United States
Department of
Agriculture
Forest
Service

December 2009

Spring Mountains National Recreation Area

Middle Kyle Complex Project

Travel Analysis

Spring Mountains National Recreation Area
Humboldt-Toiyabe National Forest
Clark County, Nevada

This Report Prepared By
TEAMS Enterprise
Forest Service Enterprise Project

Spring Mountains
Middle Kyle Complex Project
Travel Analysis
December 2009

Location:	**Clark County, Nevada**
Lead agency:	**USDA Forest Service** **Intermountain Region (R4)** **Humboldt -Toiyabe National Forest**
Responsible official:	**Stephanie Phillips, Deputy Forest Supervisor** **Spring Mountains National Recreation Area** **4701 North Torrey Pines Drive** **Las Vegas, Nevada 89130** **Phone: (702) 515-5400**
For further information:	**Hal Peterson, Civil Engineer** **Spring Mountains National Recreation Area** **4701 North Torrey Pines Drive** **Las Vegas, Nevada 89130** **Phone: (702) 515-5400**

Reviewed by:

/s/ Al Yoshida ***12/16/09***

Al Yoshida **Date**
Civil Engineer

Recommended by:

/s/ Hal Peterson ***12/16/09***

Hal Peterson **Date**
Middle Kyle Complex Project Manager

Recommended by:

/s/ Kevin Wilmot ***12/16/09***

Kevin Wilmot **Date**
Forest Engineer

Approved by:

/s/ Stephanie Phillips ***12/21/09***

Stephanie Phillips, **Date**
Deputy Forest Supervisor

TABLE OF CONTENTS

TABLE OF TABLES

TABLE OF FIGURES

LIST OF MAPS

CHAPTER 1: SETTING UP THE ANALYSIS

Background and Purpose

The Spring Mountains National Recreation Area was established in 1993 by a special act of Congress (Public Law 103-63) and is an administrative unit of the Humboldt-Toiyabe National Forest. On January 12, 2001, the Forest Service published its final administrative transportation system policy in the Federal Register (Vol. 66, No.9). Decisions to decommission, reconstruct, construct, and maintain roads are to be informed by a science-based roads analysis. On November 2, 2005, the Forest Service released their final travel management rule (36 CFR parts 212, 251, 262, and 295). This regulation governs the use of motor vehicles, including off-highway vehicles, on National Forest System lands. One of the purposes of these policies and rules is to ensure travel analysis is carried out for Forest roads and trails. Travel analysis provides the information needed to ensure the forest transportation system will:

- provide safe access and meets the needs of communities and forest users;
- facilitate the implementation of the Toiyabe National Forest Land and Resource Management Plan (Forest Plan);
- allow for economical and efficient management within likely budget levels; meeting current and future resource management objectives;
- begin to reverse adverse ecological impacts, to the extent practicable.

Travel management in the Forest Service was traditionally split between Engineering for road management and Recreation for trails management. The recently revised regulation now combines the analysis of roads and trails and under the travel analysis process (TAP). The final travel management rule requires each administrative unit (national forest, national grassland, etc.) or ranger district to designate those National Forest System (NFS) roads, NFS trails, and areas on NFS lands that are open to motor vehicle use by class of vehicle and, if appropriate, by time of year (36 CFR 212.51). The key concept underlying the TAP approach is to focus on changes to:

- The forest transportation system; or
- Restrictions and prohibitions on motor vehicle use.

The Travel Analysis requirements are, described in *FSM 7700 Travel Management; FSM 7710 (Travel Planning); FSM 7730 (Road Operations); FSM 2350 (Trails); FSH 7709.55 (Travel Analysis); FSH 7709.59 (Road Operations); FSH 2309.18 (Trail Operations).*

Process

Travel analysis is a six-step process. The steps are designed to be sequential, with understanding that the process may require feedback among steps over time as an analysis matures. The amount of time and effort spent on each step differs by project, based on specific situations and available information. The process provides a set of possible issues and analysis questions for which the answers can inform choices about road and trail system management. Decision makers and analysts determine the relevance of each question, incorporating public participation as deemed necessary. The steps in the process are:

- Step 1. Setting up the Analysis
- Step 2. Describing the Situation
- Step 3. Identifying Issues

- Step 4. Assessing Benefits, Problems and Risks
- Step 5. Describing Opportunities and Setting Priorities
- Step 6. Reporting

Products

The product of this analysis is a report for decision makers and the public that documents the information and analyses to be used to identify opportunities and set priorities for future NFS roads and trails. Included in the report is a map displaying the known road and trail systems for the analysis area, and the needs and opportunities for each road/trail, or segment of road/trail.

This Report

This report was completed during the development of the Middle Kyle Complex Environmental Impact Statement (EIS). It documents the travel analysis procedure used for the Middle Kyle Complex Travel Analysis Area and presents findings from the analysis. The EIS addresses many of the issues identified in this analysis and this report provides an analysis of the proposals in the EIS relative to the transportation system in Appendix C. This report is a "living" document, however, and it reflects the conditions of the analysis area at the time of writing. Thus, the document can be updated as the need arises and conditions warrant. This report provides recommendations only and is not a decision document.

This report will:

- Identify needed and unneeded roads and trails;
- Identify road/trail associated environmental and public safety risks;
- Identify site-specific priorities and opportunities for road and trail improvements and decommissioning;
- Identify areas of special sensitivity or any unique resource values; and
- Provide other specific information that may be needed to support project-level decisions.

Project Scope and Objectives

The Spring Mountains National Recreation Area (SMNRA) covers 315,648 acres of NFS land in Clark and Nye counties in Southern Nevada, between Las Vegas and Pahrump. The SMNRA is one of five districts of the Toiyabe National Forest, and was designated a National Recreation Area in August, 1993.

The Middle Kyle Complex Analysis Area (Middle Kyle area) is located in the eastern half of the SMNRA, approximately 45 minutes northwest of Las Vegas. The analysis area is located along the Kyle Canyon Road (SR 157), extends just east and west of Deer Creek Road (SR 158), and west of the boundary between the SMNRA and the Red Rock Canyon National Conservation Area, within Clark County. See Overview Maps 1-4. The Middle Kyle area is approximately 4,300 acres in size, with the majority of land in Forest Service ownership, and isolated small pockets of private land inholdings. Vegetation in the Middle Kyle area is dominated in the lower elevations by desert plants such as sagebrush and Joshua trees, and in the higher elevations by piñyon /juniper forest. The area also provides a variety of recreation opportunities for visitors and area residents. The Middle Kyle area is within Management Area (MA) 11, the Developed Canyons MA. Further description of the Management Area can be found below.

The close proximity of Kyle Canyon to Las Vegas makes it one of the most accessible and visited recreation areas in the SMNRA. Kyle and Lee Canyons' developed campgrounds, picnic areas and trails are the preferred destination for the majority of SMNRA visitors, which consist of approximately two million Las Vegas residents and tourists each year. Many of these visitors are seeking to escape summer heat and enjoy the winter recreation opportunities offered by the Spring Mountains' elevation. Visitation

is currently concentrated in the upper canyons, and use levels are putting stress on the upper canyon's sensitive ecological areas. Because facilities in the upper canyons cannot be expanded, the SMNRA must find another location in which to place new facilities that can help meet a growing recreation demand, while also protecting and conserving the upper canyon's sensitive resources.

All existing system roads and trails within this area were reviewed for this analysis. There are also non-system trails and roads evident in the Middle Kyle area, and as many of these roads and trails as possible were included in this analysis. Although a complete unauthorized road and trail inventory was not considered necessary or feasible, an analysis using aerial photography and field reviews was conducted in February 2007 to capture many of these roads and trails. State and County roads are also included in the analysis area, and road jurisdictions can be found in Table 1. Opportunities regarding the future use of analysis area roads and trails are stated in accordance with Forest objectives.

The focus of the analysis is limited to the Middle Kyle analysis area, with adjustments made to include some nearby roads and trails. This analysis area was chosen for the following reasons:

- A forest scale roads analysis of the primary transportation routes has been completed for the Humboldt Toiyabe National Forest; however, it did not include lower level Forest roads, unauthorized roads, or any trails as part of its analysis.
- This travel analysis is driven by a need to analyze management alternatives at the project scale and make recommendations for the minimum transportation system needed for the Middle Kyle Complex Project area.

The main objectives of this travel analysis are:

- Identify the need for changes by comparing the current road and trail system to the desired condition;
- Balance the need for access with the need to minimize risks by examining important ecological, social, and economic issues related to roads and trails;
- Furnish maps, tables, and narratives that display transportation management opportunities and strategies that address future access needs, and environmental concerns.
- Make recommendations to inform travel management decisions in subsequent NEPA documents.

Management Area Direction

The General Management Plan (GMP) for the Spring Mountains National Recreation Area, an Amendment to the Land and Resource Management Plan, Toiyabe National Forest was completed in 1996. The analysis area is located within Management Area 11, the Developed Canyons MA, established by the Toiyabe Forest Plan. The Forest Plan provides management direction for the roads and trails in this area. The Forest Plan direction for MA 11 (Pp. IV-142 and 143) is summarized as follows:

In Management Area 11, new development in upper Kyle and Lee Canyons is limited, with an emphasis on distributing use and facilities to other areas of the SMNRA, including the lower canyons. A higher emphasis is placed on protection of native species, ecological processes, and heritage resources, incorporating these considerations into the management of recreation areas. Developed sites should be enhanced where feasible to restore resource or wildlife values where recreation use has adversely affected resources. Fire management and vegetation treatments to reduce fire spread are also stressed. The area is also managed to provide a variety of high quality, public recreational activities, and to maintain high levels of scenic quality, with an emphasis on views from major roads and use areas. Traffic congestion on major roads is to be minimized, and the capability to monitor and manage visitor traffic within Kyle and Lee Canyons increased.

Management direction for MA 11 includes the following objectives which are relevant to the existing transportation system in the analysis area. These objectives include:

- Minimize traffic congestion on major roads within Kyle and Lee Canyons, in cooperation with federal, state, local agencies, local residents, and businesses.
- Increase capability to monitor and manage visitor traffic in Kyle and Lee Canyons.
- Manage the area for a variety of high quality, public recreational activities for both summer and winter, with an emphasis on those that are not available on private lands.
- Future trail alignments will emphasize public safety, resource protection, and customer satisfaction.
- Provide additional multiple use trail opportunities.
- Increase accessibility of trailheads at appropriate locations for equestrians.

Further management direction pertaining to travel management comes from the Guidelines for Engineering Analysis of Motorized Mixed Use on National Forest System Roads, EM-7700-30, December 2005. These guidelines state that the starting point for decisions regarding designating Forest Service roads for use by both highway-legal and non-highway-legal vehicles should be state traffic law. Nevada traffic law generally prohibits non-highway-legal vehicle operation on paved highways and generally allows non-highway-legal vehicles, such as all-terrain vehicles, on all other roads. Management direction also includes the SMNRA Motor Vehicle Use Map, latest edition, and the SMNRA 2004 Motorized Trail Designation Project.

Management direction for existing roads and trails in the analysis area also comes from the Conservation Agreement (CA) for the SMNRA, which establishes guidelines for protecting the ecologically-sensitive species in the area, providing long-term protection for 57 species of concern.

Road Maintenance Level Descriptions

(FSH 7709.58). See Appendices for additional travel management definitions and trail construction / maintenance descriptions.

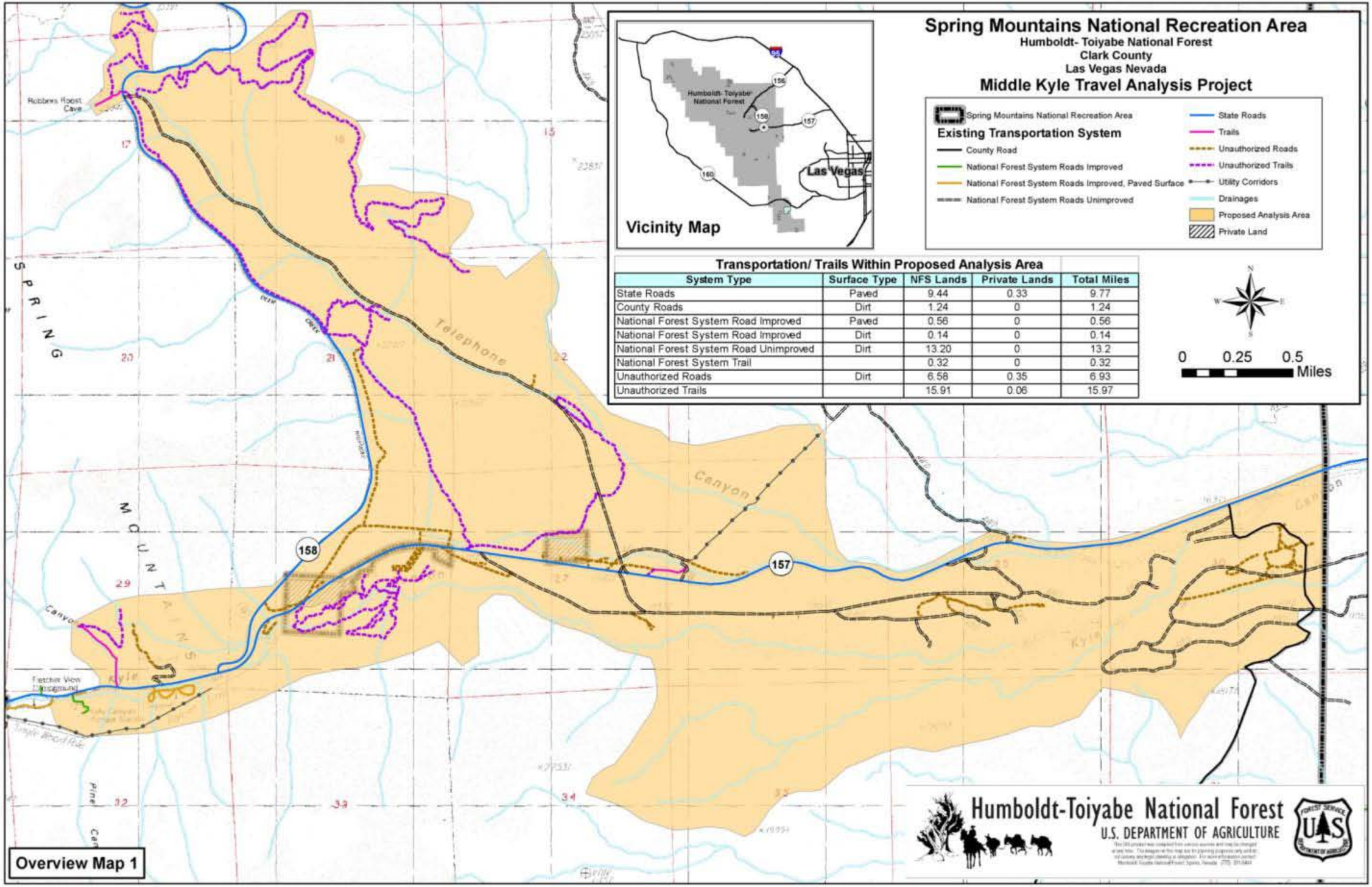
Maintenance Level 1
Assigned to intermittent service roads during the time they are closed to vehicular traffic. The closure period must exceed 1 year. Basic custodial maintenance is performed to keep damage to adjacent resources to an acceptable level and to perpetuate the road to facilitate future 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 nonmotorized uses.

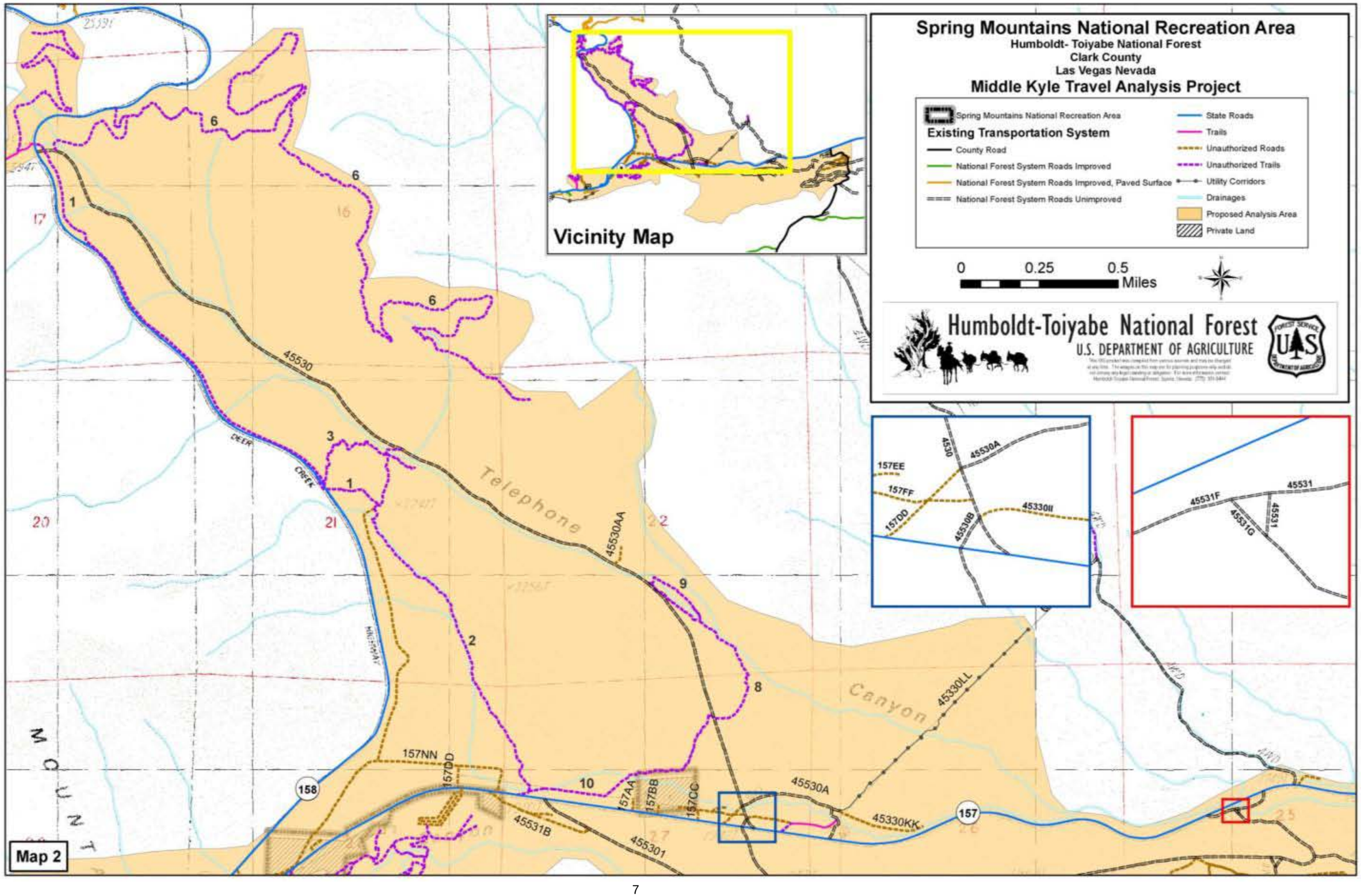
Maintenance Level 2
Assigned to roads open for use by high clearance vehicles. Passenger car traffic is not a consideration. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or other specialized uses. Log haul may occur at this level. Appropriate traffic management strategies are either to (1) discourage or prohibit passenger cars or (2) accept or discourage high clearance vehicles.

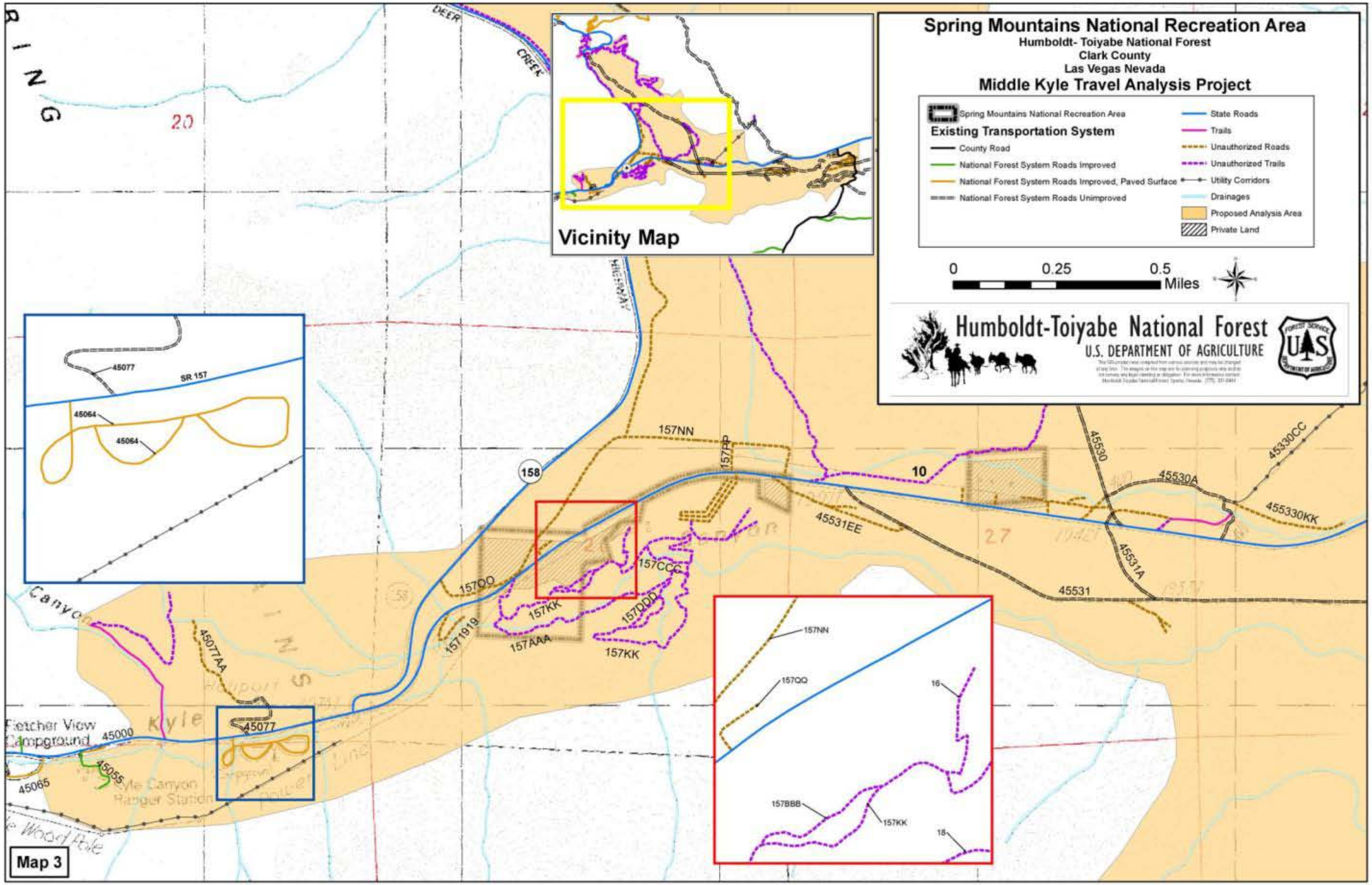
Maintenance Level 3
Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities. Roads in this maintenance level are typically low speed, single lane with turnouts and spot surfacing. Some roads may be fully 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.

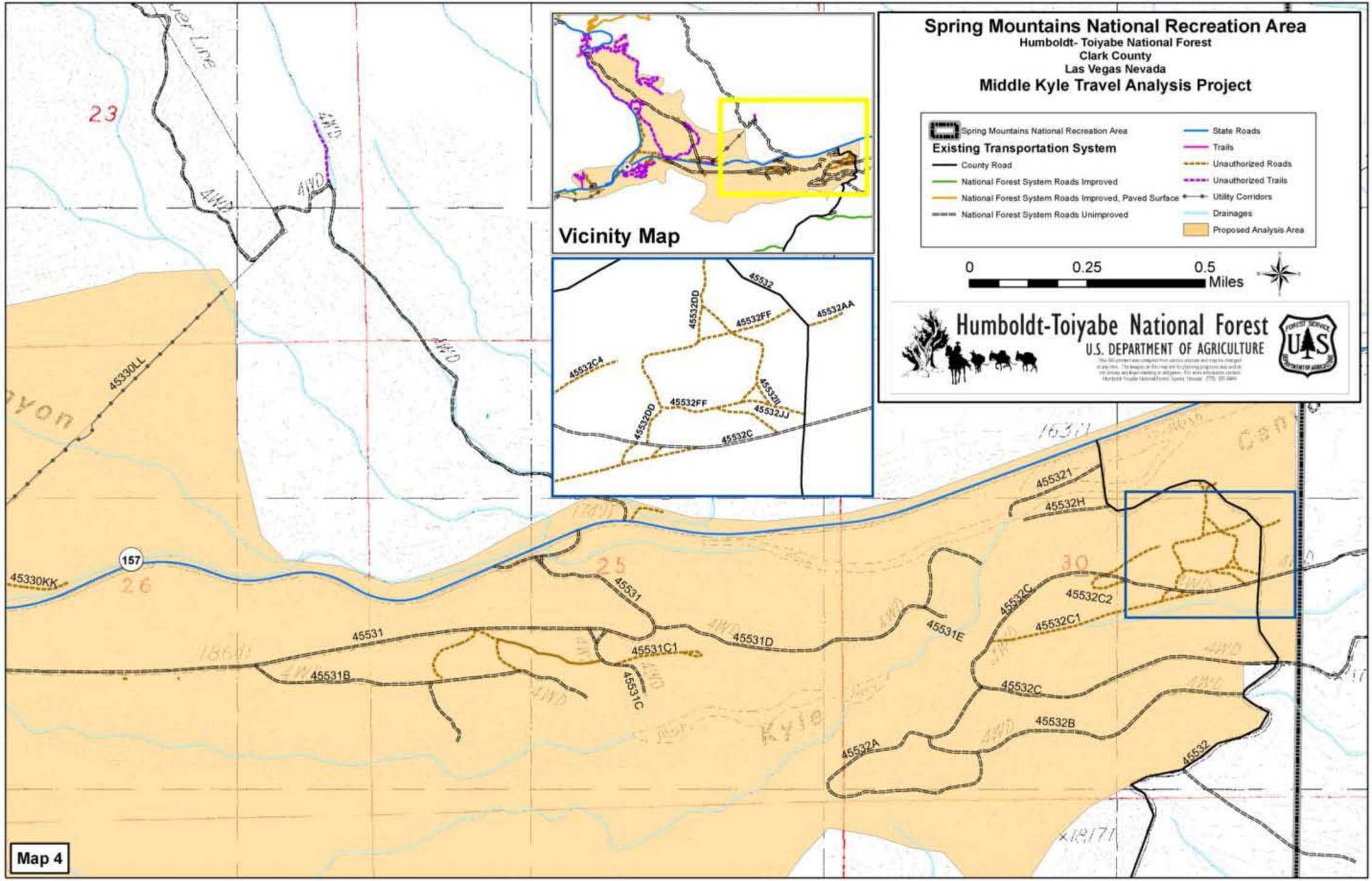
Maintenance Level 4
Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and aggregate surfaced. However, some roads may be single lane. Some roads may be paved and/or dust abated. The most appropriate traffic management strategy is "encourage." However, the "prohibit" strategy may apply to specific classes of vehicles or users at certain times.

Maintenance Level 5
Assigned to roads that provide a high degree of user comfort and convenience. These roads are normally double lane, paved facilities. Some may be aggregate surfaced and dust abated. The appropriate traffic management strategy is "encourage."


Spring Mountains National Recreation Area
Humboldt- Toiyabe National Forest
Clark County
Las Vegas Nevada
Middle Kyle Travel Analysis Project
Vicinity Map
Humboldt- Toiyabe National Forest
Las Vegas
Spring Mountains National Recreation Area
Existing Transportation System
County Road
National Forest System Roads Improved
National Forest System Roads Improved, Paved Surface
National Forest System Roads Unimproved
State Roads
Trails
Unauthorized Roads
Unauthorized Trails
Utility Corridors
Drainages
Proposed Analysis Area
Private Land
Transportation/ Trails Within Proposed Analysis Area
System Type | Surface Type | NFS Lands | Private Lands | Total Miles
State Roads | Paved | 9.44 | 0.33 | 9.77
County Roads | Dirt | 1.24 | 0 | 1.24
National Forest System Road Improved | Paved | 0.56 | 0 | 0.56
National Forest System Road Improved | Dirt | 0.14 | 0 | 0.14
National Forest System Road Unimproved | Dirt | 13.20 | 0 | 13.2
National Forest System Trail | | 0.32 | 0 | 0.32
Unauthorized Roads | Dirt | 6.58 | 0.35 | 6.93
Unauthorized Trails | | 15.91 | 0.06 | 15.97
0 0.25 0.5 Miles
Robbers Roost Cave
Telephone Canyon
Kyle Canyon
Fletcher View Campground
158
157
160
95
156
Overview Map 1
Humboldt-Toiyabe National Forest
U.S. DEPARTMENT OF AGRICULTURE


Spring Mountains National Recreation Area
Humboldt- Toiyabe National Forest
Clark County
Las Vegas Nevada
Middle Kyle Travel Analysis Project
Spring Mountains National Recreation Area
Existing Transportation System
County Road
National Forest System Roads Improved
National Forest System Roads Improved, Paved Surface
National Forest System Roads Unimproved
State Roads
Trails
Unauthorized Roads
Unauthorized Trails
Utility Corridors
Drainages
Proposed Analysis Area
Private Land
0 0.25 0.5 Miles
Humboldt-Toiyabe National Forest
U.S. DEPARTMENT OF AGRICULTURE
Vicinity Map
Map 2
Telephone Canyon
DEER CREEK
45530
45530AA
45530A
45330LL
45330KK
45330II
45330B
45531B
45531
45531F
45531G
45530A
157EE
157FF
157DD
157NN
157AA
157BB
157CC
45301
158
157


Spring Mountains National Recreation Area
Humboldt- Toiyabe National Forest
Clark County
Las Vegas Nevada
Middle Kyle Travel Analysis Project
Spring Mountains National Recreation Area
Existing Transportation System
County Road
National Forest System Roads Improved
National Forest System Roads Improved, Paved Surface
National Forest System Roads Unimproved
State Roads
Trails
Unauthorized Roads
Unauthorized Trails
Utility Corridors
Drainages
Proposed Analysis Area
Private Land
0 0.25 0.5 Miles
Humboldt-Toiyabe National Forest
U.S. DEPARTMENT OF AGRICULTURE
Vicinity Map
Map 3
45077
SR 157
45064
45064
158
157NN
157PP
10
45530
45530A
45330CC
455330KK
45531EE
45531A
45531
157CCC
157OO
157KK
157DDD
157AAA
157KK
1571919
45077AA
45077
45000
45055
45065
Fletcher View Campground
Kyle Canyon Ranger Station
157NN
157QQ
16
157BBB
157KK
18


Spring Mountains National Recreation Area
Humboldt- Toiyabe National Forest
Clark County
Las Vegas Nevada
Middle Kyle Travel Analysis Project
Spring Mountains National Recreation Area
Existing Transportation System
County Road
National Forest System Roads Improved
National Forest System Roads Improved, Paved Surface
National Forest System Roads Unimproved
State Roads
Trails
Unauthorized Roads
Unauthorized Trails
Utility Corridors
Drainages
Proposed Analysis Area
0
0.25
0.5
Miles
Humboldt-Toiyabe National Forest
U.S. DEPARTMENT OF AGRICULTURE
Vicinity Map
45532
45532DD
45532FF
45532AA
45532C4
45532II
45532JJ
45532C
45532D
45330LL
45330KK
45531
45531B
45531C
45531C1
45531D
45531E
45532H
45532C2
45532C1
45532B
45532A
157
Map 4

CHAPTER 2: DESCRIBING THE SITUATION

Existing Road and Trail System and Historic Use

Data for this travel analysis were collected from a variety of sources. Background documents used included the Humboldt-Toiyabe Roads Analysis and Toiyabe Forest Plan and the National Visitor Use Monitoring Results for Spring Mountains National Recreation Area as well as other references listed throughout the analysis. Electronic data sources used for the analysis included prior GPS road and trail mapping products as well as other existing electronic data. Data were also verified using hard copy maps and aerial photographs, as well as field reviews.

The primary focal point of National Forest road and trail system in the area is the approximately ten miles of State Highways that form southern and western axes across the analysis area. SR 157, Kyle Canyon Road, runs east-west along the southern portion of the analysis area, and SR 158, Deer Creek Road, runs north-south along the area's western boundary. In addition to these major highways, the official road network in the analysis area includes nearly two miles of improved National Forest System (NFS) roads, and Harris Springs Road, which is under county jurisdiction in the analysis area. The remainder of the NFS roads in the analysis area consists of unimproved roads such as Telephone Canyon Road, running north-south, east of SR 158, and additional shorter spur roads branching off the system. The analysis area contains only a minor amount of NFS trails, totaling less than a half mile.

In addition to the NFS roads and trails in the analysis area, the Middle Kyle transportation network includes a significant number of roads and trails that are not included in the system. When non-system roads and trails are considered, the mileage of transportation routes in the area nearly doubles. A majority of these non-system routes are unauthorized trails created by off-highway vehicle users and trail users.

The landscape of the analysis area is a transition zone between desert and forested zones in the SMNRA, and includes vegetation from several ecological zones. Much of the region surrounding the Middle Kyle analysis area is one of ecological sensitivity. For example, the Upper Kyle Canyon area is home to a concentration of plants and animals found nowhere else. Some of the Middle Kyle area is more highly developed, with disturbed landscapes and a more extensive transportation network.

Part of the cultural landscape of the analysis area is its status as a sacred site for the Southern Paiute Nation. While the entire Spring Mountain range is sacred to the Southern Paiute, there is also a site within the analysis area that is a spiritual place for tribal members. This site is a slot canyon located near the Harris Springs Road, an area with numerous unimproved roads and off-highway vehicle trails. In addition, edible and medicinal plants in the Middle Kyle landscape are valued by the Southern Paiutes, including sagebrush.

Table 1 displays the existing Forest roads and trails in the analysis area, as well as their mileage and operational maintenance level (Forest Service jurisdiction only).

Table 1 – Middle Kyle Area System Roads and Trails

Number	Name	Length, Miles[1]	Condition	OML[2]	Jurisdiction[3]
STATE ROADS					
SR 158	DEER CREEK ROAD	3.87	Improved	NA	State
SR 157	KYLE CANYON ROAD	5.91	Improved	NA	State
NATIONAL FOREST SYSTEM ROADS, IMPROVED					
45532	HARRIS SPRINGS ROAD	1.24	Improved	3	County
45055	KYLE GUARD STATION	.15	Improved, Dirt & Paved	3	FS
45064	KYLE CAMPGROUND ROAD	.66	Improved, Paved	4	FS
45065	FLETCHER VIEW CAMPGROUND ROAD	.01	Improved, Paved	4	FS
NATIONAL FOREST SYSTEM ROADS, UNIMPROVED					
45077	ERBAR ROAD	.20	Unimproved	2	FS
45530	TELEPHONE CANYON ROAD	3.34	Unimproved	2	FS
45530A	TELEPHONE CANYON LOOP ROAD	0.42	Unimproved	2	FS
45530B	TELEPHONE CANYON CONNECTOR RD.	.03	Unimproved	2	FS
45531	ERCIE ROAD	2.97	Unimproved	2	FS
45531A	CARDA ROAD	0.23	Unimproved	2	FS
45531B	EASTERLY SPUR ROAD	0.74	Unimproved	2	FS
45531C	GABI ROAD	0.21	Unimproved	2	FS
45531D	WASH ROAD	0.85	Unimproved	2	FS
45531E	WASH SPUR ROAD	0.05	Unimproved	2	FS
45531F	NEEDLEGRASS ROAD	0.11	Unimproved	2	FS
45531G	RICEGRASS ROAD	.02	Unimproved	2	FS
45531H	NEVADA NEEDLEGRASS ROAD	.04	Unimproved	2	FS
45532A	NATHER ROAD	0.95	Unimproved	2	FS
45532B	NATHERUM ROAD	0.62	Unimproved	2	FS
45532C	DUMP LOOP ROAD	1.40	Unimproved	2	FS
45532H	CRESTED WHEATGRASS ROAD	0.37	Unimproved	2	FS
45532J	BENTGRASS ROAD	0.24	Unimproved	2	FS
45577	WOODEN POLE POWER LINE ROAD	.11	Unimproved	2	FS
NATIONAL FOREST SYSTEM TRAILS					
Fletcher Canyon Trail		0.32	NA	NA	
TOTAL ANALYSIS AREA SYSTEM ROADS AND TRAILS		**25.06**			

Table 2 displays the mileage of roads and trails in the analysis area that is not part of the Humboldt-Toiyabe National Forest transportation system.

[1] Length of that portion of the road or trail that is within the analysis area.
[2] Operational Maintenance Level (OML)
[3] Jurisdiction on that portion of the road or trail that is within the analysis area.

Table 2 –Non-system Roads and Trails in the Middle Kyle Analysis Area

Type	Length, miles
Unauthorized Road	6.93
Unauthorized Trail	15.97

Table 3 displays the road density in the analysis area and in the SMNRA in its entirety, and shows the density of the transportation network within the analysis area to be significantly greater than in the larger NRA.

Table 3 –Middle Kyle Analysis Area, SMNRA Road Density

	Analysis Area	Spring Mountains NRA
System roads and trails	3.71 miles/sq. mile	.77 miles/sq. mile[4]
All roads and trails	7.2 miles/sq. mile	Data not available

[4] Non-system roads and trails could only be included in the analysis area; As miles of non-system roads and trails beyond the analysis area are unknown, the "All roads and trails in the Spring Mountains NRA" block of the table says "Data Not Available."

CHAPTER 3: IDENTIFYING ISSUES

Key Issues

In this step, the objective of the analysis is to identify key questions and issues related to management of existing roads and trails in the analysis area. These issues are derived from known issues as well as concerns identified through public meetings related to proposed activities in the project area. These issues were derived from a variety of sources, including the Middle Kyle Canyon Framework Plan (Shapins & Associates 2005), the Spring Mountains National Recreation Area Transportation Study (USDA 2005), and the Notice of Intent and Scoping letter for the Middle Kyle Complex Project (USDA 2006).

The primary road and trail related issues/comments in the Middle Kyle analysis area are as follows:

- The GMP states a desired condition to limit new development in upper Kyle and Lee Canyons while distributing use and facilities to other areas of the SMNRA, including the lower canyons which in turn results in a need to identify opportunities in the analysis area to accommodate this potential distribution.
- Off highway vehicles (OHV) using road and trail systems in SMNRA may affect the Red Rock Canyon National Conservation Area (RRCNCA) due to access from Forest Service administered lands. Under BLM's current resource management plan, RRCNCA limits off-highway use.
- Habitat conservation for the more than 57 rare and sensitive plants and animals found in the SMNRA, and management of roads and trails to minimize impact on these species
- Parking demand exceeding available parking resources, particularly on weekend and weekday evenings
- Potential inadequacy of the roaded recreation infrastructure to deal with increasing recreation pressure from the growth in the Las Vegas and Pahrump Valleys
- High volume of unauthorized roads and trails, and restoration and enforcement of closed unauthorized trails.
- Need for more multi-use loop trails.
- Air quality: the Las Vegas Valley is a "serious non-attainment" area for National Ambient Air Quality Standards; Kyle Canyon is within this area and contributes to air quality non-attainment.

CHAPTER 4: ASSESSING BENEFITS, PROBLEMS, AND RISKS

The issues described in Chapter 3 are addressed in the following assessment of benefits, problems, and risks, and will also be addressed in this Report's Recommendations. Please also reference the Humboldt-Toiyabe Forest Scale Roads Analysis, Step 4.

Ecosystem Functions and Processes (EF):

What ecological attributes, particularly those unique to the region, would be affected by roading of currently unroaded areas? (EF1)

Construction of new roads and trails in currently unaltered areas would affect habitats for endemic, sensitive, and native species. Table 4 provides general descriptions of effects.

Table 4. Generic effects (modified from Spellerberg 1998)

Effects during construction
• Direct loss of habitat and biota • Effects resulting from infrastructure and supporting activities for construction • Impacts which may occur beyond the immediate vicinity of the road/trail (e.g., altered runoff patterns and hydrology)
Short term effects (of a new road)
• The new linear surface creates a new microclimate and a change in other physical conditions extending from the road edge at varying distances • The newly created edge creates habitat for edge species • Plant mortality increases along the road edge • Some fauna will move from the area of the road as a result of habitat loss and physical disturbance
Long term effects
• Animals killed by traffic • Road kills have secondary effect as carrion • The loss of habitat and change in habitat extends beyond the edge of the road • Changes in the biological communities may extend for varying distances from the road edge • There is fragmentation of habitat and this in turn has implications for habitat damage and loss, for dispersal and vagility of organisms, and for isolations of populations

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

All movement of vehicles and some of the goods carried on those vehicles contribute to some measure to increase the introduction of exotic plant and animal species, insects, diseases, and parasites. For example, automobiles and other vehicles can carry exotic plant seeds, depositing them along travel routes. In addition, some insects can be transported by carrying unprocessed wood or outdoors items, such as lawn chairs, that may have egg cases or other life forms attached. Some diseases can also be spread through transportation of contaminated soil, such as *Phytopthora lateralis* spread among Port-Orford cedar.

At this writing, however, we know of no exotic insects or tree diseases that could have a serious impact on the tree species in the Kyle Canyon area. Domestic insects or tree diseases that could impact the tree species present can probably already be found in the Spring Mountains.

The development, use, and maintenance of roads also increases the risk of the introduction and/or spread of non-native plants and noxious weeds. Weeds are commonly associated with the displacement of native species and an increase in fire risk, loss of habitat quality for wildlife, increases in erosion, and can negatively impact occurrences of rare or endemic plants by pushing them out of the ecosystem and potentially increase their rarity listing.

Roads that are used for recreation activities pose the highest risk of introduction of weeds. These roads include ones used for camping, equestrian activities, and off road vehicle use on designated and unauthorized roads. Roads can also facilitate the introduction of exotic species through alteration of roadside habitat types. The composition of species in roadside areas is generally skewed towards a higher proportion of generalists and pioneers (e.g., cheatgrass) that can cope with the disturbances deriving from the road and its traffic (Forman et al. 1984, Mader 1984, Blair 1996, Forman et al. 2003).

Currently the area is generally weed-free with limited amounts of non-native cheatgrass present as well as some less invasive exotic plant species.

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

Road access to forested stands within Kyle Canyon facilitates the treatment of the area for potential impacts from insects, diseases, and parasites through Integrated Pest Management practices. These practices may include thinning and removal of trees. This access is especially critical in areas heavily used by the public and Forest Service personnel such as campgrounds, administrative sites, and trailheads. Un-maintained and less-traveled roads and trails are of lesser importance for this purpose, whereas maintained roads, especially in and around campgrounds and facilities are of greater importance. The current road and trail system in the Middle Kyle Canyon Complex analysis area also facilitates the application (spraying) of herbicides to control invasive plant species such as Russian knapweed.

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

The most significant natural ecological disturbance regime in the area is wildfire. The road system provides fuel breaks that limit or inhibit fire spread, provides access and locations for wildfire control activities, and provides access and control locations for the introduction of prescribed natural fire.

A strong correlation exists between roads and fires both nationally (Johnson 1963 Morrisson, et al. 2000. Wilson 1979, Yang et al., 2007) and in the analysis area (Figure 1). This correlation is demonstrated by the relatively high frequency of anthropogenic (i.e., human-caused) fire relative to fire caused by

lightning, the difficulty in controlling risk factors in roaded areas, and the tendency for fires to start near roads (Johnson 1963, McKelvey 1996). Statistics show that the occurrence of wildfires greater than 100 acres has doubled since the 1960's (Dahms and Geils 1997).

An indirect cause of increased fire risk that is associated with roads is the spread of weeds. It is well documented that weedy species are abundant in disturbed areas such as roadsides (Milburg ad Lamont, 1994; Kopecky, 1988). Increased runoff, frequent soil disturbance on and around roads, seed dispersal by cars and animals using roads as corridors, and open conditions in the cleared areas around roads account for the preponderance of weeds along roadsides. This increased richness in weedy species, combined with disrupted drainage patterns and altered microclimates in the immediate vicinity of most roads, creates a corridor of fire-susceptible vegetation along roads. According to DøAntonio & Vitousek (1992), the presence of grass weeds tends to increase the frequency and intensity of fire. This implies an increased susceptibility of vegetation to both anthropogenic and lightning-caused fires along roadsides. For instance, it is well documented that cheatgrass will increase fire frequency, out-compete native plants, and change the entire biological plant and animal community. The presence of a fine fuel type, such as cheatgrass, increases the opportunities for ignition from human-caused sources. In addition, road maintenance and construction are also associated with disruption and damage to soils and organic matter, which can reduce soil moisture retention, thereby creating more arid conditions in these areas during fire seasons (Everett et al 1994).

Because human-caused fires can occur at any time of year, including dry seasons, they are often larger and more intense than naturally-ignited fires such as lightning-caused, because they tend to occur during periods of the year when natural ignitions do not normally occur. Naturally-occurring fires are frequently associated with increased humidity and/or precipitation, which reduces fire's rate of spread and intensity. Many plant and wildlife species have evolved over time in the presence of fire. Depending upon climate, vegetation, and other ecological variables, these species that adapted to natural fire frequency and severity do not occur everywhere in the SMRNA. Lower elevation desert ecosystems are less adapted to fire than the mixed conifer vegetation community type in the SMRNA.

The second-most significant disturbance regime in the analysis area is insect activity, such as bark beetles and defoliators. Although insects of concern that would affect tree species in the area would not be directly affected by roads, the presence of the road system enhances the potential for implementing stand management activities. Stand management activities such as thinning and prescribed burning would tend to reduce the potential for and the impact of insect activity.

Existing roads may also influence surface runoff, which can cause erosion and alter the banks (e.g., gullying) of perennial and ephemeral streams/washes in the analysis area. Seasonal rains and spring runoff, which result in high water events, are necessary for the establishment of some riparian vegetation (e.g., cottonwoods and willows). Altered banks and increased sedimentation from roads and trails may interfere with the establishment and maintenance of riparian vegetation (Webb 1983).

The effects of soil movement due to roads (e.g., poor culvert placement, roadside ditches, and off highway use) are most noticeable in the increased erosion that has produced large sediment movement and down cutting of alluvial benches in the area. Much of this increased erosion occurs along the highway. Some species such as rough angelica that primarily inhabit alluvial benches have been and continue to be affected. Although this species can tolerate surface disturbance, it can be severely impacted when the benches it occupies are lost due to erosion. Roads can also alter the movement of pollinators and other animal species.

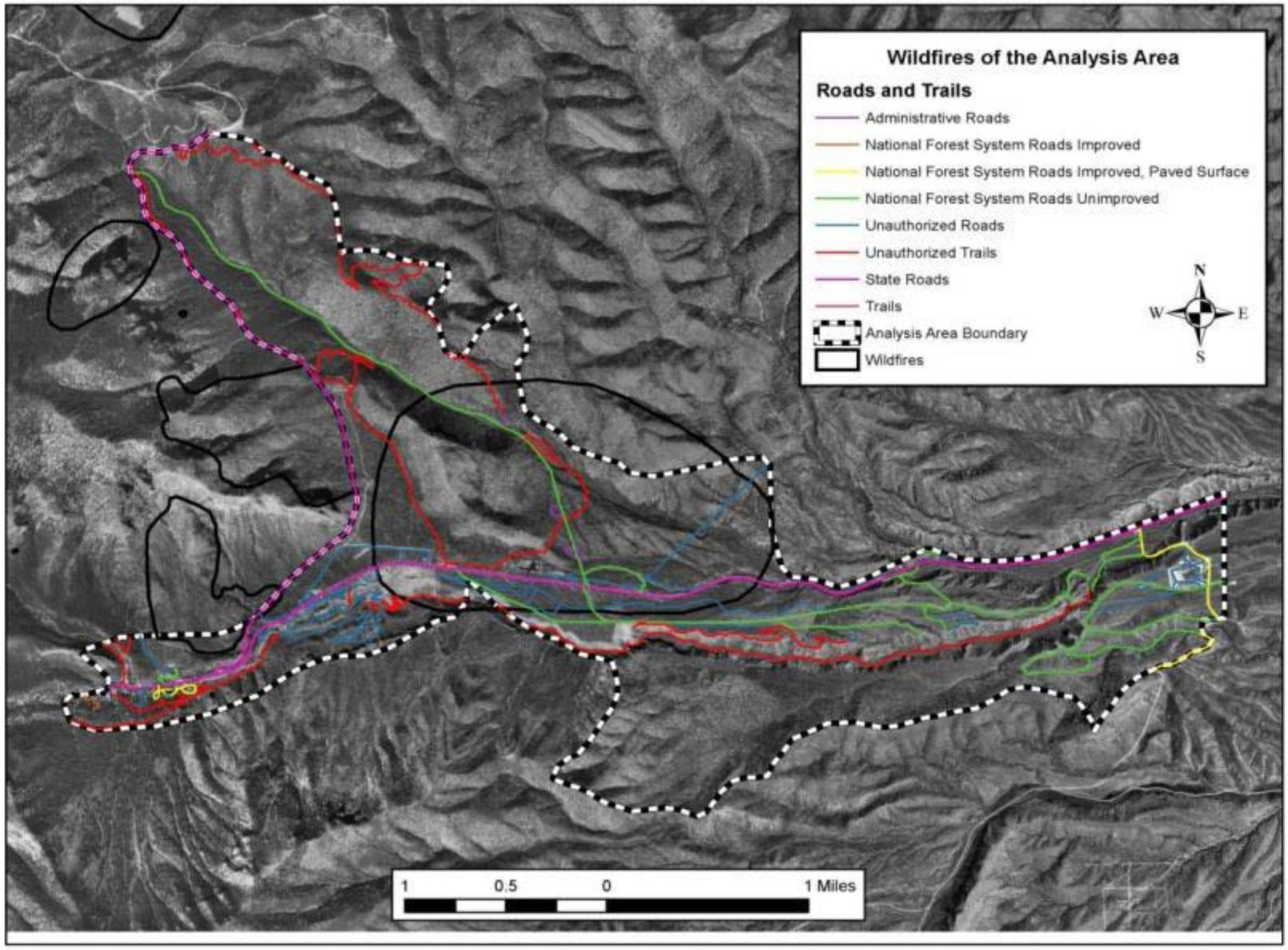


Figure 1. Wildfire events of the analysis area.

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

Most kinds of traffic using roads, including vehicular traffic, heavy equipment, small machinery, bicycles, and hikers, can result in higher than usual noise levels. Higher noise levels can locally displace animals that regularly forage, den, or nest in the area. Wildlife, including birds, reptiles, and large ungulates, respond to this disturbance with accelerated heart rate and metabolic function, and increased levels of stress (Havlick 2002). These factors can lead to displacement, mortality, and reproductive failure. As a result of increased noise levels, wildlife will tend to avoid areas with high disturbance levels. The magnitudes and frequencies of sounds generated by highway and off-highway vehicle traffic can have direct impacts on wildlife populations of arid regions (Brattstrom and Bondello 1983).

Noise effects of roads and trails can extend outward greater than 100 meters depending on the following factors: traffic type (e.g., ATV, highway vehicle, bicycle, hiker); vehicle speed and road alignment; road surface type; traffic volume (i.e., frequency of traffic); the topography (e.g., hills or berms can act as a barrier to sound waves); and the sensitivity of the species occupying the area (Forman and Deblinger 1998, Forman 2000, Miller, et al., 2001, Taylor and Knight 2003, Bautista, et al., 2004).

The analysis area contains numerous roads and trails that vary in the amount of vehicular and human traffic. The state highways within the analysis area (Kyle Canyon Road (SR 157, FH 11) and Deer Creek Road (SR 158, FH 22) receive the highest level of vehicular traffic and the highest vehicular speeds. According to Nevada Department of Transportation (NDOT) records, the average annual daily traffic volumes on Kyle Canyon Road are approximately 1,300. Average daily traffic (ADT) volumes during June and July 2003 near the Kyle Canyon/US 95 intersection are over 3,000 and the area west of Deer Creek had over 1,500 (Spring Mountains National Recreation Area Transportation Study 2005). However, the majority of this travel occurs on the weekends. SMNRA roads are lightly traveled during the week, but gridlock can occur during weekends, particularly during snow events and/or on holidays (Spring Mountains National Recreation Area Transportation Study 2005).

As described above, the noise disturbance zone can vary depending on numerous factors. Conservative estimates are used for this analysis with the disturbance zone assumed to be from 100 to 200 meters from the roadway and or trail. Under these assumptions from 57 percent (2,430 acres) (with a 100m disturbance zone) to 75 percent (3,217 acres) (with a 200m disturbance zone) of the analysis area experiences high levels of noise disturbance (Figure 2).

Behavioral disturbance impacts on wildlife species have been fairly well-documented for a number of species including deer, small mammals, reptiles, and nesting and perching birds (Miller et. al., 2001; Taylor and Knight 2003). Most species exhibit a "flight" response to disturbance resulting in temporary, or if disturbance is constant, permanent displacement. Flight responses from disturbances can negatively affect animal health by requiring increased energy expenditures (Miller et al. 2001; Taylor and Knight 2003). These effects include: alteration of habitat use (avoidance or abandonment of an area – either temporarily or permanently); interruption of reproductive activities (courtship, mating, prenatal care, nesting, etc.); and increased predation (especially of abandoned nests) (Forman and Deblinger 1998, Forman 2000, Miller, et al., 2001, Taylor and Knight 2003, Bautista, et al., 2004).

Since all of the analysis area is bordered by or adjacent to heavily used roads and trails, relatively high levels of disturbance exist. As a result, some resident animals may be acclimated to human disturbance, or have already changed their behaviors accordingly. Use of the area for walking, mountain biking, and driving probably has resulted in lower numbers of species in the area as well as a reduced diversity of species.

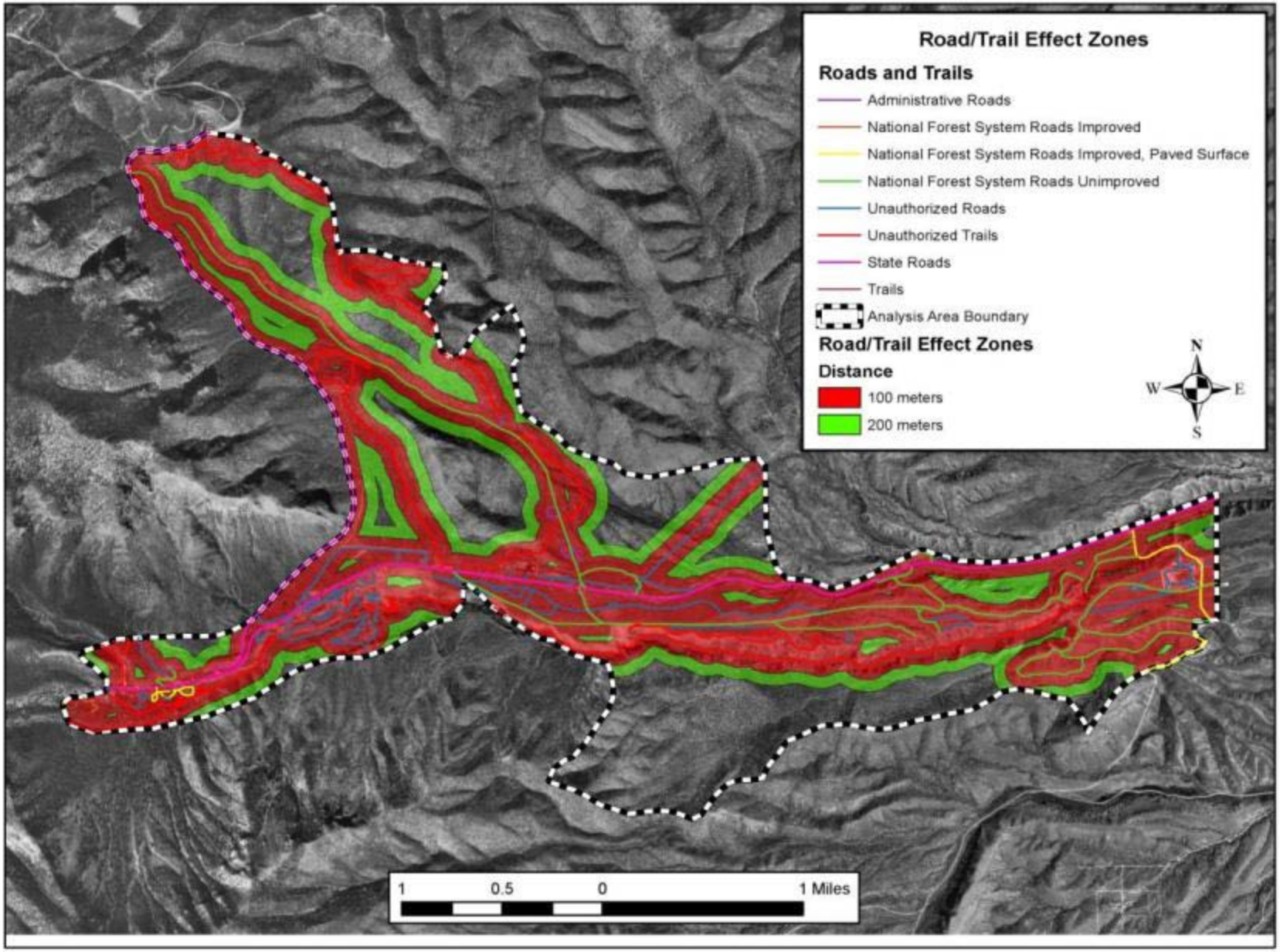


Figure 2. Road/trail Effect Zones

Aquatic, Riparian Zone and Water Quality (AQ):

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

The Kyle Canyon stream network, except where influenced by lithologically controlled springs, is ephemeral in nature. From examinations of existing climate and flow data on the area, short intense summer rains generate by far most of the surface runoff in the main stem channels. The runoff is probably in large part due to overland flow, or very shallow ground interflow, which are a function of the very thin, often scree-like mantle on valley side slopes, the pervasive rocky soil surfaces and thin, patchy ground cover (Moser, 2006). It is likely, given the very local nature of such storms, that runoff is also variable throughout a channel reach, even of a modest area as that encompassed by the project. Very thick alluvial fill in the valleys soon absorb surface flow down channel beyond the influence of the storm. Estimates by Plume of the hydraulic conductivity for the alluvium deposits, represent moderately high values for well-sorted gravels, and very high values overall in the range normally found in natural surface material (Fetter, 1988). Hydraulic conductivity values for the carbonate rocks underlying the alluvium, highly variable as they are, represent very high potential for transmission of ground-water.

The adverse effects of roads on slope hydrology stem from the interception of groundwater at cuts and of rainfall on running surfaces. The conveyance of these waters to discrete drainage points, particularly in headwater areas, accelerates the timing and magnifies the volume of storm peaks, and may, for the smaller class of events, increase total yield. Secondary parameters that contribute to the hydrologic effect of roads are hill slope gradient, and proximity of a bed to channel, particularly if the road is parallel to a channel.

Channel size in Kyle Canyon markedly decreases in proportion to drainage area in a down valley direction, probably because hill slope lengths decrease, thereby decreasing the contributing area for a given reach.

The evolution of channel morphology is associated with forest soil cover, infiltration and holding capacity. Overland flow is a rare occurrence where cover is mostly complete and capacity greater than potential rainfall intensity. A road system that covers only a small fraction of a watershed may still have a significant effect on peaks because it essentially enlarges the stream network, or area that contributes to surface runoff as describe by Hewlett and Nutter.

However, because of the thin, rocky soils, steep slopes and scant vegetative cover of the analysis area that on occasion generates overland flow over a considerable area, naturally, the effect of the road network is attenuated. Runoff from roads while exacerbating peak flow from a small area, over a natural response, will not manifest the effects very far downstream.

The range of measured annual peaks at the Lee Canyon gage (USGS Station #09419610; U.S. Geological Survey, 2006) is from 0.02 to 880 cubic feet per second (cfs), or four orders of magnitude. Some years have no recorded flow at all. Most recorded flow events last but a single day, and no more than three days. As well as being relatively rare, flow events of longer than one day occur during the winter and produce only modest peaks, probably because the rainfall is steady, but of light intensity that slowly creates near the channel a saturated soil zone that generates surface flow--a more typical scenario for forest runoff, and discussed originally by Hewlett and Nutter (1970). Because the only long term rainfall record is at the Kyle Canyon FS facility (National Climate Data Center, 2006), which does not overlap with the flow records, this possibility cannot be explored further.

Snowmelt, though ostensibly 40% of the total precipitation, comes off the higher elevations slowly enough to mostly infiltrate into the soil and percolate down into the considerable storage of the underlying alluvium (Moser, 2006).

The road segments with the greatest potential effect on surface hydrology, however slight, are the upper 3.26 miles of Telephone Canyon Road (45530), from the junction with Deer Creek Canyon Highway (SR 158), and the upper approximately 3 miles of Deer Creek Highway from the same point. Because of the low gradient and wide valley bottom of Kyle Canyon Road (SR 157), it is not expected to significantly alter runoff at any point of the main stem channel.

The volume of valley alluvium, a relic of much wetter Pleistocene era (Gucwa, 1969), has a storage capacity that is significantly in excess of the ability of the present climate regime to fill, and has qualities overall that ensure rapid transmission to outlying basins (Plume, 1985). The road network has no effect on subsurface hydrology.

How and where does the road/trail system generate surface erosion? (AQ 2)
Surface erosion would occur where flow concentrated by running surfaces is discharged over a slope of sufficient gradient to rill or gully the side slopes that are between 25 to 30 percent gradient or greater. These areas occur along the length of Deer Creek Highway, Telephone Canyon, and the first 1.25 miles of Harris Springs Road.

How and where does the road/trail system affect mass wasting? (AQ 3)
Mass wasting, in the form of gully erosion, would most likely occur along the upper three miles of Deer Creek Highway and first mile of Harris Springs Road (45532), at locations of relief drains, rolling dips, or other engineered drainage points. Due to the very thin, rocky soils, there is little to no potential for slumping or other types of structural failures brought about by road drainage or placement, and only minor incidences of gullying.

How and where do road/trail-stream crossings influence local stream channels and water quality? (AQ 4)
Channel degradation occurs at crossings where flow energy is exacerbated by routing through a pipe or constricting by a bridge. There are a number of such crossings on Kyle Canyon Road and Deer Creek Highway.

Water quality is unaffected since the channel systems are already overburdened with fines and larger material, a large range of which is easily transported by all but the lowest flows (Moser, 2006). Preliminary hydrologic analysis of the area by Caldwell, Richards, and Sorensen (2007) concludes that several of the major road stream crossings are inadequate to meet 50 and 100 year flood events. This report gives specific recommendations for re-engineering the Harris Spring Road crossing, Slot Canyon Trail Crossing, and the Telephone Canyon Road crossing. In addition, it appears that some culvert type crossings are too small for their designed purpose, such as FSR Kyle Wash crossings at Kyle Canyon campground, Kyle administrative site, and Fletcher View campground, and would reach capacity with a 25 year flood event.

How and where does the road/trail system create potential for pollutants, such as chemical spills, oils, de-icing salts, or herbicides to enter surface waters? (AQ 5)
Any point on the road system where flow is concentrated on the running surface and discharged directly into the channel, or where rilling and gullies obviously mark a flow path to a channel, has potential to carry pollutants and mix with natural surface flow. These criteria would be satisfied by virtually any of the system and non-system roads and trails.

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

Hydrologic connection of the running surfaces is described in AQ5 above. Water quantity is not significantly affected (see discussion in AQ 1). Potential for water quality effects of pollutants other than sediment, is described in AQ5. Possible road surfaces include the entire system and non system roads and trails network.

What downstream beneficial uses of water exist in the area? What changes in uses and demand are expected over time? How are they affected or put at risk by road/trail-derived pollutants? (AQ 7)
Presently, there are no domestic or municipal uses of surface water within the analysis area. There are also no jurisdictional wetlands within the analysis area.

None of the analysis area streams or greater watersheds of which they are a tributary is listed as impaired, or as needing further study for possible listing by the State of Nevada (2005), as required by the Clean Water Act section 303(d) (1972). No beneficial uses of any surface waters are listed, probably due to the ephemeral nature of flow in the channels.

How and where does the road system affect wetlands? (AQ8)
This issue is not of concern in the analysis area, as there are no wetlands in the area.

How does the road/trail system alter physical channel dynamics, including isolation of floodplains; constraints on channel migration; and the movement of large, wood, fine organic matter, and sediment? (AQ 9)
The ephemeral, and rare, flow regime of the entire stream system and the extreme range of flow have created deeply incised channels with braided beds. Definition of floodplains, as regular deposit features containing a unique vegetative community, is problematic at best and may generally be said to be absent from the analysis area streams channels. Constraints on channel migration might be mostly expected where narrow valley bottoms are shared with a road. Primarily this would be the upper 3.26 miles of Telephone Canyon Road and short segments of Kyle Canyon Road. The immediate consequence of road—channel interaction is further incision of the channel. However, the long term effects to a system with enormous potential energy due to gradient, and within an immense thickness of alluvium composed of easily transportable material, is unclear and quite likely inconsequential.

How and where does the road system restrict the migration and movement of aquatic organisms? What aquatic species are affected and to what extent? (AQ10)
This issue is not of concern in the analysis area.

How does the road system affect shading, litterfall, and riparian plant communities? (AQ11)
This issue is not of concern in the analysis area.

How and where does the road system contribute to fishing, poaching, or direct habitat loss for at-risk aquatic species? (AQ12)
This issue is not of concern in the analysis area.

How and where does the road system facilitate the introduction of non-native aquatic species? (AQ13)
This issue is not of concern in the analysis area.

To what extent does the road system overlap with areas of exceptionally high aquatic diversity or productivity, or areas containing rare or unique aquatic species or species of interest? (AQ14)
This issue is not of concern in the analysis area.

Terrestrial Wildlife and Plants (TW):

Sensitive plants, many of which are endemic to the Spring Mountains, occupy much of the landscape in the Kyle Canyon area. Along the paved roads, the ongoing effects include continued risk of the introduction of non native plants, changes to fire regimes, and erosion. Due to the shoulder maintenance of the paved roads, however, effects to existing occurrences are limited and probably occurred during the initial creation of the paved roads. Native soil roads and unauthorized routes are affecting occurrences more directly than the paved roads. These routes have endemic plants immediately adjacent to the roads, some unauthorized routes are directly impacting occurrences of plants, and the risk of soil movement and weeds directly into these occurrences is high. In addition, dust on the plants can affect the reproductive ability and reduce the photosynthetic ability of these plants.

What are the direct effects of the road/trail system on terrestrial species habitat? (TW1)
For species such as *Cryptantha* sp. and annual plant species which are disturbance tolerant, soil movement might increase available habitat in the washes. In general, however, disturbance for many of the endemic species would not be beneficial in improving habitat and could eliminate (permanently in some cases) available habitat.

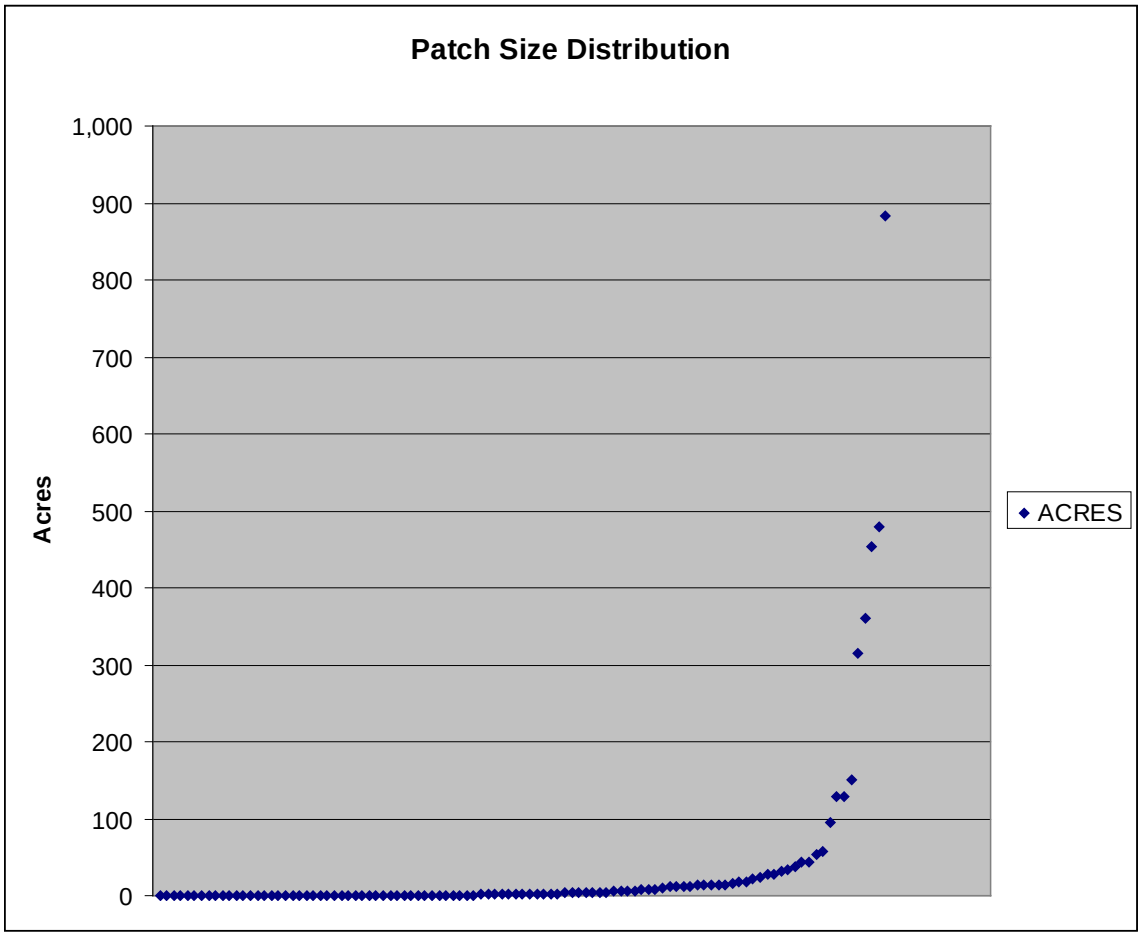
Roads and trails may also result in habitat loss and altered habitat quality for wildlife species (Forman, et al., 2003, Marshal et al., 2006). Not only is wildlife habitat directly replaced within the road/trail-bed (Forman 2000, Forman, et al., 2003), but as described above (see EF 5 and Figure 2), the road system can also have effects beyond the actual road bed (i.e., the road-effect zone). The area of wildlife habitats affected by the road system within the analysis area is substantial (Table 5).

Table 5. Wildlife habitats of the analysis area and proportion (%) within Effect Zones.

	Project Area	Effect Zone							
		Road/Trail-bed		100m		100-200m		Total	
Vegetation Series	acres	acres	%	acres	%	acres	%	acres	%
big sagebrush	71	7	10	59	83	5	7	71	100
blackbrush - utah juniper	1,183	65	5	889	75	167	14	1121	95
creosote bush	4	0	0	3	75	1	25	4	100
desert or montane mass wasted slope habitat, dwarf mountain mahogany	27	3	11	24	89	0	0	27	100
limber pine - white fir	116	1	1	54	47	41	35	96	83
pinyon pine - big sagebrush	2,443	94	4	1,189	49	474	19	1757	72
point leaf mansanita	414	17	4	205	50	98	24	320	77
white fir - ponderosa pine - curlleaf mountain mahogany	8	0	0	8	100	8	100	16	200
wood wild rose habitat	4		0	0	0	1	25	1	25
Total	4,270	187	4	2431	57	795	19	3413	80

Roads and trails result in disjunct habitat patches (i.e., fragmentation: the breaking up of large habitat or land areas into smaller parcels). Many species of wildlife cannot maintain viable populations in small habitat patches, which leads to extinction and loss of biodiversity (Forman 1998). The analysis area is highly fragmented as a result of the roads and trails which are present (Figure 3).

Roads and trails can function as barriers to movement by wildlife (e.g., reptiles and small mammals) within the analysis area. For most non-flying terrestrial animals, infrastructure implies movement barriers that restrict the animals' range, make habitats inaccessible and can finally lead to an isolation of populations. The barrier effect is the most prominent factor in the overall fragmentation caused by roads and trails (Forman, 1998).



Analysis Area (acres)	Numbers of patches	Average patch size (acres)	Minimum patch size (acres)	Maximum patch size (acres)	Standard deviation (acres)
4,262	106.0	35.0	0.1	883.7	116.0

Figure 3. Patch size distribution and fragmentation metrics.

How does the road/trail system facilitate human activities that affect habitat? (TW 2)
Changes to the fire regime, increases in weeds (from horses off road vehicles, and other vectors), and increases to erosion all can alter habitat. These include ecosystems in Kyle Canyon where fire might be needed and roads make suppression easier, and in areas where fire is not as desirable and roads increase the risk of human caused ignition sources. Weeds can also alter ecosystems that are currently weed-free and out-compete native plant species, change fire patterns, and increase sedimentation rates.

Roads and trails within the analysis area are heavily used by commuters and recreationists. Roads and trails can facilitate on- and off-road off-highway vehicle use, on- and off-trail foot traffic, recreational collecting of plants and flowers used by butterflies and other wildlife, and fuel-wood collection activities. For example, Forest Service observations at recreation areas note recreational collecting of flowers and fuelwood by campers.

The above activities result in the removal of plants important to endemic butterfly species (e.g., larval and nectar hosts plants) and removal of snags important to cavity nesting species.

Off-highway vehicle and heavy foot traffic reduce perennial and annual plant cover and density, and the overall above ground biomass (Hall, 1980). Soils in arid regions can be severely affected and damaged by off-highway vehicle and heavy foot traffic through disruption and compaction. Soil stabilizers include macrofloral elements (plants), microfloral elements (lichen, fungal, and algal crusts) and inorganic elements (soil crusts)(Wilshire, 1983). These natural soil protective elements in the desert are highly vulnerable to vehicle use. The force of rolling wheels on soil can cause compaction and have a serious long lasting negative effect (Webb, 1983). Soil compaction can decrease water infiltration, increase runoff, and cause severe erosion problems. Webb (1983) reported that soils most susceptible to compaction are loamy sands and gravelly soils with a wide range of particle sizes. These soil types are very similar to many areas in the analysis area.

Wildlife depends upon soils, plants, air, and water to survive (i.e., for their sustenance and shelter). When any of these natural requirements are altered, dependent wildlife will be affected (Havlick, 2002) as is likely the case within the analysis area.

How does the road/trail system affect legal and illegal human activities (including trapping, hunting, poaching, harassment, road kill, or illegal kill levels)? What are the effects on wildlife species? (TW 3)
Roads can increase access to plants that may be illegally collected for horticultural or herbal reasons. This could be especially true for some of the desirable cactus and yucca species in the region. While collection of many of these species is illegal, many are available as wild-collected from the region on internet nursery websites and on eBay, proving there is a demand for some of these species.

Direct effects of roads and trails include increased mortality by accidental collisions with wildlife species while crossing roads and trails. When traffic volume is high, small roads can represent a significant source of mortality affecting populations of reptiles and amphibians (Bernardino and Dalrymple, 1992; Patla and Peterson, 1994; Rosen and Lowe, 1994). As individual animals are killed trying to cross a highway, or denied access to critical habitats, local populations will likely fail or be substantially reduced. Roads and trails facilitate illegal off-road vehicle use (Matchett et al., 2004). Off-road/trail travel can cause direct mortality of wildlife by crushing individuals which may be resting or loafing under rocks or brush in the heat of the day (Havlick, 2002). Information on mortality rates due to collision is lacking for the analysis area. However, due to the volume of traffic, especially on the state highways, mortality is expected to be high. High mortality levels is a concern for rare and endemic species such Palmer's chipmunk (at Deer Creek) and a number of the butterflies inhabiting the SMNRA (Figures 4 and 5). Butterflies may be especially vulnerable to collision mortality due high traffic volumes and the proximity of larval and nectar host plant population to roads and trails (Figures 4 and 5) (Munguira and Thomas 1992, Ries et al., 2001)

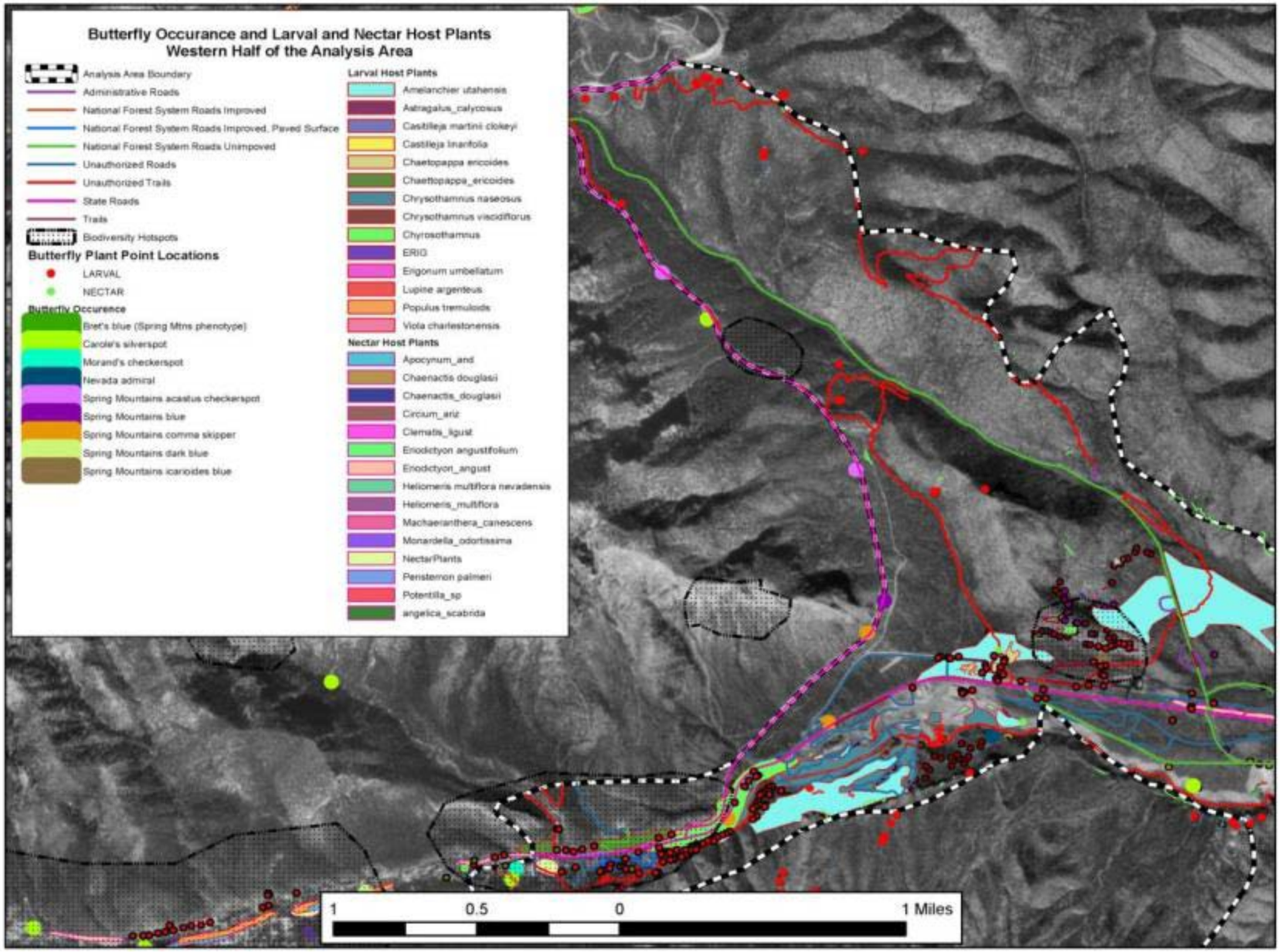


Figure 4. Butterfly occurrence & host plant population locations in western half of analysis area.

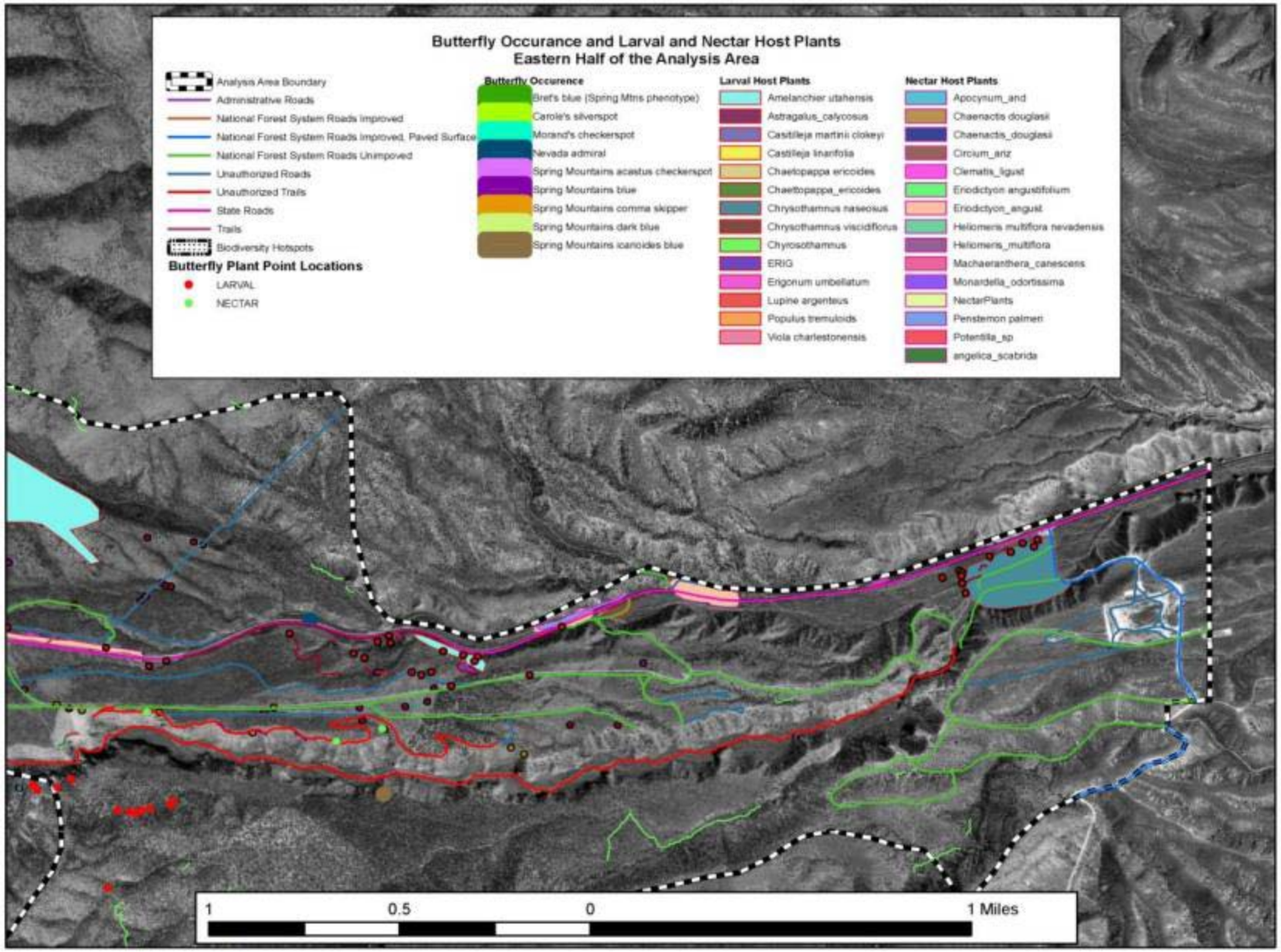


Figure 5. Butterfly occurrence & host plant population locations in eastern half of analysis area.

Although data is lacking for the analysis area, roads and highways increase human access for hunting and poaching. The detection of wildlife crimes appears to represent only a fraction of real impacts. In some, and perhaps many cases it has not been possible to draw statistically meaningful confidence intervals to approximate impacts on large mammal (e.g., big game) populations because so few violators are apprehended when poaching (Berger and Daneke 1988). Hunting of large mammals, poaching, and illegal collection (e.g., of rare butterflies and reptiles) may reduce wildlife populations in areas adjacent to roads and highways and contributes to road avoidance (Thiel 1985; McLellan and Shackleton 1988) and likely occurs within the analysis area.

The existing road and trail system facilitates illegal off-road/trail vehicle travel in relatively open habitats and dry washes/streambeds of the analysis area. In a California desert area, Sheridan (1978) documented a 50-90% decrease in plant life and a 60 -75% decrease in animal life in areas that were heavily used by off-highway vehicles . As discussed above, wildlife is negatively impacted by the presence and noise of off-highway vehicles , although some mammals may over time become habituated to these vehicles.

How does the road/trail system directly affect unique communities or special features in the area? (TW 4)
Established paved high speed roads likely affect some of the pollinator species by cars hitting these pollinators (insects) as they pass through the road corridor. The roads that pass through biodiversity hotspots, where many of the host plants for rare butterflies are present, may have the most effect on those butterfly species. Historic bisection and direct impacts of occurrences likely occurred when the paved roads were established. Few occurrences of rare plants occur along the paved roads, primarily due to continued road maintenance along the shoulders. Effects today on paved roads are generally related to increases in risk of weed introduction, ongoing erosion due to increased or accelerated runoff from roads, and changes to fire regimes to these communities (from both ignition sources and from fire suppression).

The native soil roads (system and unauthorized) have the highest direct effect on these unique communities. The effects include: direct impacts from driving on the occurrences; recreation activities such as camping or equestrian use that increase risk of fire or introduction of weeds; increased soil movement into occurrences or erosion of the occurrences; and dusting of the plants.

SMNRA provides habitat for more than 57 rare and sensitive plants and animals. Of these, 23 species are endemic and found only in this area. SMNRA was established in part to protect and manage these important natural resources. Referred to as “biological hotspots,” the most sensitive habitat areas occur in the upper elevations of Kyle and Lee Canyons, which currently contain the most heavily used recreation areas. The Conservation Agreement (CA) for the SMNRA describes biodiversity hotspots as follows (CA, page 3):

> "Biodiversity hotspots" are defined as areas of any size with any number of ecologically significant elements sharing habitats in the same area (The Nature Conservancy [TNC] 1994). Significant elements may include federally listed species, candidate species, locally and regionally endemic species, locally rare species, and unique communities, such as riparian streams and springs. A list of biodiversity hotspots is provided in Appendix C (of the Conservation Agreement).”

The priority assignment of Biodiversity Hotspots and the significant elements occurring within those of the analysis area are listed in Table 6. All sensitive elements within biodiversity hotspots of the analysis area are potentially affected by roads and trails either directly or indirectly (Table 6, Figure 6). The Middle Kyle Canyon Biodiversity Hotspot has an especially high density of roads and trails (Table 7).

Table 6. Biodiversity Hotspots within the analysis area; with priority assignment from appendix C of the CA and sensitive elements present.

Biodiversity Hotspot	Priority	Sensitive Element	Potential Effect
Deer Creek Highway	High	Spring Mountain Checkerspot *(Chlosyne acastus)*	Y
		Ringlet (*Coenonympha tuilla*)	Y
		Spring Mountains comma skipper (*Hesperia comma mojavensis*)	Y
		Spring Mtns. Icaroides Blue (*Icaricia icarioides austinorum*)	Y
		Nevada Admiral (*Limenitis weidemeyerii nevadae*)	Y
		Carole Silverspot *(Speyeria zerene carolae)*	Y
Lower Kyle Canyon	High	Dark blue butterfly *(Euphilotes ancilla purpura)*	Y
		Spring Mountains comma skipper (*Hesperia comma mojavensis*)	Y
		Spring Mtns. Icaroides Blue (*Icaricia icarioides austinorum*)	Y
		Nevada Admiral (*Limenitis weidemeyerii nevadae*)	Y
Middle Kyle Canyon	Very High	Palmer's Chipmunk *(Tamias palmeri)*	Y
		Spring Mountain Checkerspot *(Chlosyne acastus)*	Y
		Ringlet (*Coenonympha tuilla*)	Y
		Dark Blue butterfly (Euphilotes ancilla purpura)	Y
		Morand's Checkerspot *(Euphydryas anicia morandi)*	Y
		Spring Mountains comma skipper (*Hesperia comma mojavensis*)	Y
		Nevada Admiral (*Limenitis weidemeyerii nevadae*)	Y
		Carole Silverspot *(Speyeria zerene carolae)*	Y
		Rough angelica *(Angelica scabrida)*	Y
		Clokey milkvetch *(Astragalus aequalis)*	Y
		Jaeger ivesia *(Ivesia jaegeri)*	Y
		Riparian Canyon	Y

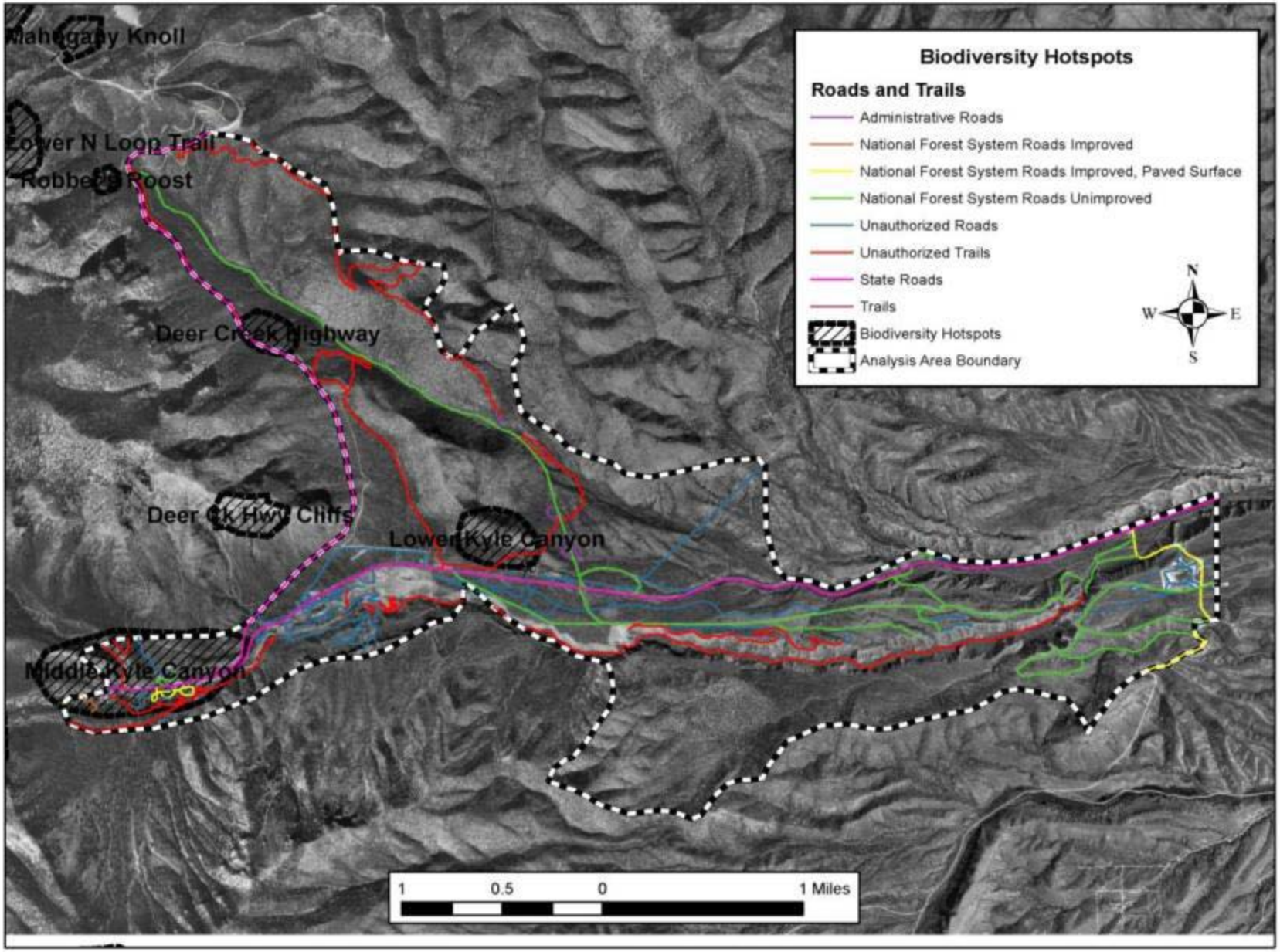


Figure 6. Roads and trails within Biodiversity hotspots.

Table 7. Road/Trail density of Biodiversity Hotspots within Analysis Area.

Name	Area (Miles^2)		Total Length (Miles)	Density (Miles/ Mile^2)
Deer Creek Highway	0.045	Non-National Forest System Trails	0.02	
		State Roads	5.92	
		Deer Creek Highway Total	5.94	0.51
Lower Kyle Canyon	0.095	Non-National Forest System Trails	0.39	
		Lower Kyle Canyon Total	0.39	4.11
Middle Kyle Canyon	0.363	National Forest System Roads Improved	0.14	
		National Forest System Roads Improved, Paved Surface	0.67	
		National Forest System Roads Unimproved	0.20	
		Non-National Forest System Roads	0.71	
		Non-National Forest System Trails	2.40	
		State Roads	2.35	
		Middle Kyle Canyon Total	6.46	17.81

Economics (EC):

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

This question focuses on financial efficiency (Present Net Value (PNV) of expenditures and revenues discounted over time) from the Forest Unit perspective. For new roads, costs to consider include planning, survey and design, construction, maintenance, decommissioning (if temporary), contract administration, and mitigation of unacceptable environmental effects. Associated or indirect revenues include receipts from commodities, recreation fees, and other services. Some associated or indirect costs may also occur as a result of road management decisions. Costs and benefits for maintaining existing roads, closing existing roads (e.g., closure and enforcement costs), and decommissioning existing roads (e.g., monitoring) should also be considered.

Currently, the Travel Analysis for the Middle Kyle Complex consists of an inventory of the present road system for the Middle Kyle analysis area. New roads and trails will be proposed for the Middle Kyle Travel analysis area, but specific opportunities or priorities related to future roads have not been identified or analyzed. This discussion is therefore limited to a qualitative assessment of road systems in general for the Middle Kyle complex area (i.e., changes in financial efficiency, economic efficiency and distributional effects are not presented). Further discussions can be found in SMNRA Market and Financial analyses (PwC 2008).

The Middle Kyle Complex Project area includes 24.74 miles of NFS inventoried roads (including approximately 10 miles of State highways, remaining miles are maintenance levels 2 to 4) and 23.3 miles of non-system roads and trails (majority of which are unauthorized) spread across 4,300 acres. The project area is located within Management Area 11 ("Developed Canyons") where direction includes:

- Emphasis on protecting native species, ecological processes, and heritage resources when managing recreation areas, allowing riparian areas to recover, and maintaining scenic quality;

- Enabling fire management and vegetation treatments to reduce fire spread; and
- Increasing capability to monitor and manage visitor traffic in Kyle Canyon.

The following factors will reduce financial efficiency (measured as PNV), relative to current baseline conditions:

- Increases in the number of miles of new Forest system roads and/or trails;
- Addressing unauthorized trails (e.g., closure, conversion/upgrade, enforcement, education);
- High costs associated with complying with standards and guidelines for constructing and maintaining roads and trails due to sensitive environmental, scenic, riparian, and heritage conditions specific to the Kyle Canyon area; options for adding additional roadway and parking capacity are limited, as implied by the need to divert traffic from the sensitive areas in the upper canyon;
- Higher or accelerated maintenance costs from increased visitor traffic, facilitated by improved roads and trails; and
- Dedication of resources to monitor and manage increased visitor traffic in Kyle Canyon.

Financial efficiency may potentially improve, relative to current baseline conditions, if:

- Increased visitor traffic provides a greater source of revenue from camping or other user fees[5]. The proposed development of the Middle Kyle complex is expected to draw visitors and activities away from more environmentally sensitive lands at higher elevations in Kyle Canyon, but may also increase overall visitation to the area. It is also likely that increases in residential and commercial development (e.g., Kyle Canyon Gateway development at intersection of Kyle Canyon Rd and US95) will increase the number and frequency of visits from Las Vegas area residents. In 2003-2004, the annual number of vehicles and people visiting Kyle Canyon, including residents and commercial users, was approximately 600,000 and 1.8 million, respectively (USDA Forest Service 2005). The SMNRA National Visitor Use Monitoring survey indicated overall SMNRA annual visitation at approximately 336,000 (USDA Forest Service 2006). Actual visitation is probably somewhere between these two estimates.
- Reduced operation and maintenance costs for roads and trails in the Upper Kyle Canyon area; and
- Reduced indirect costs associated with accessing areas targeted for vegetation treatments to reduce fire hazards or other management activities.

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

Economic efficiency measures aggregate net benefits to society and can include non-market and external costs and benefits. General examples of benefits include the value of recreational experience and passive use values, while examples of costs include decreased water quality and fragmentation of habitat. The scale is dictated by measurable consequences identified by the issues.

The objectives of this travel analysis include the desire to meet the need for access while minimizing the risk of adverse effects. Details about the project that are relevant to economic and social issues include:

[5] Sources of Forest Service revenue include percentages of gross revenue from merchandize sales, food sales, parking as determined by concessionaire contracts; campground fees and concession fees, and concession fees and rental rates for meeting areas and amphitheaters within the Middle Kyle Canyon complex (USDA Forest Service, 2005a). Changes in the number of visits and corresponding magnitude of revenue is a function of road and trail system improvements, but it is difficult to differentiate the proportion of revenue change attributable to road system improvements versus other facility and infrastructure improvements.

- Increasing recreational traffic in the context of environmental constraints. SMNRA is visited by thousands of local residents and tourists per year, and Kyle Canyon is a preferred site due to proximity, ease of access, cool summer temperatures and winter recreation opportunities. However, high levels of use are putting stress on the upper canyon's sensitive ecological areas (home to plants and animals found nowhere else). The Middle Kyle complex is designed to meet growing recreation demand[6] while protecting the upper canyon's sensitive resources;
- Needs and issues from the Spring Mountains National Recreation Area Transportation Study (2005) and the *Northwest Clark County Land Use and Development Guide* include: (1) high volume of traffic in upper Kyle Canyon causes traffic congestion, delays, and contributes to accidents, (2) transportation facilities do not provide sufficient capacity for emergency response and evacuation in congested or winter conditions (a heliport with unpaved access is located in the analysis area for emergency response), and (3) large numbers of vehicles in the upper elevations of Kyle Canyon cause adverse environmental impacts;
- Approximately 23.3 miles of non-system roads and trails (majority of which are unauthorized),
- Upper Kyle Canyon is designated a "critical groundwater area;"
- Contains isolated pockets of private land inholdings;
- A sacred site for the Southern Paiute Nation, including a ceremonial place within a slot canyon and edible and medicinal plants valued by the Southern Paiutes; and
- Location within Management Area 11 ("Developed Canyons") where emphasis is placed on protection of sensitive ecological resources and scenic quality, reducing fire hazard, and managing visitor traffic.

Factors and activities that could contribute to net social benefits from improved road and trail systems, but may difficult to quantify or monetize include:

- Decreased or managed traffic congestion, accidents, and conflicts with local communities (e.g., Mt. Charleston);
- Decreased traffic impacts and improved protection and/or conservation of ecological amenities in the Upper Kyle Canyon;
- Increased visitor use days and quality of visitor use days as determined by scenic quality and other attributes;
- Mitigation of adverse environmental effects to water quality, riparian habitat, and other natural resource attributes;
- Mitigation of impacts to cultural sites and resources;
- Increased capacity to prevent and suppress wildfire (in the wildland urban interface);
- Increased capacity for emergency and medical response; and
- Mitigation of noise, dust, and other short-term impacts to visitors and local communities during construction and maintenance.

[6] Between 1993 and 2002, the Clark county population grew from 919,388 to 1,578,322 and an additional 1 million are expected over the next 20 years (Metropolitan Las Vegas Historical Economic Data, Center for Business and Economic Research, University of Las Vegas, as cited in USDA Forest Service 2004). Housing units permitted during this time period increased by 52 percent (19,000 to 29,000), and, as a consequence, greater attention is being given to urban sprawl. Housing development is increasing on the outer edges of the city to accommodate growth (USDA Forest Service 2004). Visits to Las Vegas expanded from approximately 24 million to 35 million between 1993 and 2002 (USDA Forest Service 2004), and it has been estimated that 17 percent of Las Vegas visitors traveled to "nearby" places while in Las Vegas (2002), some of whom traveled to Mt Charleston within SMNRA.

Implementation of General Forest Road and Trail standards and guidelines associated with the *General Management Plan for the Spring Mountains National Recreation Area* is expected to help mitigate adverse impacts and improve potential for positive net benefits from road and trail system improvements.

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

The distribution of costs and benefits among geographical, political, social, ethnic, and economic sectors is used to help determine the acceptability of decisions. Components to consider include cash flows, job and income gains or losses by different sectors, distribution of non-market benefits and external costs.

Direct employment and income impacts from changes in transportation management, maintenance, and/or development may result in short-term increases in employment and income within the construction, production, and transportation sectors within Clark county (Mt Charleston may benefit locally to some extent, but employment in these sectors is very limited). Sectors such as *Accommodations and Food Services* and other services linked to tourism may experience longer term indirect impacts to employment and income as improvements to facilities, roads, and trails contribute to increased recreational spending by visitors from outside the county or region. Long-term induced impacts from increased spending are also likely. Clark County and the Las Vegas municipal area are largely dependent on tourism as evidenced by the output and employment associated with the *accommodations and food services* industry (19.28% of total employment for Clark County in 2003).

Second homes are an important economic driver in the analysis area as demonstrated by the percentage of housing units that are seasonal (35%) within the areas surrounding the SMNRA analysis area relative to that of the State of Nevada (2%)[7]. In some areas of the West, second homes have been shown to account for significant percentages of total employment as a result of spending by second home owners and guests, as well as reliance upon construction and real estate services. Changes in net benefits from improved road systems will affect the direction and magnitude of direct, indirect, and induced impacts associated with second homes.

The proportion of low-income residents within SMNRA is lower than the region as a whole. The proportion of minority residents within SMNRA is also low, though there are concentrations of minority residents in Indian Springs, Cold Creek, the Las Vegas Paiute Indian Reservation and other nearby communities[8]. Improvements in the transportation system for the analysis area have the potential to serve the mobility, access, and recreation needs of low income and minority populations in Clark and Nye counties. Adverse impacts are not anticipated to increase disproportionately for minority or low-income populations. If additional fees for access to Kyle Canyon are considered, further analysis of impacts to low-income populations would be conducted.

Timber Management (TM):

How does road spacing and location affect logging system feasibility? (TM1)
This issue is not of concern in the analysis area.

How does the road system affect managing the suitable timber base and other lands? (TM2)
This issue is not of concern in the analysis area.

[7] Data derived from US Census data for Census Tract 58.17 and Nevada (US Census Bureau 2000)
[8] Mt Charleston, the community nearest the analysis area, is home to a more affluent population ($63,125 median income, 2000$) relative to Clark county ($44,616) and has a small population (285 in 2000). Race and ethnicity of Mt. Charleston (4.9% minority, 2000) is less than that of Clark county (39.8%) as a whole. According to the US census and Nevada State Demographer's office, the Hispanic population has increased from 11 percent in 1990 to an estimated 25 percent of the Clark county population in 2004.

How does the road system affect access to timber stands needing silvicultural treatment? (TM3)
This issue is not of concern in the analysis area.

Range Management (RM):

How does the road system affect access to range allotments? (RM 1)
This issue is not of concern in the analysis area.

Minerals Management (MM):

How does the road/trail system affect access to locatable, leasable, and salable minerals? (MM 1)
This issue is not of concern, as there are no known mineral resources in the analysis area. The area was withdrawn from mineral activity as part of the National Recreation Area legislation.

Water Production (WP):

How does the road/trail system affect access, constructing, maintaining, monitoring, and operating water diversions, impoundments, and distribution canals or pipes? (WP 1)
This issue is not of concern, as there are no known water diversions, impoundments, distribution canals or pipes in the analysis area.

How does road/trail development and use affect the water quality in municipal watersheds? (WP2)
This issue is not of concern.

How does the road system affect access to hydroelectric power generation? (WP3)
This issue is not of concern in the analysis area.

Special Forest Products (SP):

How does the road/trail system affect access for collecting special forest products? (SP 1)
Forest products provided by the SMNRA include firewood and piñyon pine nuts. All drivable (by pickup truck) forest roads into areas with mountain mahogany or conifer forest and woodland provide public access for firewood cutting, within the constraints of the Toiyabe Forest Plan and the SMNRA firewood policy. All roads and trails into areas dominated by piñyon pine provide access for collectors of piñyon pine nuts. At this writing, we do not know the amount of use the various roads and trails have for these purposes. SR 157, SR 158 and roads and trails north and south of SR 157 provide access for collecting these products.

Special-use Permits (SU):

How does the road/trail system affect managing special-use permit sites (concessionaires, communications sites, utility corridors, and so on)? (SU 1)
Most developed recreation facilities in the Kyle canyon corridor are managed by concessionaire. Utility corridors occur in the analysis area, and the existing road system also provides access to a special use site further up in the canyon. The current road system in the project area is a necessary part of managing these resources, by providing access to them. There are no known conflicts with the current road and trail system that affect managing special-use permit sites. Special use permits have, and will continue to exist within the analysis area, but have not typically been an issue relative to the Forest road / trail systems. The project area does currently have special use permits issued for the Las Vegas Metropolitan Police Department sub-station and for Clark County/Republic Services transfer station to use forest land that are adjacent to each other. The current access to these sites, via separate access points, does provide potential for limited conflicts on SR 157.

General Public Transportation (GT):

How does the road/trail system connect to public roads and provide primary access to communities? (GT 1)
Forest roads connect with numerous public roads that are under the jurisdiction of other federal, state, county or local governments. Many small rural communities across Nevada and California depend upon Forest roads for primary access to communities. Forest roads in the analysis area that connect with other public roads include SR 158 and SR157, connecting the communities of Las Vegas and Mt. Charleston.

County roads located adjacent to Forest lands that traverse into or across the Forest, or connect with Forest system roads, are also important to neighboring communities. Ranching, mining and tourism are important economic activities for people in small communities and ranches; these people depend upon access into or across Forest lands for their livelihood and for recreation.

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

The land in the analysis area is almost entirely under federal jurisdiction, with the exception of a few isolated private inholdings. The roads in the analysis area, particularly Kyle Canyon Road and Deer Creek Road, have high daily vehicle counts due to the close proximity to the Las Vegas area. The beauty and cool temperatures of the mountain setting present a unique attraction for local community residents, as well. Inholdings are not a significant issue in this analysis area, however.

How does the road/trail system affect managing roads with shared ownership or with limited jurisdiction? (GT 3)
In 1975, the Forest Service developed a Memorandum of Understanding with the Federal Highway Administration that required the Forest Service to apply the requirements of the National Highway Safety Program, established by the Highway Safety Act, to all roads open to public travel. In 1982, this agreement was modified to define "open to public travel" as "those roads passable by four-wheeled standard passenger cars and open to general public use without restrictive gates, prohibitive signs…" All roads maintained at level 3, 4 and 5 meet this definition. Design, maintenance and traffic control on these roads emphasize user safety, comfort and economic efficiency.

The Forest Service has full jurisdiction on all NFS roads and trails within the analysis area. As shown in Table 1, this means all but three of the roads and trails in the analysis area. Only Kyle Canyon Road, Deer Creek Road, and Harris Springs Road are not under Forest Service jurisdiction. Management of these roads, including maintenance and safety issues, must be performed in full communication and cooperation with the primary jurisdictional entities, in this case the State of Nevada and Clark County.

How does the road/trail system address the safety of road users? (GT 4)
The road system in the analysis area has been shown to exhibit safety concerns, due primarily to its proximity to the metropolitan Las Vegas area and being a recreation destination for local residents. Traffic data gathered in the September 2005 SMNRA Transportation Study indicates congestion in both directions on the Kyle Canyon Road during weekday and weekend evenings. Anecdotal reports state that winter weather conditions exacerbate this congestion, and roads in the area can then become impassable especially in the upper canyon areas west of the Deer Creek Road intersection. An additional factor contributing to road congestion and safety concerns in the analysis area is that residents traveling the roads for dispersed recreation purposes will often park their cars in the roadway while they pursue snowplay, picnicking, or other recreation activities. This safety concern is clearly related to the adequacy of parking adjacent to the analysis area. The 2005 Transportation Study indicates that adequacy of parking may be a safety concern in some parts of the analysis area. Utilization analysis found the Interim

Visitor Center parking area to be over capacity. Parking capacity may be currently insufficient to meet the levels of recreation demand the area experiences.

An additional area of safety concerns caused by the road system involves crashes in the analysis area. The Transportation Study indicates two crash hazard areas within the analysis area, on Kyle Canyon Road. Nevada Department of Transportation data indicates 136 total vehicle crashes on the Kyle Canyon Road during a 3-year period. It is unknown what percentage of this total are within the analysis area. Many factors contribute to accidents along SR 157. The Middle Kyle Canyon Development Traffic Study (February 2007) describes the causes and locations of these highway accidents. The route traverses canyons and curves, however, where drivers may not slow to speeds appropriate for road conditions.

Administrative Uses (AU):

How does the road system affect access needed for research, inventory, and monitoring? (AU 1)
The ease and accessibility of road travel in the analysis area would impact the Forest Service's ability to perform research, inventorying, and field monitoring activities in the analysis area. Research in the Humboldt-Toiyabe National Forest, however, takes place primarily in Research Natural Areas (RNAs). As there are no RNAs in the analysis area, there are thus no significant impacts of the existing transportation system on research needs. The existing inventorying and monitoring activities in the analysis area, such as air quality monitoring activities, are currently well-served by the existing network of improved roads in the analysis area.

How does the road/trail system affect investigative or enforcement activities? (AU 2)
The Middle Kyle Complex analysis area faces a growing recreation user base, due in part to population growth in the Las Vegas area. This increase in recreation pressure can translate into an increased investigative and enforcement burden for the Forest Service. More people in the area can lead to an increase in such enforcement issues as garbage dumping, or it may involve unauthorized use of roads and trails in the area.

The Middle Kyle Complex analysis area contains approximately 23 miles of non-National Forest System roads and trails. The uses associated with these trails are typically summer off-road vehicles, equestrian use and mountain bikes. Data regarding the extent of this use and the exact amount of unauthorized motorized use is currently not available. In June 2004, the SMNRA produced a decision notice for a Motorized Trails Designation Project. In August 2007, the Spring Mountains National Recreation Area Motorized Trail Decision Implementation was signed and a Motorized Vehicle Use Map was completed in 2007. In this project, it was determined that there was an urgent and immediate need to protect the cultural and natural resources of the SMNRA from unofficial, off-trail use of motorized vehicles. Informal investigation indicates that unauthorized motorized activity exists, and increases the burden on law enforcement and investigative personnel.

Protection (PT):

This analysis addresses the fire and fuels protection questions considered for the Middle Kyle Complex Travel Analysis. A fire hazard and risk analysis was conducted by Resource Concepts Inc. (RCI) for the Kyle Canyon area within the analysis area. Results from that analysis concluded that the community of Kyle Canyon had a high hazard rating an extreme interface fuel hazard condition and a high ignition risk. Fuel treatment strategies included the construction of fuelbreaks along both sides of State Highways 157 and 158, surrounding campgrounds, day use, and other concentrated public-use areas (Clark County Wildand Assessment Project 2004).

The following table describes the transportation and trail types within the proposed analysis area.

System Type	Surface Type	Miles
State Roads	Paved	9.77
County Roads	Dirt	1.24
National Forest System Road Improved	Paved	.56
National Forest System Road Improved	Dirt	.14
National Forest System Road Unimproved	Dirt	12.98
Administrative Roads	Paved	.55
Unauthorized Roads	Dirt	13.10
Unauthorized Trails	Dirt	16.49

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

The current road system within the proposed analysis area generally provides good access for achieving fuels management objectives. Fuel treatment activities within the analysis area would primarily focus along all system roads, paved or unpaved, to reduce the fire hazard by breaking up vegetative continuity and ladder fuels. Treatment emphasis along these roads would include handpile and burning or mechanical manipulation of the vegetation. The Toiyabe Forest Plan says that a network of shaded fuelbreaks are in place to interrupt continuous stands of fuel, and designed to utilize natural barriers and existing road corridors (USDA 1996, p. 16)

Existing or proposed trail systems within the analysis area are not expected to have much impact on fuels management within the analysis area.

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

The network of roads will benefit the transporting of fire suppression personnel and resources into the project and surrounding forest. Numerous roads that access the analysis area can increase response times that could reduce the spread of wildfire. The longer it takes firefighters to respond to a reported fire, the greater the chances a fire could become larger and more difficult to suppress. The increase in road density within the analysis area allows for improved strategic and tactical decision making by fire management personnel.

From a negative perspective, many of these roads and trails afford the opportunity to access the forest and dispersed camping sites where human activities are prevalent and where human caused fire starts are likely to occur. The majority of the developed area in Kyle Canyon has a high ignition risk. Ignition history for the area shows numerous lightning strikes and other ignitions. The presence of campgrounds and the high level of visitor traffic during the fire season also contribute to the high rating (Clark County Wildland Assessment Project 2004 6.1.7).

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

The State Highways and NFS Improved Roads (paved or unpaved) provide the best access and exit routes for firefighters and the public. Some of the Forest System Unimproved and the Non-National Forest Roads are narrow, which can restrict the size of fire fighting equipment trying to access the area. Road systems that are not surfaced or regularly maintained can cause a slower fire suppression response,

allowing fires to increase in intensity, resulting in an increased risk to firefighters or forest users trying to evacuate the area.

Existing trail systems are expected to have a limited effect on firefighters and public safety.

How does the road/trail system contribute to airborne dust emissions resulting in reduced visibility and human health concerns? (PT 4)
Air quality impacts within the analysis area are associated with vehicle emissions and dust from traffic along roads and trails. The extent of these effects depends on the amount of traffic. Dust from unpaved roads also increases with dryness, as well as with vehicle weight. Motorized recreation occurs year-round within the analysis area, and ORV use is prevalent and increasing within the analysis area. When these vehicles travel on unpaved surfaces, they can stir up dust.

The analysis area is within a PM-10 non-attainment zone as defined by the Clean Air Act, and is subject to the Clark County Air Quality Regulations Section 91 – Fugitive Dust from Unpaved Roads, Unpaved Alleys, and Unpaved Easement Roads. Section 91.2.1.1 of these regulations provides direction for the management and mitigation of unpaved roads in the analysis area based upon the number of vehicles that use unpaved roads on a daily basis. There are 23 (14 miles) unpaved system roads and 13 miles of unpaved non-system roads in the analysis area.

Section 91.2.1.1.1 and 91.2.1.2 requires that for all existing unpaved roads having more than 150 vehicles per day, control measures be implemented within specified time frames. These control measures (section 91.2.1.3) include paving roads, applying dust palliatives, or seeking alternative control measures in writing with the agency and the EPA. It appears that all NFS unpaved roads (system or non-system) within the project area do not require control measures as none of the roads exceed the 150 vehicles per day traffic volume.

In 2003, the SMNRA submitted a dust mitigation plan to the Clark County Department of Air Quality in response to Management Corrective Order #CR-290 (issued by the Department). This mitigation plan tiered to the anticipated decision of the 2004 SMNRA Motorized Trails Designation Project which included road and trail closure decisions that affect the analysis area. In addition, the SMNRA Dust Mitigation Plan calls for closing to motorized vehicles "all areas not designated as Forest System roads, designated trails…" beyond those tiered to in the 2004 decision (p. 10). The 2004 SMNRA Motorized Trails Designation Project decision also includes a number of education and signage mitigations to help enforce the road and trail management changes. In the recommendations section of this document, all roads and trails affected by the 2004 SMNRA Motorized Trails Designation Project will be carried forward as well as all other non-system roads and trails in the analysis area as "Roads and Trails Recommended for Closure to Motorized Vehicles."

Unroaded Recreation (UR)

Is there now or will there be in the future, excess supply or excess demand for unroaded recreation opportunities? (UR1)
Unroaded recreation demands on the analysis area include activities such as snowplay, off-road vehicle use, hunting, and hiking. There is an intense demand for winter recreation opportunities in the area that currently exceeds the Forest's capacity to accommodate this use, as evidenced by traffic congestion and parking issues. The supply of this particular recreation opportunity, however, is clearly limited by geography and micro-climate, and is not impacted by the number of roads in the area. Most of this heightened recreation demand is for the upper Kyle and Lee Canyon areas, rather than the analysis area.

Nationally, the demand for unroaded recreation opportunities such as off-road vehicle use, has increased steadily in recent years, and has now become an issue of primary concern on public lands. The Forest

Service, with the travel management rule, has stated that although off-road vehicles are a legitimate use of our public lands, they must be managed. Therefore, the demand for unroaded all-terrain vehicle use in the analysis area must be met with management planning, such as the SMNRA's recent motorized trails designation project. There is also the potential for illegal off-highway vehicle use in the analysis area to spill over into the adjacent Red Rock Canyon National Conservation Area, which prohibits OHV use except on designated routes.

Is developing new roads into unroaded areas, decommissioning of existing roads, or changing the maintenance of existing roads/trails causing substantial changes in the quantity, quality, or type of unroaded recreation opportunities? (UR 2)
Instances of new road development or decommissioning have been minimal and therefore have not substantially changed the recreation experience in the analysis area.

What are the effects of noise and other disturbances caused by developing, using, and maintaining roads on the quantity, quality, and type of unroaded recreation opportunities? (UR 3)
Some types of unroaded recreation opportunities are not necessarily adversely impacted by the presence of roads and their associated disturbances. If visitors are not looking for primitive experiences, the presence of roads would not necessarily adversely affect their experience. As the majority of the unroaded recreation demand in the analysis area involves activities that do not require solitude, such as group snowplay, or motorized vehicle use, the effect of road noise on unroaded recreation opportunities is not likely to be significant. Although there is hiking activity in the area, the effects of road noise on front-country hikers in the project area are not likely to be significant.

Who participates in unroaded recreation in the areas affected by constructing, maintaining, and decommissioning roads? (UR 4)
Instances of new road development or decommissioning have been minimal and therefore have not substantially changed the recreation experience in the analysis area.

What are these participants' attachments to the area, how strong are their feelings, and are alternative opportunities and locations available? (UR 5)
This is not perceived to be a significant issue in this analysis area.

Road-related Recreation (RR):

The SMNRA has the potential to provide additional recreation opportunities and customer service through development of trails, campgrounds and picnic areas, interpretive facilities, and approval of certain commercial developments and uses. These could include extension of existing facilities and uses, or entirely new developments. This goal would encourage new recreation opportunities where consistent with the goals of conserving the health, diversity, integrity, and beauty of the ecosystem, protecting American Indian cultural values and heritage resources, and maintaining current uses and users.

Is there now or will there be in the future excess supply or excess demand for roaded recreation opportunities? (RR 1)
Although for the SMNRA as a whole, the level of roaded recreation supply appears to exceed the demand, the roaded recreation demand is concentrated in a few areas of the SMNRA, including the analysis area. Therefore, in the Middle Kyle Complex analysis area, the roaded recreation supply/demand balance likely differs from that of the overall SMNRA. The analysis area contains roaded recreation attractions such as snowplay and access to developed campgrounds and hiking trails, which concentrates use in the area. Furthermore, the demand for roaded recreation in the analysis area could increase significantly in the future as the result of the expanding Las Vegas metropolitan area and new residential development in lower Kyle Canyon. It is likely that the increasing demand for roaded recreation opportunities will likely soon exceed the supply, if it has not already. Market and financial

analyses (PwC 2008) are guiding the SMNRA Middle Kyle Complex proposal developments to meet future roaded recreation needs.

Is developing new roads into unroaded areas, decommissioning of existing roads, or changing the maintenance of existing road/trails causing substantial changes in the quantity, quality, or type of roaded recreation opportunities? (RR 2)
Instances of new road development or decommissioning have been minimal in the SMNRA, and therefore have not substantially changed the Forest recreation experience. The development of new unauthorized, non- Forest Service System roads has been occurring in the analysis area, and could have an impact on the quality of some visitors' roaded recreation experience. These unauthorized roads often attract motorized recreation users. Visitors driving on the area roads to view the natural features may be seeking the look of a natural setting, and increased motorized use on unauthorized roads may not be a positive change.

What are the effects of noise and other disturbances caused by developing, using, and maintaining roads on the quantity, quality, and type of roaded recreation opportunities? (RR 3)
Noise and other disturbances from road use and maintenance are not a significant concern in the analysis area, as the primary roaded recreation activities in the area are not dependent on quiet or solitude. Developed camping access, driving for pleasure, and viewing natural features are a few examples of the types of activities visitors engage in that are not likely to be significantly impacted by road noise.

Who participates in roaded recreation in the areas affected by constructing, maintaining, and decommissioning roads? (RR 4)
According to 2005 National Visitor Use Monitoring data, 88 % of National Forest Visits to the SMNRA were from white visitors, 14 % of the visits were from visitors reporting Hispanic ethnicity, and 60% were from males. NVUM data also indicates that the majority of SMNRA visitors are local residents. The top ten home zip codes reported by survey respondents were all from Nevada, and primarily from the Las Vegas region. Data on the analysis area in particular was not available at the time of this writing. The activities these visitors participated in is highly dependent on roaded recreation access. Hiking/walking, relaxing, viewing natural features, driving for pleasure were the main recreation activities reported for the SMNRA. 41% of visitors said driving for pleasure was a reason to come to the NRA. This indicates that roaded recreation is important to a wide spectrum of visitors. Disruptions to roaded recreation opportunities from construction, maintenance, or decommissioning activities, however, are not a significant concern in the analysis area.

What are these participants' attachments to the area, how strong are their feelings, and are alternative opportunities and locations available? (RR 5)
As the analysis area is one most accessible recreation areas within easy driving distance of the Las Vegas metropolitan region, local participants' attachment to the area is likely strong. There are also alternative opportunities and locations available in the general area, such as Red Rock NCA and Lake Mead NRA. These resources are not in immediate proximity, though, and offer a different set of recreation opportunities than those available in the analysis area.

Passive-Use Value (PV):

Do areas planned for road entry, closure, or decommissioning have unique physical or biological characteristics, such as unique natural features and threatened or endangered species? (PV 1)
The EF, AQ, and TW sections address the unique or significant features or communities, and rare and uncommon species associated with roads and trails in the analysis area.

All of Kyle Canyon, including the Middle Kyle analysis area, is valued for its naturally appearing scenery and high scenic quality. All activities the forest visitors experience here are performed in a scenic

environment defined by the arrangement of the natural character of the landscape along with components of the built environment, including roads and trails.

Many people are drawn to Kyle Canyon for its climatic relief from desert temperatures as well as beautiful mountain scenery and diverse scenic experiences traveling from deserts with sparse vegetation and stately Joshua trees to steep forest covered mountains and sheer, rock cliffs against a backdrop of clear, blue skies. Viewing natural features, hiking and walking, and driving for pleasure are among the most popular activities in the area (USDA Forest Service 2006). These activities draw people who view scenery and want to see a natural appearing landscape with high scenic quality.

SR 157, Kyle Canyon Road, and SR 158, Deer Creek Road, are two of the three state highways that make up the Mt. Charleston Scenic Byway, a designated Nevada State Scenic Byway. Routes achieve this designation by offering travelers outstanding scenic beauty and cultural interest as well as encompassing scenic, cultural, and historic significance. The analysis area is located in the foreground and middleground distance zones of Kyle Canyon Road and Deer Creek Road, which are sensitivity level one routes[9] and provide the primary viewshed for the analysis area. Foreground occurs up to one-half mile from the viewer, and middleground occurs from one-half mile to four miles from the viewer. Kyle Campground Road and Fletcher View Campground Road are also considered sensitivity level one routes because of the associated recreation activities occurring at the sites. Harris Springs Road, located on the eastern edge of the analysis area, can be considered a sensitivity level two route. No other roads or trails in the analysis area are considered sensitive travel routes.

Scenic attractiveness, or variety class, is a measure of the intrinsic scenic beauty of landform, water characteristics, vegetation patterns, and cultural land use and is classified into three classes: distinctive, common, or indistinctive. Although most of the analysis area has scenic attractiveness considered common to the landscape, pockets of distinctive features are also found. One such area is the slot canyon near Harris Springs Road valued for its cultural significance to the Southern Paiute Nation. The analysis area also provides the foreground to dramatic views of distinctive scenic landscapes.

Does the road system affect unique cultural, traditional, symbolic, sacred, spiritual, or religious significance? (PV 2)

There are known historic properties along the current road alignment. It is not known if they are directly affected by current maintenance activities. Future road construction, decommissioning, or reconstruction must involve design and planning from the local Archaeologist.

What, if any, groups of people (ethnic groups, subcultures, and so on) hold cultural, symbolic, spiritual, sacred, traditional, or religious values for unroaded areas planned for road entry or road closure? (PV 3)
At a minimum, the American Indian tribes with a cultural and spiritual connection to the Spring Mountains should be consulted.

Will road construction, closure, or decommissioning significantly affect passive-use value? (PV 4)
The analysis area consists of lands allocated in the Toiyabe Forest Plan as Retention and Partial Retention Visual Quality Objectives. Visual Quality Objectives (VQOs) provide categories of acceptable landscape alteration and are measured in degrees of deviation from the natural appearing landscape. The Forest Plan defines Retention VQO as a landscape where management practices are not evident to the casual observer

[9] Sensitivity level is a term used in the USDA Forest Service's Visual Management System which classifies travel routes in order to prioritize and protect visual resources in the area. Sensitivity level one is the highest level of classification, describing roads such as Interstate Highways and designated scenic roads.

and Partial Retention VQO as a landscape where management practices are visually subordinate to the characteristic landscape (USDA Forest Service 1986). Additional Forest Plan direction is to "protect the scenic viewshed of State Highway 156, 157, and 158 to maintain naturally appearing scenery" (USDA Forest Service 1996).

The current system roads and trails, although evident to the casual observer, create the platform for viewing scenery, drawing people to the area. Most of the roads found within the analysis area only slightly alter the landscape and remain visually subordinate to the valued landscape character, especially as viewed from Kyle Canyon Road and Deer Creek Road. The visual effects of trails are usually minimal since trails and trail cuts are often screened by existing vegetation and topography. Trails in the analysis area are not evident to the casual observer from sensitive viewpoints.

Road cuts on steep slopes can result in exposed, light colored soils which may begin to dominate the valued landscape character, creating lines and color uncharacteristic of the natural form, line, color, and texture found in the landscape. Most roads in the analysis area have been designed to minimize these visual effects. In the photo below, Deer Creek Road remains visually subordinate to the characteristic landscape by borrowing from the patterns and lines of the natural landscape so closely it is almost not evident to the casual observer. In contrast, a non-system road, located in the right center of the photo, is a visible deviation from the valued landscape character, introducing a line and sharp texture and color change which is not characteristic of this landscape. The location and design of this non-system road does not meet Retention VQO.

Figure 7. Photo taken from Kyle Canyon Road looking west toward the intersection of Kyle Canyon Road and Deer Creek Road.

Social Issues (SI):

What are the people's perceived needs and values for roads/trails? How does the road/trail management affect people's dependence on, need for, and desire for roads/trails? (SI 1)
What are the people's perceived needs and values for access? How does the road/trail management affect people's dependence on, need for, and desire for access? (SI 2)
Visitors' needs and values for specific roads and trails in the analysis area are unknown at the time of writing. In general, road and trail management can impact people's valuation of the transportation system. For example, deferred maintenance which leaves a road in a condition that is uncomfortable for users may cause visitors to value that road less in the future.

How does the road/trail system affect access to paleontological, archaeological, and historical sites? (SI 3)

The analysis area contains numerous known pre-historic and historic properties including the Kyle Ranger Station, also referred to as the Kyle CCC Camp. Specific locations of these sites are contained in administrative records located at the District office but are not detailed or disclosed here for their protection. Many of these sites are close to or adjacent to the existing road system. While the road system allows for access to these sites for preservation purposes, it also increases the risk of vandalism, inadvertent damage or looting.

In previous Forest Service projects, the possibility of direct effects to known cultural resources, generally, has been low, due to avoidance and project redesign. Most categories of road management activities may result in indirect cumulative effects to archaeological properties. These indirect effects range from cumulative to non-intentional public vandalism

Decommissioning roads and limiting access to these sites may limit the cumulative effects on them (e.g., vandalism, inadvertent damage, intentional looting). However, sites that cannot be monitored easily may be more subject to damage. Reducing motor vehicle access would increase the costs of future monitoring, documentation, investigation, evaluation, and interpretation of sites.

All future road activities must include consultation with the District Archeological staff in an effort to avoid or diminish known and anticipated affects to these sites.

How does the road/trail system affect cultural and traditional uses, and American Indian treaty rights? (SI 4)
No known conflicts are known between traditional uses, American Indian treaty rights and the road system. The road system in Middle Kyle Canyon is used as a primary access to traditional gathering areas for piñyon nuts and medicinal plants. Future actions should consider and maintain this use.

How are roads/trails that are historic sites affected by road management? (SI 5)
There are no known historic roads in the analysis area.

How is community social and economic health affected by road management (for example, lifestyles, businesses, tourism industry, infrastructure maintenance)? (SI 6)
Tourism is the major industry in the Las Vegas Valley, and with a growing metropolitan Las Vegas population, increasing numbers of tourists and residents alike are exploring the areas around the city. The SMNRA is thus directly impacted by both of these general trends. Due to these pressures, the SMNRA, including the analysis area, increasingly functions as an urban park for residents of and visitors to the region. The road and trail system in the analysis area is therefore important to local communities' social and economic health.

How does road management affect wilderness attributes, including natural integrity, natural appearance, opportunities for solitude, and opportunities for primitive recreation? (SI 8)
The roads in this analysis area do not affect wilderness attributes.

What are the traditional uses of animal and plant species within the area of analysis? (SI 9)
The only known traditional use associated with the analysis area is the collection of piñyon nuts and medicinal plants. All roads and trails into areas dominated by piñyon pine provide access for collectors of piñyon pine nuts. At this writing, we do not know the amount of use the various roads and trails are used for these purposes. SR 157, SR 158 and roads and trails north of SR 157 provide access for collecting these products.

How does road/trail management affect people's sense of place? (SI 10)
Kyle Canyon is the most traveled access route in the Spring Mountains. Cathedral Rock and other areas in upper Kyle Canyon are key destinations for those that use the road and trail system in the Middle Kyle

Area. Access appears to be of primary importance for these visitors, and therefore the current road and trail system is essential for maintaining their sense of place.

Civil Rights and Environmental Justice (CR):

How does the road/trail system, or its management, affect certain groups of people (minority, ethnic, cultural, racial, disabled, and low-income groups)? (CR 1)

Executive Order 12898 (February 11, 1994) directs federal agencies to focus attention on minority communities and low-income communities, the purpose being to identify and address, as appropriate, disproportionate human health and environmental effects on these populations. The percent of the Clark County population categorized as minority (American Indian (0.8%), Black (9.1%), Asian/Pacific (5.7), multi-racial (12.8)) was 28.4% in 2000, and was somewhat greater than 24.8% for the State of Nevada (USDA Forest Service 2004a). The percent American Indian was lower for Clark County (0.8%) than for the State (1.3%) in 2000. The percent of families living in poverty was similar for Clark County (7.9%) compared to the State (7.5%). Given the nature of road and trail system and demographics of the area, disproportionate human health and environmental effects on minority or low income communities do not occur. The road and trail system preserves easy access to public recreation opportunities for low-income, Hispanic, and other segments of the local population.

CHAPTER 5: DESCRIBING OPPORTUNITIES AND SETTING PRIORITIES

This travel analysis report analyzed the extent and current condition of roads on NFS lands within the Middle Kyle Complex analysis area. The report compares the current condition to a desired future condition to help identify the opportunities and need for change. The report provides information that will help develop the Forest's strategic intent for road management; that is, what may happen to balance the need to accommodate visitation demands in the area with the need to minimize recreational user impacts on sensitive species and habitats in upper Lee and Kyle Canyons. Before implementing any proposed actions, the Forest will complete the NEPA process.

One of the goals of the General Management Plan for the Spring Mountains National Recreation Area (USDA Forest Service 1996) is to provide additional recreation facilities in the lower Kyle Canyon Area. As there is a need to reduce recreation pressure on the sensitive species and habitats of the upper Kyle Canyon Area, there are potential opportunities lower in Kyle Canyon (e.g., the Middle Kyle Canyon analysis area) to relieve some of this pressure.

The purpose of this step in the analysis is to compare the current transportation system with the issues set forth in step 4, and to describe the options for modifying the transportation system to more closely match the Forest's land management goals in the analysis area.

Based on the existing and desired road and trail system conditions and issues relative to the proposed project action, the following sets of opportunities were developed:

Reduce Vehicle Use in Upper Kyle Canyon by capitalizing on infrastructure in the analysis area: The analysis identified that existing road capacity in the analysis area is sufficient to support greater infrastructure investments that may reduce vehicle use in the upper canyon, although some locations may need adjustment to provide appropriate access to proposed development. Site placement of said investments should take into consideration known traffic and parking issues associated with SR 157 and be designed to reduce said issues.

Revise current road maintenance levels where appropriate: The analysis identified opportunities to maintain the current maintenance level for some roads and trails that are currently part of the National Forest System in the analysis area. However, in order to meet desired future conditions that provide more recreation opportunities out of the upper canyon areas, some roads and trails will need to be improved which may require revision to the maintenance level. Further resource-specific recommendations regarding maintenance of existing roads and trails in the analysis area are discussed in the next chapter.

Classify roads or trails: The analysis produced limited opportunities to classify a few unauthorized roads in the analysis area. These roads are listed in the Final Recommendations section. Additional opportunities to classify roads and trails, however, may result from development alternatives associated with the Middle Kyle Complex project and separate ongoing analyses regarding motorized trail designations in the Spring Mountains National Recreation Area. Existing unauthorized trails in the Telephone Canyon area should be evaluated to determine what existing segments are appropriate for conversion to classified trails.

Road/Trail decommissioning: All classified roads and trails were found to be necessary for such purposes as recreation, safety, and vegetation management. The analysis found opportunities to close unauthorized roads and trails and would suggest that beyond closure, these roads are good candidates for decommissioning.

Road/Trail conversion: Although several roads in the analysis area serve dual purposes- as roads and as trails - this analysis did not find it to be beneficial to convert any from strictly one use to another. Market analysis (PwC 2008) and early project planning for the Middle Kyle Complex (Shapins 2005) identified demand for additional non-motorized trails, of varying lengths and difficulty levels. The Harris Springs bench area, south of Kyle wash, which is currently roaded with both designated and unauthorized routes provides an opportunity as an area that could be converted to non-motorized trail use to achieve these objectives.

Road/Trail closures: Current road and trail closure status on existing system roads and trails in the analysis area should be maintained. In addition, travel on unauthorized roads and trails is illegal; enforcement of road closures should continue to be handled by Forest Service law enforcement personnel. Additionally all non-system roads and trails not shown on the most recent Motor Vehicle Use Map should be considered for closure.

Road/Trail construction: Although this analysis did not identify specific opportunities for road or trail construction in the analysis area, it did identify the opportunity to further investigate new construction. Route improvements can provide opportunities to address resource concerns through careful design and proper location. The roaded recreation analysis identified a shortage of roaded recreation opportunities in the analysis area. Therefore, road or trail construction should be further investigated in the analysis area to avoid continued visitor displacement into more sensitive landscapes.

Both the Telephone Canyon area and the Harris Springs area south of Kyle wash provide opportunity for expanded trail networks. To the greatest extent practicable, trail connectivity between areas should be provided for a seamless trail network.

Furthermore, certain considerations should be made in planning for new road construction. A Landscape Architect should be involved in the layout and design of any new road construction in the analysis area to ensure visual quality objectives are met and to protect the scenic viewshed of State Highways 157 and 158.

Road/Trail reconstruction or maintenance: Road reconstruction or maintenance opportunities identified in this analysis are centered on the current general transportation safety concerns associated with parts of the transportation system, such as on Kyle Canyon Road.. Opportunities exist to reduce congestion in the upper canyons by providing additional recreation opportunities in other areas such as Lee Canyon or lower in Kyle Canyon. Reducing the number of intersections on Kyle Canyon Road can also be considered. There may also be opportunities for minimizing potential intersection conflicts by relocating administrative facilities such as the Las Vegas Police Department and the Clark County/Republic Services Transfer Station.

CHAPTER 6: RECOMMENDATIONS

Resource Specific Recommendations

Recommendations based on each resource area are brought forward in this section and then reconciled between resources in the section Final Recommendations. In consideration of the road and trail system opportunities identified above, the travel analysis makes the following resource based recommendations:

Ecosystem Functions and Terrestrial Wildlife Recommendations

Maintenance of system roads or trails that bisect or are adjacent to plants/wildlife species of concern or biodiversity hotspots should be coordinated with the District botanist or biologist prior to completion to avoid or reduce impacts to known locations. See Tables 8 and 9 for specific recommendations.

Unauthorized roads or trails that bisect or are adjacent to plants/wildlife species of concern or biodiversity hotspots should be closed. See Tables 8 and 9 for specific roads and species.

Close/barricade to motorized travel user-created trails in Kyle Canyon Wash and in butterfly larval host-plant populations. See specific recommendations in Tables 8 and 9.

Following closure of user created trails/roads, rehabilitate with local-sourced (immediate vicinity) native vegetation, where appropriate.

Where possible, prevent (i.e., through barricades, signage, etc.) off-trail/off-road travel by motorized and non-motorized users in butterfly larval and nectar host-plant populations.

Establish/enforce speed limits on all motorized roads and trails to reduce vehicle-animal collisions.

Control invasive plant species along all roads and trails to prevent/reduce conversion of native communities to non-native.

Limit new road/trail construction to those areas outside known butterfly nectar and larval host-plant populations to the greatest extent practicable.

Table 8. Road/Trail recommendations addressing butterfly host plant & Biodiversity Hotspot concerns.

Recommendation	Road/Trail Type	ID Number	Resource Concern	Miles
Avoid where possible known locations during road maintenance.[1]	Unimproved	45531	(CHDO - butterfly plant)	0.1
			(HEMUN - butterfly plants)	0.4
		45531 Total		0.5
	Unimproved Total			0.5
	Unimproved,4WD	45530A	(CHER, ERUN – butterfly plants)	0.1
		45530A Total		0.1
	Unimproved,4WD Total			0.1
	State Roads	SR157	(AMUT, CHNA, ERAN, HEMUN, PEPA - butterfly plants)	1.3
			(AMUT, ERAN – butterfly plants)	0.1
			(AMUT, HEMUN, PEPA - butterfly plants)	0.2

Recommendation	Road/Trail Type	ID Number	Resource Concern	Miles
			(HEMUN - butterfly plant)	0.3
		SR157 Total		1.8
	State Roads Total			1.8
Avoid where possible during road maintenance Total				2.3
Limit effects during road maintenance [2]	State Roads	SR157	Biodiversity hotspot (AMUT - butterfly plants)	0.4
		SR157 Total		0.4
	State Roads Total			0.4
Avoid/limit effects during road maintenance Total				0.4
Close road[3]	Unauthorized Roads & Trails	UAR-157KK	(AMUT - butterfly plants) (AMUT, CHNA, HEMUN, PEPA - butterfly plants) (ERAN - butterfly plant)	0.1 0.5 0.1
		UAR-157KK Total		0.7
		UAR-157MM	(AMUT, PEPA – butterfly plants)	0.2
		UAR-157MM Total		0.2
		UAR-157NN	(AMUT, CHDO, HEMUN, butterfly plants) (AMUT, HEMUN, PEPA - butterfly plants)	0.2 0.2
		UAR-157NN Total		0.4
		UAT-10	(CHDO - butterfly plant) Biodiversity hotspot (ANUT, ERAN, HEMUN)	0.1 0.6
		UAT-10 Total		0.7
		UAT-18	Biodiversity hotspot (ERUM, LUAR - butterfly plants) Biodiversity hotspot, (AMUT, APAN, CALI, CHER, ERUM, HEMUN, LUAR, ROWO - butterfly plants)	0.0 1.0
		UAT-18 Total		1.0
		UAT-2	CRTU, (AMUT, ERAN - butterfly plants)	1.1
		UAT-2 Total		1.1
		UAT-20	Biodiversity hotspot (ERUM, HEMUN - butterfly plants)	0.1
		UAT-20 Total		0.1
		Unauthorized Roads & Trails Total		4.2
Close Road Total				4.2
Close Road To Motorized Use	Unauthorized Roads & Trails	UAT-14	Butterfly plants, general terrestrial wildlife habitat (desert riparian wash)	4.1
		Unauthorized Roads & Trails Total		4.1
Close Road To Motorized Use Total				4.1

Recommendation	Road/Trail Type	ID Number	Resource Concern	Miles
Grand Total				11

[1] Avoid where possible during road maintenance - recommended where rare and /or butterfly host plants are present along a system or county road but the road is outside a biodiversity hotspot.
[2] Limit effects during road maintenance - recommended where rare and /or butterfly host plants are present along a system or county road and the road is within a biodiversity hotspot.
[3] Close road - recommended for unauthorized roads where rare plants, butterfly host plants, and/or biodiversity hotspots were present.

Table 9. Road/Trail recommendations to address botany/rare plant concerns.

R/T Recommendation	LEGEND	NUMBER	Rare Plants	Miles
Avoid where possible during road maintenance	Unimproved	45530	ASAE, CRTU	2.3
			CRTU	0.1
		45530 Total		2.4
		45531	CRTU	0.7
		45531 Total		0.7
		45532J	PBIB	0.2
		45532J Total		0.2
	Unimproved Total			3.3
	Unimproved,4WD	45531B	CRTU	0.3
		45531B Total		0.3
		45531D	CRTU	0.6
		45531D Total		0.6
		45532B	CRTU	0.6
		45532B Total		0.6
		45532C	CRTU	0.1
		45532C Total		0.1
		45577	CRTU	1.1
		45577 Total		1.1
	Unimproved,4WD Total			2.7
	Unauthorized Roads	UAR-45531DD	CRTU	0.1
		UAR-45531DD Total		0.1
	Unauthorized Roads Total			0.1
	State Roads	SR157	ERHIC	1.3
		SR157 Total		1.3
	State Roads Total			1.3
Avoid where possible during road maintenance Total				7.4
Limit effects during road maintenance	Improved,Paved	45000	Biodiversity hotspot	0.1
		45000 Total		0.1
		45064	ASAE, VICH, biodiversity hotspot	0.0
			Biodiversity hotspot	0.2
			VICH, Biodiversity hotspot	0.1
		45064 Total		0.3
	Improved,Paved Total			0.4
	State Roads	SR157	ANSC, biodiversity hotspot	0.1
			ASAE, Biodiversity hotspot	0.1

R/T Recommendation	LEGEND	NUMBER	Rare Plants	Miles
			ASAE, VICH, biodiversity hotspot	0.1
			ASFU, biodiversity hotspot	0.4
			Biodiversity hotspot	0.2
		SR157 Total		0.9
	State Roads Total			0.9
Limit effects during road maintenance Total				1.3
Close road	Unauthorized Roads & Trails	UAR-157KK	ERUNC, GLCL, IVJA	0.5
		UAR-157KK Total		0.5
		UAR-157RR	VICH, Biodiversity hotspot	0.1
		UAR-157RR Total		0.1
		UAR-157SS	Biodiversity hotspot	0.0
		UAR-157SS Total		0.0
		UAR-157TT	Biodiversity hotspot	0.1
		UAR-157TT Total		0.1
		UAR-45531BB	CRTU	0.2
		UAR-45531BB Total		0.2
		UAT-10	Biodiversity hotspot	0.6
		UAT-10 Total		0.6
		UAT-18	ASAE, biodiversity hotspot	0.0
			Biodiversity hotspot	0.0
			TOJOT, biodiversity hotspot	1.0
		UAT-18 Total		1.0
		UAT-19	ASAE, Biodiversity hotspot	0.1
		UAT-19 Total		0.1
		UAT-2	CRTU	1.1
		UAT-2 Total		1.1
		UAT-20	ASAE, Biodiversity hotspot	0.8
			ASAE, VICH, biodiversity hotspot	0.1
		UAT-20 Total		.9
		UAT-22	CRTU	0.2
		UAT-22 Total		0.2
		UAT-3	ASAE	0.4
		UAT-3 Total		0.4
		UAT-6	ASAE	0.1
			CRTU	1.6
			PETHJ	0.9
			VICH	0.4
		UAT-6 Total		3.0
	Unauthorized Roads & Trails Total			8.2
Close road Total				8.2
Limit effects during road maintenance	3-Improved,Paved	45065	Biodiversity hotspot	0.3
		45065 Total		0.3
	3-Improved,Paved Total			0.3
	5-Improved,Dirt	45055	Biodiversity hotspot	0.1

R/T Recommendation	LEGEND	NUMBER	Rare Plants	Miles
		45055 Total		0.1
	5-Improved,Dirt Total			0.1
	State Roads	SR157	Biodiversity hotspot	0.9
		SR157 Total		0.9
		SR158	Biodiversity hotspot	0.4
		SR158 Total		0.4
	State Roads Total			1.3
Limit effects during road maintenance Total				1.7
Grand Total				18.6

Economics Recommendations

Changes to existing roads or proposal for new roads/trails in the Middle Kyle Complex project area should attempt to satisfy or provide a majority of objectives detailed here. As a general point, it will be important to weigh the short-term costs of transportation investment against the long-term benefits of efficient traffic management and access provision in the context of escalating demand/traffic. Examples of economic objectives the analysis recommends a project to consider are:

The low or reduced cost of complying with standards and guidelines by avoiding roads in environmentally or culturally sensitive areas;

The capacity to handle not only the relatively high traffic/demand for access currently experienced by Middle Kyle canyon, but capacity to handle longer-term projected increases in traffic and demand for access that are likely as a result of development and growth in the region (i.e., provide some 'buffer capacity' to handle future increases in traffic and minimize the need to expand/change the system long-run);

Improving access to recreational sites that serve as source of revenue for SMNRA (e.g., user-fee campgrounds, concessionaires, etc), thereby improving financial efficiency;

Improving access for increasing need for fire and fuels management and emergency response (i.e., access investment today may minimize expense of providing these services in the future);

Reducing or minimizing adverse impacts to local residents (e.g., Mt Charleston) associated with safety, noise, and congestion from increasing traffic; and

Timber/Fuels Management Recommendations

For the treatment of forest or woodland (tree) insects and diseases all improved National System Roads (45532, 45055, 45064, and 45065) should be managed in their current status. Of the unimproved National Forest System Roads, road numbers 45530 and 45077 should be retained and improved in the future only if needed to improve access for tree removal operations.

For public woodcutting activities or piñyon pine nut collection, road number 45530 could be retained and maintained or improved only as needed to provide access for high-clearance vehicles (pickups).

General Public Transportation Recommendations

There are safety concerns associated with the road system in the analysis area, due primarily to its proximity to the metropolitan Las Vegas area. Traffic congestion and the adequacy of parking are issues at various points on the Kyle Canyon Road, especially west of the Deer Creek Road intersection.

It is recommended that additional parking areas associated with recreational destinations (such as trailheads) be established in the project area.

It is recommended that investments in recreational infrastructure be made to develop additional camping or recreation facilities in the analysis area to remove traffic from SR 157 lower in the canyon and thus reducing vehicular volume in the upper stretches of Kyle Canyon. Location of such sites should capitalize on previously disturbed sites and use existing classified and unclassified road and trail locations that do not conflict with resource needs.

Protection and Public Safety Recommendations

It is recommended that administrative facilities of the Las Vegas Police Department and Clark County/Republic Services Transfer Station be relocated to use a single access point off of SR 157.

It is recommended that all unauthorized roads or trails that do not meet classification or maintenance standards either be added as system or roads or trails and maintained accordingly or closed as needed by other resources.

It is recommended that consideration be given to locating new roads and trails and to re-align existing system roads on ridge lines or on gentle sloping ground rather than on steep slide slopes as much as possible. Roads or trails located on steep side slopes can increase risk to firefighters and the public because fires burn up slope with greater intensity and rate of spread (NWCG 2004 A-56). Roads and trails may also be used for tactical fire suppression purposes, and are generally more effective if located on ridgelines rather than side-slopes.

It is recommended that the following roads and trails be considered for road closure to motorized use for air quality considerations.

Table 10. National Forest System Roads Recommended for Closure to Motorized Vehicles – Dust Mitigation

Road Number	Miles	Road Type
45531B	0.74	Unimproved
45531C	0.21	Unimproved
45531E	0.05	Unimproved
45531G	0.02	Unimproved
45531H	0.04	Unimproved
45532J	0.24	Unimproved
Total	1.30	

Table 11. Unauthorized Roads Recommended for Closure to Motorized Vehicles – Dust Mitigation

Road Number	Miles	Road Type
UAR-157AA	0.04	Unauthorized Roads
UAR-157AAA	0.01	Unauthorized Roads
UAR-157BB	0.03	Unauthorized Roads
UAR-157BBB	0.12	Unauthorized Roads
UAR-157CC	0.18	Unauthorized Roads
UAR-157CCC	0.13	Unauthorized Roads
UAR-157DD	0.05	Unauthorized Roads
UAR-157DDD	0.10	Unauthorized Roads
UAR-157EE	0.05	Unauthorized Roads
UAR-157EEE	0.03	Unauthorized Roads

Road Number	Miles	Road Type
UAR-157FF	0.07	Unauthorized Roads
UAR-157KK	1.58	Unauthorized Roads
UAR-157MM	0.16	Unauthorized Roads
UAR-157NN	0.90	Unauthorized Roads
UAR-157OO	0.22	Unauthorized Roads
UAR-157PP	0.07	Unauthorized Roads
UAR-157RR	0.10	Unauthorized Roads
UAR-157TT	0.10	Unauthorized Roads
UAR-45077AA	0.31	Unauthorized Roads
UAR-45330HH	0.02	Unauthorized Roads
UAR-45330II	0.21	Unauthorized Roads
UAR-45330KK	0.28	Unauthorized Roads
UAR-45530AA	0.07	Unauthorized Roads
UAR-45530BB	0.04	Unauthorized Roads
UAR-45530CC	0.02	Unauthorized Roads
UAR-45530DD	0.15	Unauthorized Roads
UAR-45530EE	0.30	Unauthorized Roads
UAR-45530FF	0.03	Unauthorized Roads
UAR-45531BB	0.20	Unauthorized Roads
UAR-45531C1	0.23	Unauthorized Roads
UAR-45531C2	0.20	Unauthorized Roads
UAR-45531CC	0.02	Unauthorized Roads
UAR-45531DD	0.07	Unauthorized Roads
UAR-45531EE	0.13	Unauthorized Roads
UAR-45531HH	0.10	Unauthorized Roads
UAR-45531II	0.58	Unauthorized Roads
UAR-45531JJ	1.43	Unauthorized Roads
UAR-45532AA	0.04	Unauthorized Roads
UAR-45532C1	0.40	Unauthorized Roads
UAR-45532C2	0.03	Unauthorized Roads
UAR-45532C3	0.12	Unauthorized Roads
UAR-45532C4	0.13	Unauthorized Roads
UAR-45532DD	0.29	Unauthorized Roads
UAR-45532EE	0.02	Unauthorized Roads
UAR-45532FF	0.25	Unauthorized Roads
UAR-45532GG	0.11	Unauthorized Roads
UAR-45532HH	0.07	Unauthorized Roads
UAR-45532KK	0.01	Unauthorized Roads
Total	9.80	

Table 12. Unauthorized Trails Recommended for Closure to Motorized Vehicles – Dust Mitigation

Trail Number	Miles	Trail Type
UAT-1	2.91	Unauthorized Trails
UAT-10	0.74	Unauthorized Trails
UAT-13	0.05	Unauthorized Trails

Trail Number	Miles	Trail Type
UAT-15	0.35	Unauthorized Trails
UAT-16	0.12	Unauthorized Trails
UAT-17	0.09	Unauthorized Trails
UAT-18	1.19	Unauthorized Trails
UAT-19	0.06	Unauthorized Trails
UAT-2	1.26	Unauthorized Trails
UAT-20	0.97	Unauthorized Trails
UAT-21	0.57	Unauthorized Trails
UAT-3	0.43	Unauthorized Trails
UAT-4	0.12	Unauthorized Trails
UAT-5	0.12	Unauthorized Trails
UAT-6	4.45	Unauthorized Trails
UAT-7	0.78	Unauthorized Trails
UAT-8	0.69	Unauthorized Trails
UAT-9	0.24	Unauthorized Trails
Total	15.14	

Unroaded Recreation Recommendation

It is recommended that all unauthorized roads/trails in the project area that were identified for closure in the 2004 Spring Mountains National Recreation Area Motorized Trails Designation Project decision be closed.

Passive-Use Value Recommendation

From a scenery resource perspective, consider decommissioning and rehabilitating road UAR-157NN depicted on the recommendations map.

Final Recommendations

Resource based recommendations were reviewed collectively by the interdisciplinary team and consolidated in to a single set of final recommendations for the analysis area. Often, management recommendations of one resource could be accomplished via the recommendations of another. For example, if a recommendation based on butterfly protection calls for limiting road maintenance and an air quality recommendation calls for closing that same road to motorized vehicles, the final recommendation for that road would be to close it to motorized vehicles. In this case, the final recommendation accomplishes both resource needs. General recommendations of other resources are consolidated into these recommendations where applicable. Maps 5, 6, and 7 display the final recommendations of this analysis. These recommendations are independent of the proposed Middle Kyle Complex project. See Appendix C for discussion of road and trail recommendations relative to the Middle Kyle Complex project.

Whereas this section displays a consolidated view of overall recommendations, future management should consider the specific recommendations presented in the previous section if that management differs from these final recommendations.

Final Recommendations – Existing Road System

Close Road or Opportunity To Decommission Road

These roads were deemed by the IDT to be in excess of current and future infrastructure needs and presented resource conflicts that would be best resolved by closing or decommissioning the road.

		Resource Driving Recommendation					
Road Number	Miles	Wildlife/ Plants	Air Quality	Economics	Visuals	Recreation	Public Safety
UAR-157DD	0.05	X	X	X			X
UAR-157EE	0.05	X	X	X			X
UAR-157OO	0.22		X			X	X
UAR-157SS	0.03	X	X	X			X
UAR-45531BB	0.18	X	X	X			X
UAR-45532AA	0.04		X			X	
UAR-45532C1	0.48		X			X	
UAR-45532C2	0.03		X			X	
UAR-45532C3	0.12		X			X	
UAR-45532C4	0.13		X			X	
UAR-45532DD	0.29		X		X	X	X
UAR-45532EE	0.02		X			X	
UAR-45532FF	0.25		X			X	
UAR-45532GG	0.11		X			X	
UAR-45532HH	0.08		X			X	
UAR-45532II	0.03		X			X	
UAR-45532JJ	0.08		X			X	
UAR-45532KK	0.01		X			X	
Total	2.20						

Close Road To Motorized Vehicles-Allow Administrative Use if Needed

These roads were deemed by the IDT to be in excess of current and future public access needs and presented resource conflicts but that could serve as a public trail or road for administrative purposes.

Road Number	Miles	Resource Driving Recommendation					
		Wildlife/ Plants	Air Quality	Economics	Visuals	Recreation	Public Safety
UAR-157AA	0.04		X			X	X
UAR-157BB	0.03		X			X	X
UAR-157CC	0.18		X			X	X
UAR-157EE	0.03		X			X	X
UAR-157FF	0.07		X			X	X
UAR-157NN	0.51		X			X	X
UAR-157PP	0.07		X			X	X
UAR-45077AA	0.31		X			X	X
UAR-45330HH	0.02		X			X	X
UAR-45330II	0.30		X			X	X
UAR-45330KK	0.31		X			X	X
UAR-45530AA	0.07		X			X	X
UAR-45530BB	0.13		X			X	X
UAR-45530CC	0.02		X			X	X
UAR-45530DD	0.15		X			X	X
UAR-45530EE	0.15		X			X	X
UAR-45530FF	0.03		X			X	X
UAR-45531BB	0.02		X			X	X
UAR-45531C1	0.23		X			X	X
UAR-45531CC	0.02		X			X	X
UAR-45531DD	0.07		X			X	X
UAR-45531EE	0.13		X			X	X
UAR-45531HH	0.10		X			X	X
Total	2.99						

Road Maintenance Limitations

These roads (or road segments) were deemed by the IDT necessary for current and future infrastructure needs but presented resource conflicts that should be considered or mitigated during maintenance of the road. Specific recommendations for maintenance limitations are found in Tables 8 and 9.

Road Number	Miles	Resource Driving Recommendation					
		Wildlife/ Plants	Air Quality	Economics	Visuals	Recreation	Public Safety
45055	0.14	X					
45064	0.32	X					
45065	0.27	X					
45530	2.46	X					
45531	1.17	X					
45532B	0.62	X					
45532C	0.12	X					

45577	1.09	X					
45998	0.04	X					
SR157	3.43	X					
SR158	0.43	X					
Total	10.09						

Unauthorized Roads that are Recommended for Classification[10]

These roads were deemed by the IDT to be necessary for current and future infrastructure needs and recommend that they be added as classified system roads.

Road Number	Recommended Classification
UAR-157AA	Maintenance Level 4 (Las Vegas Metro substation access)
UAR-157BB	Maintenance Level 4 (NDOT maintenance station access)
UAR-157CC	Maintenance Level 4 (Solid waste transfer station access)
UAR-157GG	Maintenance Level 3 (parking)
UAR-157JJ	Maintenance Level 4 (Village/former golf course parking and access)
UAR-157MM	Maintenance Level 2 (Well access road)

[10] Roads recommended for classification/maintenance levels need to be validated through standard classification processes for final recommendations by qualified staff including a roads engineer. See Chapter 1 for maintenance level definitions.

Final Recommendations – Existing Trail System

Close Trail or Opportunity To Decommission Trail

These trails were deemed by the IDT to be in excess of current infrastructure needs and present resource conflicts, such as improper location or unauthorized OHV use and access that would be best resolved by closing, decommissioning or relocating the trail.

Trail Number	Miles	Resource Driving Recommendation					
		Wildlife/ Plants	Air Quality	Economics	Visuals	Recreation	Public Safety
UAT-10	0.63	X	X	X		X	X
UAT-18	1.13	X	X	X		X	X
UAT-19	0.06	X	X	X		X	X
UAT-2	1.13	X	X	X		X	X
UAT-20	0.99	X	X	X		X	X
UAT-21	0.58	X	X	X		X	X
UAT-3	0.42	X	X	X		X	X
UAT-6	3.08	X	X	X		X	X
Total	8.02						

Opportunity to Add Non-Motorized Trails

These unauthorized trails are currently being accessed or used by motorized and/or non-motorized users. The trails provide recreational opportunities that are consistent with current and future recreation needs in the analysis area but present resource conflicts with motorized use. It is recommended that these trails be added as non-motorized system trails.

Trail Number	Miles	Resource Driving Recommendation					
		Wildlife/ Plants	Air Quality	Economics	Visuals	Recreation	Public Safety
UAT-1	2.97	X	X				X
UAT-10	0.12	X	X				X
UAT-13	0.05	X	X				X
UAT-14	4.10	X					
UAT-15	0.35	X	X				X
UAT-16	0.12	X	X				X
UAT-17	0.09	X	X				X
UAT-18	0.06	X	X				X
UAT-2	0.24	X	X				X
UAT-4	0.12	X	X				X
UAT-5	0.12	X	X				X
UAT-6	1.37	X	X				X
UAT-7	0.77	X	X				X
UAT-8	0.72	X	X				X
UAT-9	0.24	X	X				X
157KK	0.78	X	X	X			X
157AAA	.01		X			X	X
157BBB	.12		X			X	X

157CCC	.13		X			X	X
157DDD	.1		X			X	X
157KK	.8		X			X	X
157NN	.51		X			X	X
45531C1	.23		X			X	X
45532C1	.48		X			X	X
Total	11.44						

Final Recommendations – Future Road and Trail System

Protect Plant, Animal, and Archeological Resources. Locate new road/trail construction to those areas outside of known endemic plants and species of concern, and known archeological sites to the maximum extent practicable. Minimize impacts to butterfly host, larval and nectar plants. Where impacts to plants are unavoidable, implement appropriate revegetation strategies to mitigate plant loss. Biological and cultural resources are considerable throughout the analysis area. Maps of these resource locations are on file at the SMNRA and should be consulted prior to any new road or trail locations.

Address Safety Issues on State Road 157. The September 2005 SMNRA Transportation Study identified safety enhancements that should be implemented within the project area. The recommendations included signage and marked pedestrian crossings for the Fletcher Canyon Trail and the Robbers Roost Trail. The February 2007 Middle Kyle Canyon Development Traffic Study identified highway intersections within the project area that should be improved if the Middle Kyle Complex is implemented. Implementation of these improvements will need to be coordinated with and approved by the Nevada Department of Transportation.

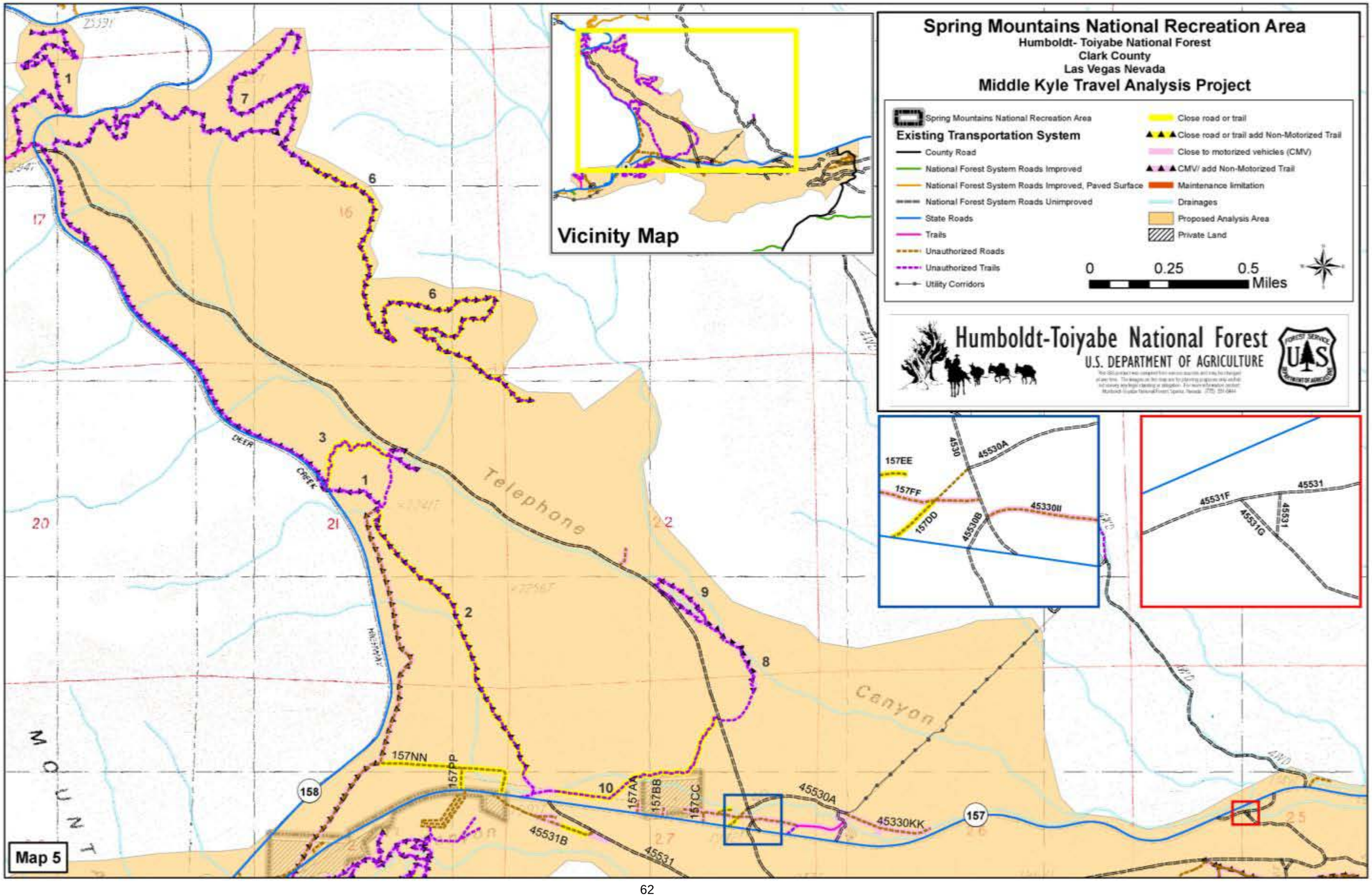
Provide Recreational Destinations in Middle Kyle Canyon. It is recommended that investments in recreational infrastructure be made to develop additional camping and other recreation facilities in the analysis area to encourage visitor use lower in the canyon and thus reducing vehicular volume in the upper stretches of Kyle Canyon. Location of such sites should capitalize on previously disturbed areas and use existing classified and unclassified road and trail locations that do not conflict with resource needs.

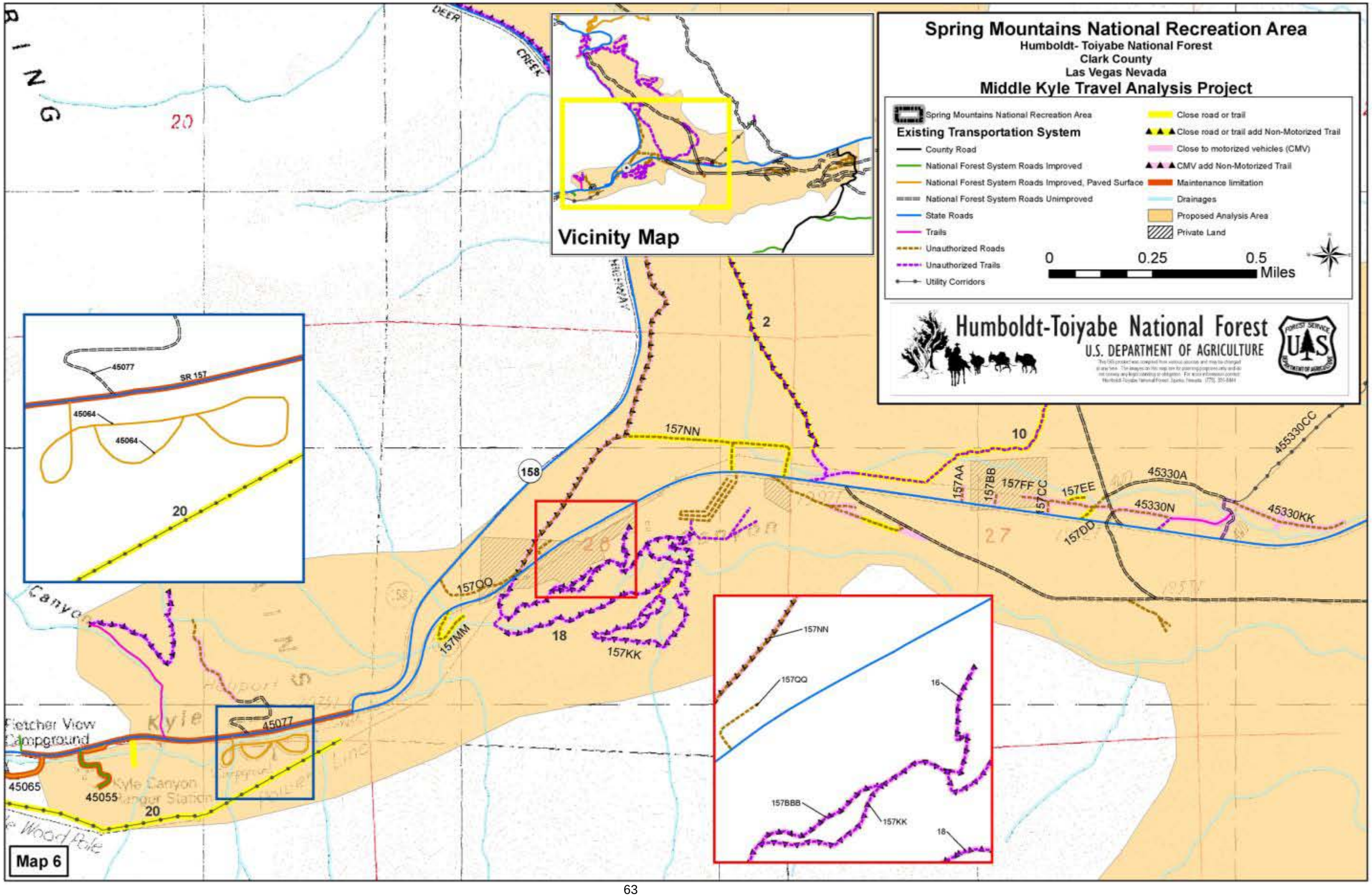
Construct Additional Areas for Parking. As new specific projects are proposed in Middle Kyle Canyon, additional parking areas adjacent to existing or new facilities should provide additional parking capacity. Generally, previously disturbed sites outside of biodiversity hotspots are preferred. Consideration should be given to provide space for future shuttle bus stops. Improved traffic count data and visitor use monitoring should be implemented to inform future decisions on alternative transportation (e.g., shuttle buses) implementation.

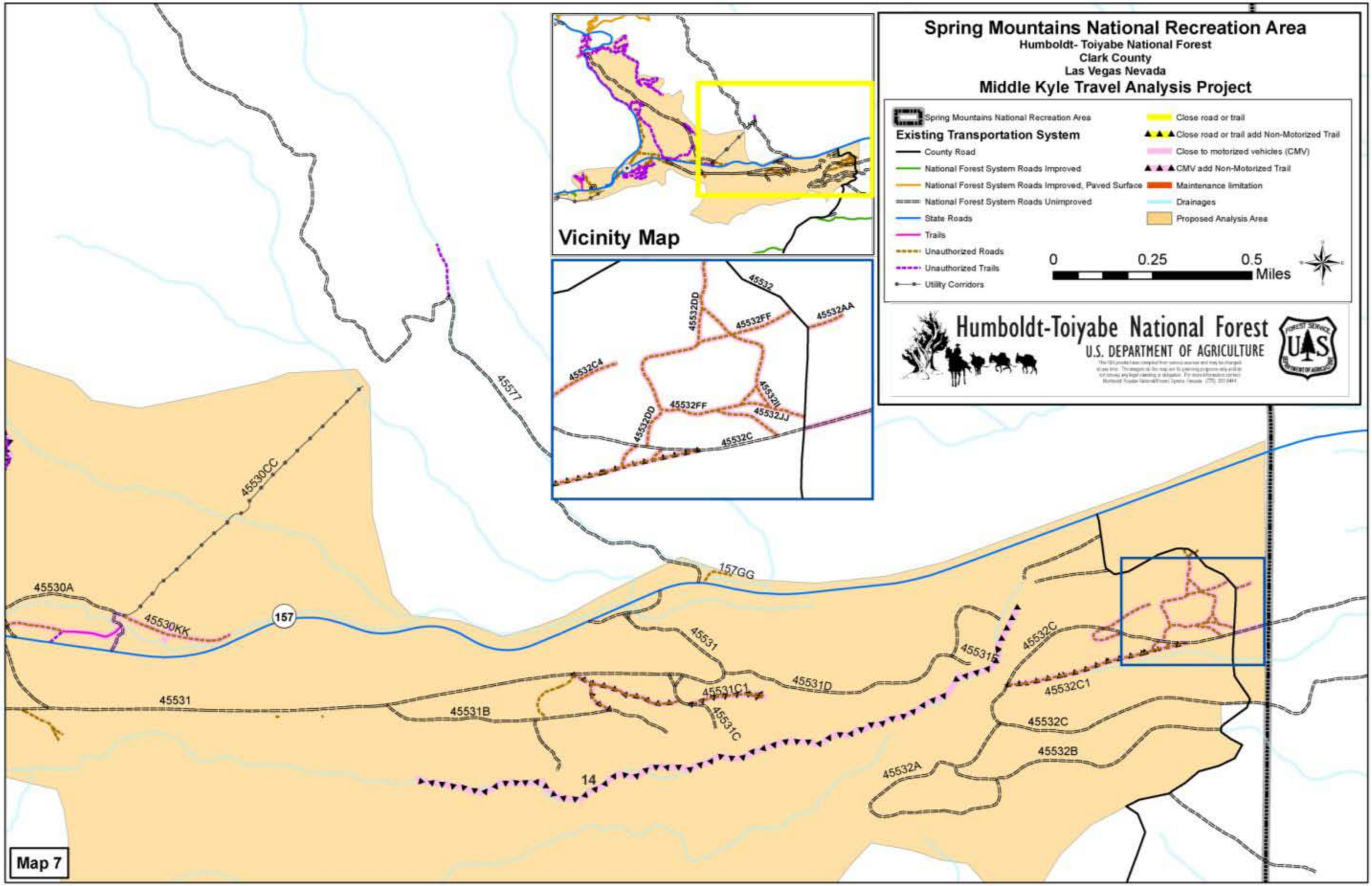
New Roads should Facilitate Fire Suppression. Locate new roads and re-align existing system roads on ridge lines or on gentle sloping ground rather than on steep slide slopes as much as possible. Roads or trails located on side slopes can increase risk to firefighters and the public because fires burn up slope with greater intensity and rate of spread (NWCG 2004 A-56). Roads and trails may also be used for tactical fire suppression purposes, and are generally more effective if located on ridgelines rather than side-slopes.

Replace Undersized Culverts and Construct New Crossings to Meet Forest Service Standards. On all existing roads that will continue to be part of the Forest System, all culverts that do not meet flood or drainage requirements should be replaced. Hydrologic analysis by Caldwell, Richards, and Sorensen (August 2007) finds several of the major road stream crossings are inadequate to meet 50 and 100 year flood events. It identifies inadequate capacity at Fletcher View Campground, Kyle CCC Camp, and Kyle Canyon Campground crossings. All proposed new major drainage crossings for roads and trails should be designed to meet current Forest Service standards.

Evaluate Opportunities for Expanded Trail Network. Develop new trail opportunities to meet a diverse range of user needs and abilities. Assess safety and user conflict potential when determining trails designations; monitor use and use adaptive management techniques to evaluate user designations over the long term. Provide short, medium and long trail loops. Provide appropriate signage to mark trails with corresponding map guides.


Spring Mountains National Recreation Area
Humboldt- Toiyabe National Forest
Clark County
Las Vegas Nevada
Middle Kyle Travel Analysis Project
Vicinity Map
Existing Transportation System
Spring Mountains National Recreation Area
County Road
National Forest System Roads Improved
National Forest System Roads Improved, Paved Surface
National Forest System Roads Unimproved
State Roads
Trails
Unauthorized Roads
Unauthorized Trails
Utility Corridors
Close road or trail
Close road or trail add Non-Motorized Trail
Close to motorized vehicles (CMV)
CMV/ add Non-Motorized Trail
Maintenance limitation
Drainages
Proposed Analysis Area
Private Land
0 0.25 0.5 Miles
Humboldt-Toiyabe National Forest
U.S. DEPARTMENT OF AGRICULTURE
Telephone
Canyon
MOUNT
DEER CREEK
157NN
157PP
157AA
157BB
157CC
45531B
45531
45530A
45330KK
157EE
157FF
157DD
45530
45530B
45330H
45531F
45531G
Map 5


Spring Mountains National Recreation Area
Humboldt- Toiyabe National Forest
Clark County
Las Vegas Nevada
Middle Kyle Travel Analysis Project
Spring Mountains National Recreation Area
Existing Transportation System
County Road
National Forest System Roads Improved
National Forest System Roads Improved, Paved Surface
National Forest System Roads Unimproved
State Roads
Trails
Unauthorized Roads
Unauthorized Trails
Utility Corridors
Close road or trail
Close road or trail add Non-Motorized Trail
Close to motorized vehicles (CMV)
CMV add Non-Motorized Trail
Maintenance limitation
Drainages
Proposed Analysis Area
Private Land
0 0.25 0.5 Miles
Humboldt-Toiyabe National Forest
U.S. DEPARTMENT OF AGRICULTURE
Vicinity Map
Deer Creek
Kyle Canyon
Fletcher View Campground
Kyle Canyon Ranger Station
45077
SR 157
45064
45064
20
45077
45065
45055
20
158
157NN
157QQ
157MM
18
157KK
10
157AA
157BB
157FF
157CC
157EE
157DD
45330A
45330N
45330KK
455330CC
2
16
157BBB
157KK
18
Map 6


Spring Mountains National Recreation Area
Humboldt- Toiyabe National Forest
Clark County
Las Vegas Nevada
Middle Kyle Travel Analysis Project
Spring Mountains National Recreation Area
Existing Transportation System
County Road
National Forest System Roads Improved
National Forest System Roads Improved, Paved Surface
National Forest System Roads Unimproved
State Roads
Trails
Unauthorized Roads
Unauthorized Trails
Utility Corridors
Close road or trail
Close road or trail add Non-Motorized Trail
Close to motorized vehicles (CMV)
CMV add Non-Motorized Trail
Maintenance limitation
Drainages
Proposed Analysis Area
0
0.25
0.5
Miles
Humboldt-Toiyabe National Forest
U.S. DEPARTMENT OF AGRICULTURE
Vicinity Map
45577
45530CC
45530A
45530KK
157
45531
45531B
45531C1
45531C
45531D
45531E
45532
45532DD
45532FF
45532AA
45532C4
45532II
45532JJ
45532C
157GG
45532C1
45532B
45532A
14
Map 7

APPENDIX A: GLOSSARY

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.

Maintenance Levels. Maintenance levels define the level of service provided by, and maintenance required for, a specific road. Maintenance levels must be consistent with road management objectives and maintenance criteria. Roads may be currently maintained at one level and planned to be maintained at a different level at some future date.

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.

Operational Maintenance Level. The operational maintenance level is the maintenance level currently assigned to a road considering today's needs, road condition, budget constraints, and environmental concerns; in other words, it defines the level to which the road is currently being maintained.

Objective Maintenance Level. The objective maintenance level is the maintenance level to be assigned at a future date considering future road management objectives, traffic needs, budget constraints, and environmental concerns. The objective maintenance level may be the same as, or higher or lower than, the operational maintenance level. The transition from operational maintenance level to objective maintenance level may depend on reconstruction or disinvestment.

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.

APPENDIX B: REFERENCES

Blair, R. B. (1996) Land use and avian species diversity along an urban gradient. Ecological Applications (6) 506-519.

Bautista, L. M., J. T. Garcia, R. G. Calmaestra, C. Palacin, C. A. Martin, M. B. Morales, R. Bonal, and J. Vinuela. 2004. Effect of weekend road traffic on the use of space by raptors. Conservation Biology. 18 (3) 726-732.

Berger, J. and D. Daneke. 1988. Effects of agricultural, industrial, and recreational expansion on frequency of wildlife law violations in the Central Rocky Mountains, USA. Conservation Biology 2 (3) 283-289.

Bernardino, F.S., Jr. and G.J. Dalrymple. 1992. Seasonal activity and road mortality of the snakes of the Pa-hay-okee wetlands of Everglades National Park, USA. Biological Conservation. 62:71-75.

Brattstrom, B.H. and M.C. Bondello. 1983. Effects of off-road vehicle noise on desert vertebrates. Pages 167-206 *in:* R. H. Webb and H. G. Wilshire (eds.). Environmental effects of off-road vehicles: Impacts and management in arid regions. Springer-Verlag. New York.

Clark County Wildand Assessment Project. 2004. http://www.rci-nv.com/reports/clark/ http://www.rci-nv.com/reports/clark/section06.html

Dahms, C.W. and B.W. Geils, ed. 1997. An assessment of forest ecosystem health in the southwest. General Technical Report RM-GTR-295. USDA Forest Service, Rocky Mountain Forest and Research Station, Fort Collins, Colorado, 97 pp. Available online at http://www.rms.nau.edu/publications/rm_gtr_295.index.html

DøAntonio, C.M. and Vitousek, P.M. 1992. Biological invasions by exotic grasses, the grass/fire cycle, and global change. Annual Review of Ecological Systems 23: 67-87.

Everett, R.L.; M.E. Jensen; P.S. Bourgeron; W.G. Robbins; D.W. Wolf; J.K. Agee; B.A. McIntosh; C.G. Johnson. 1994. Eastside forest ecosystem health assessment. Pacific Northwest Research Station, Portland, OR. USDA Forest Service Pacific Northwest Research Station.

Forman, R. T. T., D. Sperling, J. A. Bissonette, A. P. Clevenger, C. D. Cutshall, V. H. Dale, L. Fahrig, R. L. France, C. R. Goldman, K. Heanue, J. Jones, F. Swanson, T. Turrentine , T. C. Winter. 2003. Road Ecology: Science and Solutions. Island Press. 481 pp.

Forman, R.T.T. 2000. Estimate of the area affected ecologically by the road system in the United States. Conservation Biology 14:31–35.Forman, R. T. T., D. Sperling, J. A. Bissonette, A. Clevenger, and H. J. Mader. 1984. Animal habitat isolation by roads and agricultural fields. Biological Conservation (29) 81-96.

Forman, R.T.T. and R. D. Deblinger. 1999. The Ecological Road-Effect Zone of a Massachusetts (U.S.A.) Suburban Highway. Conservation Biology 14 (1) 36–46.

Forman, R. T. T. 1998. Land mosaics: The ecology of landscapes and regions. Cambridge University Press. 632 pp.

Graham, Russell T.; McCaffrey, Sarah; Jain, Theresa B. (tech. eds.) 2004. Science basis for changing forest structure to modify wildfire behavior and severity. Gen. Tech. Rep. RMRS-GTR-120. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 43 p.

Gucwa, J.H. 1969. Late Cenozoic Geomorphic History of Lee Canyon, Spring Mountains, Nevada. Master's Thesis, Pennsylvania State University, Department of Geology and Geophysics.

Hall, J. A. 1980. Direct impacts of off-road vehicles on vegetation. Pages 63-74 *in*: P.G. Rowlands (ed.). The effects of disturbance on desert soils, vegetation and community processes with emphasis on off-road vehicles: a critical review. U.S. Dept. Interior, Bureau of Land Management, Desert Plan Staff Special Publication. Riverside, CA.

Havlick, David G. 2002. No Place Distance: Roads and Motorized Recreation on America's Public Lands. Island Press. Washington D.C. 297 pp.

Hewlett, J.D. and W.L. Nutter. 1970. The varying Source Area of Streamflow from Upland Basins. In Proceedings of the Symposium on Interdisciplinary Aspects of Watershed Management. America Society of Civil Engineers. New York, NY, pp. 65-83

Johnson, R.F. 1963. The roadside fire problem. Fire Control Notes 24: 5-7.

Kopecky, K. 1988. Influence of roads on the synanthropization of the flora and vegetation according to observations in Czechoslovakia. Folia-Gedotanica-Phytotaxonomica 23 (2):145-171.

Marshal, J. P. , V. C. Bleich, P. R. Krausman, M. L. Reed, N. G. Andrew. 2006. Factors Affecting Habitat Use and Distribution of Desert Mule Deer in an Arid Environment. Wildlife Society Bulletin 34 (3) 609–619.

Matchett, J. R., L. Gass, M. L. Brooks, A. M. Mathie, R. D. Vitales, M. W. Campagna, D. M. Miller, and J. F. Weigand. Spatial and Temporal Patterns of Off-Highway Vehicle Use at the Dove Springs OHV Open Area, California. Unpublished report. Bureau of Land Management–California State Office, Sacramento, CA. February 11, 2004.

McKelvey, K.S. 1996. An overview of fire in the Sierra Nevada. Status of the Sierra Nevada: Sierra Nevada Ecosystem Project Final Report to Congress: Volume II. Wildland Resources Center Report No. 37. University of California, Davis.

McLellan, B.N. and D.M. Shackleton. 1988. Grizzly bears and resource-extraction industries: effects of roads on behavior, habitat use and demography. J. Appl. Ecol. 25:451-460.Mendelson, J.R.I., and W.B. Jennings. 1992. Shifts in the relative abundance of snakes in a desert grassland. Journal of Herpetology 26:38–45.

Milberg, P. and B.B. Lamont. 1995. Fire enhances weed invasion of roadside vegetation in southwestern Australia. Biological Conservation 73: 45-49.

Miller, S. G., R. L. Knight, and C. K. Miller. 2001. Wildlife responses to pedestrians and dogs. Wildlife Society Bulletin (29) 124-132.

Morrisson, P.H., J.W. Karl, L. Swope, K. Harma, and T. Allen. 2000. Assessment of Summer 2000 Wildfires: Landscape History, Current Condition, and Ownership.

Moser, E.A. 2006. Hydrology and Valley Morphology of Upper Lee Canyon. Unpublished report for Spring Mountain NRA, Humboldt-Toiyabe NF. 24 p.

Munguira, M. L., and J. A. Thomas. 1992. Use of road verges by butterfly and burnet populations, and the effects of roads on adult dispersal and mortality. Journal of Applied Ecology 29:316-329.

National Climate Data Center. 2006. Records of Coop station 265400, Kyle Forest Service Station.

NWCG 2004. Fireline Handbook. Great basin cache supply office. Development office. Boise ID http://www.nwcg.gov/pms/pubs/pubs.htm

Patla, D.A. and C.R. Peterson. 1994. The effects of habitat modification on a spotted frog population in Yellowstone National Park. Unpublished report to the University of Wyoming National Park Service Research Center. 116 pp.

Plume, R. W. 1985. Ground-Water Resources of Kyle and Lee Canyons, Spring Mountains, Clark County, Nevada. U.S. Geological Survey, Open-File Report 84-438. Prepared in cooperation with the U.S. Forest Service. 47 p.

PricewaterhouseCoopers (PwC). 2008. Spring Mountains National Recreation Area Market, Financial and Operational Analysis. Prepared for Humboldt-Toiyabe National Forest.

Ries, L., D. M. Debinski, and M. L. Wieland. Conservation value of roadside prairie restoration to butterfly communities. Conservation Biology 15 (2) 401-411.

Rosen, P.C. and C.H. Lowe. (1994). Highway mortality of snakes in the Sonoran Desert of southern Arizona. Biological Conservation. 68:143-148.

Scott, T.G. 1938. Wildlife mortality on an Iowa highway. American Midland Naturalist (20) 527–539.

Shapins Associates. 2005. Middle Kyle Canyon Framework Plan. Prepared for Humboldt-Toiyabe National Forest.

Sheridan, D. 1980. Off-Road vehicles on public lands. Council on Environmental Quality. Washington D.C., 84 pp.

Spellerberg, I. F. 1998. Ecological effects of roads and traffic: A literature review. Global Ecology and Biogeography Letters. (7) 317-333.

Taylor, A.R. and R.L. Knight, R.L. 2003. Behavioural responses of wildlife to human activity: terminology and methods. WildIife Society Bulletin (31) 1263-1271.

Thiel, R.P. 1985. Relationship between road densities and wolf habitat suitability in Wisconsin. Am. Midl. Nat. 113:404-407.

Trombulak, S. C., and C. A. Frissell, C. A. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. Conservation Biology (14) 18-30.

US Census Bureau 2000. American Factfinder, Census 2000: Housing units (H1) and vacancy status, For seasonal, recreational, or occasional use (H8)

USDA Forest Service. 1986. Land Resource Management Plan. Toiyabe National Forest. Pacific Southwest Region. Carson City, NV

USDA Forest Service. 1996. General Management Plan for the Spring Mountains National Recreation Area, Humboldt -Toiyabe National Forest, Pacific Southwest Region, Carson City, NV 77 pp.

USDA Forest Service, 2003. Humboldt-Toiyabe Forest-scale Roads Analysis (January, 2003). Humboldt-Toiyabe National Forests, Clark County, Nye County.

USDA Forest Service 2004. Planning research for sustainable use: Nel property, Mt. Charleston, Clark County, Nevada (Phase I). Report prepared by R. Bruce Hutton, Ph.D. March 2004.

USDA Forest Service, 2005. Spring Mountains National Recreation Area Transportation Study, Final Report (September, 2005). Humboldt-Toiyabe National Forests, Clark County, Nye County.

USDA Forest Service, 2005a. Business Case Support: Middle Kyle Canyon Plan, Phase III. Report prepared by R. Bruce Hutton (August, 2005) for Spring Mountain National Recreation Area, Humboldt-Toiyabe National Forests.

USDA Forest Service, 2006. Social and Economic Report: Spring Mountains Hazardous Fuels Reduction Project. Humboldt-Toiyabe National Forests.

USDA Forest Service. 2006. National Visitor Use Monitoring (NVUM) Results for Spring Mountains National Recreation Area. Pacific Southwest Region. 43 pp.

USDA Forest Service, 2007. Middle Kyle Canyon Development Geotechnical Materials and Related Studies (August, 2007). Prepared by Case, Lowe & Hart. Humboldt-Toiyabe National Forests, Clark County, Nye County.

USDA Forest Service, 2007. Middle Kyle Canyon Development Traffic Study. (February, 2007). Prepared by PBS&J. Humboldt-Toiyabe National Forests, Clark County, Nye County.

USDA Forest Service, 2007. Spring Mountains National Recreation Area Motorized Trail Decision Implementation (August, 2007). Humboldt-Toiyabe National Forests, Clark County, Nye County.

U.S. Geological Survey 2006. National Water Information System. Web Interface. http://waterdata.usgs.gov/nwis/rt

Webb, R.H. 1983. Compaction of desert soils by off-road vehicles. Pages 51-79. *in:* R. H. Webb and H. G. Wilshire (eds.). Environmental effects of off-road vehicles: Impacts and management in arid regions. Springer-Verlag. New York.

Wilshire, H.G. 1983. The impact of vehicles on desert soil stabilizers. Pages 31-50 *in:* R.H. Webb and H. G. Wilshire (eds.). Environmental effects of off-road vehicles: Impacts and management in arid regions. Springer-Verlag. New York.

Wilson, C.C. 1979. Roadsides- Corridors with high fire hazard and risk. Journal of Forestry, September 1979.

Yang, J., S. H. Hong, S. R. Shifley, and E. J. Gustafson. 2007. Spatial Patterns of Modern Period Human-Caused Fire Occurrence in the Missouri Ozark Highlands. Forest Science 53(1) 2007

APPENDIX C: ROAD AND TRAIL RECOMMENDATIONS FOR MIDDLE KYLE COMPLEX PROPOSED ROADS AND TRAILS

Consistency of the Middle Kyle Complex EIS Proposed Action and Market Supported Action

The Middle Kyle TAP ID team reviewed the Middle Kyle Complex Proposed Action and Market Supported Alternative for consistency with the recommendations of the TAP. For the purposes of this analysis, the only roads and trails analyzed were those where new uses or entirely new roads and trails were proposed. All existing road and trails that are proposed to remain in their current state were analyzed in the main section of this analysis, and therefore not included in the appendix. Most of the recommendations on proposed roads were ecosystem-based. Furthermore, all general resource-based considerations mentioned above carry forward to the proposed roads and trails, and should be reviewed prior to new trail or road construction.

In general, the Middle Kyle Complex Market Supported Alternative and the Proposed Action is consistent with this analysis with a few exceptions (see Appendix Table 1). The Market Supported Alternative and Proposed Action both accomplish the following:

1. **Protects Plant, Animal, and Archeological Resources** by limiting new road/trail construction to those areas outside known endemic plants and species of concern and known archeological sites to the maximum extent practicable.

2. **Address Safety Issues on State Road 157** by providing marked pedestrian crossings at the Fletcher Canyon Trailhead and highway improvements for safe intersection to proposed major developed areas.

3. **Provides Recreational Destinations in Middle Kyle Canyon and Additional Areas for Parking** by proposing multiple new recreation opportunities that will include additional trails, camping facilities, picnic facilities, parking facilities, a visitor center, gathering areas and other recreation based improvements. These proposals should attract users that may reduce the amount of vehicle traffic in the upper reaches of Kyle Canyon.

4. **Construct Additional Areas for Parking** by constructing new trailhead parking areas.

5. **Ensure that New Roads Facilitate Fire Suppression** by not proposing most new roads on mid slope elevations.

6. **Replace Undersized Culverts** by proposing crossing improvements at Fletcher Canyon Campground, Kyle Guard Station, and Kyle Canyon Campground crossings.

7. **Evaluate Opportunities for Expanded Trail Network** by establishing a variety of trail opportunities in both action alternatives.

The analysis revealed a few inconsistencies between the Market Supported Alternative and Proposed Action and the TAP analysis. To bring these parts of the Market Supported and Proposed Action into consistency, therefore, the analysis makes the following resource based recommendations:

Ecosystem Functions and Terrestrial Wildlife Recommendations

The following roads and trails should be reviewed by the district wildlife staff for possible conflicts with long term use, construction, or management of said roads and trails. Appropriate mitigation or design features should be built into the Market Supported Alternative and Proposed Action upon review.

Appendix Table 1. Recommendations addressing butterfly host plant & Biodiversity Hotspot concerns on roads/trails for Market Support Action and Proposed Action alternatives: Avoid occurrences of the following plants when constructing roads/trails (see Appendix Map 2 for road/trail locations).

Proposed Action

Rd/Trail ID	Road/Trail Type	Plant/ Resource Concern
0	Accessible trail	One occurrence of butterfly host plant HEMUM
5	bike/hike	Biodiversity hotspot - will be some impact, numerous butterfly host plants (ROWO, AMUR, ERUM, HEMUM, CALI, also VICH
581	bike/hike	One butterfly plant occurrence (Chaetopappa ericoides)
577	bike/hike	Several butterfly host plants (ERUM), HEMUM)
8	bike/hike	Occurrence each of butterfly host plants (ERUM and HEMUM)
10	hike	Numerous occurrences of rare and butterfly host plants (AMUT, CHDO, ERUM, CALI, PEPA); in large AMUT area
667	hike	Numerous occurrences of rare and butterfly host plants (AMUT, CHDO, ERUM, CALI, PEPA, CHER)
690	bike	Occurrences of butterfly plant at south end (ERAN, HEMUM, CHER, PEPA, in large AMUT area)
986	hike/equestrian trail	One occurrence of CHDO and is in AMUT area - both butterfly host plants
991	hike/bike/ equestrian trail	One occurrence each of ERUM and AMUT - butterfly plants
618	hike trail	One occurrence of PEPA and AMUT - butterfly host plants
988	hike/bike/ equestrian trail	Once occurrence of the butterfly host plant CHDO)
252	proposed cg access road	One occurrence of the butterfly host plant HEMUM)
275	proposed cg access road	Occurrences of CHER - butterfly host plants

Market Supported Alternative

Rd/Trail ID	Road/Trail Type	Plant/ Resource Concern
609	hike trail	Biodiversity hotspot - will be some impact, also VICH
5	bike/hike trail	Biodiversity hotspot - will be some impact, numerous butterfly host plants (ROWO, AMUR, ERUM, HEMUM, CALI, also VICH
581	bike/hike trail	One butterfly plant occurrence (Chaetopappa ericoides)
577	bike/hike trail	Several butterfly host plants (ERUM), HEMUM)
8	bike/hike trail	Occurrence each of butterfly host plants (ERUM and HEMUM)
10	hike trail	Numerous occurrences of rare and butterfly host plants (AMUT, CHDO, ERUM, CALI, PEPA); in large AMUT area
667	hike trail	Numerous occurrences of rare and butterfly host plants (AMUT, CHDO, ERUM, CALI, PEPA, CHER)
690	bike trail	Occurrences of butterfly plant at south end (ERAN, HEMUM, CHER, PEPA, in large AMUT area)
986	hike/equestrian trail	One occurrence of CHDO and is in AMUT area - both butterfly host plants
991	hike/bike/ equestrian trail	One occurrence each of ERUM and AMUT - butterfly plants
618	hike trail	One occurrence of PEPA and AMUT - butterfly host plants
988	hike/bike/ equestrian trail	Once occurrence of the butterfly host plant CHDO)
252	campground access road	One occurrence of the butterfly host plant HEMUM)
275	campground access road	Occurrences of CHER - butterfly host plants

Additional Recommendations

Economics

The proposal for new roads/trails in the Middle Kyle Complex project area should attempt to satisfy or provide a majority of objectives detailed here. As a general point, it will be important to weigh the short term costs of transportation investment against the long-term benefits of efficient traffic management and access provision in the context of escalating demand/traffic. Examples of economic objectives the analysis recommends a project consider are:

The low or reduced cost of complying with standards and guidelines by avoiding roads in environmentally or culturally sensitive areas.

The capacity to handle not only the relatively high traffic/demand for access currently experienced by Middle Kyle canyon, but capacity to handle longer-term projected increases in traffic and demand for access that are likely as a result of development and growth in the region (i.e., provide some 'buffer capacity' to handle future increases in traffic and minimize the need to expand/change the system long-run).

Improving access to recreational sites that serve as source of revenue for SMNRA (e.g., user-fee campgrounds, concessionaires, etc), thereby improving financial efficiency.

Improving access for increasing need for fire and fuels management and emergency response (i.e., access investment today may minimize expense of providing these services in the future).

Reducing or minimizing adverse impacts to local residents (e.g., Mt Charleston) associated with safety, noise, and congestion from increasing traffic.

Increasing management's flexibility to close roads/trails in the upper canyon, thereby saving maintenance/management expenses and environmental/cultural damages associated with Upper Canyon roads/trails.

Protection and Public Safety

It is recommended that consideration be given to locating new roads on ridge lines or on gentle sloping ground rather than on steep slide slopes as much as possible. Roads or trails located on side slopes can increase risk to firefighters and the public because fires burn up slope with greater intensity and rate of spread (NWCG 2004 A-56). Roads and trails may also be used for tactical fire suppression purposes, and are generally more effective if located on ridgelines rather than side-slopes.

Administrative

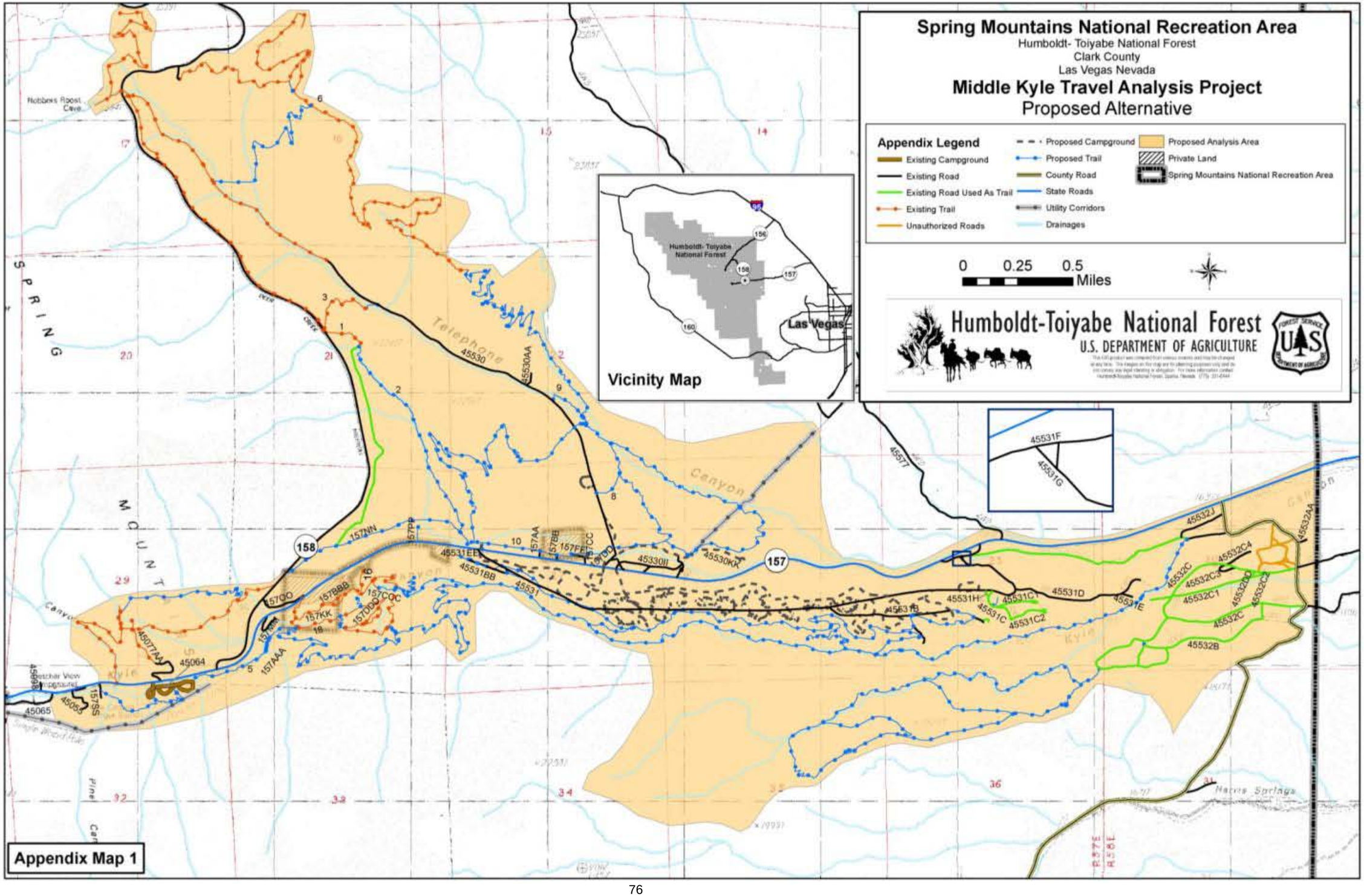
Update Motor Vehicle Use Map to reflect Middle Kyle Complex Environment Impact Statement Record of Decision.

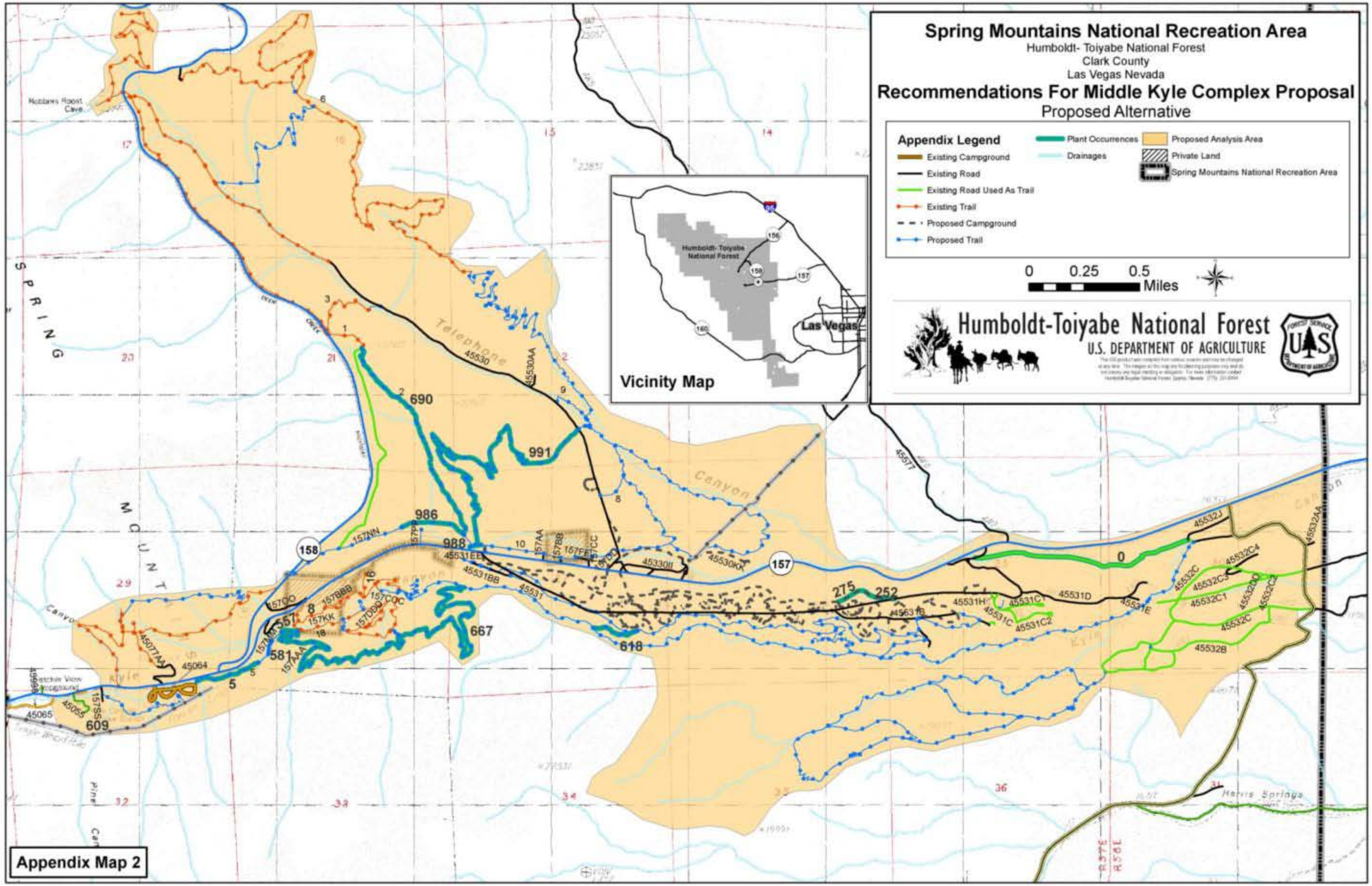
APPENDIX D: EXISTING AND RECOMMENDED ROAD AND TRAIL MAINTENANCE OBJECTIVES – CLASSIFIED ROAD AND TRAILS

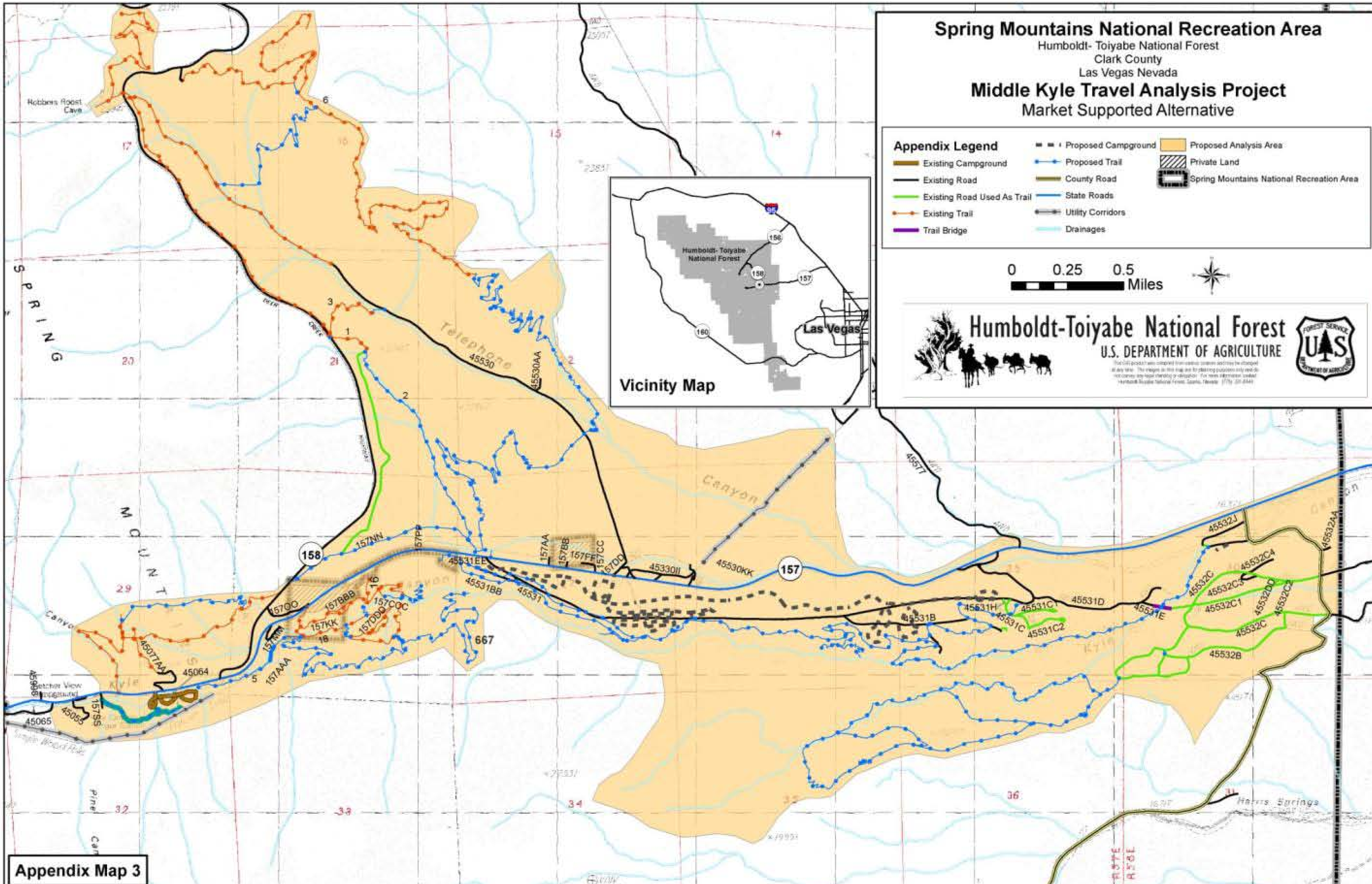
Road/Trail Number	Road/Trail Name	Existing Objective[11]	Recommended Objective
45055	KYLE GUARD STATION	3	3
45064	KYLE CAMPGROUND RD	4	4
45065	FLETCHER VIEW CAMPGROUND RD	4	4
45077	ERBAR RD	2	2
45530	TELEPHONE CANYON RD	2	2
45530A	TELEPHONE CANYON LOOP RD	2	**2**[12]
45530B	TELEPHONE CANYON CONNECTOR RD.	2	2
45531	ERCIE RD	2	2
45531A	CARDA RD	2	2
45531B	EASTERLY SPUR RD	2	**2**[12]
45531C	GABI RD	2	**2**[12]
45531D	WASH RD	2	**2**[12]
45531E	WASH SPUR RD	2	**2**[12]
45531F	NEEDLEGRASS RD	2	2
45531G	RICEGRASS RD	2	2
45531H	NEVADA NEEDLEGRASS RD	2	**2**[12]
45532	HARRIS SPRINGS RD	3	3 (county rd)
45532A	NATHER RD	2	2
45532B	NATHERUM RD	2	2
45532C	DUMP LOOP RD	2	**2**[12]
45532H	CRESTED WHEATGRASS RD	2	2
45532J	BENTGRASS RD	2	**2**[12]
45577	WOODEN POLE POWER LINE RD	2	2
UAR-157AA		NA	4
UAR-157BB		NA	4
UAR-157CC		NA	4
UAR-157GG		NA	3
UAR-157JJ		NA	4
UAR-157MM		NA	2

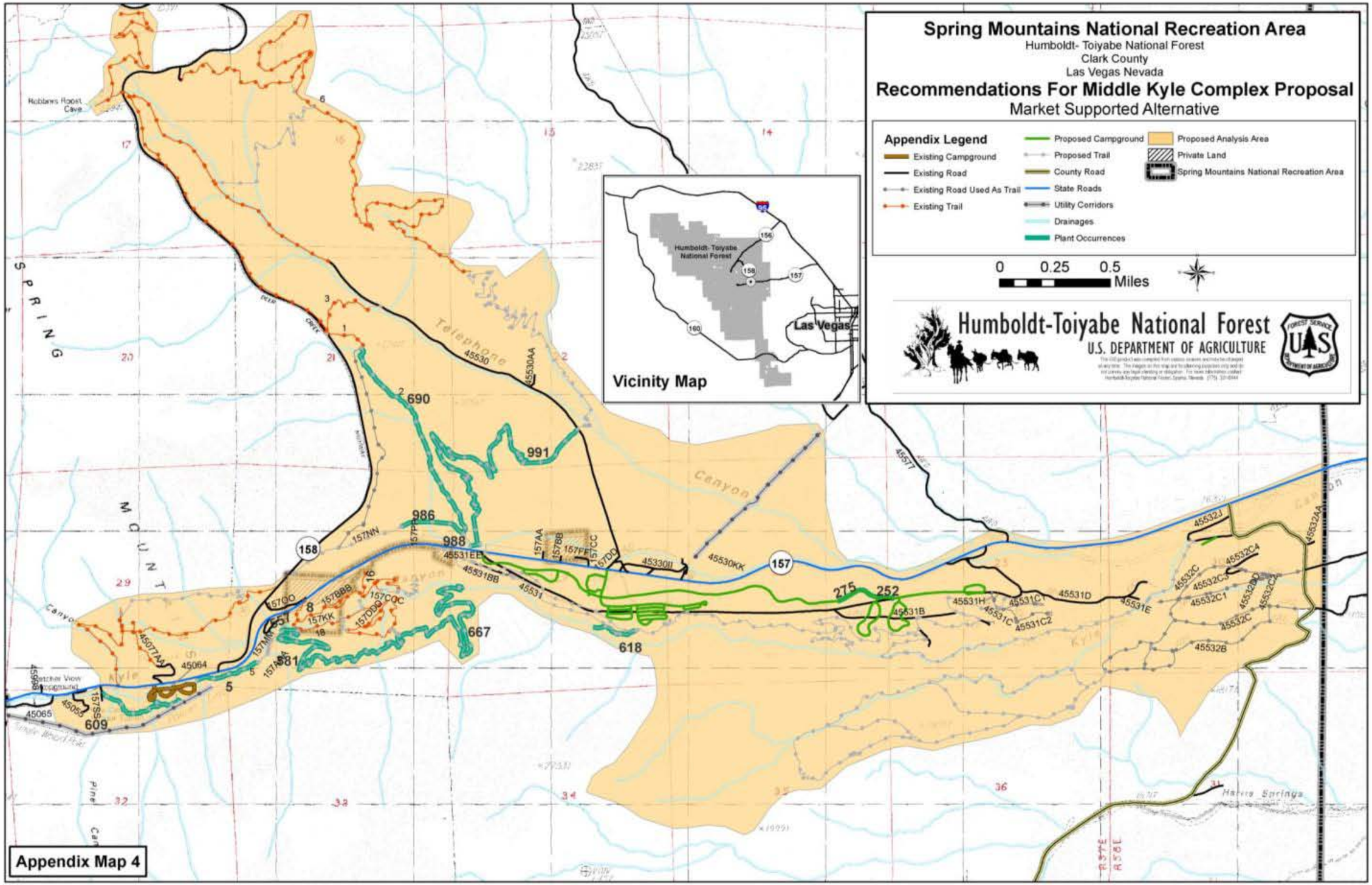
Note: If the Middle Kyle Complex project is implemented, revise recommended road maintenance objective level as appropriate to be consistent with the Record of Decision.

[11] Road Maintenance Objective Level (RMO) (FSH 7709.58).
[12] Within this RMO, recommended traffic management strategy is to close road to passenger vehicles.


Spring Mountains National Recreation Area
Humboldt- Toiyabe National Forest
Clark County
Las Vegas Nevada
Middle Kyle Travel Analysis Project
Proposed Alternative
Appendix Legend
Existing Campground
Existing Road
Existing Road Used As Trail
Existing Trail
Unauthorized Roads
Proposed Campground
Proposed Trail
County Road
State Roads
Utility Corridors
Drainages
Proposed Analysis Area
Private Land
Spring Mountains National Recreation Area
0 0.25 0.5 Miles
Humboldt-Toiyabe National Forest
U.S. DEPARTMENT OF AGRICULTURE
Vicinity Map
Humboldt- Toiyabe National Forest
Las Vegas
156
158
157
160
Robbers Roost Cave
SPRING
MOUNT
Telephone Canyon
Kyle Canyon
Harris Springs
45530
45530AA
45531
45531AA
45531B
45531C
45531C1
45531C2
45531D
45531E
45531F
45531G
45531H
45531J
45532
45532AA
45532B
45532C
45532C1
45532C2
45532C3
45532C4
45532D
45532J
45530II
45530KK
45531BB
45531EE
45577
45064
45065
45077AA
157AAA
157BBB
157CCC
157DDD
157FF
157KK
157OO
157PP
157SS
157WW
Fletcher View Campground
Appendix Map 1


Spring Mountains National Recreation Area
Humboldt- Toiyabe National Forest
Clark County
Las Vegas Nevada
Recommendations For Middle Kyle Complex Proposal
Proposed Alternative
Appendix Legend
Existing Campground
Existing Road
Existing Road Used As Trail
Existing Trail
Proposed Campground
Proposed Trail
Plant Occurrences
Drainages
Proposed Analysis Area
Private Land
Spring Mountains National Recreation Area
0 0.25 0.5 Miles
Humboldt-Toiyabe National Forest
U.S. DEPARTMENT OF AGRICULTURE
Vicinity Map
Humboldt- Toiyabe National Forest
Las Vegas
Robbins Roost Cave
Telephone Canyon
Kyle Canyon
Harris Springs
690
991
986
988
667
618
581
557
609
158
157
Appendix Map 2


Spring Mountains National Recreation Area
Humboldt- Toiyabe National Forest
Clark County
Las Vegas Nevada
Middle Kyle Travel Analysis Project
Market Supported Alternative
Appendix Legend
Existing Campground
Existing Road
Existing Road Used As Trail
Existing Trail
Trail Bridge
Proposed Campground
Proposed Trail
County Road
State Roads
Utility Corridors
Drainages
Proposed Analysis Area
Private Land
Spring Mountains National Recreation Area
0 0.25 0.5 Miles
Humboldt-Toiyabe National Forest
U.S. DEPARTMENT OF AGRICULTURE
Vicinity Map
Las Vegas
Appendix Map 3
Robbers Roost Cave
158
157
667
45530
45531D
45532B
Harris Springs


Spring Mountains National Recreation Area
Humboldt- Toiyabe National Forest
Clark County
Las Vegas Nevada
Recommendations For Middle Kyle Complex Proposal
Market Supported Alternative
Appendix Legend
Existing Campground
Existing Road
Existing Road Used As Trail
Existing Trail
Proposed Campground
Proposed Trail
County Road
State Roads
Utility Corridors
Drainages
Plant Occurrences
Proposed Analysis Area
Private Land
Spring Mountains National Recreation Area
0 0.25 0.5 Miles
Humboldt-Toiyabe National Forest
U.S. DEPARTMENT OF AGRICULTURE
Vicinity Map
Humboldt- Toiyabe National Forest
Las Vegas
Robbers Roost Cave
Telephone Canyon
Kyle Canyon
Harris Springs
690
991
986
988
667
618
581
609
275
252
158
157
Appendix Map 4