross-country travel in high probability areas susceptible to motorized vehicle damage.

Direct and Indirect Effects of Road Closures

Approximately 376 miles of open roads will be designated for closure under the Proposed Action. There are 346 known sites directly associated with these roads that either cross or lie within 300 feet of the road (Table 32). Many of these roads were user created and were brought into the Forest Service road system over time. Closure will have a direct beneficial effect on sites experiencing ongoing damages from vehicles by eliminating the source of the damage. Limiting motorized access to high probability areas will likely result in an indirect beneficial effect to cultural resource sites by reducing artifact collecting and vandalism.

Table 31. Alternative 2 Proposed Open Road System (2011 Data)

Location of Sites	Number of sites
Sites bisected by roads	311
Sites 50 ft. from road	503
Sites 100 ft. from road	671
Sites 200 ft. from road	879
Sites 300 ft. from road	1001
Sites 1/4 mi from road	1711
Sites 1/2 mi from road	2136
Sites 1 mi from road	2477

Total Sites =3090

Table 32. Alternative 2 Proposed Road Closures (2011 Data)

Location of Sites	Number of sites
Sites bisected by roads	122
Sites 50 ft. from road	176
Sites 100 ft. from road	220
Sites 200 ft. from road	301
Sites 300 ft. from road	346

Total Sites =3090

Mitigation Measures

This alternative will limit cross-country travel and direct vehicle use to an existing designated road system that has a low likelihood of generating further impacts to cultural resource sites. While the open system will bisect sites, site records were reviewed to determine which sites might have intact features that were being eroded by road use. These sites were inspected and where necessary, roads were identified for closure or mitigation measures were implemented to stabilize the site. If future concerns arise, they will be addressed on a case by case basis.

Direct and Indirect Effects of Dispersed Camping Corridors

Direct effects to cultural resources from dispersed camping corridors that permit cross-country travel are the same as those that exist under current travel policy. Vehicle tires and the undercarriage of the vehicle can create ruts, destroy vegetation and promote erosion. Vehicles can also crush or displace artifacts and features impacting the physical integrity of the site and impairing or destroying scientific information that may contribute to our understanding of the history and prehistory of an area. The types of impacts to sites from dispersed camping most frequently encountered on the NKRD include construction of fire pits on sites, artifact collecting (as noted by collector piles), removal of pueblo architectural stone for use in fire rings, trash, temporary outhouse depressions, as well as denuded vegetation, surface compaction, and erosion (small gullies or deflated surfaces) created by vehicle tracks (Betenson and Reid 2011). Some of these impacts are directly associated with vehicle use (crushing of features and artifacts, soil erosion or compaction), while others can occur regardless of whether the camper accessed the site on foot or by vehicle. These impacts are similar to the findings of the Sullivan et. al, 2003 and Uphus et.al, 2006 on the Tusayan District on the south Kaibab.

An indirect effect that may occur from designating dispersed camping corridors is an increase in off road motorized use within the corridors as a result of concentrating use to specific areas. More frequent use of an area could lead to greater impacts to sites within the corridor.

There are 12 unevaluated or eligible sites and one site listed on the National Register of Historic Places within the 100 ft. camping corridor designations (Table 33). With the exception of the Dry Park fire lookout tower and associated cabin, all are artifact scatters that are susceptible to impacts from cross-country travel. The Forest Service administrative facilities would not be affected.

Table 33. Sites within 100 ft. Corridor

Site Number	Site Type	Site Eligibility	Susceptible to Vehicle Damage
03-0230	Artifact Scatter	Eligible	Yes
03-0583	Artifact Scatter	Eligible	Yes
03-0584	Artifact Scatter	Eligible	Yes
03-0585	Artifact Scatter	Eligible	Yes
03-0841	Fire Tower/Cabin	Listed on NR	No
03-1063	Artifact Scatter	Eligible	Yes
03-1069	Artifact Scatter	Unevaluated	Yes
03-1071	Artifact Scatter	Unevaluated	Yes
03-1532	Artifact Scatter	Unevaluated	Yes

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03-2434	Artifact Scatter	Unevaluated	Yes
03-2445	Artifact Scatter	Unevaluated	Yes
03-2446	Artifact Scatter	Unevaluated	Yes
03-2523	Artifact Scatter	Unevaluated	Yes

Italics = Non-susceptible sites

There are 41 unevaluated or eligible sites and two sites listed on the National Register of Historic places within the 300 ft. corridor designations. Of these, 6 are unlikely to suffer impacts from cross-country travel (Table 34). These include a historic roadbed, two rock bridges, General Land Office (GLO) monument markers, the Jacob Lake fire lookout tower and outhouse, and the Big Springs fire lookout tree.

The remaining 37 unevaluated or eligible sites are potentially susceptible to vehicle damage and include 13 historic sites (one that includes a prehistoric artifact scatter) and 24 prehistoric artifact scatters (Table 34). Historic sites include the remains of 4 historic sawmill sites and associated camps, 5 mining related sites with artifacts, two historic trash dumps, and a historic roadbed with trash dumps. The prehistoric sites consist of camp sites and resource procurement areas. Since all sites contain artifacts on the surface and some have the potential for subsurface deposits, they can be adversely affected by vehicles and frequent camping atop the site.

Table 34. Sites within 300 ft. Corridor

Site Number	Site Type	Site Eligibility	Susceptible to Vehicle Damage
03-0097	Historic Sawmill Site	Unevaluated	Yes
03-0114	Mining Site/Cabin	Unevaluated	Yes
03-0116/1654	Historic Sawmill Site	Unevaluated	Yes
03-0232	Artifact Scatter	Unevaluated	Yes
03-0706	Artifact Scatter	Unevaluated	Yes
03-0707	Artifact Scatter	Eligible	Yes
03-0779	Mine Trench/Artifacts	Unevaluated	Yes (Dumps Only)
<i>03-0840</i>	<i>Fire Tower/Outhouse</i>	<i>Listed on NR</i>	<i>No</i>
03-0979	Artifact Scatter	Unevaluated	Yes
03-0989	Artifact Scatter	Unevaluated	Yes
03-1023	Artifact Scatter/Historic	Eligible	Yes
<i>03-1038</i>	<i>Lookout Tree</i>	<i>Listed on NR</i>	<i>No</i>
03-1054	Artifact Scatter	Unevaluated	Yes
03-1060	Artifact Scatter	Unevaluated	Yes
03-1130	Artifact Scatter	Unevaluated	Yes

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Site Number	Site Type	Site Eligibility	Susceptible to Vehicle Damage
03-1526	Artifact Scatter	Eligible	Yes
03-1701	Artifact Scatter	Unevaluated	Yes
03-1702	Trash Dump/Camp	Eligible	Yes
03-1703	Artifact Scatter	Unevaluated	Yes
03-1704	Artifact Scatter	Unevaluated	Yes
03-1708	Sawmill/Logging Camp	Eligible	Yes
03-1715	Historic Sawmill	Eligible	Yes
03-1757	Artifact Scatter	Unevaluated	Yes
03-1758	Artifact Scatter	Unevaluated	Yes
03-1759	Artifact Scatter	Unevaluated	Yes
03-1762	Artifact Scatter	Unevaluated	Yes
03-1763	Artifact Scatter	Unevaluated	Yes
03-1768	Artifact Scatter	Unevaluated	Yes
03-1773	Artifact Scatter	Unevaluated	Yes
03-1869	Mine Trench/Artifacts	Unevaluated	Yes
03-1870	Mine Trench/Artifacts	Unevaluated	Yes
03-1875	Mine Trench	Unevaluated	Yes
03-2074	Artifact Scatter	Unevaluated	Yes
03-2076	<i>Historic Roadbed</i>	<i>Unevaluated</i>	<i>No</i>
03-2078	Trash Dump	Unevaluated	Yes
03-2085	<i>Historic Rock Bridge</i>	<i>Eligible</i>	<i>No</i>
03-2086	<i>Historic Rock Bridge</i>	<i>Eligible</i>	<i>No</i>
03-2354	Artifact Scatter	Unevaluated	Yes
03-2355	Artifact Scatter	Eligible	Yes
03-2364	Artifact Scatter	Unevaluated	Yes
03-2368	Historic Roadbed/Trash Dumps	Unevaluated	Yes (Dumps Only)
03-2447	Artifact Scatter	Eligible	Yes
03-2765	<i>GLO Monuments</i>	<i>Eligible</i>	<i>No</i>

Italics=Non-susceptible sites

Mitigation Measures

All proposed corridors have been completely surveyed for cultural resources as per the guidelines developed by Reid and Hanson 2006. The guidelines define complete inventory as 15 meter pedestrian transect survey intervals in all high probability areas and 30 meter transect intervals in medium probability areas. Consequently, the location of sites within the corridors is known. A total of 47 sites potentially susceptible to vehicle damage are located with the 100 ft. and 300 ft. corridors combined (12 in the 100 ft. and 36 in the 300ft.), although some of these sites are located in settings that are unlikely to be used for motorized camping activities. Segments of the corridor containing vulnerable sites will be signed closed to cross-country motorized use unless established closures, topography, environmental setting or existing structural features (i.e., fences and administrative facilities) make additional signage unnecessary. Specific locations of sites will not be identified due to their sensitivity. Closures will include buffer zones to avoid drawing attention to individual site locations, unless the site is designated as a public interpretive site, or is otherwise adequately protected. Closure signage will also be used in other areas within corridors where cross-country travel is not appropriate such as administrative facilities or areas with other resource concerns. Consequently, a closure expressly for cultural resource purposes will not be specified. If susceptible sites are removed from the corridor following these recommended mitigation measures, there will be no direct or indirect effects to the site from corridor designation.

The remaining sites are unlikely to be affected by cross-country motorized travel because of their site type or location. Sites are periodically monitored. If unanticipated impacts are noted, a closure can be implemented for these sites where warranted.

Direct and Indirect Effects of Spur Roads, Formerly Closed and Unauthorized User Created Roads

There will be no direct effects to cultural resources from designated spur roads. All the spurs are pre-existing and have been surveyed for cultural resource sites. Only those lacking sites were incorporated into the system. Spur routes accessing recreational opportunity areas were eliminated if they were adjacent to a site or a susceptible site was clearly visible (identifiable) from an associated dispersed camp site. Although some of these are located in high probability landscapes, the locations have been used repeatedly for dispersed camping. It is not possible to quantify indirect impacts that may occur from designating these locations as open for vehicle use. However, public access to high probability areas does contribute to artifact collecting and site vandalism. Designation of spurs will have a potential beneficial effect on cultural resources by concentrating use to a location verified not to have cultural resources present, and perhaps reducing artifact collecting and site vandalism.

Mitigation Measures

There are no direct effects to cultural resource sites as none are present along the spur roads or at any dispersed vehicle campsite accessed by the spur. Monitoring of sites near the spur roads may reveal an increase in collecting activity. In that event, closure of the spur will be considered. Elimination of routes adjacent to a site, or crossing a site, or where a site was clearly visible from a motorized recreational use area was incorporated as a mitigation measure.

Direct and Indirect Effects of Limited Big Game Retrieval

Limiting cross-country travel will have a beneficial effect on cultural resources by reducing the potential for sites to be damaged. This alternative would restrict motorized big game retrieval to elk and bison. In 2009, 38 buffalo and no elk were taken (AZGF 2010). If an OHV were used to retrieve the take, a 2 mile roundtrip for big game retrieval in a truck with an average 7 foot wide tire span could potentially result in a ground disturbance of approximately 1.7 acres per vehicle. This figure assumes a direct route is taken, and includes the span of the undercarriage, though often cross-country travel is more circuitous in nature given vegetation and terrain constraints. While there is a possibility that cross-country game retrieval of either of these species could impact a cultural resource site, given the low number of takes each year, it is anticipated that the potential for adverse effects to a site would be negligible: 38 entries per year equates

to less than .0099% of the acreage on the NKR. The odds of adversely affecting a cultural resource site under these conditions are extremely low.

Mitigation Measures

Mitigation measures would be difficult to implement for motorized big game retrieval. It would not be practical or feasible for agency archaeologists to survey access routes for big game retrieval. Game must be retrieved shortly after the animal is killed. Ingress and egress routes are determined at the time of the kill. It is not possible for agency staff to survey each retrieval access route every time an animal is taken. Consequently, a common sense approach needs to be taken when addressing this issue given that the odds of adversely affecting a cultural resource site by limiting cross-country motorized retrieval to elk and bison are extremely low. Hunters are legally responsible for damages to archaeological sites. If damage is found and can be linked to a specific retrieval event, reparations for damages can be sought.

Motorized Access to Wood Cutting Authorized by Permit

Cross-country travel for the purposes of gathering fire wood is authorized by permit throughout wooded areas across the district, excluding Congressionally-Designated Wilderness areas or other excepted locations. Fuelwood gathering is highly dispersed across the landscape. Under dry conditions with ample surface vegetation or duff cover, limited off road use is generally not discernible. Documented vehicle related damages to cultural resource sites tend to be concentrated in the pinyon-juniper zone of the district where high site densities, soil types, lack of understory vegetation, and site types combine to yield surface conditions that are particularly susceptible to vehicle damage. Many sites in this zone have extensive surface features and artifact concentrations that are easily damaged by being driven upon. In contrast, sites in the ponderosa pine and mixed conifer forest tend to be protected by well-developed duff layers in off road contexts, and above ground surface features are typically historic (i.e., cabins, mining pits, dumps) and less likely to be driven upon.

Mitigation Measures

Fuelwood permits authorize public gathering of fire wood in specified areas, and contain restrictions designed to minimize resource damage by permit holders. North Kaibab fuelwood permits will exclude cross-country motorized travel for wood retrieval in pinyon-juniper stands. Exceptions to this will occur only in areas that have been completely inventoried for cultural resource sites, and site avoidance measures are in place. Consequently, sites most susceptible to vehicle impacts will be protected through a permit process that limits cross-country travel within high site probability areas. Ponderosa pine and mixed conifer areas of the district have a lower frequency of sites. Soils associated with these vegetation types are typically more resilient to vehicle damage, and heavy duff coverage provides protection to surface sites. Given the highly dispersed nature of fuelwood gathering, the potential for adversely affecting heritage resource sites in the ponderosa pine and mixed conifer zones is minimal. The fuelwood permit process will limit the potential for inadvertent resource damage by focusing activity to locations that are unlikely to be damaged by limited vehicle use, thus significantly reducing the potential for adverse effects to cultural resource sites from off road vehicles use associated with this activity.

Alternative 3

Alternative 3 includes prohibiting-cross country travel, designating a road system that includes approximately 1386 miles of open road plus approximately 16 additional miles of spur roads to facilitate dispersed camping, 466 miles of road closure, no motorized big game retrieval and restricting off road motorized access for fuelwood cutting to the ponderosa pine and mixed conifer forests where authorized by permit. This alternative will minimize impacts to cultural resource sites by significantly limiting cross-country travel in high probability areas susceptible to motorized vehicle damage.

Direct and Indirect Effects of Road Closures

There are 361 known sites directly associated with the proposed road closures under this alternative that either cross or lie within 300 feet of the road. Many of these roads were user generated roads that were

brought into the Forest Service road system over time. Closures will have a direct beneficial effect on sites experiencing ongoing damages from vehicles by eliminating the source of the damage. Limiting motorized access to high probability areas will also likely have an indirect effect of reducing artifact collecting and vandalism.

Table 35. Alternative 3 Proposed Open Road System (2011 Data)

Location of Sites	Number of sites
Sites bisected by roads	326
Sites 50 ft. from road	495
Sites 100 ft. from road	661
Sites 200 ft. from road	862
Sites 300 ft. from road	981
Sites 1/4 mi from road	1684
Sites 1/2 mi from road	2105
Sites 1 mi from road	2462

Total Sites =3090

Table 36. Alternative 3 Proposed Road Closures (2011 Data)

Location of Sites	Number of sites
Sites bisected by roads	128
Sites 50 ft. from road	183
Sites 100 ft. from road	230
Sites 200 ft. from road	315
Sites 300 ft. from road	361

Total sites=3090

Mitigation Measures

This alternative will have beneficial effects to cultural resource sites by eliminating cross-country travel, and directing vehicle use to a designated road system that has a low likelihood of generating further impacts to cultural resource sites. While the open system does bisect sites, site records were reviewed to determine which sites might have intact features that were being eroded by road use. These sites were inspected and where necessary, roads were identified for closure or mitigation measures were implemented to stabilize the site. If future concerns arise, they will be addressed on a case by case basis.

Direct and Indirect Effects of Spur Roads, Formerly Closed and Unauthorized User Created Roads

Direct and indirect effects and mitigation measures are the same as those analyzed for the Proposed Action. The same 16 miles of spur roads found in the Proposed Action (Alternative 2) are included in Alternative 3. See Alternative 2 for a complete discussion of this topic.

Direct and Indirect Effects of No Motorized Big Game Retrieval

Lack of cross-country travel will have a beneficial effect on cultural resources. There will be no adverse direct or indirect effects to cultural resources since the potential for motorized vehicle damages to sites from cross-country motorized game retrieval will be eliminated.

Mitigation Measures

No mitigation measures are necessary as there are no adverse direct or indirect effects to cultural resources.

Motorized Access to Wood Cutting Authorized by Permit

Effects and mitigation measures are the same as those analyzed for the Proposed Action. See Alternative 2 for a complete discussion of this topic.

Alternative 4

This alternative includes all aspects of the Proposed Action (Alternative 2) with the exception of limiting motorized big game retrieval to elk and bison only. Alternative 4 proposes to allow motorized game retrieval for deer, elk, and bison within one mile on either side of an open road. Effects of road closures, designated dispersed corridor camping, and spur roads and road additions, and permitted motorized access for fuelwood gathering are addressed under Alternative 2.

Direct and Indirect Effects of Motorized Big Game Retrieval within 1 Mile of Existing Roads

Arizona Game and Fish Department harvest data from 2009 indicates that during the 2005-2009 hunting seasons an average of 1564 permits for big game animals in unit 12A (NKRK) were issued annually with an average success rate of 954 animals taken each year (AGFD 2010).

Around 75% of the NKRK has not been inventoried for cultural resource sites. It is unknown how often OHV damage to a particular site can be attributed to hunter game retrieval. However, approximately 83% of the known sites on the North Kaibab are within 1 mile of a road and 97% of the district outside of Congressionally-Designated Wilderness is within 1 mile of a road. Consequently, it can be predicted that the majority of the known sites on the district could be affected by motorized cross-country travel within 1 mile of a road. Quantifying the actual likelihood for damage to sites from motorized big game retrieval, however, is more difficult. The results are dependent on the number of game retrieval trips annually and over time, the location of those retrievals (high probably areas versus low probability), site types found in the area, soil characteristics, route used to access the game and weather conditions at the time of retrieval. The fewer number of trips that occur, the lower the odds are of encountering and impacting a cultural resource site.

Using the averages found in the 2009 harvest data, it could be estimated that over a 10 year period between 9500 – 15,600 (or 19,000-31,200 in/out) motorized game retrieval trips could hypothetically occur on the NKRK. An unknown number of those trips could result in damages to susceptible cultural resource sites. Additionally, the largest hunts take place during the months of September-November when deer typically relocate to their winter range at the lower elevations on the eastern and western flanks of the Kaibab Plateau. This is also the area of the district with the highest site densities. Given the higher use levels associated with fall rifle hunts, potential for inclement weather, and fragile soils in many locations, motorized big game retrieval in these areas has the greatest likelihood of adversely affecting cultural resource sites.

Adopting a rule of “one trip in” and “under dry conditions” as suggested by the AGFD will not eliminate potential impacts to heritage resource sites from motorized cross-country travel in areas with fragile soils or surface architectural features or artifacts easily crushed by vehicles. While wet conditions contribute to soil erosion and vegetation damage, sandy and fine clay areas and those with crypto biotic soils can be damaged by cross-country motorized travel even under dry conditions. These areas are found in locations

known to have a high density of sites. This rule alone will not mitigate the potential damage to cultural resource sites by motorized game retrieval.

Mitigation Measures

Mitigation measures would be difficult to implement for motorized big game retrieval. It would not be practical or feasible for agency archaeologists to survey access routes for motorized big game retrieval. Game must be retrieved shortly after the animal is killed. Ingress and egress routes are determined at the time of the kill. It is not possible for agency staff to survey each retrieval access route every time an animal is taken.

Cumulative Effects

Cultural resources are bound in time and space. The cumulative effects boundary for this analysis is the NKR D boundary. Appendix 2 describes the past, present and reasonably foreseeable future activities on the NKR D over the next 20 years. The full range of Forest Service management activities happen within the roaded areas of the NKR D. In general, sites are protected from direct adverse effects by Forest Service actions through site avoidance or appropriate mitigation measures put in place by the agency. This limits cumulative damage and loss of sites over time. However, unmanaged activities including motorized cross-country travel and illegal activities such as unauthorized artifact collecting and site excavations, can result in both direct and cumulative damages to cultural resources sites, accelerating the loss of the resource over time.

Cultural resource sites are non-renewable. Because they are bound in time, they are also limited in quantity. While each individual site possesses unique characteristics, when viewed together, these resources combine to provide a synthesis of human history, i.e., the sum is greater than its parts. Over time, the number of ancient sites decreases due to destructive processes, both natural and human caused. The cumulative impacts of human land use activities serve to accelerate this loss. The more a site is driven upon, the greater the likelihood of damage to that site. Repeated episodes can ultimately destroy a site. When artifacts are continually removed or features destroyed within a site, less information can be retrieved from the site. Eventually a site can lose its physical and scientific integrity. As additional individual sites are lost, there is a cumulative adverse effect to the resource as a whole: the permanent loss of information that contributes to the understanding of the whole.

The No Action Alternative would facilitate continued human generated impacts to cultural resources, accelerating the loss of cultural resource sites over time by permitting unfettered off road motorized vehicle use. It would have the most deleterious cumulative effects on cultural resources.

Implementation of the travel management rule will have long term beneficial effects to cultural resource sites by reducing damages to sites by motorized cross-country vehicle travel. The effects of actions authorized under Alternatives 2, 3, and 4, even when added to the effects of past, present, and reasonably foreseeable future actions described in Appendix 2, will benefit cultural resources by reducing cumulative adverse effects to sites from unrestricted cross-country motorized travel. However, Alternative 4 would potentially result in more adverse cumulative effects to cultural resources than Alternatives 2 and 3, by authorizing motorized retrieval of all big game species within 1 mile of the roads located in high site density areas.

Range Management

Affected Environment

Livestock grazing has been occurring on the North Kaibab Ranger District since the late 1800's. Brought in by homesteaders and ranchers from the area, livestock numbers were believed to have been in excess of 20,000 head of cattle and 100,000 sheep, as well as unknown numbers of horses and buffalo. During the

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1920's the Forest Service began issuing livestock permits and creating allotments to regulate grazing on the plateau.

The project area contains seven active grazing allotments, one allotment closed to grazing, and a wildlife area managed by the Arizona Game & Fish Department. Each has its own season of use and stocking rate based on individual allotment analyses. All of the active livestock grazing allotments are separated from each other by fences or natural topography and contain developed water sources and corrals or water lots. Many also are divided by interior fences, creating multiple pastures for rotational grazing systems. Table 25 lists each of the allotments.

Table 37. List of allotments on the NKRD

Allotment Name	Permitted Season of Use	Permitted Animal Unit Months
Burro	July 16 to September 30	500
Central Summer	June 1 to October 15	3,200
Central Winter	May 1 to June 30	1,600
Houserock	December 1 to March 31	528
Kanab Creek	Closed to Grazing	0
Kane	October 15 to November 1	587
Ryan	Yearlong	1,560
Willis Canyon	November 15 to April 30	1,340

The current NKRD road system provides sufficient access to the active grazing allotments. Livestock permittees are able to properly perform maintenance to range improvements and conduct management activities associated with the grazing permits. Forest Service employees also have sufficient access to administer the livestock grazing permits.

The livestock management concerns with the current road system are primarily associated with the high density of Level 1 or user created roads that cross pasture fences. Across the district there are hundreds of locations where roads cross fence lines. These locations will have either a cattle guard or some form of a gate to allow forest users to continue traveling the road while leaving no gaps in the fence for livestock to escape. Many of the well-traveled roads have cattle guards while less traveled roads have gates.

When the gates are left open, the integrity of the fence is lost and livestock management becomes more difficult. This has been a continual problem on every allotment and is a greater concern in the ponderosa pine ecosystem where the road density is higher from old timber sales and user created roads. Some of these roads do access a structure or a recreation site and may call for a cattle guard installation, assuming use is high enough to justify the expense. However, some roads simply end on the other side of a fence and no longer serve a viable purpose other than recreational use.

Other livestock management concerns tied to the current road system involve disturbance and/or vandalism to livestock and range improvements. With the exception of timber sales and user created roads, many of the remaining roads access livestock management structures. A larger road system creates greater ease of access to livestock related improvements. Easier access can lead to higher occurrences of disturbance and vandalism. These occurrences include using fence posts and poles as fire wood, using monitoring cages for camp fire grates, and shooting holes into water storage tanks. Overall, this has been

a minor issue with few incidents on record, but the level of past vandalism can be linked to the level of access.

Effects Analysis

Direct and Indirect Effects

Alternative 1 – No Action

Alternative 1, the No Action Alternative, would leave all roads open to the public. No roads would be closed, motorized cross-country travel would continue, and dispersed camping would not be restricted. This alternative would provide the fewest acres of forage for livestock as the road system would continue to displace forage. In some locations, erosion may potentially occur from these roads that can also reduce forage.

The problems with gates that can be left open on Maintenance Level 1 roads that cross fences will continue at current levels and will continue to impact the permittees' ability to control their livestock. Occasional issues with disturbance and vandalism at livestock structures will continue at the current rates as the general public continues to travel by all allotment structures.

There would be no need to address motorized use by grazing permittees in their Allotment Management Plans and Annual Operating Instructions. Permittees would continue to access their livestock and allotment related structures, as needed.

Effects Common to Action Alternatives 2 and 4

Alternatives 2 and 4 are very similar with the only difference being that motorized mule deer retrieval would be authorized in Alternative 4. There is not expected to be an affect to grazing management by authorizing mule deer retrieval. Benefits to grazing from these alternatives include the removal of 376 miles of roads from the system, improving the amount of available forage by a small degree as these roads become revegetated over time. Depending on the size of the road, the 376 miles of non-system roads removed from the system would add approximately 1,000 to 1,300 acres of available forage across the district. Erosion impacts would be reduced in areas where roads are removed from the system.

Problems with open gates will be reduced as 14 roads that cross fence lines will be removed from the system. An additional 20 user created or old timber sale roads will no longer be accessible to the public due to motorized cross-country travel restrictions. The ability to prevent livestock from escaping from the authorized pasture will be increased. With many of the allotment structures located off of the road system, disturbance and potential vandalism to structures will be reduced as the access and visibility is reduced.

The action alternatives will also benefit grazing management as recreation activities near livestock structures will be reduced, thus reducing the potential for vandalism.

Allotment Management Plans and Annual Operating Instructions will be modified to authorize permittees to continue utilizing all roads that are essential for the proper management of the allotment. This includes roads restricted from public use as long as it follows Travel Management Implementation guidelines. The same authorities will be available for Forest Service employees that need to perform administration duties on the allotments.

Alternative 3

Alternative 3 would remove 466 miles of roads from the system, improving the amount of available forage by small degree over Alternative 2. Depending on the size of the road that would no longer be on the system, acres of forage created by discontinuing use of these roads could be as high an additional 200

acres more than Alternatives 2 and 4. Erosion impacts would be further reduced in areas where additional roads are removed from the system.

Problems with open gates would be reduced to a higher degree than Alternatives 2 and 4, as 17 roads that cross fence lines will be removed from the system and the same 20 non-system roads would no longer be open to the public due to motorized cross-country travel restrictions.

The recreational opportunities implemented by this alternative will also benefit grazing management as recreation by livestock structures will be greatly reduced.

Allotment Management Plans and Annual Operating Instructions will be modified to authorize permittees to continue utilizing all roads that are essential for the proper management of the allotment. This includes roads removed from use for the public as long as it follows Travel Management Implementation guidelines. The same authorities will be available for Forest Service employees that need to perform administration duties on the allotments.

Cumulative Effects

Past, present and reasonably foreseeable activities over the next ten years on NKRD include mechanical and managed-fire vegetation projects, recreation opportunities, wildlife habitat enhancement, and invasive species treatment.

The implementation of noxious and invasive weed control efforts has reduced the number of exotic plant species within the North Kaibab Ranger District. The containment, control, and eradication of species like Musk Thistle, Spotted Knapweed, and Cheatgrass is expected to continue for the foreseeable future. With these practices are guidelines for performing project activities that will reduce the risk of introduction of new invasive species and prevent the spread of undetected existing populations. The reduction of roads open to the public will reduce the amount of area that weed species can be introduced to and be further spread by livestock.

The continuation of vegetation projects for wildlife, watershed, and/or forest health initiatives across the district, through mechanical or prescribed fire techniques, will increase the understory forage available to livestock and other foraging species. As the roads that are removed from the system begin to revegetate, these projects will add to the overall forest health and promotion of the understory.

Conflicts between recreation opportunities and livestock have been reduced over the years through each allotment's respective management plan. In most cases, these conflicts have been resolved through fencing, discontinued use of a water source, or changing the timing of a pasture's use around peak visitation of forest users. As many of the past livestock/recreational opportunity conflicts have been mitigated, there is no increase in conflict anticipated as a result of the road system being analyzed or implementation of the proposed action.

Fire and Fuels Management

Affected Environment

Currently, there are 264 miles of ML 3 and 4 roads traversing the district. For simplicity and the purpose of this analysis, all roads which are well maintained and suitable for use by passenger cars (i.e., ML 3 and 4 roads) were combined in road totals when analyzing alternative or making comparisons. ML 1 and 2 roads provide further access to areas between the ML 3 and 4 roads. The present density of roads (1.81 linear miles per square mile) is such that very few areas of the district are more than one mile from an existing road. At this density, there is wide-spread dispersal of forest visitors which may contribute to a higher number of human-caused wildfires. Additionally, desirable management fires for resource benefit (low to moderate intensity) can be stopped prematurely due to a break in fuels at the road edge.

Effects Analysis

Direct and Indirect Effects

Alternative 1- No Action

The current density of roads adequately facilitates patrolling, initial attack response and movement of suppression resources. The spread of desirable management fires for resource benefit is often hampered by the break in fuel continuity at the edge of roads. All ML 2, 3 and 4 roads are used extensively by the visiting public and OHV use is expected to increase. Human-caused fires in undeveloped areas may increase, especially given the expected increase in off road driving. As visitation in undeveloped areas increases, the ability to make adequate fire prevention contacts will diminish without additional personnel, vehicles and related funding. Damage to patrol vehicles will likely increase as well, from driving rough roads in the effort to make adequate contacts over a wider area.

Alternative 2 – Proposed Action and Alternative 4

Closing 376 miles of existing ML 2 district roads and adding 16 miles of spur roads will have very little impact on the ability to move fire management resources, adequately patrol, and provide initial attack response. While it may be several years before sufficient vegetation covers the closed road to provide a continuous fuel bed for the spread of desirable management fires for resource benefit, the reduction will be a favorable step in that direction. Visitor use, especially within the 100- and 300-foot camping corridors, will be less dispersed, making it easier to patrol and provide prevention contacts. Allowing motor vehicle use for MBGR, regardless whether mule deer are included, will have little impact on fire and fuel management because wildland fires starting from motorized big game retrieval incidents have been rare.

Alternative 3

From the perspective of fire management, the effects of Alternative 3 are similar to Alternative 2. Closing 466 miles of existing ML 2 district roads and adding 16 miles of spur roads will have very little impact on the ability to move fire management resources, to adequately patrol, and to provide initial attack response. While it may be several years before sufficient vegetation covers the closed road to provide a continuous fuel bed for the spread of desirable management fires for resource benefit, the reduction will be a favorable step in that direction. Visitor use will be less dispersed, making it easier to patrol and provide prevention contacts.

Cumulative Effects

The geographical extent of this cumulative effects analysis is confined to the NKRD. A 20-year timeframe was selected for this cumulative effects analysis, 2000 - 2020. Past, present and reasonably foreseeable projects and activities in the cumulative effects analysis area that may have an effect on fire and fuels management are listed in Appendix 2. Indirect and direct effects to fire management are anticipated to be minimal. No additional cumulative effects from these past, ongoing, and future projects are anticipated.

Vegetation Management

Affected Environment

Vegetation management occurs on many parts of the district. This work is not expected to be affected by TMR. The primary concern for vegetation management is provision of an adequate transportation system in order to provide access for vegetation management projects. Roads are needed in order for contractors to access work areas in order to load and haul timber as well as small diameter wood. Roads are also needed for fuelwood and Special Forest Product (SFP) collecting (i.e., Christmas trees, pinecones, pine boughs) which are popular uses of the North Kaibab Ranger District.

Effects Analysis

Direct and Indirect Effects

Effects Common to All Alternatives

Vegetation management will continue with any temporary road construction, obliteration or use of closed roads covered under the environmental planning and contract preparation for each specific project. Fuelwood, Christmas tree cutting and forest product collection will continue to be permitted as needed to meet vegetation management goals and local demand for fuelwood and SFPs.

Alternative 1 – No Action

There are no direct effects on vegetation management with the existing condition. There may be indirect effects related to unmanaged cross-country travel, if soil erosion and soil productivity are decreased. These are expected to be slightly negative over time.

Alternative 2, 3 and 4

These alternatives will not have direct effects on the vegetation management program. Closed roads and temporary roads would still be used for vegetation management projects as needed and approved under project specific planning. There would be no effect on vegetation management activities from dispersed camping or motorized big game retrieval for bison and elk. Fuelwood/SFP collection might be negatively affected since the open road system would be reduced, making it more difficult to access certain areas of the district. Further, the prohibition of motorized cross-country travel would require that individuals use non-motorized methods of gathering fuelwood from within the forest interior (mostly within the pinyon-juniper forest type). Though roadside parking along open roads would be allowed, fuelwood cutters would not be able to drive motorized vehicles off of open roads to search for or locate fuelwood. However, once fuelwood is located (through non-motorized methods, such as on foot by the fuelwood permit holder), one motorized trip in would be allowed only in the Ponderosa pine and mixed conifer forest types to gather the wood. No such motorized travel for gathering and retrieval would be allowed within the pinyon-juniper forested type, except in areas cleared through specific environmental analyses. However, non-motorized fuelwood gathering and retrieval would still be allowed in these areas.

Cumulative Effects

There are no cumulative effects on the vegetation management program on the NKRD over a 20-year horizon. However, individuals will continue to be affected by the restriction on motorized cross-country travel as it pertains to fuelwood and special forest products collection. Past vegetation management projects, such as the Ryan Free Use Project, have permitted collection of juniper. Future projects will likely include the provision of fuelwood cutting areas accessible by vehicle (free and permitted). Public demand for fuelwood is expected to be met through an active vegetation management program on the district and the only change would be the manner in which fuelwood gathering takes place. Special forest product gathering will continue to be handled on a case by case basis and approved after subsequent analysis.

Lands and Minerals

Affected Environment

There are approximately 19.4 acres of private property located within the 655,078 acres of the North Kaibab Ranger District. There are existing roads leading to the private property parcel. The general public, including private property owners, are allowed to use open forest roads to access their property.

By law, the Forest Service is required to provide access to private lands surrounded by National Forest System lands. Usually, the provided access is by an existing road. A property owner must obtain written authorization to upgrade an existing road on Forest Service administered land.

There are several special use permits issued periodically for commercial uses on the district including, but not limited to electrical power lines, water transmission pipelines, research studies, and communication sites. Many of these permits also allow for motorized cross-country travel as part of their operating plans or as a condition of their special use authorization.

Effects Analysis

Direct and Indirect Effects

Effects Common to All Alternatives

None of the alternatives would cause direct or indirect effects to the administration of lands and mineral through implementation of the Travel Management Rule. Commercial users will still be allowed to access their permitted areas either from open roads or under written authorization. Ingress and egress to private property owners will still be accomplished with written authorization.

Mineral material contractors and mining claimants will still have written authorization to use specific forest roads for access to contract areas or claims.

Cumulative Effects

These activities have been limited in the past 20 years, and no increase in these types of activities is foreseeable. Since there are no direct or indirect effects under any alternative, there are no cumulative effects.

Social and Economic Environment

The area for this social and economic analysis is the North Kaibab Ranger District. The district is located within Coconino County except for a sliver on the far west side that is in Mojave County. Since over 90 percent of the area is within Coconino County, their county-wide data will be used to estimate economic impacts, as well as applicable state and national data. Federal agencies administer over 33% of the land in Coconino County, which makes the management of public land a large factor in these communities. The U.S. Forest Service, National Park Service, Bureau of Land Management, and Arizona State Land Department all manage lands within the county. Virtually all of these lands are open space. Most are heavily used by recreationists, especially in the national park system, BLM system and National Forest System lands (Coconino County 2003). The Kaibab Paiute Indian Reservation and the Navajo Indian Reservation are not directly adjacent to National Forest System lands, but these lands are important to the tribes from a traditional use standpoint, and they use resources on the North Kaibab RD.

The social and economic effects analysis attempts to identify potential effects that Forest Service travel management may have on local, county and regional economic systems and on people using the natural resources the Kaibab National Forest provides. In particular, the questions needs to be asked as to whether changes in use on the North Kaibab Ranger District for recreation and the amount of change in the designation of forest roads and trails would be large enough or significant enough to cause measurable economic changes. Also, the analysis will determine if the economy of the local area is diverse enough and robust enough that the proposed changes will be insignificant or will be felt in very specific segments of the local economy.

The analysis area data compares census data and when appropriate, population and recent population characteristics. Additional data is provided by Coconino County, Arizona Dept. of Commerce, Forest Service, and other agencies.

Affected Environment

For the purposes of this analysis, North Kaibab Ranger District's social and economic environment will primarily consider Forest Service and National Park Service concessionaires on the Kaibab Plateau, as well as the surrounding communities.

The North Kaibab RD is adjacent to the boundary of Grand Canyon National Park, North Rim (GCNPNR). The NKRDR permitted resorts and service providers, and nearby communities, are highly dependent on serving national park visitors. Some visitors and forest users come to the district as a destination, to access trailheads into Grand Canyon NP, mountain bike ride, hunt, and gather fuelwood, among other activities. Visitation to the Kaibab Plateau occurs primarily during the spring, summer and fall. Highway 67 to the North Rim is closed just north of the Jacob Lake Inn during the winter. The largest concessionaires on the district include Jacob Lake Inn and associated gas station, Kaibab Lodge, and the North Rim Country Store. Jacob Lake and Demotte Campgrounds are also operated by concessionaires, and Antelope Vendors, a Native American organization, operates seasonally at the LeFevre and Houserock Valley overlooks. Some Forest Service employees are housed seasonally at Jacob Lake and Big Springs administrative facilities within the forest.

Grand Canyon National Park (GCNP) is the second most visited national park in the country. Over 4.3 million visitors come to GCNP each year, and of these about 10 percent visit the North Rim (National Park Service 2006). The majority of visitors drive private vehicles to the park, others arrive by tour bus, and some through bicycle tours. Park Service employee housing area at GCNPNR is at the Bright Angel Peninsula. The GCNPNR concessionaire operates from late spring through fall, and only a skeletal National Park Service crew remains onsite through the winter and early spring.

Communities near the Kaibab Plateau include Fredonia, AZ, Jacob Lake, AZ, the Kaibab Paiute Indian Reservation and Marble Canyon, AZ. Bitter Springs and other scattered settlements are found on the Navajo Nation across the Colorado River to the east of the plateau. Most employment in the Fredonia, Arizona area is derived from government based jobs, service industry and tourism related activities, and some employment related to the forest products industry, mining, and trade employment.

Social Background

Human habitation in the general area of district originates with occupation by native peoples during prehistoric times. Immediately prior to the arrival of European settlers, the area was occupied by the Kaibab Paiute Tribe. In the late 1800s, Mormons and other Euro-American settlers arrived in the Grand Canyon area and engaged in timber harvesting, ranching, mining, and tourism ventures. This history continues to influence the culture today as western rural lifestyles are an important part of local communities.

Due to the small percentage of private land in the area, the Kaibab NF has long been viewed as a community commons. Long-term uses include grazing, timber harvesting, hunting, primitive camping, cutting firewood, and collecting forest products such as medicinal plants. The ecological and social systems within the socioeconomic impact area are tightly linked, and their dependency on one another is increasingly apparent. In the Attitudes, Values and Beliefs analysis prepared for the KNF in 2006, the social setting for the forest has five prominent themes: history, population composition and growth, land ownership, transitioning local economies, and, the interaction of forestlands with rural lifestyles.

Communities near the Kaibab Plateau historically depended on federal lands for their livelihood and embraced a rural lifestyle. However, there has been some transition in lifestyles. While use of natural

resources for personal and economic gain was a common practice of early Euro-American settlements, the early emphasis on tourism at the Grand Canyon was unique to this area. The area has gone through a transition from a forest product and grazing based economy to one dependent upon tourism. This transformation brought changes to nearby communities, where a new workforce directly or indirectly supports tourism and visitation to the Grand Canyon and other nearby national parks, Bureau of Land Management and Forest Service administered lands as well as Paiute and Navajo Indian Reservations. While much of the old tie to rural lifestyles and forest products has decreased or disappeared as an economic factor, many communities retain historic ties to these lifestyles. Local tribal tradition and culture is prevalent in the area including use of natural resources and forest products. Tribal communities gather forest products for personal, religious and ceremonial uses.

Demographics

The population of Coconino County in 2008 was 135,614, decreasing to 134,421 in 2010 (2010 U.S. Census data). The population composition is approximately 55% white, 27% American Indian, 14% Hispanic, 2% other race, 1% Asian and 1% African American (Arizona Department of Commerce 2009).

Fredonia, Arizona is the closest community to the North Kaibab RD with detailed census information available. The town had a population of 1,048 in 2009, increasing to 1,314 in 2010 (2010 U.S. Census data) with the population of the town growing very slowly over time. Just over 87% of the population is white, 7 % is American Indian, 4 % Hispanic, and 2 % other race (US Census Bureau, American Community Survey).

Income

The largest economic sector in the county is government-related, followed by leisure-hospitality, trade-transportation-utility, and education-health services. The total median household income in Coconino County is \$48,259 and per capita income is \$22,238.

In Fredonia, Arizona, the largest economic sector is government-related, followed by leisure-hospitality, trade-transportation-utility, and education-health services (Arizona Department of Commerce, 2009). While the economic sector reflects that of overall Coconino County, the median income lower, at \$38,611 and per capita income is \$15,738 (US Census Bureau, American Community Survey 2009).

Forest Products and Fuelwood Gathering

The North Kaibab Ranger District has provided forest products since its designation. Many communities rely on forest products from the district as a source of economic benefit and personal wellbeing.

The fuel used to heat homes in Coconino County is not dependent upon economic or social background. The data in the following table compares house heating fuel type. Almost 16 percent (US Census Bureau 2000) of households rely on wood as their primary source of heat. No data is provided about use of wood as a secondary source of heat. The collection of wood for heat gives users a tie to (and dependence upon) the National Forest.

Table 38. Primary sources of heat in Coconino County

House Heating Fuel	Number of Households	Percent
Utility Gas	22, 308	55.2
Bottled, Tank, or LP Gas	6,233	15.4
Electricity	5,043	12.5
Fuel Oil, Kerosene, etc.	211	0.5

Coal	61	0.2
Wood	6,354	15.7
Solar Energy	50	0.1

The ability to gather forest products for personal use, such as firewood and pinyon nuts is important to residents and tribes adjacent to the analysis area. For some, it is part of their heritage and cultural identity. For others it is an important way to enjoy their National Forest. Residents of nearby communities such as Fredonia, Arizona, Colorado City, Arizona, and Kane County Utah obtain fuelwood from the district. Members of the Kaibab Paiute Tribe and Navajo National also acquire fuelwood as well as ceremonial forest products from the district. In some cases, gathering forest wood is critical to peoples’ subsistence by providing fuel to cook with and to heat their homes.

Effects Analysis

Direct and Indirect Effects

There are no direct or indirect effects from implementing the TMP that would change the social makeup of the study area. There would be no economic impacts to Coconino County residents. Under all alternatives, the North Kaibab Ranger District would continue to manage forestry programs to accomplish forest health objectives, and to provide commercial and personal use products in a manner which is compatible with the purpose and intent of the TMR. Access to National Forest System lands for tourism and travel would remain. Recreational activities such as hiking, camping, and hunting would continue to be available. The North Kaibab Ranger District would offer fuelwood and permits for forest products. The Arizona Game and Fish Department would continue to administer and regulate hunting permits, setting annual limits.

Alternative 1 – No Action

Continuing with the current condition would not affect the population, poverty level, race, or ethnicity of the study area. There would be no economic impacts to Coconino County residents. There would be no change in opportunities for tourism and travel. Fuelwood collection areas and forest product gathering permits would continue to be provided on the district. The Arizona Game and Fish Department would continue to administer and regulate hunting permits.

Alternatives 2, 3, and 4

Alternatives 2, 3, and 4 would not create changes to the population, poverty level, race, or ethnicity of the study area. There would be no economic impacts to Coconino County residents. There would be no change in opportunities for tourism and travel. Recreational activities such as hiking, camping, and hunting would remain available. The Arizona Game and Fish Department would still regulate and administer hunting permits for game species, setting annual limits. Fuelwood collection areas would still be provided on the district. Removal of other forest products (other than fuelwood) would continue. Motorized activities of other forest product gatherers would still be defined and authorized in the appropriate permit.

Cumulative Effects

There are no past, present, or reasonably foreseeable effects from the implementation of the TMR that would change the social makeup of the study area, or have an economic impact. Any future road construction, openings, or closing would generally be addressed under a separate environmental analysis.

Transportation

Affected Environment

There are 3,343 miles of existing National Forest System roads on the NKRD (a complete list of the roads is found in the North Kaibab Ranger District Travel Analysis Process report, 2010). The Forest Service has jurisdiction and maintenance responsibility for the National Forest road system. In addition to the existing roads, there are 114 miles of state highways and several miles of unauthorized routes on the National Forest that are not part of the forest road system and are not maintained by the agency.

Roads evaluated in this analysis are the existing National Forest system passenger car and high clearance roads, and any unauthorized routes added to the proposed road system. Forest roads are maintained at five different maintenance levels. Maintenance Levels (ML) are used to classify roads ranging from ML 1 to ML 5. ML 1 indicates a closed road, ML 2 are high clearance roads, and ML 3, 4 and 5 are roads suitable for passenger cars. A glossary of terms that define Forest Service transportation system terminology is provided at the end of this document.

There are approximately 264 miles of passenger car roads (ML 3 and 4) on the NKRD and 1,588 miles of high clearance roads (ML 2). The passenger car roads provide the primary access points to the district. These roads typically have a crushed aggregate surface composed of limestone or volcanic material. Some roads have culverts at drainages or watercourse crossings, but due to the xeric environment, most crossings do not have culverts. Most of the remaining forest roads are classified as high clearance roads; these are unpaved and are constructed, native-surface roads.

Costs of Road Maintenance

Road maintenance is currently performed on passenger car roads more frequently than on high clearance roads. The passenger car roads have higher standards that must be met and are more expensive to maintain. Maintenance on high clearance roads is to a lower standard and less costly because they are only maintained for passage by high clearance vehicles and are not subject to the Highway Safety Act. Since only a limited number of roads can be maintained due to available funds, emphasis is placed on keeping the passenger roads to standard. Very little road maintenance is done on high clearance roads. The costs to maintain roads vary by maintenance level requirements, fuel prices, haul distances and other variables. Table 39 summarizes the costs of maintenance for the different alternatives based on average road maintenance costs across Region 3 in 2005.

Table 39. Road maintenance costs by alternative.

Maintenance Level	Cost per Mile	Alternative 1		Alternatives 2 and 4		Alternative 3	
		Miles	Cost	Miles	Cost	Miles	Cost
1	\$107	1,491	\$159,537	1,865	\$199,555	1,957	\$209,399
2	\$420	1,588	\$666,960	1,287	\$540,540	1,197	\$502,740
3 & 4	\$6,751	264	\$1,782,264	189	\$1,275,939	189	\$1,275,939
Total Maintenance Cost		\$2,608,761		\$2,016,034		\$1,988,078	

Approximately 54% of all roads on the Kaibab National Forest are located on the North Kaibab Ranger District. The Forest usually receives approximately \$920,000 per year for road maintenance. Therefore, if the district receives 54% of this funding, or \$497,000, it would be 19% of the funding needed for annual road maintenance.

When needed or scheduled road maintenance cannot be performed due to budget or other limitations, the work that is delayed is referred to as “deferred maintenance” (see Glossary). Given the budget constraints discussed above, deferred maintenance needs increase every year on the North Kaibab Ranger District. Eventually, maintenance needs may make a particular road impassable, and a decision would be made to restore the road, reduce the maintenance level (from passenger car to high clearance road) or close or decommission the road.

Minimum Road System

The minimum road system was identified in the North Kaibab TAP (Forest Service 2010). It is the road system needed for safe and efficient travel and for the administration, utilization, and protection of National Forest System lands (36 CFR 212.5(b)). The minimum road system is that which is needed to meet resource and other management objectives adopted in the relevant land and resource management plan (36 CFR part 219), laws and regulations, long-term funding expectations, and minimizes adverse environmental impacts. The desired minimum road system attempts to balance these elements and make progress toward a sustainable road system.

Effects Analysis

Direct and Indirect Effects

Alternative 1 – No Action

The No Action Alternative represents the existing condition. It provides 1,852 miles of open National Forest System roads at different maintenance levels (see Table 4 or Table 29 above). Of the four alternatives analyzed in detail, Alternative 1 is the most costly for road maintenance (See Table 22). Approximately 19% of the road system can be maintained annually; the remainder of the roads will not be maintained on a set schedule, and this alternative contributes the most to deferred maintenance on the district. Maintenance priorities are placed on the passenger car roads as these must meet higher standards for health and safety. When these higher standard roads cannot be sufficiently maintained, the road surface breaks down, and the roads become difficult to navigate with passenger cars. It takes more resources to bring a road back to standard that has been neglected because of a lack of maintenance. This alternative would not make progress toward the minimum road system, does not minimize environmental impacts, does not reduce road maintenance costs, and does not implement the Travel Management Rule.

The existing unauthorized routes would remain, and additional routes would likely be created as off-road travel creates new routes. Resource damage and road maintenance needs would continue to increase.

This alternative has the greatest potential for negative impacts to resources. It retains the greatest number of roads and allows motorized cross-country use and unauthorized routes created from this use. Damage to resources from motorized cross-country use would be exacerbated by climate change, especially drought, if lower precipitation prevented or reduced re-establishment of vegetation. Repeated traffic along unauthorized routes results in loss of plant cover and the potential for soil erosion. If estimates for increasing OHV use and other recreational uses occur (see Recreation and Scenic Resources section above), there could be increased areas of bare ground that are vulnerable to soil movement. Bare soil is also more vulnerable to the spread of invasive exotic plants.

Alternative 2 – Proposed Action and Alternative 4

Alternatives 2 and 4 each provide 1,476 miles of open National Forest System roads at different maintenance levels (See Table 4 and Table 29). Each would close 376 miles of existing roads and add 16 miles of Maintenance Level 2 roads. Changing roads from ML 2 to ML 1 would result in lowered maintenance costs for the district’s transportation system by approximately \$313 per mile. Road

maintenance costs would be less than those for Alternative 1 and about 25% of the roads could be maintained annually. Alternatives 2 and 4 would reduce the deferred maintenance burden compared with Alternative 1, but not as much as Alternative 3. These alternatives reduce the number of roads while providing adequate access for resource management, recreational activities, and reducing annual road maintenance costs.

These alternatives would add 16 miles of short spur roads to the designated system that have historically served as access to recreational activities on the district. Adding 16 miles of road in short segments scattered throughout the district, along with dispersed camping corridors, is expected to accommodate existing motorized recreation needs with little change from the current use. These roads would also be added to the designated system as ML 2 roads (Table 29). Based on site-specific analysis by engineers, these proposed roads either meet or exceed Forest Service standards for ML 2 roads. These roads would be maintained at ML 2 to provide the intended visitor experience and reduce resource impacts. Mitigation and monitoring measures are in place to ensure impacts from motorized use within dispersed camping corridors and for motorized big game retrieval are minimized.

These alternatives reduce the potential for negative impacts to resources from climate change. They retain 20% fewer roads than Alt. 1 and prohibit motorized cross-country use. Although damage to resources from motorized cross-country use would be exacerbated by climate change especially drought, these alternatives limit motor vehicle use to designated roads and camping corridors and limited use by hunters to retrieve legally taken big game animals. If estimates for increasing OHV use and dispersed camping occur (see Section 3.1), there would be decreased areas of bare ground that are vulnerable to soil movement. Fewer areas of bare soil created by motorized cross-country travel would be created that are vulnerable to spread of invasive exotic plants.

Alternative 3

This alternative provides 1,386 miles of open National Forest System roads at different maintenance levels. It would remove 466 miles from the open road system and add 16 miles of ML 2 roads. Road maintenance costs are less than Alternative 1, 2 or 4. Approximately 25% of the forest roads could be maintained annually. This alternative would further reduce the increase of deferred maintenance costs, although it only differs by approximately \$29,000 per year over Alternatives 2 and 4.

These alternatives would add 16 miles of short spur roads to the designated system that have historically served as access to recreational activities on the district. The 16 miles of road are expected to help meet demand for recreational activities on the district. Based on site-specific analysis by engineers, these proposed roads either meet or exceed Forest Service standards for ML 2 roads. These roads would be maintained at ML 2 s to provide for forest visitor experience and reduce resource impacts.

This alternative reduces the potential for negative impacts to resources from climate change. It proposes to retain 25% fewer roads than Alternative 1, and prohibits motorized cross-country travel.

Cumulative Effects

The cumulative effects analysis area consists of the North Kaibab Ranger District, and the time period is 2000 to 2020.

Past, present and foreseeable projects and activities in the cumulative effects analysis area that affect transportation include: availability of funding, timber and fuelwood harvesting, forest thinning, grassland restoration tree removal, sagebrush restoration, prescribed burning, livestock grazing, fence construction, water tank construction and maintenance, invasive weed control, trail construction and maintenance, pipeline and possible transmission line construction and maintenance (see Appendix 4).

Implementation of Alternative 1 would have increasingly negative cumulative effects. Fewer miles of existing National Forest System roads would be maintained and more miles of road would become deteriorated. These would be compounded by permitted uses, pipeline and transmission line use and maintenance. This alternative has the most potential to have effects magnified by climate change. The overall cumulative effects of not implementing TMR would result in fewer miles of adequately maintained road over time.

Implementation of Alternatives 2, 3, & 4 will have an increasingly positive cumulative effect on the transportation system as the miles of roads needing maintenance decreases. There would be an adequate system of roads to provide for forest management activities and recreational pursuits. Continued effects from permitted uses, pipeline and transmission line use and maintenance would continue to be addressed through project implementation. The net cumulative effect of implementing TMR will result in less resource damage.

Implementation of Alternatives 2, 3, & 4 will have an increasingly positive cumulative effect on the transportation system as the miles of roads needing maintenance decreases. There would be an adequate system of roads to provide for forest management activities and recreational pursuits. Resource damage would decrease from existing roads on sensitive soils resulting in decreased erosion and sedimentation as future projects would continue to address areas of concern and as motorized cross-country use would be restricted. Continued effects from permitted uses, pipeline and transmission line use and maintenance would continue to be addressed through project analysis. The net cumulative effect of implementing TMR will result in less resource damage.

Climate Change

The Southwestern Regional Office planning program has summarized some ecological and socioeconomic effects of climate change (Periman 2008). The following is an excerpt of the information.

The state of knowledge needed to address climate change at the forest scale is still evolving. Most global climate models are not yet suitable to apply to land management at the forest scale. This limits regional analysis of potential effects especially for a specific project. At a more local scale, paleoenvironmental studies of changing southwestern climate may provide limited historical ecological context for ecosystem variability and climate change. These can provide limited knowledge about past climate change, patterns of precipitation, drought severity and changes in vegetation patterns.

Climate modelers generally agree that the Southwestern United States is experiencing a drying trend that will continue into the latter part of 21st century. In the recent past, two droughts occurred, one in the 1930's Dustbowl and one in the 1950's Southwestern Drought. Climate model scenarios suggest the warming trend observed in the last 100 years may continue into the next century with the greatest warming occurring during the winter. Some climate models predict 2-3 degree temperature changes in the next 20 years. Such temperature changes could result in limited water supplies and altered fire regimes, as well as influence the distribution and abundance of animal and plant species.

Some potential ecological implications of climate change trends include:

- More extreme disturbance events such as wildfires, intense rain and wind events.
- Greater vulnerability to invasive species.
- Long term shifts in vegetative patterns, such as cold-tolerant vegetation moving upslope or disappearing in some areas.
- Changes in wildlife populations, diversity, viability and migration patterns.

Some potential socioeconomic effects of climate change trends include:

- Water shortages.
- Impact on amenities, goods and services from forests.

Other Disclosures

Environmental Justice

On February 11, 1994, President Clinton issued Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." This Executive Order was designed to focus the attention of federal agencies on the human health and environmental conditions in minority and low-income communities. It requires federal agencies to adopt strategies to address environmental justice concerns within the context of existing laws, including NEPA.

The goal of Environmental Justice Analysis is not to shift risks among populations, but to identify potential disproportionately high and adverse effects, and to identify alternatives that may mitigate these impacts. One way that this is achieved is by providing an opportunity for minority and low-income populations to participate in planning, analysis, and decision making. Individual tribal members may use the project area for the personal collection of traditional or medicinal plants. Low-income groups may use the area for the collection of fuelwood. None of the alternatives would have adverse effects on these uses or to low income and minority populations in the area. No concerns or issues related to Environmental Justice were raised during project scoping or the Notice and Comment period. Additionally, the American Indian Tribes listed in Chapter 4 were consulted regarding this proposal and potential effects were analyzed.

There are no adverse effects expected to public health or safety under any of the alternatives. The actions proposed in alternatives of this EA would have no effect on park lands or prime farmlands, rangeland, and forest land as defined in FSH 1909.15 section 65.2. These kinds of allocations or land capability either do not exist on the North Kaibab Ranger District or would be unaffected by the proposed activities of the alternatives.

There are no adverse effects expected on inventoried roadless areas under any of the alternatives (i.e., there is no road construction or reconstruction proposed under any alternative that would alter the roadless characteristics) on the NKR D.

Chapter 4 – Consultation and Coordination

The Forest Service consulted the following individuals, Federal, state and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

Interdisciplinary Team:

Glenn “Todd” Allison	Planning, Wildlife
Connie Reid	Heritage
Jason Bulkley	Law Enforcement
Dustin Burger	Range, Botany, Soils and Watershed
Paul Callaway	Forestry
Garry Domis	Silviculture
Angela Gatto	Wildlife, Botany
Ed Hiatt	Fuels and Fire Management
Ed Kolle	Engineering
Patrick Lair	Public Affairs
Kevin Larkin	Team Lead, Deputy District Ranger
Mike Lyndon	Tribal Relations
Charlotte Minor	Landscape Architecture, Recreation
John O’Brien	Engineering
Connie Reid	Heritage, Tribal Relations
John Riling	Silviculture, GIS
Melissa Spandl	Recreation, GIS
David Vincelette	NEPA Planning
Damien Zona	Silviculture, GIS

Other Participants:

Brooks Baker	Fuels and Fire Management
Joshua Erickson	Fuels and Fire Management
Britt Betenson	Heritage
Debra Saunders	Forestry
Liz Schuppert	Public Services Team Leader
Tim Short	District Ranger
Russ Tom	Forestry
Mark Herron	NEPA Coordinator & KNF Silviculturist

Federal, State, and Local Agencies:

US Fish & Wildlife Service
Arizona State Historic Preservation Office
Bureau of Land Management
National Park Service
Arizona Game and Fish Department
Coconino County, AZ
Kane County, UT
City of Fredonia, AZ
City of Page, AZ
City of Kanab, UT

American Indian Tribes:

Kaibab Band of Paiute Indians
Hopi Tribe
Navajo Nation
Pueblo of Zuni
Hualapai Tribe
Havasupai Tribe
Yavapai-Prescott Indian Tribe

Tribal Consultation Summary

The Kaibab National Forest recognizes that area tribes have cultural ties and knowledge about the lands now managed by the Forest Service. Many tribal members regularly visit the Kaibab National Forest to gather traditional resources and to visit traditional cultural properties and sacred sites. Therefore, tribes share an interest in protecting important natural and cultural resources from damage, including damage caused by uncontrolled cross-country motor vehicle traffic.

Due to the level of use of the forest by tribal members and the unique interests of area tribes, the Kaibab National Forest has conducted extensive tribal consultation and scoping of tribal communities throughout the Travel Management process. This consultation process reflects a long-standing commitment by the Kaibab National Forest to share the stewardship of public lands with area tribes. For the current project, tribal consultation was conducted at the government-to-government level with concerned tribes according to established Memoranda of Understandings with the tribes and pertinent laws and regulations. Additionally, the forest scoped tribal communities and individual tribal members that utilize the forest. Such scoping assures that affected publics are given the opportunity to participate in the planning process as required by the National Environmental Policy Act and other laws and regulations.

The Kaibab National Forest has heard comments and concerns from area tribes about the management of forest roads and off road travel for many years. Prior to 2005, specific issues with road access, obliteration, and maintenance had been addressed on a case-by-case basis. By 2005, the Kaibab National Forest initiated broader discussions with tribes regarding the management of the forest-wide road system as initial analysis for the Five Forest OHV EIS and the Tusayan Roads Analysis project. These discussions included government-to-government meetings with the Hopi Tribe in Kykotsmovi, AZ on 2/24/2005 and 1/18/2006, and the Havasupai Tribe on 4/6/2006 in Supai, Arizona. On 11/12/2006, forest representatives attended a meeting of the Cameron Chapter of the Western Navajo Agency to identify local concerns with Navajo tribal members.

By 2006, the forest began to focus on analysis of the Tusayan District, specifically. However, consultation with tribes on general issues and concerns regarding Travel Management continued. On 4/1/2006, the Tusayan Travel Management Project was added to the Kaibab National Forest Fiscal Year 2006 Third Quarter Schedule of Proposed Actions. A copy of the SOPA was sent to the Havasupai Tribe, the Hualapai Tribe, the Hopi Tribe, the Yavapai-Prescott Indian Tribe, the Navajo Nation, and the Bodaway/Gap, Cameron, Coalmine Canyon, Leupp, and To’Nanees’Dizi Chapter Houses of the Western Agency of the Navajo Nation. On February 1, 2008, the Williams Travel Management project was added to the Kaibab National Forest Fiscal Year 2008 Second Quarter Schedule of Proposed Actions. A copy of the SOPA was sent to the Havasupai Tribe, the Hualapai Tribe, the Hopi Tribe, the Yavapai-Prescott Indian Tribe, the Navajo Nation, and the Bodaway/Gap, Cameron, Coalmine Canyon, Leupp, and To’Nanees’Dizi Chapter Houses of the Western Agency of the Navajo Nation. On October 1, 2008, the North Kaibab Ranger District Travel Management project was added to the Kaibab National Forest Fiscal Year 2009 First Quarter Schedule of Proposed Actions. A copy of the SOPA was sent to the Havasupai Tribe, the Hualapai Tribe, the Hopi Tribe, Kaibab Band of Paiute Indians, the Yavapai-Prescott Indian Tribe, the Navajo Nation, the Pueblo of Zuni, and the Bodaway/Gap, Cameron, Coalmine Canyon,

Environmental Assessment North Kaibab Ranger District Travel Management Project

Coppermine, Lechee, Leupp, and To’Nanees’Dizi Chapter Houses of the Western Agency of the Navajo Nation. Copies of the SOPA have been mailed to the parties above on a quarterly basis since that time, including updated information about the project.

Over the last three years, forest representatives have updated the tribes on the general Travel Management process during regularly scheduled government to government consultation meetings with the Hopi Tribe on 2/21/2007, 6/21/2007, 2/20/2008, and 5/20/2009, 3/23/2011; the Havasupai Tribe on 4/6/2006, 2/6/2007, 3/18/2008 and 1/8/2009; the Hualapai Tribe on 3/4/2008; the Kaibab Band of Paiute Indians on 1/28/2008, 4/16/2009, 11/23/2009; the Navajo Nation on 1/31/2007, 11/19/2007, 2/14/2008, 3/12/2010; the Yavapai-Prescott Indian Tribe on 2/19/2008; and the Pueblo of Zuni on 10/7/2008 and 06/18/2009; and Intertribal meetings held in Williams AZ on 8/7/2007 and 8/3/2008. Additionally, The Kaibab Navajo Liaison has regularly updated the Western Navajo Agency Chapters about Travel Management at regularly scheduled Chapter Meetings. Travel Management was specifically discussed at the Cameron Chapter on 3/21/2007, 8/12/2007 and 1/25/2009 and the Bodaway/Gap Chapter on 7/12/2007. The North Kaibab Travel Management project was specifically discussed with the Hopi Tribe on 12/22/2008 and 6//2/2011; the Pueblo of Zuni on 6/18/2009; and the Kaibab Band of Paiute Indians on 1/28/2008, 5/28/2008, 11/12/2008, 4/16/2009, 11/23/2009, 6/7/2010, and 9/7/2010 and maps of the North Kaibab road system were given to these tribes.

Table 40. Summary of tribal consultation on Travel Management issues

Date	Tribe	Location	Activity
2/24/05	Hopi Tribe	Kykotsmovi, AZ	Kaibab N.F. representatives met with Hopi Tribe.
1/18/06	Hopi Tribe	Kykotsmovi, AZ	Kaibab N.F. representatives met with Hopi Tribe.
4/1/06	Havasupai Tribe, Hualapai Tribe, Hopi Tribe, Yavapai-Prescott Indian Tribe, Navajo Nation, and Bodaway/Gap, Cameron, Coalmine, Leupp, To’Nanees’ Dizi Chapters of Western Navajo Agency	N/A	Tusayan Travel Management added to SOPA. SOPA mailed to tribes quarterly.
4/6/06	Havasupai Tribe	Supai, AZ	Kaibab representatives met with the Havasupai Tribal Chair.
11/12/06	Cameron Chapter, Western Navajo Agency	Cameron, AZ	KNF representatives attended a Chapter meeting.
1/31/07	Navajo Nation	Window Rock, AZ	The Forest Supervisor and other KNF representatives met with Navajo Nation.
2/6/07	Havasupai Tribe	Tusayan, AZ	Tusayan District Ranger and other KNF representatives met with Havasupai Tribal council.
2/21/07	Hopi Tribe	Kykotsmovi, AZ	Tusayan District Ranger and other KNF representatives met with Hopi Tribe. Hopi Tribe identified one ceremonial access issue on Williams District.
3/21/07	Cameron Chapter of Western Navajo Agency	Cameron AZ	KNF representatives attended a Chapter meeting.
6/21/07	Hopi Tribe	Kykotsmovi, AZ	Kaibab representative met with Hopi Tribe and developed mitigation for tribal access

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			issue on Williams District.
7/12/07	Bodaway/Gap Chapter of Western Navajo Agency	Gap, AZ	KNF representatives attended a Chapter meeting.
8/7/07	Havasupai Tribe, Hopi Tribe, Hualapai Tribe, Kaibab Band of Paiute Indians, Navajo Nation, Tonto Apache Tribe, Yavapai-Prescott Indian Tribe, and Yavapai-Apache Nation	Williams, AZ	Forest Supervisor, District Rangers, and staff met with representatives of the Havasupai Tribe, Hopi Tribe, Hualapai Tribe, Kaibab Band of Paiute Indians, Navajo Nation, Tonto Apache Tribe, Yavapai-Prescott Indian Tribe, and Yavapai-Apache Nation at the Kaibab Intertribal Meeting.
8/12/07	Cameron Chapter of Western Navajo Agency	Cameron, AZ	KNF representatives attended a Chapter meeting.
11/19/07	Navajo Nation	Window Rock, AZ	Williams District Ranger and other KNF staff met with Navajo Nation.
1/28/08	Kaibab Paiute Tribe	Fredonia, AZ	NKRD District Ranger and NKRD staff met with KPT Environmental and Cultural staff.
2/1/2008	Havasupai Tribe, Hualapai Tribe, Hopi Tribe, Kaibab Band of Paiute Indians, Yavapai-Prescott Indian Tribe, Navajo Nation, and Bodaway/Gap, Cameron, Coalmine, Leupp, Lechee, To’Nanees’Dizi Chapters of Western Navajo Agency	N/A	Williams Travel Management added to SOPA. SOPA mailed to tribes quarterly.
2/14/08	Navajo Nation	Flagstaff, AZ	Tusayan District Ranger and other Kaibab staff met with Navajo Nation.
2/19/08	Yavapai-Prescott Indian Tribe	Williams, AZ	The Acting Forest Supervisor and other Kaibab staff met with the Yavapai-Prescott Indian Tribe.
2/20/08	Hopi Tribe	Kykotsmovi, AZ	The Acting Forest Supervisor and other Kaibab representatives met with the Hopi Tribe.
3/4/08	Hualapai Tribe	Peach Springs, AZ	Kaibab staff met with Hualapai Tribal Chair and staff
3/18/08	Havasupai Tribe	Tusayan, AZ	Tusayan District Ranger and other KNF representatives met with Havasupai Tribal council.
5/28/08	Kaibab Paiute Tribe	Fredonia, AZ	NKRD staff met with KPT Environmental and Cultural staff.
8/3/08	Hopi Tribe, Kaibab Band of Paiute Indian, Hualapai Tribe, Navajo Nation	Williams, AZ	Forest Supervisor, District Rangers, and staff met with representatives of the Hopi Tribe, Kaibab Band of Paiute Indian, Hualapai Tribe, and Navajo Nation at the Kaibab Intertribal Meeting.
10/7/08	Pueblo of Zuni	Zuni, NM	Kaibab staff met with Pueblo of Zuni.
11/12/08	Kaibab Paiute Tribe	Fredonia, AZ	NKRD staff met with the HPT Environmental and Cultural staff.
12/22/08	Hopi Tribe	Flagstaff, AZ	Kaibab representatives met with the Hopi

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			Tribe.
1/8/09	Havasupai Tribe	Supai, AZ	Kaibab representatives met with the Havasupai Tribal Council.
1/25/09	Cameron Chapter of Western Navajo Agency	Cameron, AZ	KNF representatives attended a Chapter meeting.
4/16/09	Kaibab Paiute Tribe	Fredonia, AZ	NKRD District Ranger and NKRD staff met with the Tribal Council.
5/20/09	Hopi Tribe	Kykotsmovi, AZ	Kaibab representatives met with the Hopi Tribe.
6/18/09	Pueblo of Zuni	Zuni, NM	Tusayan District Ranger and Kaibab staff met with Pueblo of Zuni.
10/26/09	Navajo Nation	Window Rock, AZ	Tusayan District Ranger and Kaibab staff met with Navajo Nation.
11/23/09	Kaibab Paiute Tribe	Fredonia, AZ	NKRD staff met with KPT Environmental and Cultural staff.
6/07/10	Kaibab Paiute Tribe	Fredonia, AZ	NKRD District Ranger and KNF staff sponsored public meeting at Kaibab Paiute Reservation-Forest Plan and TMR.
9/7/10	Kaibab Paiute Tribe	Fredonia, AZ	NKRD staff met with KPT Environmental and Cultural staff.
3/12/10	Navajo Nation	Window Rock, AZ	Forest staff updated Navajo Nation on TMR
3/23/11	Hopi Tribe	Kykotsmovi, AZ	Forest staff updated the Hopi Tribe
6/21/11	Kaibab Paiute Tribe	Fredonia, AZ	NKRD staff met with KPT Environmental and Cultural staff.
6/22/11	Hopi Tribe	Kykotsmovi, AZ	Forest staff met with Hopi CPO to discuss archaeological site mitigation related to TMR.

Tribal Concerns with the North Kaibab Travel Management Project

The majority of tribal concerns submitted during the consultation and scoping process involved access to special areas on the forest or maintenance and management of the forest road system. In general, tribes have voiced concerns over increased off-road travel and user created roads, and have stated support for restricting such travel. Tribal representatives indicate they have observed damage to ceremonial plant collecting areas and other natural and cultural resources from uncontrolled off-road travel.

While tribes have made numerous comments about Travel Management issues over the last several years, most of specific comments pertain to the Tusayan Ranger District, which borders both Navajo and Havasupai tribal lands. On the North Kaibab Ranger District, no concerns related to specific areas or travel routes were identified by the tribes. The Hopi Tribe responded to the draft environmental assessment by letter (July 5, 2011 correspondence), indicating that they supported the North Kaibab Ranger District Travel Management Plan. The forest also consulted with the tribes in regards to suitable mitigation measures for sites located within roadways (see Cultural Resources section Chapter 3). The Pueblo of Zuni has asked for copies of all cultural resource survey reports associated with Travel Management planning on the North Kaibab Ranger District. The Forest will send all such reports to the Pueblo of Zuni upon completion. Under all of the alternatives, tribal members may require access to closed roads to harvest ceremonial and medicinal plants or for other traditional uses. These requests can be accommodated under a separate written instrument such as a special use permit and will be addressed on a case-by-case basis.

Glossary of Terms

Abbreviations:

AASHTO. American Association of State Highway and Transportation Officials.

CFR. Code of Federal Regulations.

EM. Forest Service Engineering Manual.

EO. Executive Order.

FSH. Forest Service Handbook.

FSM. Forest Service Manual.

USC. United States Code

- **Access Right (1).** The right of ingress to and egress from a property that abuts a street or highway. (23 CFR 710.105)
- **Access Right (2).** The authority to pass over a property for purposes of ingress to or egress from a piece of property. (FSM 5460.5)
- **Administrative unit.** A National Forest, a National Grassland, a purchase unit, a land utilization project, Columbia River Gorge National Scenic Area, Land between the Lakes, Lake Tahoe Basin Management Unit, Midewin National Tallgrass Prairie, or other comparable unit of the National Forest System. (36 CFR 212.1, 36 CFR 261.2)
- **All-Terrain Vehicle.** A type of off-highway vehicle that travels on three or more low-pressure tires; has handle-bar steering; is less than or equal to 50 inches in width; and has a seat designed to be straddled by the operator. (FSH 2309.18.05)
- **Annual Maintenance.** Work performed to maintain serviceability, or repair failures during the year in which they occur. Includes preventive and/or cyclic maintenance performed in the year in which it is scheduled to occur. Unscheduled or catastrophic failures of components or assets may need to be repaired as a part of annual maintenance. (Financial Health - Common Definitions for Maintenance and Construction Terms, July 22, 1998)
- **Construction (1).** The supervising, inspecting, actual building, and incurrence of all costs incidental to the construction or reconstruction of a highway, including bond costs and other costs relating to the issuance in accordance with section 122 of bonds or other debt financing instruments and costs incurred by the State in performing Federal-aid project related audits that directly benefit the Federal-aid highway program. Such term includes--
 - (A) locating, surveying, and mapping (including the establishment of temporary and permanent geodetic markers in accordance with specifications of the National Oceanic and Atmospheric Administration of the Department of Commerce);
 - (B) resurfacing, restoration, and rehabilitation;
 - (C) acquisition of rights-of-way;
 - (D) relocation assistance, acquisition of replacement housing sites, and acquisition and rehabilitation, relocation, and construction of replacement housing;
 - (E) elimination of hazards of railway grade crossings;
 - (F) elimination of roadside obstacles;
 - (G) improvements that directly facilitate and control traffic flow, such as grade separation of intersections, widening of lanes, channelization of traffic, traffic control systems, and passenger loading and unloading areas; and
 - (H) capital improvements that directly facilitate an effective vehicle weight enforcement program, such as scales (fixed and portable), scale pits, scale installation, and scale houses. (23 USC 101)
- **Construction (2).** The erection, construction, installation, or assembly of a new fixed asset. (Financial Health - Common Definitions for Maintenance and Construction Terms, July 22, 1998)

- **Culvert.** A conduit or passageway under a road, trail, or other obstruction. A culvert differs from a bridge in that the top of a culvert does not serve as the road surface and is constructed entirely below the elevation of the traveled way. (Handbook of Steel Drainage & Highway Construction Products).
- **Cyclic Maintenance.** Preventive maintenance activities that recur on a periodic and scheduled cycle. (Financial Health - Common Definitions for Maintenance and Construction Terms, July 22, 1998)
- **Decommission.** Demolition, dismantling, removal, obliteration and/or disposal of a deteriorated or otherwise unneeded asset or component, including necessary cleanup work. This action eliminates the deferred maintenance needs for the fixed asset. Portions of an asset or component may remain if they do not cause problems nor require maintenance. (Financial Health - Common Definitions for Maintenance and Construction Terms, July 22, 1998)
- **Deferred Maintenance.** Maintenance that was not performed when it should have been or when it was scheduled and which, therefore, was put off or delayed for a future period. When allowed to accumulate without limits or consideration of useful life, deferred maintenance leads to deterioration of performance, increased costs to repair, and decrease in asset value. Deferred maintenance needs may be categorized as critical or non-critical at any point in time. Continued deferral of non-critical maintenance will normally result in an increase in critical deferred maintenance. Code compliance (e.g. life safety, ADA, OSHA, environmental, etc.), Forest Plan Direction, Best Management Practices, Biological Evaluations other regulatory or Executive Order compliance requirements, or applicable standards not met on schedule are considered deferred maintenance. (Financial Health - Common Definitions for Maintenance and Construction Terms, July 22, 1998)
- **Design Speed.** A selected speed used to determine the various geometric design features of the roadway with respect to topography, anticipated operating speed, the adjacent land use, and the functional classification of the road. The selected design speed should be consistent with the speeds that drivers are likely to expect on a given highway facility. (AASHTO, 2001, A Policy on Geometric Design of Highways and Streets)
- **Design Vehicle.** A selected vehicle, with representative weight, dimensions, and operating characteristics, used to establish the design controls for the road. There are four general classes of design vehicles: (1) passenger cars, (2) buses, (3) trucks, and (4) recreational vehicles. (AASHTO, 2001, A Policy on Geometric Design of Highways and Streets)
- **Designated road, trail, or area.** A National Forest System road, a National Forest System trail, or an area on National Forest System lands that is designated for motor vehicle use pursuant to 36 CFR 212.51 on a motor vehicle use map. (36 CFR 212.1)
- **Easement (1).** A type of special use authorization (usually granted for linear rights-of-way) that is utilized in those situations where a conveyance of a limited and transferable interest in National Forest System land is necessary or desirable to serve or facilitate authorized long-term uses, and that may be compensable according to its terms. (36 CFR 251.51)
- **Easement (2).** An interest in real property that conveys a right to use a portion of an owner's property or a portion of an owner's rights in the property. (23 CFR 710.105)
- **Easement (3).** An interest in land owned by another party that entitles the holder to a specific limited use or enjoyment. (FSM 5460.5)
- **Forest Road.** A road wholly or partly within, or adjacent to, and serving the National Forest System that is necessary for the protection, administration, and utilization of the National Forest System and the use and development of its resources. (23 USC 101)
- **Forest Road and Trail Act Easement.** An easement issued by the Forest Service to a Public Road Authority for a non-Federal-Aid road or non-Forest Highway crossing National Forest System lands. (FSH 2709.12, 30)
- **Forest Road or Trail.** A road or trail wholly or partly within or adjacent to and serving the National Forest System that the Forest Service determines is necessary for the protection, administration and utilization of the National Forest System and the use and development of its resources. (36CFR 212.1, 36 CFR 251.5, 36 CFR 261.2)

- **Forest Trail.** A trail wholly or partly 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. (23 USC 101)
- **Forest Transportation Atlas.** A display of the system of roads, trails and airfields of an administrative unit. (36 CFR 212.1)
- **Forest Transportation Facility.** A forest road or trail or an airfield that is displayed in a forest transportation atlas, including bridges, culverts, parking lots, marine access facilities, safety devices, and other improvements appurtenant to the forest transportation system. (36 CFR 212.1)
- **Forest Transportation System.** The system of National Forest System roads, National Forest System Trails, and airfields on National Forest System lands. (36 CFR 212.1)
- **Forest Transportation System Management.** The planning, inventory, analysis, classification, record keeping, scheduling, construction, reconstruction, maintenance, decommissioning, and other operations undertaken to achieve environmentally sound, safe, cost-effective, access for use, protection, administration, and management of National Forest System lands. (FSM 7705)
- **Fugitive Dust.** Particles lifted into the ambient air caused by man-made and natural activities such as the movement of soil, vehicles, equipment, blasting, and wind. This excludes particulate matter emitted directly from the exhaust of motor vehicles and other internal combustion engines, from portable brazing, soldering, or welding equipment, and from piledrivers.
- **Heavy maintenance.** Work usually done by highway agencies in repairing damage normally expected from seasonal and occasionally unusual natural conditions or occurrences. It includes work at a site required as a direct result of a disaster which can reasonably be accommodated by a State or local road authority's maintenance, emergency or contingency program. (23 CFR 668)
- **High Scenic Integrity.** Landscapes where the valued physical, biological and cultural features appear intact. Deviations may be present, but must repeat the form, line, color, texture and pattern common to the landscape character so completely and at a scale where they are not evident.
- **Highway.** The term "highway" includes-- (A) a road, street, and parkway, (B) a right-of-way, bridge, railroad-highway crossing, tunnel, drainage structure, sign, guardrail, and protective structure, in connection with a highway; and (C) a portion of any interstate or international bridge or tunnel and the approaches thereto, the cost of which is assumed by a State transportation department, including such facilities as may be required by the United States Customs and Immigration Services in connection with the operation of an international bridge or tunnel. (23 USC 101)
- **Jurisdiction (1).** The legal right or power to interpret and apply the law. Authority or control. (Webster)
- **Jurisdiction (2).** The legal right to control and regulate the use of a transportation facility. Roads on National Forest lands are under the control of the Forest Service, except for public roads established under the Act of July 26, 1866, private roads, roads for which the Forest Service has granted rights-of-way to private landowners or public road agencies, and roads whose use and rights pre-date the National Forest. Other factors may affect jurisdiction on acquired lands or easements. Review the granting document and obtain appropriate legal opinion for these cases, when necessary. There are roads on the transportation system where the Forest Service has limited rights of use and no jurisdiction over the traffic, such as private road systems and State, county, or township roads. (FSH 7709.59.21)
- **Jurisdiction (3).** The legal right or authority to control, operate, regulate use of, maintain, or cause to be maintained, a transportation facility, through ownership or delegated authority. The authority to construction or maintain such a facility may be derived from fee title, easement, written authorization, or permit from a Federal agency, or some similar method. (23 CFR 660.103)

- **Local Road (1).** A road that primarily provides access to land adjacent to collector roads over relatively short distances at low speeds. (AASHTO, 2001, A Policy on Geometric Design of Highways and Streets)
- **Local Road (2).** A forest road that connects terminal facilities with forest collector, forest arterial or public highways. Usually forest local roads are single purpose transportation facilities. (FSH 7709.54, no longer in print)
- **Low-Volume Road.** A road that has an average daily traffic of 400 or less. (AASHTO, 2001, Guidelines for Geometric Design of Very Low-Volume Local Roads)
- **Maintenance (1).** The preservation of the entire highway, including surface, shoulders, roadsides, structures and such traffic-control devices as are necessary for its safe and efficient utilization. (23 USC 101)
- **Maintenance (2).** The upkeep of the entire forest transportation facility including surface and shoulders, parking and side areas, structures, and such traffic-control devices as are necessary for its safe and efficient utilization. (36 CFR 212.1)
- **Maintenance (3).** The act of keeping fixed assets in acceptable condition. It includes preventive maintenance normal repairs; replacement of parts and structural components, and other activities needed to preserve a fixed asset so that it continues to provide acceptable service and achieves its expected life. Maintenance excludes activities aimed at expanding the capacity of an asset or otherwise upgrading it to serve needs different from, or significantly greater than those originally intended. Maintenance includes work needed to meet laws, regulations, codes, and other legal direction as long as the original intent or purpose of the fixed asset is not changed. (Financial Health - Common Definitions for Maintenance and Construction Terms, July 22, 1998)
- **Maintenance Levels.** Defines the level of service provided by, and maintenance required for, a specific road, consistent with road management objectives and maintenance criteria. (FSH 7709.58, 12.3)
 - o **Maintenance Level 1.** Assigned to intermittent service roads during the time they are closed to vehicular traffic. The closure period must exceed 1 year. Basic custodial maintenance is performed to keep damage to adjacent resource to an acceptable level and to perpetuate the road to facilitate future management activities. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level. Appropriate traffic management strategies are "prohibit" and "eliminate". Roads receiving level 1 maintenance may be of any type, class or construction standard, and may be managed at any other maintenance level during the time they are open for traffic. However, while being maintained at level 1, they are closed to vehicular traffic, but may be open and suitable for non-motorized uses. (FSH 7709.58, 12.3)
 - o **Maintenance Level 2.** Assigned to roads open for use by high clearance vehicles. Passenger car traffic is not a consideration. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or other specialized uses. Log haul may occur at this level. Appropriate traffic management strategies are either to (1) discourage or prohibit passenger cars or (2) accept or discourage high clearance vehicles. (FSH 7709.58, 12.3)
 - o **Maintenance Level 3.** Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities. Roads in this maintenance level are typically low speed, single lane with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed material. Appropriate traffic management strategies are either "encourage" or "accept." "Discourage" or "prohibit" strategies may be employed for certain classes of vehicles or users. (FSH 7709.58, 12.3)
 - o **Maintenance Level 4.** Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and aggregate surfaced. However, some roads may be single lane. Some roads may be paved and/or dust abated. The most

- appropriate traffic management strategy is "encourage." However, the "prohibit" strategy may apply to specific classes of vehicles or users at certain times. (FSH 7709.58, 12.3)
- o **Maintenance Level 5.** Assigned to roads that provide a high degree of user comfort and convenience. These roads are normally double-lane, paved facilities. Some may be aggregate surfaced and dust abated. The appropriate traffic management strategy is "encourage." (FSH 7709.58, 12.3)
 - **Moderate Scenic Integrity.** Landscapes where the valued physical, biological and cultural features appear slightly altered. Noticeable deviations remain visually subordinate to the landscape character being viewed.
 - **Motor Vehicle.** Any vehicle which is self-propelled, other than:
 - A vehicle operated on rails; and
 - Any wheelchair or mobility device, including one that is battery-powered, that is designed solely for use by a mobility-impaired person for locomotion, and that is suitable for use in an indoor pedestrian area. (36 CFR 212.1, 36 CFR 261.2)
 - **Motor Vehicle Use Map.** A map reflecting designated roads, trails, and areas on an administrative unit or a Ranger District of the National Forest System. (36 CFR 212.1)
 - **Motorized Equipment (1).** Any machine activated by a nonliving power source except small battery-powered hand-carried devices such as flashlights, shavers, Geiger counters, and cameras. (36 CFR 261.2)
 - **Motorized Equipment (2).** Machines that use a motor, engine, or other nonliving power sources. This includes, but is not limited to, such machines as chain saws, aircraft, snowmobiles, generators, motorboats, and motor vehicles. It does not include small battery or gas powered hand-carried devices such as shavers, wristwatches, flashlights, cameras, stoves, or other similar small equipment. (FSM 2320.5)
 - **National Forest System.** As defined in the Forest Rangeland Renewable Resources Planning Act, the "National Forest System" includes all National Forest lands reserved or withdrawn from the public domain of the United States, all National Forest lands acquired through purchase, exchange, donation, or other means, the National Grasslands and land utilization projects administered under title III of the Bankhead-Jones Farm Tenant Act (50 Stat. 525, 7 U.S.C. 1010-1012), and other lands, waters or interests therein which are administered by the Forest Service or are designated for administration through the Forest Service as a part of the system. (36 CFR 212.1)
 - **National Forest System Land.** All lands, waters, or interests therein administered by the Forest Service. (36 CFR 251.51)
 - **National Forest System Road.** A forest road other than a road which has been authorized by a legally documented right-of-way held by a State, county or other local public road authority. (36 CFR 212.1, 36 CFR 251.51, 36 CFR 261.2)
 - **National Forest System Trail.** A forest trail other than a trail which has been authorized by a legally documented right-of-way held by a State, county or other local public road authority. (36 CFR 212.1)
 - **Obliteration (1).** To eliminate completely so as to leave no trace. (Webster)
 - **Obliteration (2).** The reclamation and or restoration of land to resource production from that of a transportation facility. (FSH 7709.54, no longer in print)
 - **Off-Highway Vehicle (1).** Any motorized vehicle designed for or capable of cross county travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other natural terrain. (36 CFR 212.1)
 - **Off-Highway Vehicle (2).** Any motorized vehicle designed for or capable of cross county travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other natural terrain; except that term excludes (A) any registered motorboat, (B) any fire, military, emergency or law enforcement vehicle when used for emergency purposes, and any combat or combat support vehicle when used for national defense purposes, and (C) any vehicle whose use is expressly authorized by

the respective agency head under a permit, lease, license, or contract. (EO 116-44 as amended by EO 11989). See also FSM 2355.01 - Exhibit 01.

- **Off road Vehicle.** Synonymous with off-highway vehicle. (FSM 7709.55 34)
- **Open to Public Travel (1).** The road section is available, except during scheduled periods, extreme weather or emergency conditions, passable by four-wheel standard passenger cars, and open to the general public for use without restrictive gates, prohibitive signs, or regulation other than restrictions based on size, weight, or class of registration. Toll plazas of public toll roads are not considered restrictive gates. (23 CFR 460.2)
- **Open to Public Travel (2).** Except during scheduled periods, extreme weather conditions, or emergencies, open to the general public for use with a standard passenger auto, without restrictive gates or prohibitive signs or regulations, other than for general traffic control or restrictions based on size, weight, or class of registration. (23 CFR 660.103)
- **Operating Costs for Traffic Monitoring, Management, and Control.** Includes labor costs, administrative costs, costs of utilities and rent, and others costs associated with the continuous operation of traffic control, such as integrated traffic control systems, incident management programs, and traffic control centers. (23 USC 101)
- **Operating Speed.** The speed at which drivers are observed operating their vehicles during free-flow conditions. (AASHTO, 2001, A Policy on Geometric Design of Highways and Streets)
- **Passenger Cars.** These include passenger cars of all sizes, sport/utility vehicles, minivans, vans and pickup trucks. (AASHTO, 2001, A Policy on Geometric Design of Highways and Streets)
- **Permit.** A special use authorization which provides permission, without conveying an interest in land, to occupy and use National Forest System land or facilities for specified purposes, and which is both revocable and terminable. (36 CFR 251.51)
- **Private Road.** A road under private ownership authorized by easement to a private party, or a road which provides access pursuant to a reserved or private right. (FS-643, Roads Analysis; Informing Decisions About Managing the National Forest Transportation System, August 1999.)
- **Public Agency.** Any organization with administrative or functional responsibilities which are directly or indirectly affiliated with a governmental body of any nation, State, or local jurisdiction. (23 CFR 635.102)
- **Public Authority.** A Federal, State, county, town or township, Indian tribe, municipal or other local government or instrumentality thereof, with authority to finance, build, operate or maintain toll or toll-free highway facilities. (23 CFR 460.2)
- **Public Lands Highway.** A forest road under the jurisdiction of and maintained by a public authority and open to public travel or any highway through unappropriated or unreserved public lands, nontaxable Indian lands, or other Federal reservations under the jurisdiction of and maintained by a public authority and open to public travel. (23 USC 101)
- **Public Road.** Any road or street under the jurisdiction of and maintained by a public authority and open to public travel. (23 USC 101)
- **Reconstruction.** To construct again. (Webster)
- **Recreational Vehicle.** These include motor homes, cars with camper trailers, cars with boat trailers, motor homes with boat trailers and motor homes pulling cars. (AASHTO, 2001, A Policy on Geometric Design of Highways and Streets)
- **Rehabilitation (1).** Minor reconstruction. Non-standard highway-related operation and maintenance activities to provide minor upgrades to a highway. (23 CFR 625)
- **Rehabilitation (2).** Renovation or restoration of an existing fixed asset or any of its components in order to restore the functionality or life of the asset. Because there is no significant expansion or change of purpose for the fixed asset, the work primarily addresses deferred maintenance. (Financial Health - Common Definitions for Maintenance and Construction Terms, July 22, 1998)
- **Repair.** Work to restore a damaged, broken, or worn-out fixed asset, component, or item of equipment to normal operating condition. Repairs may be done as annual maintenance or deferred

maintenance activities. (Financial Health - Common Definitions for Maintenance and Construction Terms, July 22, 1998)

- **Replacement.** Substitution or exchange of an existing fixed asset or component with one having essentially the same capacity and purpose. (Financial Health - Common Definitions for Maintenance and Construction Terms, July 22, 1998)
- **Restoration.** To bring back to an original state. (Webster)
- **Right-of-Way (1).** Land authorized to be used or occupied for the construction, operation, maintenance and termination of a project or facility passing over, upon, under or through such land. (36 CFR 251.51)
- **Right-of-Way (2).** A privilege or right to cross over or use the land of another party for egress and ingress such as roads, pipelines, irrigation canals, or ditches. The right-of-way may be conveyed by an easement, permit, license, or other instrument. (FSM 5460.5)
- **Road (1).** A motor vehicle route over 50 inches wide, unless identified and managed as a trail. (36 CFR 212.1)
- **Road (2).** A general term denoting a facility for purposes of travel by vehicles greater than 50 inches width. Includes only the area occupied by the road surface and cut and fill slopes. (FSM 2355.05)
- **Road Construction or Reconstruction.** Supervising, inspecting, actual building, and incurrence of all costs incidental to the construction or reconstruction of a road. (36 CFR 212.1)
- **Road Decommissioning.** Activities that result in the stabilization and restoration of unneeded roads to a more natural state. (36 CFR 212.1)
- **Road Maintenance.** The ongoing upkeep of a road necessary to retain or restore the road to the approved road management objective. (FSM 7705)
- **Road Management Objectives.** Defines the intended purpose of an individual road based on management area direction and access management objectives. Road management objectives contain design criteria, operation criteria, and maintenance criteria. (FSH 7709.55, 33)
- **Roadway.** The portion of a highway, including shoulders and auxiliary lanes, for vehicular use. (AASHTO, 2001, A Policy on Geometric Design of Highways and Streets)
- **Routine Maintenance.** Work that is planned to be accomplished on a continuing basis, generally annually or more frequently. (FSH 7709.58, 13.41)
- **Other than Routine Maintenance.** Work that can be deferred without loss of road serviceability, until such time that the work can be economically or efficiently performed. The frequency of such work is generally longer than a year. (FSH 7709.58, 13.41)
- **Service Life.** The length of time that a facility is expected to provide a specified service. (FSH 7709.56b, 05)
- **Special Use Authorization.** A permit, term permit, lease, or easement which allows occupancy, use, rights, or privileges of National Forest System land. (36 CFR 251.51)
- **Subject to the Highway Safety Act (HSA).** 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. (FSM 7705)
- **Trail.** A route 50 inches or less in width or a route over 50 inches wide that is identified and managed as a trail. (36 CFR 212.1)
- **Trailhead.** The transfer point between a trail and a road, lake, or airfield. The area may have developments that facilitate the transfer from one transportation mode to another. (FSM 2353.05)
- **Trail Vehicle.** Vehicle designed for trail use, such as bicycles, snowmobiles, trail bikes, trail scooters, and all-terrain vehicles. (FSM 2353.05)
- **Travel Management atlas.** An atlas that consists of a forest transportation atlas and a motor vehicle use map or maps. (36 CFR 212.1)

- **Travel Route.** A road, river or trail, that is open for use by members of the general public. (36 CFR 292.21)
- **Unauthorized Road or Trail.** A road or trail that is not a forest road or trail or a temporary road or trail and that is not included in a forest transportation atlas. (36 CFR 212.1)
Unauthorized roads are categorized into two types and recorded in the SYSTEM linear event in the Infra Travel Routes database. The two types are:
 - ✓ **Undetermined.** Roads where long term purpose and need has yet to be determined, and
 - ✓ **Not Needed.** Roads not needed for long-term management of national forest resources as determined through an appropriate planning document. (Travel Routes National Data Dictionary for Roads)
- **Vehicle.** Any device in, upon, or by which any person or property is or may be transported, including any frame, chassis, or body of any motor vehicle, except devices used exclusively upon stationary rails or tracks. (36 CFR 261.2)
- **Wheelchair.** A device designated solely for use by a mobility impaired person for locomotion that is suitable for use in an indoor pedestrian area. (36 CFR 212.1, FSM 2352.05)
- **Wet Weather Road System.** A system of roads, trails, and areas that are open for motor vehicle use to provide limited access to NFS lands when emergency travel restrictions are in place
- **Wet Weather Roads Policy.** Emergency travel restrictions, implemented at the discretion of the Forest Supervisor or District Ranger, based on soil moisture conditions and the potential for road and resource damage. The policy is implemented through the issuance of an official Order describing the conditions, prohibitions and exemptions to the Order. An Exhibit (map) that clearly depicts those roads, trails, and areas that are open for motor vehicle use is included with the Order.

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Resource Specialists Reports:

- Kaibab National Forest – North Kaibab Ranger District, Travel Management Project Environmental Assessment, *Final Soils, Watershed, and Air Quality Specialist Report*, Kit MacDonald, August 06, 2012.
- NKRD *Travel Management Project Recreation and Scenic Resources Report*, Prepared by Charlotte Minor, Forest Landscape Architect, and Kevin Larkin, Recreation Staff. Reviewed and Finalized by Wade Christy, Lands and Recreation Staff. August 6, 2012.
- North Kaibab Ranger District Travel Management Plan, Social and Economic Environment – Resource Report*, Prepared by Charlotte Minor, Forest Landscape Architect. Reviewed and Finalized by Wade Christy, Lands and Recreation Staff. August 6, 2012.
- Final Report - Travel Management Rule Environmental Analysis, Cultural Resources Specialist Report, Connie Reid, Archeologist. August 1, 2012.
- Wildlife Report, Travel Management Report, Kaibab National Forest – North Kaibab Ranger District, Angela Gatto, District Wildlife Biologist, July 31, 2012.
- Note: (References listed in each specialist report are hereby incorporated into the EA; See each Specialist report for complete listing).**

Appendix 1 – Proposed Forest Plan Amendment

Kaibab National Forest Land Management Plan (Forest Plan) Amendment

Since the 1988 Forest Plan (as amended) permits cross country travel in most areas of the North Kaibab Ranger District (NKRK), and does not incorporate the Motor Vehicle Use Map (MVUM) as the enforcement tool for motorized travel designation, the plan would be amended to implement the MVUM provisions of the Travel Management Rule (TMR) for the NKRK.

To provide for consistency between the Forest Plan and the TMR, the following amendments are to be made:

Add the following Forest-wide Standard on page 34-1 of the Forest Plan (to be listed just above Other Forest-wide Guidelines):

7. Motor vehicle use off the designated system is prohibited on the North Kaibab Ranger District (NKRK), except as identified on the NKRK Motor Vehicle Use Map (MVUM).

The following direction regarding off-highway vehicle use would be corrected in the Forest Plan. This does not constitute a major or significant Forest Plan amendment because the intent of the Forest Plan direction is not being changed.

Change the following table on page 11 of the Forest Plan:

Table 7. Acres Closed to Off-Highway Vehicle Use.*		
	This Plan (as amended)	Previous Plan
Acres Closed	1,565,734	11,392
* These figures do not include acres of classified wilderness also closed to OHV use or significant landforms on the Forest effectively closed because of rough terrain.		

Appendix 2 – Projects Considered in Cumulative Effects

Kaibab National Forest, North Kaibab Ranger District

(Past, Present, and Reasonably Foreseeable Actions Considered in Specialist Reports)

The following is a partial listing of actions considered in the cumulative effects analysis for this project:

- Activities such as vegetation management, fuels management, livestock grazing, recreational activities, and other management activities (e.g. noxious weeds treatments) have occurred in the past, are occurring, and are reasonably foreseeable actions on the district. These activities could occur on private lands as well.
- Fuelwood cutting has occurred in the past and would continue in the foreseeable future on the district.
- Private landowners may harvest timber on their lands for lumber or to reduce fire hazards.
- Urban development and interface growth will continue on private lands.
- Management of designated wildernesses (Kanab Creek and Saddle Mountain Wildernesses) would continue.
- Road construction and maintenance and right-of-way brushing can be expected to continue on non-National Forest System land. Road construction, reconstruction, and decommissioning are expected to continue to move towards Forest Plan desired conditions.
- Road realignment, reconstruction, or decommissioning may occur with future vegetation management projects.
- Recreation activities are expected to continue to increase on the Forest. Future recreation projects may be developed.
- Historic and ongoing mining activities will continue.
- Adjacent National Forest System Lands have been and will continue to be managed to meet the multiple-use goals and objectives established in their Forest Plans.

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Following is a partial listing of projects considered in the cumulative effects analysis for this project:

Item	Project Name	Project Type and year	Acres	Project Description	Current Condition	Desired Condition	Effects
A	Multiple timber sales	Even-aged shelterwood and seed tree harvests 1987—1992	5,909	Multiple timber sales using even-aged shelterwood cut and seed-tree cut regeneration harvest methods.	Most acres consist of high densities of VSS 1-3 with spaced individual VSS 5/6 seed trees	Uneven-aged stands with openings and ground cover	Currently two story stand that needs thinning to create uneven-age structure
B	Willis Salvage	Fire and blowdown Salvage logged in 1987 Trees planted in 1989	2,100	Willis fire salvage followed by blowdown salvage treatment then tree planting adjacent to the Jacob-Ryan project area.	Westerly steep areas have converted to grass/shrubs and PJ. Some pine in VSS 1-3.	Uneven-aged ponderosa pine sites	Soil effects stabilizing by time and vegetation. Some community type conversion
C	Hidden Salvage	Fire salvage 2001	464	Hidden Fire salvage in analysis area. Snag retention maintained on steep slopes. Ponderosa pine planted on salvage acres	Even-aged where planted in VSS 1&2. Heavy gamble oak regeneration with grass and shrubs. Some VSS 4-6 overstory remaining	Uneven-aged ponderosa pine sites	Soil effects stabilizing by time and vegetation
D	Warm Fire Wildland Fire Use	Wildland fire use from lightning ignition 2006	19,000	Warm Fire use area managed on the surface for resource benefits on about 20 K acres	Late seral vegetation in place	Reduction in fuel loading and increases in grass, forbs and shrubs	Most of area beneficially (90-95%) burned with some recovery
E	ADOT Highway Hazard Tree Removal	Hazard tree removal along highway right of ways 2007	300	ADOT removal of hazard and burnt trees along Highways 67 and 89A following the Warm Fire. Highway corridor experiencing a great deal of aspen regeneration.	Early seral vegetation in place. 100 foot open buffer either side of highway for visual safety	Grass/forb/shrub vegetation in the 100 foot buffer both sides of hwy.	Some pile burning and weed control remains to be completed. Corridor is much safer for public transportation
F	Forest Service Road Hazard Tree Removal	Hazard tree removal along FS roads and AZ Trail burned in Warm Fire 2009	2,000	Hazard tree removal along Forest Service roads and trails for public safety following the Warm Fire burn.	Ongoing about ½ completed with removal of dead burned trees leaving remaining green trees.	Removal of standing dead trees along FS roads	Trees removed for public safety

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Item	Project Name	Project Type and year	Acres	Project Description	Current Condition	Desired Condition	Effects
G	Fracas Wildlife Project	Wildlife habitat improvement project 2009	2,000	Habitat improvement project to thin ponderosa pine followed by under burning for area wildlife	Vegetation management ongoing	Fire adapted uneven-aged stands in ponderosa pine	Would reduce tree density, improve forest health and increase grass/forbs
H	Jacob-Ryan Vegetation Management Project	Vegetation and habitat improvement project, 2011	26,000	Thin ponderosa pine followed by under burning for ecosystem restoration	Forest out of desired stand structure, at risk for high intensity fire	Fire adapted uneven-aged stands in ponderosa pine	Would reduce tree density, improve forest health
I	Plateau Facility Fire Protection Project	Facility Fuels Reduction project on Kaibab Plateau 2011	5,081	North Kaibab Plateau facility and urban interface fuels reduction project designed to protect multiple stakeholders, their property and ensure public safety from wildfires	Most facilities in moderate to high risk from wildfire damage	Reduction in tree density, fuel loading and ladder fuel that provides defensible space	Would help protect life, property and enhance public safety
J	Warm Fire Suppression	Fire Use Project converted to suppression 2006	39,000	39K acres under Warm Fire suppression.	Early seral vegetation in place along with many standing dead burned trees (snags) and limited dozer lines.	Uneven-aged stand structure. Some in ponderosa pine but most in mixed conifer	No cumulative effects due to different forest type (mixed conifer)and fire regime
K	Warm Fire Recovery Project	Salvage timber 2010	9,000	Salvage burned timber and replant trees. Specific effects by resource	Early seral plants in place along with many standing dead burned trees(snags)	Uneven-aged, fire adapted mixed conifer stands	No cumulative effects due to different forest type (mixed conifer)and fire regime

Appendix 3 – Maps

Maps for the North Kaibab Travel Management Environmental Assessment contain too much fine detail to portray effectively on 8 ½” by 11” paper. Attached are 11 by 17 inch maps for the project record hard-copy. More detailed maps (in electronic pdf format) associated with this project are available on the Kaibab National Forest web site at www.fs.usda.gov/kaibab, or by contacting the project leader as listed on the cover of this document.

Page 138 – Alternative 1 - No Action Alternative (11 x 17 inches)

Page 139 – Alternative 2 - Proposed Action (11 x 17 inches)

Page 140 – Alternative 3 (11 x 17 inches)

Page 141 – Alternative 4 (11 x 17 inches)