GILA NATIONAL FOREST

FOREST LEVEL ROADS ANALYSIS REPORT

Approved by: _____

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Gila National Forest
Forest Level Roads Analysis Report

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Introduction

The current road system on the Gila National Forest (GNF) consists of 7,431 miles of level 1-5 roads, of which 5,797 miles are under Forest Service jurisdiction. The roads can be further classified as follows:

Maintenance Level	Total Mileage	Forest Service Jurisdiction
1	1,487	1,467*
2	3,829	3,636
3	712	331
4	576	294
5	827	69

* To date, the Gila National Forest has decommissioned 569 miles of roads.

This forest level Roads Analysis addresses roads that are currently classified at objective maintenance levels (ML) 3, 4 or 5 on the Forest Transportation system. Maintenance level 1 and 2 roads (closed and high clearance vehicle roads) will be addressed at the watershed and project scale. Objective maintenance level refers to the desired level of service provided by, and maintenance required for, a specific road. The objective maintenance level may be the same as, higher, or lower than the current operational maintenance level (the level of service and maintenance the road is currently intended to provide and receive).

The Forest scale analysis was conducted in October 2002 - January 2003 by an interdisciplinary team using the procedure in FS-643 Roads Analysis: *Informing Decisions About Managing the National Forest Transportation System*.

The objective of a roads analysis in the Forest Service (FS) is to provide line officers with critical information to implement road systems that are safe and responsive to public needs, are affordable and efficiently managed, are adequate for management activities, have minimal negative ecological effects on the land, and are in balance with available funding.

The contents of this analysis are for the sole purpose of identifying potential issues and concerns for site-specific analysis. The risk categories used are merely identifiers to alert forest managers, that are in the process of a site specific project analysis, that certain portions of a road should be examined for potential resource or cultural issues. Management recommendations presented in this document are of a general nature given that this document is not management direction but rather an inventory of the forest system roads. Road management decisions will not be made only on the contents of this analysis since it is broad in scope and designed as a reference for site-specific project analysis that may include a road segment.

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Executive Summary

This analysis provides information that will help the Gila National Forest manage the transportation system more efficiently and effectively within existing and anticipated funding levels. Recommendations are made that will improve maintenance of high value roads, reduce overall road maintenance program costs, reduce adverse ecological road-related effects, and focus cooperative efforts with Federal, State and County transportation departments. The analysis also provides general information to guide the next level of area or project analysis.

The roads analyzed are important for primary access to the multiple uses of the Gila National Forest. Under this analysis, 724 miles of roads were studied. Preliminary results indicate a potential to reduce the maintenance levels on 90 miles of Forest Service jurisdiction roads. Such a reduction would result in a reduction in annual maintenance costs and would result in less risk associated with roads classified for passenger car access.

Of the 724 miles analyzed, approximately 302 miles of these roads present a high risk for wildfire, or to wildlife, watersheds or cultural resources. It is important to note that in some cases, only a portion of a road rated as high risk (see Appendix A).

Over the past 15 years, approximately 390 miles of road on the Gila National Forest have been decommissioned (ripped, scarified, seeded and/or water-bared) for the benefit of wildlife and watershed.

Risk and value assessments conducted for this analysis provide information to guide area analysis or project analysis. Each road was screened for its effect to wildfire, wildlife, cultural resources, and watershed conditions. Each road was categorized as "high" or "low" value for access to recreation, forest facilities, resources and safety/protection. The risk and value assessments provide information to focus transportation analysis and other planning efforts, and will guide the need for gathering of field data on affected resources and road condition and use.

Products of the Analysis

- A report for line officers and the public that documents the information and analysis used to identify opportunities and set priorities for the future road system on the Gila National Forest.
- A map displaying the main road system for the entire Forest and the risks and opportunities for each road or road segment.
- Additional tables necessary to portray specific management strategies and recommended changes in the road system.

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Scope of the Analysis:

Geographic Scale	Forest-wide
Roads	Roads on existing inventory in the following categories: National Forest System roads, objective maintenance level 3-5.
Analysis period	20 year outlook on needs, effects and implications
Specialist Information	Forest level analysis was conducted using existing information and the best judgement of technical specialists. The analysis proceeded without information that could not be obtained within the analysis period, acknowledging that uncertainties remain.
Public participation:	The County Commissioners of Grant and Catron Counties, as well as key external groups were contacted.
Internal review	R3 Regional Office Transportation Engineer Mike Noland, Forest Supervisor, Rangers and Staff.

Existing Condition

The following table displays the miles of roads analyzed, as well as the miles in the Gila National Forest inventory.

Obj. Mtc. Level	**Miles in Analysis** (*Miles in GNF Inventory*)				
	Total	FS	County	State	Private
1	**0** (*1487*)	**0** (*1467*)	**0** (*0*)	**0** (*0*)	**0** (*20*)
2	**0** (*3829*)	**0** (*3636*)	**0** (*15*)	**0** (*0*)	**0** (*178*)
3	**337** (*712*)	**331** (*331*)	**0** (*329*)	**0** (*26*)	**6** (*26*)
4	**318** (*576*)	**294** (*294*)	**0** (*239*)	**0** (*5*)	**24** (*38*)
5	**69** (*827*)	**69** (*69*)	**0** (*0*)	**0** (*758*)	**0** (*0*)
Total	**724** (*7431*)	**694** (*5797*)	**0** (*583*)	**0** (*789*)	**30** (*262*)

Management Plan Road Information

The Gila National Forest Plan (GNFP) and amendments provide direction for road management. The recommendations in the roads analysis complement this direction, and provide information for future Forest level management planning. Some of the GNFP information is highlighted here; please refer to the plan and amendment documents for complete and specific information.

Road Reconstruction: The GNFP (table 13, page 25) lists 8 road reconstruction projects by priority. Two of these projects have completed to date.

Road Maintenance: The GNFP calls for road maintenance to meet use needs and safety requirements.

Road Density:

Existing road density on the GNF is 1.54 miles per square mile based on current (2002) inventory.

The Gila National Forest follows the general guidelines of the New Mexico Comprehensive Plan (NMCP). The NMCP was drafted, but not adopted by the State of New Mexico Game and Fish Department. The plan states "Manage habitat for wildlife populations consistent with goals outlined in the New Mexico Comprehensive Plan (NMCP) and consistent with other resource values."

Road density guidelines in the draft NMCP (page 4) are:

> "Manage to maintain open road densities optimally as follows or as specified in the land management plan.
>
> Big game winter range - optimally at no more than 0.5 mile per square mile or as provided in approved land use management documents.
>
> Big game summer range - optimally at no more than 1.0 mile per square mile or as provided in approved land use management documents.
>
> Big game primary winter range - optimally at no more than 0.1 mile per square mile or as provided in approved land use management documents."

The GNFP contains specific road density guidelines for each management area. Please refer to the plan for site specific data.

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Road operation/maintenance funding and costs

Road operation and maintenance funding on the Gila National Forest ranges from approximately $1.6 - $1.8 million per year and is expected to stay in that range in the foreseeable future.

Road condition surveys conducted in 1999 and 2000 documented the road deficiencies and associated costs needed to maintain roads to the industry standards for safety and assigned traffic service level. Traffic service levels (TSL) describe a road's significant traffic characteristics and operating conditions. These levels are identified as a result of transportation planning activities. The results from the surveys are as follows:

Deferred Maintenance:

$179,382,170 – FS roads maintenance level 3-5
$ 40,216,915 – Critical health and safety ML 3-5
$111,639,292 – Resource Protection ML 3-5

Annual maintenance:

$ 4,508,135 – FS roads maintenance level 3 -5
$ 1,326,735 - Critical health and safety ML 3-5
$ 1,218,030 - Resource Protection ML 3-5

Cooperative maintenance agreements between the Counties and the FS help to address our combined road maintenance needs. Currently, 121 miles of FS jurisdiction roads are included in cooperative maintenance agreements with the four Counties that border the Gila N.F. Although the Forest Service occasionally provides materials and/or equipment towards maintenance of the roads under the cooperative agreements, it is not meeting its current commitments equitably as is called for in policy direction for cooperative maintenance agreements. The Forest Service and the Counties are working cooperatively to transfer jurisdiction of County maintained roads to the Counties in order to certify the mileages to the State of New Mexico for reimbursement as part of the County road system.

Risks and Benefits of Roads

Roads on the GNF provide access for many uses. Their presence has effects on the natural and cultural resources of the National Forest. See Appendix B for a more detailed discussion of the ecological, social and economic considerations associated with GNF roads.

GNF Forest Level Roads Analysis Process

Hazard and risk assessment:

The interdisciplinary team (IDT) selected a method of analysis that would assess the Value and the Risk associated with each road.

The following values and risks were identified by the IDT. These also represent, in broad terms, the "issues" associated with the GNF main transportation system

Values: Roads are valued for Forest management because they provide access to:

FACILITIES
RESOURCES
RECREATION
SAFETY (escape from populated areas, access for wildfire response)

Risks: The presence or conditions of roads present risks associated with:

HUMAN CAUSED FIRE
WATERSHED CONDITION
WILDLIFE
CULTURAL RESOURCES

Roads were placed in categories of high or low value combined with high, potentially high, or low risk. The overall risk assessment for a given road will be rated as "high" if any portion of the analyzed road segment is found to pose a risk to any of the four risk criteria. The overall value for a given road will be rates as "high" if any portion of the analyzed road segment is found to be of high value.

Recommendations were made for each of six categories based on this assessment.

Value Assessment Criteria

Facilities: Access to FS administrative facilities and special use facilities. Access to private land and associated facilities is not a criteria used to assess the value of a FS operated road. The FS cooperates with State or County agencies in accessing private land, but access to private land is not a primary value determining operation of Forest Service jurisdiction roads.

HIGH - A high value road has Forest Service related facilities that require access by passenger car. Examples are Ranger District main offices, offices

or locations that offer public information services, locations with crew quarters, facilities, and special-use facilities that require access by the general public.

LOW - A road accessing no facilities, facilities not open to the public, and facilities where high clearance vehicle access is adequate. Examples are roads to lookouts, some special-use sites or FS communication sites.

Resources: Access to vegetative treatment areas, wood product management and harvest, and access to range resources.

HIGH – Roads that are the primary access to several planned or potential vegetative management projects, or large amounts of high-value commercial wood resources. These roads will be used many times for vegetative management in the 20-year analysis period. The improved condition of these roads reduces haul time/cost or improves safety significantly.

or

Roads that are the primary access to permitted grazing allotments where a maintenance level 3 road is needed to safely accommodate cattle trucks or larger trailers on a regular and recurring basis.

LOW - Roads that do not provide access to high value wood resources, or where consistent or recurring access by low clearance hauling vehicles is not needed.

or

Roads that do not provide access to permitted grazing allotments or roads where high clearance vehicle access is adequate for resource use and management.

Recreation: Access to dispersed recreation areas, trailheads, campgrounds, picnic grounds, touring routes.

HIGH – Access to recreation uses that require access by passenger car. Examples are developed sites in the urban, rural or roaded natural Recreational Opportunity Spectrum (ROS) class, main touring routes, main routes to many (10 or more identified) dispersed recreation sites.

LOW – High clearance vehicle access is adequate for use and management of the recreation resource. Examples are trailheads in roaded natural or semi-primitive motorized ROS class, and access to 9 or fewer dispersed camp areas.

Safety: Access for fire suppression, evacuation routes and emergency medical response.

HIGH – Roads that provide alternate emergency aggress from populated areas. Roads that provide access to areas at high risk of wildfire, with high resources or human values making response time critical.

LOW- Roads to areas that are not populated or where access by high clearance vehicle will be adequate for fire suppression.

Risk Assessment Criteria

Human Caused Fire:

HIGH – Roads that access areas that have a recorded pattern of human caused fire ignitions, or that access areas where use, landownership, vegetation and fuel conditions indicate a high potential for human caused fire ignition.

LOW - Roads that are not evaluated as high risk.

Watershed Condition (effect to water quality and inherent erosion hazard):

HIGH – The road management situation will hinder attainment of state water quality standards. The road density is greater than 3 mi/mi^2. Road has drainage features directly connected to the stream network. Road is within a streams 100-year floodplain, within 200 feet of a stream or within 200 ft. of a stream's associated 100-year floodplain. Road exists in sensitive soils subject to surface erosion and/or mass movement. Road is on a cross slope exceeding 40%.

LOW – State water quality standards can be achieved through assigned road management standards. Road is located mostly in inherently stable soils and is on a cross slope less than 20%. Road is greater than 300 feet away from stream channel and its associated 100-year floodplain.

Wildlife Risk Assessment Criteria

Impacts from road use, maintenance, development and reconstruction will have varying degrees of risks (i.e. effects) depending on the spatial distribution, maintenance level, and distance of roads from critical wildlife habitats. For this Forest Road Analysis (FRA), the criteria for evaluating risk to wildlife are presented below. The criteria addresses risk from Forest Level 3, 4 and 5 roads on wildlife and serves to rank the risk as either High or Low. Wildlife used for this analysis will be species that are, in order of priority, Endangered, Threatened, Proposed, and Sensitive. The reason for selecting these species over others such as game species are due to the fact that they

influence forest management activities more than other species. In addition, critical winter range for big game will also be evaluated, since road densities tend to affect winter range habitat more than other factors (i.e. weather) in the southwest.

Mexican Spotted Owl: Federally listed as threatened under the Endangered Species Act.

HIGH - Road intersects a Protected Activity Center (PAC) or is within a ¼ mile of a known nest site or roost site. If nest or roost site is not known, the center of the PAC will be considered the nest site for this analysis.

LOW - Road does not intersect a PAC or is more than ¼ mile away from a known nest site. If nest site is not known, then the center of the PAC will be considered the nest site for this analysis.

Bald Eagle: Federally listed as threatened under the Endangered Species Act.

HIGH - Road intersects a wintering area.

LOW - Road does not intersect a wintering area.

Chiricahua Leopard Frog: Federally listed as threatened under the Endangered Species Act.

HIGH – Road intersects, is within the 100 year floodplain, or is within 200 ft. of occupied habitat. Road densities are greater than 1.5 miles/sq.mile in watersheds with occupied habitat.

LOW – Road does not intersect the habitat, is not within the 100 years floodplain and is located greater than 200 ft. from stream and 100 year floodplain. Road densities are less than or equal to 1.5 miles/sq.mile in watersheds with occupied habitat.

Loach Minnow: Federally listed as threatened under the Endangered Species Act.

HIGH – Road intersects, is within the 100 year floodplain, or is within 200 ft. of the stream and/or 100 year floodplain of occupied habitat or designated critical habitat. Road densities are greater than 1.5 miles/sq.mile in watersheds with occupied habitat or designated critical habitat.

LOW – Road does not intersect, is not within the 100 years floodplain and is located greater than 200 ft. from stream and 100 year floodplain in areas with occupied or designated critical habitat. Road densities are less than

or equal to 1.5 miles/sq.mile in watersheds with occupied habitat or designated critical habitat.

Spikedace: Federally listed as threatened under the Endangered Species Act.

HIGH – Road intersects, is within the 100 year floodplain, or is within 200 ft. of the stream and/or 100 year floodplain of occupied habitat or designated critical habitat. Road densities are greater than 1.5 miles/sq.mile in watersheds with occupied habitat or designated critical habitat.

LOW Road does not intersect, is not within the 100 years floodplain and is located greater than 200 ft. from stream and 100 year floodplain in areas with occupied or designated critical habitat. Road densities are less than or equal to 1.5 miles/sq.mile in watersheds with occupied habitat or designated critical habitat.

Gila trout: Federally listed as Endangered under the Endangered Species Act.

HIGH – Road intersects, is within the 100 year floodplain, or is within 200 ft. of the stream and/or 100 year floodplain of occupied habitat. Road densities are greater than 1.5 miles/sq.mile in watersheds with occupied habitat or designated critical habitat.

LOW – Road does not intersect, is not within the 100 years floodplain and is located greater than 200 ft. from stream and 100 year floodplain in areas with occupied habitat. Road densities are less than or equal to 1.5 miles/sq.mile in watersheds with occupied habitat or designated critical habitat.

Gila Chub: Federally Proposed to be listed as threatened with critical habitat under the Endangered Species Act.

HIGH – Road intersects, is within the 100 year floodplain, or is within 200 ft. of the stream and/or 100 year floodplain of occupied habitat or designated critical habitat. Road densities are greater than 1.5 miles/sq.mile in watersheds with occupied habitat or designated critical habitat.

LOW – Road does not intersect, is not within the 100 years floodplain and is located greater than 200 ft. from stream and 100 year floodplain in areas with occupied or designated critical habitat. Road densities are less than or equal to 1.5 miles/sq.mile in watersheds with occupied habitat or designated critical habitat.

Southwestern willow flycatcher: Federally listed as threatened under the Endangered Species Act.

HIGH – Road intersects, is within the 100 year floodplain, or is within 200 ft. of occupied habitat. Road densities are greater than 1.5 miles/sq.mile in watersheds with occupied habitat.

LOW – Road does not intersect the habitat, is not within the 100 years floodplain and is located greater than 200 ft. from stream and 100 year floodplain. Road densities are less than or equal to 1.5 miles/sq.mile in watersheds with occupied habitat.

Mexican Gray Wolf: Federally listed as experimental non-essential population under the Endangered Species Act.

HIGH – Road intersects denning area. Road densities are greater than 3 miles/sq.mile in watersheds with occupied habitat.

LOW – Road does not intersect denning area. Road densities are less than 3 miles/sq.mile in watersheds with occupied or suitable habitat.

Northern Goshawk: Listed as Sensitive by the Regional Forester.

HIGH - Road intersects a Post-Fledging Family Area (PFA) or are within a ¼ mile from a known nest site. If nest site is not known, then the center of the PFA will be considered the nest site for this analysis.

LOW - Road does not intersect a PFA or are more than ¼ mile from a known nest site. If nest site is not known, then the center of the PFA will be considered the nest site for this analysis.

Peregrine Falcon: Listed as Sensitive by the Regional Forester.

HIGH - Road intersects management zones A and B.

LOW - Road does not intersect management zones A and B.

Big Game Winter Range Habitat:

HIGH - Road intersects high quality winter range habitat.

LOW - Roads does not intersect high quality winter range habitat.

Cultural Resources Risk Assessment Criteria: Risk assessments for roads analysis are guided by the following questions:

- Has the road been surveyed for cultural resources?
- Does the road impact any cultural resources?
- Is the road located in a high, moderate, or low site probability area?

HIGH - The road has been surveyed for cultural resources and identified sites are impacted by the road, or the road has not been surveyed but is located in an area with high or moderate site density.

LOW - The road has been surveyed for cultural resources and no sites are impacted by the road, or the road has not been surveyed but is located in a low site density area.

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General Recommendations for Value/Risk Categories:

The following recommendations are general in nature and reflect some of the management options that may be employed. During the Watershed or Project Level assessments, site specific recommendations will be made.

High Value/High Risk

These roads are the "main transportation system" for the Forest. Recommend continued Forest Service or cooperative agency maintenance for passenger car access.

High risk and value indicate these are the ***highest*** priority for investment of time and funds to mitigate or eliminate risk and accommodate uses.

Recommend mitigation of risk. Mitigation depends upon the specific risks and may include, but is not limited to: additional maintenance effort, reconstruction, relocation, seasonal maintenance restriction, seasonal road closure.

High Value/Low Risk

These roads are the "main transportation system" for the Forest. Recommend continued Forest Service or coop agency maintenance for passenger car access.

Low risk indicates low priority for investment of time and funds to mitigate risk.

Low Value/High Risk

Passenger car access for enjoyment or use of National Forest resources is not needed on these roads.

Short term (~1 month to 1 year) improvement of these roads may be needed for improved access to project areas during project activities.

Recommend mitigation of risk. High risk indicates these roads are third priority (behind the high value/potentially high risk roads) for investment of time and funds to mitigate or eliminate risk. Mitigation depends upon the specific risks and may include additional maintenance efforts, reconstruction, relocation, seasonal maintenance restrictions, and road closure.

Recommend reducing maintenance costs by reducing maintenance level of FS jurisdiction roads to high clearance (ML 2), or administratively closed (ML 1).

Coordinate with County government or private landowners to determine maintenance responsibility on roads needing passenger car access to private lands. On roads where the primary use is access to communities, request public roads agencies (County, Towns, State government) to assume road operational jurisdiction. On roads where exclusive need is access to private land, issue a special use permit for the road. On roads or road segments not open to the public, and not required for access to private land, close or decommission the road. Additional information may be needed to determine level and type of use.

Low Value/Low Risk

Passenger car access for enjoyment or use of National Forest resources is not needed.

Short term (~1 month to 1 year) improvement of these roads may be needed for improved access to project areas during project activities.

Recommend reducing maintenance costs by reducing maintenance level of FS jurisdiction roads to high clearance (ML 2), or administratively closed (ML 1).

Coordinate with County government or private landowners to determine maintenance responsibility on roads needing passenger car access to private lands. On roads where the primary use is access to communities, request public roads agencies (County, Towns, State government) to assume road operational jurisdiction. On roads where exclusive need is access to private land, issue a special use permit for the road. On roads or road segments not open to the public, and not required for access to private land, close or decommission the road. Additional information may be needed to determine level and type of use.

Analysis Results

Risk and Value Analysis Results

Total Miles Analyzed = 724

High Risk/High Value **38 % / 278 total miles**	**High Risk/Low Value** **3 % / 24 miles**
Low Risk/High Value **50 % / 356 total miles**	**Low Risk/Low Value** **9 % / 66 total miles**

Reducing Maintenance Need

Reducing the maintenance level from an objective maintenance level 3, 4 or 5 to an objective maintenance level 2 on the 90 miles of "low value" FS jurisdiction roads identified under this analysis would reduce the annual maintenance needed by an estimated $179,500. The reduction is based on the assumption that all roads are maintained to standard with an average cost of $350/mile/year for a ML 2 road and $2,350/mile/year for a ML 3 road.

An assessment of operational/maintenance jurisdiction has yet to be completed on all roads within the Gila National Forest to determine whether the existing allocation of responsibility is accurate. The mix of traffic on the road, and documentation of the origination of the road can indicate the share that each agency or private party has in the operation of a road. Many miles of Forest Service jurisdiction roads in this analysis provide the primary access to communities on private lands. For many of these roads, the type and level of access needed for use of the private land is a higher standard than the level of access needed for the use or management of the National Forest lands. If the majority of traffic on a road is due to the public accessing private lands, then jurisdiction of the road by a public road agency, such as State or County, is indicated. Current traffic count classification on GNF roads does not exist. The interest Counties have in GNF road operations is recognized by the cooperative

agreements between the four Counties and the GNF, covering 121 miles of FS jurisdiction roads, most of which are included in this analysis. Determining the amount and the generator of use on these roads is an important step in defining appropriate maintenance responsibility.

Mitigating Risk

Risk assessments for this analysis were based on information contained in the Forest's Geographic Information System. The assessment provides a screening level indication of the likelihood a risk is present. This indication is a useful tool in guiding issue development and planning additional data collection. Field analysis will be required to determine the most appropriate mitigation measures for each road or road segment.

Right-of-Way Needs and Priorities

Appendix C lists the roads analyzed that lack right-of-way through private land and where acquisition would guarantee access. In the past few years, several private landowners bordering the GNF have locked gates on roads that lack legal right-of-way for the FS and public to cross their land. Additional closures are likely and may result in large portions of National Forest becoming inaccessible to the general public and to land managers. It is possible that in some cases a County will be able to assert their prescriptive right to a road if the road in question has been maintained over a period of time by a County road department.

Ecological, Social, and Economic Considerations

Appendix B provides information on ecological, social and economic considerations that were addressed by the interdisciplinary team. This information provided the basis for the development of the risk and value assessment used in this analysis.

Additional Roads Analysis

Watershed Analysis: The GNF is currently implementing area planning and treatment by fifth code watershed. Roads analysis should be integrated with the planning efforts for these watersheds. The priority watersheds listed by the Gila National Forest Strategic Plan are:

D3: Largo/Agua Fria
D6: Negrito

Road management issues or projects that may require a roads analysis:

Forest Wide: Culvert/Aquatic Species Analysis
D5: Mesa Campground reconstruction
D6: FSR 141 reconstruction (29.5 miles from San Francisco bridge to junction with FSR 28) public FS road project.
D7: Burro Mountains OHV study.
Mill Timber Sale

Conclusion

Future road management on the GNF should be guided by this Forest-level roads analysis. This analysis provides for more efficient and effective road operation and maintenance, reduced road-related environmental effects and safe, appropriate access for forest use and management.

Site-specific information on road effects and effective risk mitigation will be gathered during area or project planning.

Forest Service road system operation costs can be reduced by a reduction in maintenance level and by resolving jurisdiction questions. Site-specific traffic analysis and coordination with County governments is needed to support an effort to implement jurisdiction reassignment.

Appendix A: Risk and Value Assessment

The table below summarizes each road and its analyzed segment length along with the analysis criteria. The criteria consisted of fire, wildlife, watershed, cultural resources, resource access, facilities, recreation, and safety. The risks and values for roads, (maintenance levels 3, 4, or 5), were analyzed using the Gila Geographic Information System. A risk and value rating was assigned to each road segment. These ratings included: HR for High Risk, LR for Low Risk, HV for High Value, and LV, for Low Value. These ratings were than combined in GIS to arrive at risk-value combinations such as HRHV for High Risk High Value, HRLV for High Risk Low Value, LRHV for Low Risk High Value, and LRLV for Low Risk Low Value. Road number along with the corresponding miles of road summarizes these results in Appendix A. The **X** in the table below indicates a high risk or high value was present for the specific road segment. The overall values are further summarized in the analysis table on page 15.

ROAD #	NAME	ANALYZED SEGMENT LENGTH (Miles)	RISK				OVERALL ROAD RISK	VALUES				OVERALL ROAD VALUE	RISK / VALUE
			Cultural Resources	Wildlife	Watershed	Human Caused Fire		Facilities	Resource Access	Recreation	Safety		
11	ALAMOCITO	10.12					LR		X		X	HV	LR HV
11	ALAMOCITO	2.38		X	X		HR		X		X	HV	HR HV
11 M	MANGAS MTN LOOKOUT	0.09			X		HR					LV	HR LV
11 M	MANGAS MTN LOOKOUT	0.40					LR					LV	LR LV
110	FT BAYARD CORRAL	0.06	X		X		HR					LV	HR LV
110	FT BAYARD CORRAL	1.63					LR					LV	LRLV
111	ANTELOPE MESA	0.10	X		X		HR				X	HV	HR HV
111	ANTELOPE MESA	3.74					LR				X	HV	LR HV
118	SADDLE ROCK CANYON	0.51			X		HR					LV	HR LV
118	SADDLE ROCK CANYON	3.06					LR					LV	LRLV
119	CLAREMONT ROAD	6.01		X	X		HR		X		X	HV	HR HV
129	GLENWOOD ADM SITE	0.01				X	HR	X			X	HV	HR HV
129	GLENWOOD ADM SITE	0.50					LR	X			X	HV	LR HV
13	QUEMADO LAKE	14.62			X	X	HR		X	X	X	HV	HR HV
13	QUEMADO LAKE	2.66					LR		X	X	X	HV	LR HV
13 B	JUNIPER C G	0.40			X		HR			X		HV	HR HV
13 B	JUNIPER C G	0.05					LR			X		HV	LR HV

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13 C	PINION CG	0.24			X		HR			X		HV	HR HV
13 C	PINION CG	0.24					LR			X		HV	LR HV
13 E	COVE	0.23			X		HR			X		HV	HR HV
136	TYRONE	0.33	X	X	X		HR			X	X	HV	HR HV
136	TYRONE	14.95					LR			X	X	HV	LR HV
141	RESERVE BEAVERHEAD	31.75	X	X	X	X	HR		X	X	X	HV	HR HV
141	RESERVE BEAVERHEAD	7.90					LR		X	X	X	HV	HR HV
142 I	DIPPING VAT	0.35					LR			X		HV	LR HV
142 I	DIPPING VAT	0.39			X	X	HR			X		HV	HR HV
149	MEADOW CREEK	2.14					LR		X	X		HV	LR HV
149	MEADOW CREEK	1.69	X	X	X		HR		X	X		HV	HR HV
150	NORTH STAR	8.73	X	X	X		HR			X	X	HV	HR HV
150	NORTH STAR	41.76					LR			X	X	HV	LR HV
150 A	COONEY PLACE	1.46	X	X	X		HR			X	X	HV	HR HV
150 A	COONEY PLACE	1.29					LR			X	X	HV	LR HV
150 B	ROCKY CG	0.13		X	X		HR			X		HV	HR HV
150 B	ROCKY CG	0.06					LR			X		HV	LR HV
150 C	BLACK CANYON CG	0.22		X	X		HR			X		HV	HR HV
150 D	BEAVERHEAD A.S.	0.39					LR	X				HV	LR HV
150 E	BEAVERHEAD A.S.	0.09					LR	X				HV	LR HV
150 F	BEAVERHEAD A.S.	0.13					LR	X				HV	LR HV
150 G	BEAVERHEAD A S	0.04	X				HR	X				HV	HR HV
150 G	BEAVERHEAD A S	0.10					LR	X				HV	LR HV
150 H	BEAVERHEAD A.S.	0.13					LR	X				HV	LR HV
150 I	BEAVERHEAD A.S.	0.06					LR	X				HV	LR HV
152	MCKNIGHT	4.58	X	X	X		HR	X		X		HV	HR HV
152	MCKNIGHT	12.80					LR	X		X		HV	LR HV
153	DEEP CREEK	11.42	X	X	X	X	HR		X	X	X	HV	HR HV
153	DEEP CREEK	1.98					LR		X	X	X	HV	LR HV
154	SIGNAL PEAK	5.32	X	X	X		HR		X	X		HV	HR HV
154	SIGNAL PEAK	1.77					LR		X	X		HV	HR HV
154 A	SIGNAL PEAK TRAIL HEAD	0.02					LR					LV	LR LV
155	TURKEY CREEK	3.39	X	X	X		HR			X	X	HV	HR HV
155	TURKEY CREEK	8.01					LR			X	X	HV	LR HV
157	KINGSTON	3.97		X	X		HR				X	HV	HR HV
157	KINGSTON	12.86					LR				X	HV	LR HV
161	ELK HORN CANYON	0.94			X		HR					LV	HR LV
172	ALLEN SPRING	0.08			X		HR				X	HV	HR HV
172	ALLEN SPRING	2.47					LR				X	HV	LR HV
18	DD BAR	6.02	X	X	X		HR				X	HV	HR HV
18	DD BAR	3.21					LR				X	HV	LR HV
180	CORNER MOUNTAIN	3.95		X	X		HR		X		X	HV	HR HV
180	CORNER MOUNTAIN	1.90					LR		X		X	HV	LR HV
196	LITTLE DRY TRAILHEAD	0.15			X		HR					LV	HR LV

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196	LITTLE DRY TRAILHEAD	3.61					LR					LV	LR LV
209	FRISCO DIVIDE	2.95	X	X	X		HR		X		X	HV	HR HV
209	FRISCO DIVIDE	12.25					LR		X		X	HV	LR HV
209 B	SADDLE MTN L O	1.94		X			HR					LV	HR LV
209 B	SADDLE MTN L O	0.46					LR					LV	LR LV
21 A	RESERVE ADM SITE	0.90			X	X	HR	X			X	HV	HR HV
21 B	RESERVE SHOP	0.09			X		HR	X				HV	HR HV
220	BILL LEE MESA	7.38		X	X	X	HR		X		X	HV	HR HV
220	BILL LEE MESA	4.01					LR		X		X	HV	LR HV
225	LINK	6.07	X	X	X		HR				X	HV	HR HV
226	SILVER MONUMENT	9.08	X	X	X		HR		X	X	X	HV	HR HV
226	SILVER MONUMENT	17.15					LR		X	X	X	HV	LR HV
226 A	LOOKOUT MOUNTAIN LO	0.68			X		HR		X		X	HV	HR HV
226 A	LOOKOUT MOUNTAIN LO	6.91					LR		X		X	HV	LR HV
231	CORDUROY CANYON	10.06			X		HR		X		X	HV	HR HV
231	CORDUROY CANYON	4.64					LR		X		X	HV	LR HV
232 A	PUEBLO PARK C.G.	0.32		X			HR			X		HV	HR HV
232 C	PUEBLO PARK	0.13	X	X			HR					LV	HR LV
233	POLK MESA	6.47	X	X	X	X	HR		X		X	HV	HR HV
233	POLK MESA	5.72					LR		X		X	HV	LR HV
255 A	CHERRY CREEK C G	0.02			X		HR			X		HV	HR HV
255 A	CHERRY CREEK C G	0.15					LR			X		HV	LR HV
255 C	MC MILLAN	0.04			X		HR			X		HV	HR HV
255 C	MC MILLAN	0.06					LR			X		HV	LR HV
28	BURSUM	21.01		X	X		HR		X	X	X	HV	HR HV
28	BURSUM	3.06					LR		X	X	X	HV	LR HV
28 A	SILVER CREEK DIVIDE	0.10			X		HR					LV	HR LV
28 A	SILVER CREEK DIVIDE	0.14					LR					LV	LR LV
28 B	BURSUM CAMP	0.02			X		HR					LV	HR LV
28 B	BURSUM CAMP	0.02					LR					LV	LR LV
28 C	SANDY POINT	0.06					LR					LV	LR LV
28 E	GILITA C.G.	0.26		X	X		HR			X		HV	HR HV
282	SHEEP CORRAL	2.39		X	X		HR	X	X			HV	HR HV
282	SHEEP CORRAL	4.57					LR	X	X			HV	HR HV
289	SAND CANYON ROAD	4.40	X	X	X	X	HR		X		X	HV	HR HV
289	SAND CANYON ROAD	13.63					LR		X		X	HV	LR HV
30	O BAR O	0.62		X	X		HR		X	X	X	HV	HR HV
30	O BAR O	9.61					LR		X	X	X	HV	LR HV
3040 A	VALLE TIO VENCES	0.10					LR			X		HV	LR HV
306	MALPAIS SPRING	0.05			X		HR		X		X	HV	HR HV
306	MALPAIS SPRING	6.88					LR		X		X	HV	LR HV
3070	LONG CANYON	2.44		X	X		HR		X		X	HV	HR HV
3070	LONG CANYON	3.38					LR		X		X	HV	LR HV
319	QUEMADO ADMIN SITE	0.21					LR	X				HV	LR HV

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3261	NEGRITO WORK CENTER	0.40		X	X		HR	X				HV	HR HV
33	LEGGETT LOOP	2.84					LR		X		X	HV	LR HV
35	HIGHLAND	4.50		X	X		HR		X		X	HV	HR HV
35	HIGHLAND	7.90					LR		X		X	HV	LR HV
36	HELL ROARING MESA	7.88			X		HR		X		X	HV	HR HV
363	LITTLE WALNUT GROUP AREA	0.01			X		HR			X		HV	HR HV
363	LITTLE WALNUT GROUP AREA	0.13					LR			X		HV	LR HV
366 A	FS ADMIN SITE	0.14	X		X		HR	X			X	HV	HR HV
366 A	FS ADMIN SITE	0.58					LR	X			X	HV	LR HV
38	EAGLE PEAK L.O.	2.39		X	X	X	HR					LV	HR LV
38	EAGLE PEAK L.O.	1.89					LR					LV	LR LV
385	KARRUTH	0.61			X		HR		X		X	HV	HR HV
385	KARRUTH	7.94			X		HR		X		X	HV	HR HV
40 A	IRON CREEK CG	0.29		X	X		HR			X		HV	HR HV
40 D	EMORY PASS VISTA POINT	0.02					LR			X		HV	LR HV
40 D	EMORY PASS VISTA POINT	0.02		X	X		HR			X		HV	HR HV
40 E	LADRONE	0.24		X	X		HR				X	HV	HR HV
40 E	LADRONE	1.11					LR				X	HV	LR HV
4000 M	CENTERFIRE BOG LINK	1.52			X		HR		X	X	X	HV	HR HV
4002 L	VEGA SPRINGS	0.01			X		HR					LV	HR LV
4002 L	VEGA SPRINGS	0.73					LR					LV	LR LV
4003 A	JONES SPRING	0.08	X				HR					LV	HR LV
4003 A	JONES SPRING	0.24					LR					LV	LR LV
4006 O	JONES SPRING	0.71					LR					LV	LR LV
4006 P	JONES SPRING	0.12	X		X		HR					LV	HR LV
4006 P	JONES SPRING	0.99					LR					LV	LR LV
4008 B	JEWETT LANDING STRIP	1.11			X		HR	X				HV	HR HV
4009 J	WILLOW SPRING	0.02			X		HR					LV	HR LV
4009 J	WILLOW SPRING	0.27					LR					LV	LR LV
4009 M	WILLOW SPRING	0.11	X		X		HR					LV	HR LV
4009 M	WILLOW SPRING	0.82					LR					LV	HR LV
4009 N	WILLOW SPRING	1.78					LR					LV	LR LV
4019 U	ROMERO LAKE	0.86		X	X		HR					LV	HR LV
4020 Z	LANEY AVENUE	0.96					LR					LV	LR LV
4025 T	TROUT CREEK	0.12		X	X		HR			X		HV	HR HV
4026 D	RODEO ROAD	0.13		X	X		HR					LV	HR LV
4026 D	RODEO ROAD	0.01					LR					LV	LR LV
4026 U	SAN FRANSISCO RIVER	0.18			X		HR					LV	HR LV
4026 U	SAN FRANSISCO RIVER	0.75					LR					LV	LR LV
4028 H	CENTERFIRE BOG LINK	0.26			X		HR		X	X	X	HV	HR HV
4033 P	GREEN GATE	1.78	X	X	X		HR				X	HV	HR HV
4033 R	APACHE CR ARC SITE	0.03	X				HR			X		HV	HR HV
4033 R	APACHE CR ARC SITE	0.46					LR			X		HV	LR HV
4040 F	SUBSTATION	0.09			X		HR					LV	HR LV

4040 L	LEGGETT LOOP	1.11	X		X	X	HR		X		X	HV	HR HV
4040 L	LEGGETT LOOP	1.54					LR		X		X	HV	LR HV
4040 M	LEGGETT LOOP	0.73					LR		X		X	HV	LR HV
4040 M	LEGGETT LOOP	0.42	X			X	HR		X		X	HV	HR HV
4040 Q	LEGGETT LOOP	0.02			X		HR		X		X	HV	HR HV
4040 Q	LEGGETT LOOP	1.01					LR		X		X	HV	LR HV
4040 U	RANCHO GRANDE	0.38			X		HR				X	HV	HR HV
4040 U	RANCHO GRANDE	0.16					LR				X	HV	LR HV
4042 J	RESERVE TOWN ROAD	0.13			X	X	HR					LV	HR LV
4042 L	MCCARTY	0.96		X	X		HR				X	HV	HR HV
4042 L	MCCARTY	0.10					LR				X	HV	LR HV
4043 G	RAINY MESA PIT	0.260			X		HR					LV	HR LV
4043 H	NEGRITO CREEK	0.09		X	X		HR			X		HV	HR HV
4043 I	NEGRITO CREEK	0.08		X	X		HR			X		HV	HR HV
4055 H	GLENWOOD BRUSHY	0.28			X		HR					LV	HR LV
4055 H	GLENWOOD BRUSHY	1.21					LR					LV	LR LV
4057 T	WILLOW CREEK	0.05		X	X		HR			X		HV	HR HV
4060	WILLOW CREEK	0.17		X	X		HR			X		HV	HR HV
4068 V	KLINE RANCH	0.04					LR					LV	LR LV
4069 C	HOYT CREEK	0.74		X	X		HR					LV	HR LV
4069 C	HOYT CREEK	2.37					LR					LV	LR LV
4071 Z	STRAIGHT GULCH CABIN	0.14		X			HR	X				HV	HR HV
4077 W	RAIN CREEK	0.40					LR					LV	LR LV
4078 J	SEWAGE PONDS	0.16	X		X		HR	X				HV	HR HV
4078 P	SAPILLO GROUP	0.04			X		HR			X		HV	HR HV
4078 P	SAPILLO GROUP	0.39					LR			X		HV	LR HV
4078 R	SAPILLO GROUP	0.03			X		HR			X		HV	HR HV
4078 R	SAPILLO GROUP	0.54					LR			X		HV	LR HV
4078 T	SAPILLO CG	0.59					LR			X		HV	LR HV
4079 G	MEEKINS	0.10					LR					LV	LR LV
4082 W	LITTLE WALNUT HOST	0.17					LR			X		HV	LR HV
4086 R	MIMBRES HELIPORT	0.16		X	X		HR	X				HV	HR HV
4087 A	LOWER NOONDAY	0.96					LR					LV	LR LV
4087 B	UPPER NOONDAY	0.10		X	X		HR					LV	HR LV
4087 J	EMORY PASS HELIPORT/MICROWAVE	0.12			X		HR					LV	HR LV
4087 J	EMORY PASS HELIPORT/MICROWAVE	0.33					LR					LV	LR LV
4087 X	KINGSTON	0.02		X			HR					LV	HR LV
4087 X	KINGSTON	0.26					LR					LV	LR LV
4090 A	BURRO MTN HOME (SILBY)	0.16		X			HR				X	HV	HR HV
4090 B	4090 B	0.12		X			HR				X	HV	HR HV
4091 Y	BURRO MTN MICROWAVE	0.31					LR					LV	LR LV
4092 R	BALKIE TANK	0.62	X		X		HR					LV	HR LV
4108	ALLIE CANYON	0.17			X		HR					LV	HR LV

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4108	ALLIE CANYON	1.38					LR					LV	LR LV
4126 X	CANOVAS SPRING	0.06		X			HR				X	HV	HR HV
4126 X	CANOVAS SPRING	0.15					LR				X	HV	LR HV
4127 U	ROMERO LAKE	1.56			X		HR					LV	HR LV
4129 Z	KARRUTH CREEK	0.01			X		HR					LV	HR LV
4129 Z	KARRUTH CREEK	0.08					LR					LV	LR LV
4130 Z	BISHOP	0.41					LR					LV	LR LV
4134 J	TROUT CREEK	0.21		X	X		HR			X		HV	HR HV
4134 W	LUNA ADMIN PARKING	0.03					LR	X				HV	LR HV
4134 X	LUNA ADMIN OFFICE	0.11					LR	X				HV	LR HV
4134 Y	OLD CAMPBELL PLACE	0.17					LR					LV	LR LV
4134 Z	HEAD OF DITCH CG	0.12		X	X		HR			X		HV	HR HV
4135	HEAD OF DITCH CG	0.17		X	X		HR			X		HV	HR HV
4135 A	HEAD OF DITCH CG	0.18	X	X	X		HR			X		HV	HR HV
4142 G	BEAVERHEAD LANDSTRIP RD	0.13					LR	X				HV	LR HV
4145 E	KINGSTON CG	0.03		X			HR			X		HV	HR HV
4145 E	KINGSTON CG	0.06					LR			X		HV	LR HV
4161 T	HUDSON CORRAL	0.06					LR					LV	LR LV
4161 T	HUDSON CORRAL	0.15				X	HR					LV	HR LV
4161 V	RESERVE TOWN ROAD	0.31			X	X	HR				X	HV	HR HV
4177 P	APACHE CREEK CG	0.14			X	X	HR			X		HV	HR HV
4179 F	APACHE CREEK CG	0.21			X	X	HR			X		HV	HR HV
4179 G	APACHE CREEK CG	0.45		X	X		HR			X		HV	HR HV
4183 N	AGUA FRIA	0.02	X				HR					LV	HR LV
4183 N	AGUA FRIA	0.13					LR					LV	LR LV
4184 H	AGUA FRIA	0.15					LR				X	HV	LR HV
4187 K	EL CASO CG	0.28			X		HR			X		HV	HR HV
4187 L	EL CASO CG	0.23			X		HR			X		HV	HR HV
4187 M	EL CASO CG	0.12			X		HR			X		HV	HR HV
4202 C	PICTOGRAPH	0.04					LR					LV	LR LV
4202 D	PURGATORY	0.03			X		HR					LV	HR LV
4202 D	PURGATORY	0.02					LR					LV	LR LV
4202 Y	CAMP T BIRD	0.03			X		HR					LV	HR LV
4202 Y	CAMP T BIRD	0.39					LR					LV	HR LV
4204 S	MIMBRES BARN	0.02			X		HR	X				HV	HR HV
4204 T	MIMBRES BONEYARD	0.32		X	X		HR	X				HV	HR HV
4204 U	MIMBRES WAREHOUSE	0.04		X	X		HR	X				HV	HR HV
4204 Z	RAIL ROAD	0.12		X	X		HR			X		HV	HR HV
4205 B	UPPER GALLINAS	0.18		X	X		HR			X		HV	HR HV
4205 D	EMORY PASS SPRING	0.05					LR					LV	LR LV
4206 P	ROBERTS LAKE	0.20		X	X		HR			X		HV	HR HV
4206 Q	LAKE ROBERTS WELL HOUSE ROAD	0.04			X		HR	X				HV	HR HV
4206 Q	LAKE ROBERTS WELL HOUSE ROAD	0.05					LR	X				HV	LR HV
4207 P	MATHIS	0.16					LR					LV	LR LV

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4208 A	ME OWN LANDING STRIP	0.16					LR	X				HV	LR HV
4209 K	KNEELING NUN VISTA	0.07					LR					LV	LR LV
4229 K	W-S RANCH	0.16				X	HR				X	HV	HR HV
4230 V	GLENWOOD	0.11			X		HR					LV	HR LV
4230 V	GLENWOOD	0.05					LR					LV	LR LV
4230 W	GLENWOOD HELIPAD	0.14					LR	X				HV	LR HV
4230 Z	BIG HORN CAMPGROUND	0.01					LR			X		HV	LR HV
4230 Z	BIG HORN CAMPGROUND	0.11		X	X		HR			X		HV	HR HV
4238 C	COTTONWOOD CG	0.01			X		HR			X		HV	HR HV
4238 C	COTTONWOOD CG	0.07					LR			X		HV	LR HV
4241	SAPILLO CG	0.03			X		HR			X		HV	HR HV
4241	SAPILLO CG	0.21			X		HR			X		HV	HR HV
4241 I	SAPILLO CG	0.19					LR			X		HV	LR HV
4241 P	SAPILLO CG	0.01			X		HR			X		HV	HR HV
4241 P	SAPILLO CG	0.10					LR			X		HV	LR HV
4241 Q	SAPILLO CG	0.01			X		HR			X		HV	HR HV
4241 Q	SAPILLO CG	0.35					LR			X		HV	LR HV
4257 E	TADPOLE T.H.	0.10					LR					LV	LR LV
4258	ARRASTRA	0.03			X		HR			X		HV	HR HV
4258	ARRASTRA	0.09					LR			X		HV	LR HV
4259	FT BAYARD ADMIN SITE	0.19					LR	X				HV	LR HV
4271 H	FRISCO DIVIDE ELECTRONIC SITE	0.62					LR					LV	LR LV
4271 H	FRISCO DIVIDE ELECTRONIC SITE	0.03			X		HR					LV	HR LV
4301 I	ALUM T.H.	0.05					LR					LV	LR LV
4301 S	HEART BAR WILDLIFE	0.18		X	X		HR					LV	HR LV
4308	FDT 706 TRAILHEAD	0.08			X		HR					LV	HR LV
4308	FDT 706 TRAILHEAD	1.95					LR					LV	LR LV
4308 B	FDT 705 TRAILHEAD	0.64					LR			X		HV	LR HV
4308 C	FDT 143 TRAILHEAD	0.65					LR					LV	LR LV
4313 D	NEGRITO WORK CENTER	0.15			X		HR					LV	HR LV
4313 E	NEGRITO WORK CENTER	0.20			X		HR	X				HV	HR HV
4318 K	RESERVE AIRSTRIP	0.05			X		HR				X	HV	HR HV
4318 L	NM HWY DEPT	0.05			X		HR				X	HV	HR HV
4318 M	RANCHO GRANDE CAFE	0.11			X		HR				X	HV	HR HV
4318 M	RANCHO GRANDE CAFE	0.07					LR				X	HV	LR HV
4318 N	RODEO TRAILER	0.28			X	X	HR				X	HV	HR HV
4318 O	RODEO PARKING	0.20			X	X	HR				X	HV	HR HV
4318 P	TULAROSA CABIN	0.44		X	X		HR					LV	HR LV
4318 P	TULAROSA CABIN	0.15					LR					LV	LR LV
4319 Q	RESERVE	0.74		X	X	X	HR				X	HV	HR HV
4319 Q	RESERVE	0.07					LR				X	HV	LR HV
46	FRANKS	2.85	X	X	X		HR				X	HV	HR HV
46	FRANKS	3.13					LR				X	HV	LR HV
47	LONG CANYON	2.88		X	X		HR		X		X	HV	HR HV

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47	LONG CANYON	5.98					LR		X		X	HV	LR HV
49	TORIETTE LAKE	3.97	X		X	X	HR		X	X	X	HV	HR HV
49	TORIETTE LAKE	7.44					LR		X	X	X	HV	LR HV
500	TURKEY RUN	0.10			X		HR					LV	HR LV
500	TURKEY RUN	2.17					LR					LV	LR LV
503	RAINY MESA	0.56		X	X		HR					LV	HR LV
506 A	LITTLE WALNUT C G	0.04			X		HR			X		HV	HR HV
506 A	LITTLE WALNUT C G	0.27					LR			X		HV	LR HV
508	WILLOW CREEK CG	0.31		X	X		HR			X		HV	HR HV
509	NEGRITO AIRSTRIP	1.37					HR					HV	HR HV
512	NEGRITO MOUNTAIN LO	0.98			X		HR					LV	HR LV
521	ADOBE RANCH	0.11			X		HR		X		X	HV	HR HV
521	ADOBE RANCH	8.58					LR		X		X	HV	LR HV
522	TIERRA BLANCA	1.41					LR	X			X	HV	LR HV
522	TIERRA BLANCA	0.07			X		HR	X			X	HV	HR HV
524	IVANHOE	0.06		X	X		HR					LV	HR LV
524	IVANHOE	0.51					LR					LV	LR LV
528	EAST FORK ROAD	1.90		X	X	X	HR			X	X	HV	HR HV
528 A	GILA RIVER ACCESS	0.07		X	X	X	HR			X		HV	HR HV
528 C	GRAPEVINE C.G.@S.A. CAN.	0.08		X	X		HR			X		HV	HR HV
536	FT BAYARD	0.03			X		HR	X		X	X	HV	HR HV
536	FT BAYARD	3.02					LR	X		X	X	HV	LR HV
537	EAST CANYON	0.36		X	X		HR			X		HV	HR HV
537	EAST CANYON	0.32					LR			X		HV	LR HV
540	BEARDON	0.17			X		HR				X	HV	HR HV
540	BEARDON	0.74					LR				X	HV	LR HV
545	EAST CAMP	0.92	X		X		HR		X	X	X	HV	HR HV
545	EAST CAMP	0.81					LR		X	X	X	HV	LR HV
560	SILVER SPRING	0.02			X		HR					LV	HR LV
560	SILVER SPRING	0.01					LR					LV	LR LV
583	HELIPORT ROAD	0.71					LR	X				HV	LR HV
584	KENNEDY CANYON	0.91			X		HR		X		X	HV	HR HV
584	KENNEDY CANYON	9.06					LR		X		X	HV	LR HV
59	MIMBRES AS	0.07		X	X		HR	X				HV	HR HV
601	BEN LILLY	0.04					LR					LV	LR LV
609	LINK RANCH	1.32	X	X	X		HR				X	HV	HR HV
61	ME OWN HILL	0.71					LR	X				HV	LR HV
610	MESA CG	0.34			X		HR			X		HV	HR HV
610	MESA CG	0.39					LR			X		HV	LR HV
614	FORKS CAMPGROUND	0.12		X	X		HR			X		HV	HR HV
614 A	FORKS CAMPGROUND LOOP	0.03		X	X		HR			X		HV	HR HV
614 B	FORKS CAMPGROUND LOOP	0.12		X	X	X	HR			X		HV	HR HV
614 C	FORKS CAMPGROUND LOOP	0.08		X	X	X	HR			X		HV	HR HV
614 D	FORKS CAMPGROUND LOOP	0.08		X	X		HR			X		HV	HR HV

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614 E	FORKS CAMPGROUND LOOP	0.06		X	X		HR			X		HV	HR HV
614 F	FORKS CAMPGROUND LOOP	0.03		X	X		HR			X		HV	HR HV
614 H	FORKS CAMPGROUND	0.01		X	X		HR			X		HV	HR HV
617	SALIZ MOUNTAIN	0.57			X		HR				X	HV	HR HV
62	BLACK CANYON	0.64		X	X		HR					LV	HR LV
626	GUT ACHE MESA	1.82	X	X	X		HR		X		X	HV	HR HV
627	LAKE ROBERTS BOAT LANDIN	0.27			X		HR			X		HV	HR HV
630	CLINTON P ANDERSON	0.06			X		HR			X		HV	HR HV
630	CLINTON P ANDERSON	0.06					LR			X		HV	LR HV
634	WILLOW CREEK AS	0.11		X	X		HR	X				HV	HR HV
635	BEN LILLY	0.08		X	X		HR			X		HV	HR HV
644	BOUNDARY	0.04			X		HR				X	HV	HR HV
644	BOUNDARY	1.23					LR				X	HV	LR HV
665	GROGAN CANYON	6.70			X		HR		X		X	HV	HR HV
677	HARTSON SPUR	0.25					LR		X			HV	LR HV
701	MINERAL CREEK	0.48					LR					LV	LR LV
729	MOON RANCH	0.01			X		HR				X	HV	HR HV
729	MOON RANCH	0.58					LR				X	HV	LR HV
729 A	CUTOFF	0.23					LR				X	HV	LR HV
73	GEORGETOWN	0.31		X	X		HR				X	HV	HR HV
73	GEORGETOWN	5.06					LR				X	HV	LR HV
730	CIRCLE SEVEN	0.31			X		HR					LV	HR LV
730	CIRCLE SEVEN	1.41					LR					LV	HR LV
754	NINE-SIXTEEN	0.01			X		HR				X	HV	HR HV
754	NINE-SIXTEEN	0.47					LR				X	HV	LR HV
755	WORTHY	0.75		X	X		HR			X	X	HV	HR HV
755	WORTHY	0.67					LR			X	X	HV	LR HV
756	WRIGHTS CABIN	0.05		X	X		HR			X		HV	HR HV
77	DIPPING VAT CG	0.78		X	X	X	HR			X		HV	HR HV
770	FOX MOUNTAIN	4.00			X		HR					LV	HR LV
770	FOX MOUNTAIN	1.61					LR					LV	LR LV
775	CRUMBLEY	0.04			X		HR				X	HV	HR HV
775	CRUMBLEY	1.74					LR				X	HV	LR HV
777	WINDMILL PASTURE	1.73					LR				X	HV	LR HV
778	HANOVER CANYON	0.05			X		HR					LV	HR LV
778	HANOVER CANYON	1.77					LR					LV	LR LV
803	OWENS	0.41					LR				X	HV	LR HV
804	CLEVELAND MINE	0.23					LR				X	HV	LR HV
808	CYPRESS	0.48	X	X	X		HR					LV	HR LV
808	CYPRESS	1.58					LR					LV	HR LV
809	GILA RIVER	2.83		X	X		HR			X		HV	HR HV
809	GILA RIVER	1.74					LR			X		HV	HR HV
819	SHRINE MINE	0.04			X		HR					LV	HR LV
819	SHRINE MINE	3.24					LR					LV	LR LV

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828	COPELAND	0.01			X		HR					LV	HR LV
828	COPELAND	0.31					LR					LV	LR LV
837	C BAR RANCH	0.04			X		HR				X	HV	HR HV
837	C BAR RANCH	2.79					LR				X	HV	HR HV
838	WALKING X	0.07			X		HR				X	HV	LR HV
838	WALKING X	0.73					LR				X	HV	LR HV
841	WD RANCH	0.74		X	X		HR				X	HV	HR HV
841	WD RANCH	2.79					LR				X	HV	LR HV
841 A	841 A	0.06			X		HR				X	HV	HR HV
841 A	841 A	1.01					LR				X	HV	LR HV
843	CURETON	1.17					LR					LV	LR LV
849	AXLE CANYON	0.04			X		HR				X	HV	HR HV
849	AXLE CANYON	2.19					LR				X	HV	HR HV
851	REDROCK	0.49			X		HR			X	X	HV	HR HV
851	REDROCK	11.27					LR			X	X	HV	LR HV
852	RIDGE	2.84					LR			X	X	HV	LR HV
853	BEAR MTN	0.80			X		HR				X	HV	HR HV
853	BEAR MTN	13.83					LR				X	HV	LR HV
859	MILL CANYON	0.13			X		HR					LV	HR LV
859	MILL CANYON	6.01					LR					LV	LR LV
860	GOLD GULCH	0.29	X		X		HR					LV	HR LV
860	GOLD GULCH	7.03					LR					LV	LR LV
861	KNIGHT CANYON	0.37			X		HR					LV	HR LV
861	KNIGHT CANYON	4.57					LR					LV	LR LV
880	LOOKOUT POINT	0.68					LR	X				HV	LR HV
882	RIVER	0.58	X	X	X		HR			X		HV	HR HV
886	ROYAL JOHN	1.84			X		HR					LV	HR LV
886	ROYAL JOHN	1.73					LR					LV	LR LV
888	BERENDA	0.11			X		HR				X	HV	HR HV
888	BERENDA	0.84					LR				X	HV	LR HV
898	HUDSON STREET WAREHOUSE	0.07					LR	X				HV	LR HV
899	FIRE BASE	0.13					LR	X				HV	LR HV
91	OLD TYRONE	1.30					LR					LV	LR LV
929	NFSR 929	0.20					LR	X				HV	LR HV
93	SLAUGHTER MESA	13.23	X	X	X		HR		X	X	X	HV	HR HV
93	SLAUGHTER MESA	4.33					LR		X	X	X	HV	LR HV
94	COX CANYON	13.40	X	X	X	X	HR		X	X	X	HV	HR HV
94	COX CANYON	9.96					LR		X	X	X	HV	LR HV
95	CATWALK	0.09			X		HR		X	X		HV	HR HV
953	ADAMS PLACE	1.17			X		HR		X		X	HV	HR HV
953	ADAMS PLACE	0.08					LR		X		X	HV	LR HV
970	VISITORS CTR. ACCESS	0.86	X	X	X		HR	X			X	HV	HR HV
970	VISITORS CTR. ACCESS	0.25					LR	X			X	HV	HR HV
970 A	GILA BARN	0.16		X	X		HR	X				HV	HR HV

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970 B	GILA V.C. PARKING (LOOP)	0.12		X	X		HR	X				HV	HR HV
970 C	GILA HOUSING AREA	0.09		X	X		HR	X				HV	HR HV
970 E	GILA BONEYARD	0.03					LR					LV	LR LV
970 F	GILA PUMP HOUSE	0.15	X		X		HR					LV	HR LV
970 G	GILA HELI SPOT	0.18		X	X		HR					LV	HR LV
970 H	GILA HELITACK	0.03	X	X	X		HR	X				HV	HR HV
970 I	GILA WAREHOUSE	0.07		X	X		HR	X				HV	HR HV
971	RUINS VISTA PARKING LOT	0.09			X		HR			X		HV	HR HV
973	LOWER SCORPION CORRAL CG	0.05	X	X			HR			X		HV	HR HV
973 A	UPPER SCORPION C.G.	0.12		X			HR			X		HV	HR HV
973 B	CONTACT TRAILER PKG LOTS	0.12		X	X		HR	X		X		HV	HR HV
973 C	WOODY'S CORRAL TRAILHEAD	0.30		X			HR			X		HV	HR HV
973 D	ADOBE CANYON RESTROOMS	0.03		X			HR				X	HV	HR HV
973 E	T.J. CORRAL TRAILHEAD	0.04		X			HR			X		HV	HR HV
973 F	GILA DUMP STATION	0.07		X	X		HR	X				HV	HR HV
974	UPPER END C G	0.23		X	X		HR			X		HV	HR HV
980	GALLINAS CG	0.25		X	X		HR			X		HV	HR HV
981	LEOPOLD VISTA	0.40					LR			X		HV	LR HV
989	SALIZ HELIPORT	0.43	X		X		HR	X				HV	HR HV
99	DEEP CREEK ROAD	0.03			X		HR					LV	HR LV
99	DEEP CREEK ROAD	0.28					LR					LV	HR LV
991	WOLF HOLLOW	0.83					LR			X		HV	LR HV

Appendix B: Ecological, Social and Economic Considerations

Ecosystem Functions and Processes (EF)

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

There are no plans to build roads within inventoried roadless areas. In addition, no other unroaded areas are planned to have permanent roads built. The ecological attributes of these areas will continue to be protected by the Forest Plan and project-level design features.

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

The presence of roads increases the risk of spread of existing and new noxious weeds to the Forest and surrounding landscapes. The higher the assigned maintenance level and subsequent frequency of road maintenance increases the chances for spread of many exotic (noxious) plants into new areas. These noxious weeds will often displace the habitat of existing native species near many roads. The end result is ecosystem function can be dramatically altered by the introduction and spread of noxious weeds and our road system provides a major opportunity for introduction of new species from other states.

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

The presence of roads allows access to the forest for many types of treatment, including, mechanical, chemical, burning.

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

The disturbance these roads cause has already occurred in the construction of the road, and all are well established roads. These existing roads have already committed the disturbance and now we deal with the effects of the presence, use and maintenance of the roads.

The most common disturbance regimes on the Gila National Forest are fire, drought and insects and disease in the Ponderosa Pine and coniferous forest types. These regimes are interrelated since drought often leads to increased incidences of fire and outbreaks of

insects and disease. Fire is thought to be the most significant disturbance regime and many past large stand replacing fires are found on all three Ranger districts of the Forest.

Although road access provides risk for human-caused fires on the Forest, roads also allow rapid response opportunity for fire suppression activities. Even though it is acknowledged that road access in the Forest increases risk for human caused fire, this risk can be minimized through administrative means such as smoking and campfire restrictions and complete closures during high and extreme fire danger periods.

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

Noise from developing, using and maintaining roads may effect people and wildlife within hearing distance. There is no specific data on the effects of noise from Gila National Forest roads on people or wildlife. The Lincoln National Forest has studied the effects of noise on the Mexican spotted owl. Recommendations made in these studies are applicable to the Gila National Forest.

The adverse effects of noise on wildlife have been documented in several studies (Delaney et. al., 1999; Delaney and Grubb, 2001; Henderson, 2001). Delaney et. al., 1999 studied the effects of noise, specifically low-level helicopter flights and chainsaws, on the Sacramento Ranger District, Lincoln National Forest. The study focused on nesting and non-nesting Mexican spotted owls and their response to helicopter and chainsaw noise. The study found that Mexican spotted owls are affected by noise levels above 92 dBA at a distance of < or = to 105 meters. The study also found that chain saws were more disturbing to Mexican spotted owls than helicopter flights at comparable distances. The study concluded that a 105 meter buffer zone for helicopter overflights on the Lincoln National Forest would minimize spotted owl flush (i.e. leaving a nest or perch) response and any potential effects on nesting activity.

Delaney and Grubb, 2001 studied the effects of recreational motorcycle noise on Northern Spotted Owl Habitat on the Mendocino National Forest. The study did not locate spotted owls during the course of the study, and therefore could not provide definitive recommendations for mitigating the effects of noise. However, the researchers did provide preliminary findings and areas that needed further study. The preliminary findings include; 1) Northern spotted owls are not likely to flush in response to motorcycle activity > 180 meters from an owl location based on prior noise research conducted on Mexican spotted owls and chainsaws, 2) Motorcycles passing on steep slope trails (> 16%) may elicit greatest behavioral response by spotted owls, followed by horizontal slope (0%) and moderately sloped trails (9-16%). In addition, motorcycle traffic on straight trails may elicit greater response behavior than curved trails, 3) Nest types also differ on the degree of noise effects. Cavity nest may receive higher noise levels than other external structure nest types due to a resonating effect within the nest cavity itself, 4) Motorcycle type and driver aggressiveness also result in different noise

effects. Higher frequency motorcycles (200 cc motorcycles) are potentially more disturbing to spotted owls than lower frequency motorcycles (400 cc motorcycles). In addition, more aggressive the driver, the more substantial the effect on noise levels and noise energy distribution, 5) Enduro check points and fuel stops should not be located near owl locations because of the potential increases in noise levels and duration of noise levels.

Henderson, 2001 conducted an analysis predicting blast noise levels for the Forest Road 107 Improvement Project. Henderson found many factors affecting noise levels that include; 1) air temperature inversions results in higher noise levels, and 2) locations that are downwind from the blast site also result in higher noise levels. 3) distance and topographic features between the blast site and the sensitive area of concern. To mitigate high noise levels, blasting should occur in the absence of air temperature inversions, with sensitive sites being located upwind from the blast site, and at a distance of 0.25 to 0.5 miles.

Aquatic, Riparian Zone, and Water Quality (AQ)

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

Roads can have several effects on the hydrology of a watershed. These can include interception of rainfall directly on the road surface and cutbanks, expansion of the channel network, conversion of subsurface flow to surface flow, concentrating of flows, either on the surface or in an adjacent ditch or channel, reduction of infiltration on the road surface, diversion of water from normal flow paths

The channel network is expanded by road ditches, which create stream channels in previously unchannelized portions of the hillside. Road ditches also intercept subsurface flow and convert it to surface flow. An expanded channel network augments peak flows since water traveling as concentrated surface flow reaches the channel faster than water traveling as subsurface flow. Reduced infiltration contributes to additional surface flow since water does not infiltrate for storage in the soil profile, but rather runs off as overland or surface flow. These surface flows can cause gullies downstream of roads that are not properly drained. Storage and movement of water through the soil profile as subsurface flow regulates and sustains baseflows. When roads disrupt these processes, more water becomes available during peak flows, and less water is available to sustain baseflows.

Road density is an indicator of the road system's relative potential for modifying surface and subsurface hydrology, that is, the higher the road density, the greater the potential for the road system to affect hydrologic processes. Density, coupled with local factors, determines the hydrologic effects that roads are having within particular areas.

Precipitation on the Gila National Forest is highly variable, with a bimodal pattern of winter snow and summer monsoonal rains occurring throughout much of the Forest. Intense summer thunderstorms can cause extreme runoff events, particularly in granitic, alluvial, and volcanic areas dominated by shallow soils and high concentrations of rock. In flashy runoff events, little infiltration occurs and roads in these areas act as flow pathways, which accelerate delivery of water to the stream network. Rutting of roads and damage to road drainage can occur when roads are used during wet periods. In the higher elevations, where snow occurs over most of the winter months, effects from roads occur primarily during spring runoff and major thunderstorm events.

Mitigation measures to consider if roads are likely to modify surface and subsurface hydrology can include the following concepts:

- Design roads to minimize interception, concentration, and diversion potential
- Design measures to reintroduce intercepted water back in to subsurface flow
- Use outsloping and drainage structures to disconnect road ditches directly from stream channels
- Evaluate and eliminate diversion potential at stream crossings

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

Surface erosion is highly dependent on soils, road surfacing, road grade, age of the road, traffic volumes, road densities, and the effectiveness and spacing of drainage structures. The greatest surface erosion problems occur in highly erodible terrain, particularly areas dominated geologically by granitic, rhyolite, Gila conglomerate, or volcanic sediment parent material. Sediment delivery to stream systems is likely highest in the initial years after road construction, although raw ditchlines and road surfaces with little binder can remain chronic sources of sediment. Drainage structure, function, and spacing are key to minimizing the amount of surface flow, which directly affects surface erosion. Drainage structures should be closer together on erodible soils on steep slopes with little to no binder, and further apart on flatter gravel surfaces with moderate binder and little to no fines. Cut and fill slopes should be re-vegetated.

Different parts of the road system and adjoining cutbanks and fillslopes can behave quite differently hydrologically. All roads do not perform equally during storms, and the same road segment may behave quite differently during storms of different magnitudes. As storms become larger and soils become increasingly saturated, more of the road system can contribute water and sediment directly into a stream channel. Steeper road gradients will produce an amplified effect on the magnitude of road-induced runoff. . Discharge from hillslopes, cutbank height, density of stream crossings, soil properties, and response to storms all differ by slope position and/or watershed aspect. These features all need to be taken into consideration when constructing, reconstructing and maintaining Forest roadways.

Proper design and maintenance of roads can reduce the amount of sedimentation moving into the stream network. Mitigation measures can include increasing the number and

effectiveness of drainage structures. Culverts should be properly maintained and replaced when in need. In addition, either gravelling, or adding a binding material to those roads that have native surfaces with no inherent binder can improve road surfaces.

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

Road-related mass wasting results from 1) improper placement and construction of road fills and stream crossings, 2) inadequate culvert sizes to accommodate the peak flows, sediment loads, and woody debris, 3) roads located on soils prone to mass wasting, and) water diversion onto unstable hillslopes. Mass wasting is not a widespread concern on the Gila National Forest, however, there are some areas of concern where roads are located on or near highly erosive soils formed from granite, rhyolite, Gila conglomerate or volcanic sediments. Concentration and diversion of flow into headwater areas can cause incision of previously unchanneled portions of the landscape and initiate slides in colluvial hollows. Diversion of streamflow at road-stream crossings, road proximity to stream channels, and the culvert placements and frequencies are key factors contributing to road failure, and other landscape erosional consequences during large flood events. Other potential factors include unusually high antecedent moisture content in the soils as a result of above normal precipitation years, or heavy snow pack allowing increased risk for slumping or small landslides along cutbanks and fillslopes.

More in-depth analysis on a project scale will identify areas where the interaction of the soils underlying bedrock, slope steepness, and subsurface hydrology are creating high priority concern areas. Opportunities to address existing roads in areas with high mass wasting include relocation of roads to areas with more stable soils, and relocation of drainage structures so that the outlets are on less sensitive areas with flatter slopes and well-drained soils.

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

Road-stream crossings have the potential to directly and indirectly affect local stream channels and water quality. These crossings can be a major source of sediment to streams, resulting from channel fill around culverts, subsequent road-crossing failures, and subtle or major changes in stream morphology. Poorly designed crossings directly affect hydrologic function when they constrict the channel, when they are misaligned relative to the natural stream channel, or when improperly sized culverts are installed. Road crossings also act as connected disturbed areas where water and sediment are delivered directly to the channel. Greater road density typically leads to a larger number of road-stream crossings, thereby increasing the likelihood of impacts on water quality, with an increasing amount of fine sediments or sand entering streams at these juncture points. Stream crossings such as fords allow greater sediment delivery to streams, due to the direct connection of the road to the stream, compared to culvert crossings or bridges. Increasing peak flows through the extended channel network increase the energy

available for in-channel erosion, which affects stream stability and increases sedimentation. Higher volumes of traffic and an increased density of non-paved roads, additionally, add to the negative impacts that sedimentation may cause to water quality and fish and macro-invertebrate habitat.

There are several opportunities to improve concern areas in roads of all levels. Crossings can be designed to pass all potential bedload including water, sediment, and woody debris. Crossings can be realigned that are more consistent with the channel's natural pattern, form, and function. Crossing designs can be altered that provide a more suitable fit for the landscape, including bottomless arch culverts, and hardened crossings. Cross drains can be installed near stream crossings to reduce connected disturbed areas. Relocating or redesigning a road, to accommodate only those crossings absolutely necessary can minimize the potential for adverse affects.

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

Anywhere roads run adjacent to, or cross, streams or floodplains, there is some potential for spilled pollutants to access streams. Paved road systems have a higher risk of contributing chemical pollutants to stream systems, due to larger volumes of vehicular traffic, greater attention on road maintenance requirements, and potential accidental spills, while unpaved road systems likely contribute more fines to nearby streams. Clear and open pathways for pollutants to enter surface waters are generally at road crossings, such as fords and roadside culverts that have outlets near or directly into surface waters. Poorly cross-drained ditches may transport spilled pollutants to standing or flowing water bodies. The potential for pollutants to enter surface waters is also based upon the design of the road system such as out-sloped vs. in-sloped road designs, the incorporation of broad road dips, and the number of culvert installations along road-side ditches. A road's proximity to a stream can often be mitigated by the amount of vegetation within the stream's buffer zone that can serve as a "pollutant trap" between the road and stream channel. If the road is designed poorly, or there is a lack of vegetative buffer between the road and stream, movement of pollutants into surface waters is more likely to occur.

Log haulers and other heavy equipment associated with harvest and road activities carry sufficient fuel and oil to cause localized water quality problems should an accident occur. This is minimized by stipulations in timber sale contracts that specify haul speeds, fueling practices, weather or road moisture limitations, and other aspects of the operations. Forest road maintenance crews are also trained to utilize safe areas and procedures for refueling heavy equipment. The potential for pollutant associated with log haulers would be highest on those roads commonly used for timber harvest access, particularly maintenance level 3-5 roads.

The application of magnesium or calcium chloride for road dust abatement may affect water quality, although repeated year-round application is often necessary before any

effects are detected. The Gila National Forest has employed this method of dust abatement during large logging operations in the past, however practice has been minimal in recent years due to minimal logging operations. Salts may be used during the winter months as de-icing agents by New Mexico Department of Transportation and local county agencies on State highways and county-maintained roads within or adjacent to the Forest. This method of salt application typically has a higher rate of application than that used for dust abatement and has chemicals that do not bind with the pavement. These reasons lead de-icing to have a higher potential for affecting water quality, particularly if the road is within 100 feet of a water body, without sufficient vegetative buffer. State highways at high elevations within the Forest boundary likely receive the highest application rates of de-icing salts. Noxious weed treatments along shoulders of Forest roads, adjacent to stream channels, may affect water quality through leaching and overland flow processes during storm events. These treatments have been practiced on the Gila National Forest on a limited scale. Bituminous treatments (asphalt products) applied during road construction/maintenance can also adversely affect water quality and aquatic habitat if any of the product reaches the stream channel. New Mexico Department of Transportation has recently required bituminous applications to be cut with a 50 percent dilution of water to reduce possible pollutant discharge.

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

See AQ(1), (2), (3), and (4) for additional information. The road is hydrologically connected to the stream system where there are connected disturbed areas. These areas can be stream crossings, leadout ditches, grade dips, culverts and other road drainage features that have direct outlet access to a stream channel, without an adequate vegetative buffer. Water quality can be degraded where connected disturbed areas increase sediment delivery to the stream network. Highly erodible soils within these connected disturbed areas are mostly likely to contribute the most sediment to the channel. As discussed in AQ(1), the extended channel network can additionally increase peak flows, which can accelerate erosion and sediment movement already occurring in the roads drainage system.

For thermal increases, roads that closely parallel streams can increase sunlight exposure to the channel, as trees are often removed from the road corridor for safety and maintenance purposes. Without the road the trees would have been left to act as shade corridors and an immediate source of litter fall into stream channels. Loss of trees and woody riparian species, within the road corridor and adjacent to streams, can potentially reduce shade coverage, expose surface waters to more sunlight, and increase water temperatures.

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

New Mexico Environment Department lists the following individual use supports for assessed waters of New Mexico: High Quality Cold Fishery; Coldwater Fishery; Marginal Coldwater Fishery; Warmwater Fishery; Limited Warmwater Fishery; Primary Contact; Secondary Contact; Domestic Water Supply; Fish Culture; Irrigation; Livestock Watering; and Wildlife Habitat. Assessed waters are those water bodies for which the State can determine levels of support for designated uses established in the *Assessment Protocol: State of New Mexico Standards Attainment for § 303(d) List and § 305(b) Reports* as well as for the goals of the federal Clean Water Act (CWA) **(**1). Levels of support for designated uses are determined for individual water bodies as either Fully supporting; Fully supporting, impacts observed; Partially supporting; or Not supporting. Currently, the Gila National Forest has several stream reaches (within or immediately adjacent to Forest boundaries) listed as impaired on New Mexico's 303(d) list (NMED, 2002). These include reaches in the following streams, and their attainment status:

- Alamosa Creek→ Partial support of marginal coldwater fishery
- Percha Creek → Partial support of marginal coldwater fishery; partial support of warmwater fishery
- Cold Springs Creek→ Non-support of coldwater fishery
- Gallinas Creek→ Partial support of coldwater fishery
- Hot Springs Creek → Non-support of coldwater fishery
- Mimbres River → Non-support of high quality coldwater fishery; Non-support of coldwater fishery
- Black Canyon Creek→ Non-support of high quality coldwater fishery
- Canyon Creek→ Partial support of high quality coldwater fishery
- East Fork Gila River→ Non-support of high quality coldwater fishery
- West Fork Gila River→ Non-support of high quality coldwater fishery
- Middle Fork Gila River→ Non-support of high quality coldwater fishery
- Middle Fork Gilita Creek→ Partial support of high quality coldwater fishery
- Mogollon Creek→ Partial support of high quality coldwater fishery
- Sapillo Creek→ Partial support of high quality coldwater fishery
- Taylor Creek→ Non-support of high quality coldwater fishery
- Turkey Creek→ Non-support of high quality coldwater fishery
- Centerfire Creek → Non-support of high quality coldwater fishery
- South Fork Negrito Creek → Non-support of high quality coldwater fishery
- Negrito Creek → Non-support of high quality coldwater fishery
- San Francisco River → Non-support of coldwater fishery
- Tularosa River → → Non-support of warmwater fishery
- Whitewater Creek → Non-support of high quality coldwater fishery
- Wall Lake → Non-support of coldwater fishery
- Mangas Creek → Non-support of warmwater fishery
- Quemado Lake → Non-support of coldwater fishery
- Lake Roberts → Partial support of coldwater fishery
- Wall Lake → Non-support of coldwater fishery

- Bear Canyon → Non-support of coldwater fishery

These reaches are listed due to various causes of impairment including, but not limited to, turbidity, elevated organics, temperature, pH, dissolved oxygen, stream bottom deposits, plant nutrients, and elevated metals. Any additional road-induced impacts to water quality in these reaches can cause further degradation in designated fish habitat.

Additionally, the stream network within the Gila National Forest has associated water rights filings based on the prior appropriation doctrine. These filings list claims associated with the first beneficial use of waters, which can include domestic use, livestock and wildlife watering, irrigation, prospecting and mining, construction of public works, highways and roads, and diversion of water for dust abatement work on roads. Changes in uses and demand are ongoing and may include changes in points of diversion, points of use, and beneficial uses.

Demands for most water uses are following an increasing trend, as population increases continue in and around the Gila National Forest. With this increase in population, an inherent increase is expected in recreational and transportation needs. Controversy over appropriate uses of water will also grow with population increases. Most major river basins in New Mexico are fully or over-appropriated, adding complexity to the problem of determining the best use of state waters.

Several of the designated uses and beneficial uses can be affected by road-derived pollution. Sediment from forest roads can surpass the tolerance of fish and prey (aquatic invertebrate) populations, and/or roads can cause channel instability, which degrades aquatic habitat. If best management practices are not implemented, or effective, during road design, building, or maintenance, water quality can also be lowered. Road-induced sedimentation can impact downstream water right holders, such as the silting in of a stock tanks, lowering its capacity.

Road-derived pollutants might include hydrocarbons, salts, mineral sediments, or anything spilled from a hauling vehicle. These pollutants, if present in enough quantity, could affect the drinking water and the health of the people using that water in a municipal watershed. Currently, roads are not believed to be significantly affecting water quality for public water supply.

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

Low gradients, high water tables, ample soil developments, water-loving plants, and poorly defined drainage and sheet flow areas often define wetland areas. Trafficking of wetland roads generally occurs in the driest time of year while upland roads are usually designed for year-round access. Wetlands are likely to be found near spring areas where flat trails or road cuts are located in amply shaded locations, near naturally dammed areas such as travertine deposits or known active beaver areas, or along near valley flats where perennial streams can be found. Roads can affect wetlands directly by encroachment,

and indirectly by altering hydrologic surface and subsurface flow paths. Encroachment results in a loss of wetland directly proportional to the area disturbed by the road. Alteration of the hydrologic flow path can affect wetland function with the effects extending beyond the area directly affected by the road. Road rutting in wetlands can often lead to channelization of flow, funneling normally dispersed waters into one area, subsequently leading to headcutting and drying up of the meadow.

Mitigation measures to protect wetlands can include relocating roads out of wetland areas, setting road-stream crossing bottoms at natural levels of wet meadow surfaces, and using alterative methods to restore natural hydrology of the wetland (i.e. French drains, diffused drainage on crossings, etc.).

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

Roads affect geomorphic and channel dynamics from four different mechanisms: **1)** accelerating erosion from the road surface and prism itself by both mass and surface erosion processes that adds or changes the equilibrium dynamics in a channel through sediment loading and erosional processes; **2)** directly affecting channel structure and geometry by constraints to the floodplain or stream that have a natural tendency for lateral (or vertical) migration; **3)** altering of surface flow paths and increasing stream density, leading to increased landscape dissection or channelization onto previously unchannelized portions of the landscape; and **4)** causing complex interactions among water, sediment, and woody materials (where an increase in sediment movements, road side failures, slumpings, stream bank failures, landslides, and changes in streamflow dynamics will occur. These mechanisms involve different physical processes, have varying effects on erosion rates, and are not uniformly distributed either within or among landscapes or watersheds.

Roads can direct affect physical channel dynamics when they encroach on floodplains or restrict channel migration. Floodplains help dissipate excess energy during high flows and recharge soil moisture and groundwater. Floodplain function is compromised when roads encroach on or isolate floodplains, which can increase peak flows. When peak flows increase, more water is available for in-channel erosion, which then effects channel stability. Restricting channel migration can cause channel straightening, again increasing stream velocities and the potential for banks erosion and channel instability. A change in stream form, pattern, and profile ultimately leads to a decline in the stream's ability to effectively transport its bedload (water, sediment, and coarse wood).

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

Migration and movement of aquatic organisms are primarily restricted at road-stream crossings with culverts. Generally, the restriction is on upstream migration, although downstream migration can also be affected. Road systems affect the migration and movement of aquatic organisms by blocking access to spawning grounds or suitable habitats through inappropriately installed culverts, poorly designed low water crossings, or changes in water velocities in a stream. An inappropriately installed culvert is likely to pose a movement barrier to resident fish attempting to move to headwaters to spawn. This same culvert may also affect juvenile fish attempting to move to rearing habitat or cooler waters by increasing water velocities through the culvert and prohibiting movement within a stream. Culverts and low water crossings can also affect habitat links between different streams and stream systems within a watershed or multiple watersheds. If culverts or low water crossings close off habitat links, then genetic exchange between fish populations is reduced or eliminated, resulting in isolated populations and inbreeding. The probability of losing these isolated populations to disease and extirpation increases with time.

On the Gila National Forest, it is currently not known where restriction of migration and movement of aquatic organisms occurs. No surveys of culverts or low water crossings have been conducted to determine where conflicts with aquatic organisms exist.

Channel crossings by means of culverts designed to allow uninterrupted stream flow might also affect the morphology of small tributary streams, as well as limit or eliminate fish passage due to incorrect culvert placement and slope angle. Indirect effects of roads on channel morphology include the contributions of sediment and altered streamflow that can alter channel width, depth, local gradients, and habitat features (pools, riffles) for aquatic organisms.

Mitigation measures to address problem crossings can include resetting culverts to eliminate the limiting factor, and replacing culverts with alternative crossings such as bridges, low-water fords, or bottomless arch culverts.

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

See AQ (6) The road system directly affects riparian communities where it impinges on riparian areas. When a road is built in a riparian area tree and shrub habitat is lost which can reduce the shading of the stream. Trees and shuds can be removed during road maintenance. Roads can indirectly affect riparian communities by intercepting surface and subsurface flows and routing these flows so that riparian areas dry up and the riparian vegetation is replaced with upland vegetation. Riparian communities play a vital role in providing shade. Removal or degradation of these communities can affect stream stability and water temperatures, which in turn, affects aquatic habitat.

Mitigation measures to protect riparian areas can include relocating roads out of riparian areas and restoring natural hydrologic processes in riparian areas that have been dewatered by the road system.

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

The existing road system on the Gila National Forest is currently adequate to allow access to fishing waters by sportsmen. High traffic roads adjacent to streams with fish are the most likely to contribute to fishing and poaching. However, fish bearing streams where road networks loop or interconnect with other roads have a higher potential for poaching than roads that dead-end at a lake or stream. Poachers tend to favor roads that loop or interconnect with other roads in order to enter an area one way and then exit the same area in a totally different direction. This is not generally considered an issue on the Forest, and does not significantly affect aquatic populations and at-risk aquatic species.

Habitat loss for at-risk aquatic species occurs where the road prism results in direct or indirect loss of habitat. Direct loss of habitat results from the placement of roads in or near streams and riparian areas. For example, loss of stream habitat can occur by the placement of culverts in a stream, where a culvert and associated fill replaces native streambed materials. Encroachment of the road prism along streams also indirectly affects habitat by reducing riparian habitat that provides food, and shade that helps cool stream waters. In addition, added silt from roads that run parallel to streams affects spawning habitat by covering gravel beds, and filling the interstitial spaces of cobble and rubble substrates, thus suffocating eggs and larvae Roads that rank as a high risk for watershed values will likely be a high risk for aquatic species as well.

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

The introduction of non-native aquatic species occurs primarily through stocking of non-native fish, where access to water is readily available. The introduction of non-natives, such as bullfrogs, gold fish, sunfish, and bait bucket minnows is more likely where a road crossing intercepts flowing streams or standing pools. Waters located along passenger roads are more likely to receive non-native introduced species than waters located in back country areas or along more rugged high clearance roads. In addition, waters with high recreational fishing use will tend to receive more bait bucket introductions than waters located in back country areas where access is limited to foot travel. Non-native aquatic species have become a problem in recreational lakes, the San Francisco River, and Gila River on the Gila National Forest. Goldfish are adversely affecting the recreational fisheries in several of the lakes on the Forest. Catfish, carp, bass, and other non-native species are adversely affecting native fisheries in rivers like the San Francisco and Gila. Historically the New Mexico Game and Fish Departments stocked non-native salmonids

into many of the streams on the Gila. The stocking of non-native salmonids into lakes on the Forest via Forest roads is still occurring.

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

The road system generally has moderate overlap with areas of high aquatic diversity, or aquatic species of interest. The primary species include Southwestern willow flycatcher, Chihuahua chub, Gila chub, Spikedace, Loach minnow, Gila trout, Chiricahua leopard frog, Southwestern toad, Lowland leopard frog, Narrow-headed garter snake, Roundtail chub, Rio Grande cutthroat trout, NM hot spring snail, Gila spring snail, Iron Creek woodland snail, and Oreohelix chloride. Those that have a high risk of resource damage associated with roads and containing sensitive aquatic populations would be a priority for more detailed analysis at a project level.

Terrestrial Wildlife (TW)

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

Direct affects to terrestrial species habitat from the Gila National Forest road system include: 1) loss of habitat due to conversion of native vegetation to a particular road surface (paved, gravel, dirt), 2) fragmentation of habitats due to road system development, 3) interruption in migratory patterns of wildlife to reach breeding habitat or winter range habitat, and 4) lack of habitat use by wildlife due to disturbance caused by use of the road system.

Loss of wildlife habitat can be correlated to road miles by converting road width and road distance into acres of habitat. The current miles of road being analyzed differs slightly between each administrative unit. Most single lane roads, level 2 and some level 3 roads, have a standard width of 12 feet. Most double lane roads (level 4 roads) have a standard width of 24 feet. For this analysis, an average width of 16.5 feet will be used. A road 16.5 feet wide and one half mile long is equivalent to 1 acre. Table 1 illustrates each Ranger District's total road miles, inclusive of all road levels, and the amount wildlife habitat in acres that has been converted to a road surface over time.

Table 1. Miles of road per ranger district and associated acres of wildlife habitat.

Ranger District	Miles of Road	Acres of Habitat
Black Range	123.5	247
Quemado	139.5	279
Reserve	199	398
Glenwood	28	56
Wilderness	112	224
Silver City	122	244

Total	**724**	**1,448**

Researchers have reported decreased use of areas adjacent to roads for distances ranging from 0.25 to 0.50 miles. Lack of wildlife use in habitats along roads can be correlated to the level of use a road receives over a period of time. Low use roads may tend to have wildlife using road side habitats more frequently than roads with high traffic volume.

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

Human activities that affect habitat and are facilitated by the existing road system include; 1) Off road vehicle travel, 2) Dispersed shooting or target practice, 3) Dispersed camping, 4) Large group special uses, 5) Forest Service commodity production (i.e. livestock, timber and mining).

Off-road vehicle travel on undesignated routes (i.e. cross country) is facilitated from existing roads, whether it's a level 2 or a level 5 road. Off-road vehicle travel affects habitat through trampling of vegetation, compaction of soil, loss of vegetation and soil, and contributing sediment to stream waters. Impacts to habitat can either be short term or long term. Short term impacts maybe where an off-road vehicle makes one pass across a stream and the resulting sediments clear up in a few minutes. Long-term impacts are where multiple passes occur across the stream resulting in eroded banks and loss of vegetation and soils for an extended period of time (i.e. years).

Recreational uses such as dispersed shooting areas, camping or large group events also impact wildlife habitat to varying degrees. For example, large group events occur periodically and over a short period of time. Most often, they occur over a weekend and result in trampling of vegetation in a meadow. The effects of such an activity are likely to last only a short period of time, a few days or a week. In contrast, dispersed shooting areas that receive continued use that has evidently occurred over a long period of time. At these sites, affects to wildlife habitat are seen in loss of vegetation and soil from target shooting. Areas void of vegetation are evident where target practice has occurred over an extended period of time. Loss of soil at these sites is also seen from off-road activities associated with target shooting (i.e. placement of targets, separation from other shooters, etc.). Other affects include displacement of wildlife due to noise associated with the discharge of firearms.

Past Forest Service commodity production has resulted in large part to the existing road system and network present today. Human activities such as timber harvest and livestock management affect wildlife to varying degrees. Wildlife forage, nesting, and thermal cover habitat are affected by these activities to varying degrees, depending on the degree of timber and forage extraction that occurs.

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

The existing road system being analyzed in this document influences both legal and illegal human activities. Legal activities such as hunting and trapping are facilitated by the existing road system. The road system facilitates hunting and trapping by making access to areas easier and faster, and also helps distribute road hunters (sportsmen who hunt from their vehicles or along road ways) over a greater area. In addition, level 2 roads and above also facilitate access for sportsmen with disabilities. In contrast, the same benefits of roads for legal activities such as hunting and trapping also help facilitate some illegal activities such as poaching. Poachers benefit and find it easier to take wildlife in areas with a well established road system. As discussed earlier poachers prefer road systems with loops or interconnected road networks, and tend not to use "dead end" roads or roads with no secondary outlet (i.e. one way in, one way out). However too many roads (high road densities) can also affect wildlife negatively through harassment, displacement, or vulnerability to hunters and poachers. The Rocky Mountain Elk Foundation has funded several studies on the effects of road on elk, and in particular to effects on mature bulls (Stalling, 1994). These studies have found that hunter densities increase in proportion to road densities. The more roads you have in an area, the more hunters you will have, resulting in more hunting pressure and harvesting of mature bulls. Stalling (1994) summarized one study that looked at elk mortality in three different areas; 1) High density of open roads, 2) Roads closed to motorized vehicles during hunting season, and 3) area with no roads. In the area with a high density of open roads, only 5% of all bulls lived to maturity (4.5 years). None of the bulls lived past 5.5 years, and the herd contained about 10 bulls for every 100 cows. In the area with roads closed during the hunting season, 16% of the bulls lived past maturity, most reaching 7.5 years. The herd contained 20 bulls for every 100 cows. In the area with no roads, 30% of the bulls lived to maturity, most reaching 10 years. This herd contained 35 bulls per 100 cows. The study found that as road access increases, elk become increasingly vulnerable to hunting mortality. This trend will result in elk populations with undesirable sex and age structure, increasingly complex and restrictive hunting regulations to protect elk herds, and a loss of recreational opportunity.

Illegal motorized vehicle use off road has become a major problem that is possibly linked to road systems. New roads/trails are constantly being created on the Forest by illegal use of off-road vehicles.

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

The Gila National Forest has numerous Endangered Species Act listed animals, and Regional Forester designated sensitive plants and animals. These species habitats are sometimes dissected by a road. The effect of the road will vary by species. Where habitat includes a road, some habitat is lost to the road surface. Sometimes the road's

drainage design causes an effect. Effects of a road or road maintenance to Federally listed species and/or Regional Forester designated sensitive species are analyzed through the Biological Assessment/Evaluation process on a case-by-case basis.

Economics (EC)

EC(1): How does the road system affect the agency's direct costs and revenues? What, if any, changes in the road system will increase net revenue to the agency by reducing cost, increasing revenue, or both?
At the Forest scale, this question can be answered in broad terms, as a detailed cost/benefit economic assessment is not feasible. The IDT for the Gila National Forest RAP addressed this question by developing the Road Value versus Risk matrix and used this tool to determine what roads fell into which road management category. The IDT identified four road management categories for this forest scale roads analysis.

The Gila National Forest RAP only considered maintenance level 3, 4, 5 roads. The IDT determined early in the process that an assumption that the majority of these roads would remain open due to the following reasons: access to private property, arterial road, or collector road. Most of these roads were developed over the years for a variety of access needs, and considerable capital investments were incurred to construct these roads. Most of these roads were analyzed in some form, which likely included use needs, construction design standards, environmental considerations, and economic assessment.

The IDT's challenge was to develop a process to sort out those level 3, 4, and 5 roads that may not be meeting current and future access and land management needs, at least not at their current maintenance levels. This process helps identify opportunities to reduce road maintenance costs on some roads. The IDT also determined that even if funding was shifted from low value to high value roads, the annual road maintenance funding available is significantly less than needed.

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

This is a project-level question, not a forest scale question.

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

This is a project-level question, not a forest scale question.

Commodity Production

Gila National Forest
Forest Level Roads Analysis Report

Timber Management (TM)

TM(1): How does road spacing and location affect logging system feasibility?

Most harvest activities whether it's conducted in the commercial forest land (Mixed Conifer, Ponderosa, Aspen) or the woodland zone (pinion, juniper), are harvested with ground-based equipment. The trees are either felled by hand with chain saws or cut mechanically with a feller-buncher and then yarded to the landing with rubber or tracked skidders. In general, a road spacing of 2,000 to 3,000 feet would be economical for ground-based skidding. Some cable logging has been conducted in the past and a road spacing less than above is necessary.

In general, close road spacing results in quick turn times and higher production that reduces yarding cost and increases stumpage value. Although closer road spacing can increase the total road cost due to more roads, this total cost can be reduced with the use of temporary roads.

Generally, road construction is only allowed where it is determined to be economically and technically necessary to achieve resource management objectives. The most efficient road spacing that would maximize timber stumpage values is not acceptable because it usually conflicts with other resource management objectives.

TM(2): How does the road system affect managing the suitable timber base and other lands?

See TM (1). Access to the lands, suitability of this access for haul trucks mixed with tourists, hunters, ranchers etc is a health and safety concern.

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

In addition to the above discussion concerning acres of suitable timber lands for logging, there is a new emphasis on management of the woodland component. This zone includes pinion, juniper, some oak and other shrubby species. Management in this zone has the greatest need for watershed improvements and also the greatest potential for increased water yield and biomass production. Historically, this area has been neglected in regard to road construction and transportation planning. So, future transportation planning must address this area in addition to the above commercial lands.

Minerals Management (MM)

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

The maintenance level 3, 4 and 5 roads in this analysis serve as access to general areas and provide adequate access. Most mineral operations occur on maintenance level 1 or 2 roads.

Range Management (RM)

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

The road system is vital for efficient administration and management of permitted grazing allotments. Forest Service personnel must be able to monitor, inspect and evaluate range conditions on a regular basis to effectively administer existing grazing permits. The current road system allows for rapid access to allotments to react to the numerous public issues challenging the range program today.

Grazing permittees need reasonable vehicular access within allotments to maintain existing range improvements and to manage and care for permitted livestock. Care for livestock often includes transporting large trailers and truck loads of cattle on Forest Service roads.

As the road network on the Gila National Forest has advanced from a few maintained roads to many miles of good roads, so has the dependency on those roads for the commercial and recreational activities on the forest. Range management and livestock grazing activities are certainly one of the many uses of the Gila National Forest that have grown dependant on the current road system to manage livestock operations to the intensity that is required today. Without these roads there is no doubt the cost of managing the range allotments and the cost to permittees would skyrocket.

Water Production (WP)

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

The existing road system is adequate to access all existing water diversions, impoundments, and distribution systems. Arterial and collector roads generally access the larger impoundments and diversions. The Forest does have some agricultural ditches and impoundments that are closed to public access, and used only administratively or under permitted authorization. This access is often for inspection and maintenance only under conditions of the permit. Public motorized access on these roads is generally restricted, and extensive use by the permittee is usually addressed with maintenance requirements in their permit.

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

Municipal watersheds are limited on the Gila National Forest to one small system near Ft. Bayard, with minimal consumptive use. This is addressed by project on a case-by-case basis for road development. Use has not been identified, thus far, as a concern or problem for water quality. Any new road development has the potential to impact water quality, although not necessarily affect water supply quantity in a municipal watershed. Its significance in impacts to water quality is dependent on the amount of road use, seasonal weather events, and road density values Municipal watersheds that have high road density values, where roads are unpaved, can increase the potential for sedimentation and turbidity to streams and impoundments. This is due in part to the greater acreage of exposed roads that are subject to erosion, and vehicle use causing the release of fines into stream waters during heavy precipitation events. During dry periods, where roads are accessed often by the public, swirls of dust from passing vehicles can settle out on nearby plants, and are subsequently released into the streams during rainfall events. Watersheds with high road density values can also increase the timing and discharge of stream waters, thus increasing the potential for direct sedimentation into the stream channels. This may increase the need for dredging of sediments from dams, or increased filtration requirements for piped-in drinking water systems. Roads in close proximity to streams increase the risk of introduction of sedimentation and fines into stream channels. Paved roads may contribute water quality problems of oils from passing cars, salting of roads during winter to help keep roads free from snow and ice, and the increased risk of accidents due to higher speed limits where cars, trucks, or tractor trailers may contribute the release of harmful liquids into nearby streams.

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

There are no hydroelectric power generation facilities existing or planned on the Gila National Forest.

Special Forest Products (SP)

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

The current maintenance level 3 - 5 road system provides adequate access for collecting special forest products such as mushrooms, seed cones, transplants, Christmas trees, firewood, etc. If road closure or seasonal closure is considered in a project or watershed analysis, access for special forest products will be considered.

Special-Use Permits (SU)

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

The maintenance level 3, 4 and 5 roads in this analysis serve as general access to "areas" that lead to maintenance level 1 and 2 roads that are generally adequate for management and administration of special use permits.

General Public Transportation (GT)

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

County roads, U.S. and State highways give communities, tourists, and industries access to the National Forest. These roads connect to arterial, collector, and some local FS roads, where traffic is dispersed into the forest for a variety of uses. Some County roads and State highways traverse into or through the National Forest, as shown on the maps.

Roads included in this analysis include the following jurisdictions; Private (30 miles) and Forest Service (694 miles).

National Forest system roads connect to numerous public roads managed and operated by the U.S. DOT, State of New Mexico, and County governments. Forest Service jurisdiction roads create the sole or primary access to many parcels of private land within the Forest Boundary. No Forest Service jurisdiction roads serve as the primary through-routes that connect the larger communities.

Cooperative maintenance agreements between the Counties and FS help to address our combined road maintenance needs. 121 miles of FS jurisdiction roads are included in cooperative maintenance agreements with the four counties that the Gila National Forest lies within. When larger developments or subdivisions occur and inholding traffic is expected to exceed that generated by the users of the National Forest, agency policy is to pursue transfering jurisdiction of the Forest road over to another public road authority such as the County or State. The Gila National Forest is currently in the process of working with Grant, Hidalgo and Sierra Counties to transfer jurisdiction of the 121 miles of cooperatively maintained roads.

Traditional road access to the National Forest is being lost by lack of legal right of way through private lands within the Forest. This issue is expected to grow as private land parcels change hands and use of the roads increases. The Forest Service negotiates with landowners to gain public access with varied result. Where these roads create access that is of interest to the County, they may assert jurisdiction and public right-of way on the road, but that is uncommon.

As population increases, recreation and commercial use of the road system is also expected to increase.

These roads and others are important to and used by smaller communities around the Forest. Many people in these communities rely on access to the Forest for their livelihood as well as for recreation. The Forest is important for recreation, timber, ranching, and mining.

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

The amount and dispersion of private and other ownership lands vary across the Forest. Private lands are widely interspersed with National Forest land within the Silver City and Reserve Ranger Districts. In addition to private ownership, Gila National Forest lands are bordered by or surround lands of the Bureau of Land Management, State of New Mexico, State of New Mexico, and municipalities (such as Silver City, Glenwood, Reserve, and Luna).

Much of the private land is accessed by public arterial and collector roads. However, some are accessed by lower standard local Forest Service roads and some by no roads at all. Access needs to inholdings are addressed on an individual basis as requests are received. Forest Service policy is that access will be provided to a level that is reasonable and suitable for the uses occurring on the land. When landowners desire access, they are asked to apply for a special use or road use permit. The application is then analyzed through the NEPA process to determine possible environmental effects and the level of reasonable access required. When subdivision occurs on larger private parcels, the Forest policy is to request the landowners to create an association or some type of consolidated organization to represent all of the landowner interests. This eliminates the need for the Forest to enter into road use or special use permits with each individual landowner. Responsibilities for improvements and maintenance should be determined through a commensurate share process. If access is being provided by a public road agency such as the county or state, then the Forest Service may not be obligated to provide any additional access over federal lands. When larger developments or subdivisions occur and inholding traffic is expected to exceed that generated by the users of the National Forest, agency policy is to pursue turning jurisdiction of the Forest road over to a public road authority such as the county or state.

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

The amount of private land inside or bordering the Gila National Forest, as well as the pattern of population growth, indicate a need to increase road management cooperation, and refine road jurisdictions and maintenance responsibilities.

Many roads on the Gila National Forest call for a higher level of maintenance and construction for the private lands that they access. Use and management of the Gila National Forest often requires only access by high clearance vehicle, while access to private lands may dictate a need for passenger car access.

Numerous roads crossing the National Forest fall under the jurisdiction of State, County or private organizations. When desirable, cooperative agreements should be established to share road improvement and maintenance responsibilities when all partners can benefit.

The Forest Service, Federal Highway Administration and the New Mexico State Department of Transportation have entered into a Memorandum of Understanding (MOU). This document sets forth general procedures for planning, programming, environmental studies, design, construction and maintenance of highways.

The Gila National Forest has cooperative road maintenance agreements with all four counties that lie within its boundaries. These agreements cover 121 miles of Forest jurisdiction roads. Catron County has recently accepted easement on 308 miles of Forest roads, a large portion of which were previously on a cooperative agreement.

The Gila National Forest has several road use and maintenance agreements with private landowners on the Forest.

Rights of access by law, reciprocal rights, or easements are recorded in Forest files and county courthouse documents. The Forest recognizes these rights and works with the owners to preserve access while protecting the natural resources and facilities on adjacent National Forest Lands. There is also an understanding by the Forest Service that individuals or entities may have established valid rights, unknown to the Forest Service at this time, to occupy and use National Forest lands and roads. The courts have established that such valid outstanding rights may be subject to some federal regulation. See *Sierra Club v. Hodel,* 848 F 2d. 1068 (10th Circuit, 1988). This analysis recognizes that such valid outstanding rights may exist and the Forest Service will certainly honor such rights when it is subsequently determined that the specific facts surrounding any claim to such rights meet the criteria set forth in any respective statute granting such occupancy and use (see *Washington County v. The United States,* 903 F. Supp. 40 [D. Utah, 1955]).

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

In 1975, the Forest Service developed a Memorandum of Understanding with the Federal Highway Administration that required the Forest Service to apply the requirements of the National Highway safety program, established by the Highway Safety Act, to all roads open to public travel. In 1982, this agreement was modified to define "open to public travel" as "those roads passable by four-wheeled standard passenger cars and open to general public use without restrictive gates, prohibitive signs…" Most roads maintained

at level 3, 4, and 5 meet this definition. Design, maintenance, and traffic control on these roads emphasizes user safety and economic efficiency.

The largest proportion of road maintenance and improvement funds allocated to the Forest is spent on these higher standard roads. Safety work such as surface maintenance, roadside clearing and installation and maintenance of warning and regulatory signs are performed on an annual basis. Traffic control signing follows standards set forth in the Manual on Uniform Traffic Control Devices (MUTCD). Funding for road maintenance is not adequate to address safety needs on all roads. Road condition surveys conducted in 1999 and 2000 reveal a total maintenance backlog of $179 million, $40 million (25%) of that is critical health and safety items on objective maintenance level 3-5 roads. The condition surveys document a need of approximately $4.5 million annually to maintain level 3-5 roads in the Gila National Forest system. Of this, $1.3 million is safety related (29%). Annual funding for road maintenance on the Gila National Forest ranges from approximately $1.6 million to $1.8 million.

When accidents occur on Forest roads, often the Forest Service may not be informed. Accidents are usually reported to the local sheriff or state patrol, if reported at all. When the Forest becomes aware of an accident, an investigation is initiated to attempt to identify the cause. If a feature of the road is found to be unsafe, addressing the condition becomes a high priority. Presently, there is no comprehensive program on the Gila National Forest for identifying or tracking accident locations and for maintaining surveillance of those locations having high accident rates or losses as is required by Highway Safety Act. One of the objectives of the Roads Analysis is to identify the minimum 3-5 road system the Forest can effectively and efficiently manage.

With increased use by more urbanized visitors, expectations have changed. Forest users expect to feel safe while traveling on Forest Service roads, have ready access to emergency medical services, and have emergency evacuation routes.

Administrative Use (AU)

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

In all six districts of the Gila, the road system appears to provide adequate access for research, inventory, and monitoring.

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

The level 3, 4, and 5 road system on the Gila National Forest generally provides good access for investigative and enforcement activities. These roads provide access to developed and dispersed recreation sites where many common violations occur. These roads also provide access to the many developed trailhead-parking areas for the trail system that provides backcountry access.

While the road system provides access to perform investigative and enforcement activities, it also provides access for increasing public use of the National Forest System lands, hence, the Forest is experiencing an increase in criminal activities.

Protection (PT)

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

The maintenance level 3, 4 and 5 roads in this analysis provide adequate access to the general areas where fuels management activities occur. Most fuels management project activities on the Gila National Forest need only maintenance level 3 access. Many of the most critical fuels management project areas are in the Wildland Urban Interface (WUI), and access to them is gained through the bordering private landowners.

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

Historically, a quick response time to suppress wildfires is crucial to keeping suppression cost and size of the burned areas to a minimum. Allowing Forest Service and Cooperators to respond quickly will aid in an aggressive, short-lived suppression effort, allowing for less exposure to danger and a safer environment for suppression resources. Therefore, level 3-5 roads are preferred for accomplishing suppression efforts most efficiently.

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

A driver's safety can be affected by the road construction, signing, design and it's condition. This applies to the general public as well as individuals responding to suppress or support a fire.

Evacuation routes for the growing communities within the Gila National Forest are deemed adequate.

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

Air quality impacts from the Forest road system are associated with vehicle emissions and dust from traffic on unpaved roads. Forest roads are usually unpaved and are used for recreational purposes, as well as resource management purposes related to timber harvest, range management and mining. Motorized recreation occurs year-round, with summer use including off-highway, two-wheel and four-wheel drive vehicles.

Unpaved roads, whether native soil or graveled, can contribute airborne dust during times of dry weather conditions, especially during extended drought periods. Dust emissions also increase with traffic and vehicle weight. Winds can pick up fine dust from unpaved roads and release them whenever winds die out. Winds can also transport fine dust at appreciable distances close to active road use areas, such as nearby resident houses, or campgrounds, affecting those who are particularly sensitive to the fine dust. Reduced visibility may result from unpaved roads, especially graveled roads, during windy periods. These effects typically are localized and temporary, and their extent depends on the amount of traffic. Higher road density values of graveled roads have the potential to reduce visibility and, in some cases, increase health concerns in localized areas. The air quality data previously collected on the Forest, however, does not show any adverse impact to the air resource. As use of Forest roads increases with visitation, road dust impacts to sensitive areas may need to be addressed.
Some Forest Service jurisdictional roads on the Gila National Forest also provide primary access to private land. With subdivision of these lands, traffic may increase significantly on these Forest roads, increasing the dust emissions. During resource management activities, dust abatement measures can be used to mitigate air quality impacts of sustained and heavy traffic use. Best management practices typically require application of dust abatement products to higher public use roads that pass through or near residential areas. Other mitigation measures such as reduced haul speeds, watering, limited trips per day, and timing of operations can be implemented. Watering during blading, or scheduling maintenance when natural moisture content is higher helps to reduce dust emissions. Dust abatement should also be considered on higher volume roads that are near high-use recreation areas, or in riparian areas where dust would have unacceptable impacts to sensitive plant and animal species.

Unroaded Recreation (RR)

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

Temporary road construction in smaller unroaded areas may reduce the supply of unroaded recreation opportunities in relatively small areas as a temporary condition, while the temporary road is being used and before it rehabilitates. There are no plans to construct roads in the inventoried roadless areas (areas larger than 5000 acres). The supply of large unroaded recreation opportunities in the inventoried roadless and designated wilderness areas will be unchanged. As world, national and local human

populations increase, demand for all types of recreation, including unroaded, is expected to increase.

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

This is dependent on whether the interest is being weighed by vehicle enthusiasts or proponents of unroaded areas. Hunting is a very important part of the Gila's recreation use and roads provide access to areas which many hunters would not or could not reach. Increase or decrease in the number of miles of road will have an effect on recreation opportunities.

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

Very little effect by virtue of having thousands of acres of wilderness to experience an area without roads and associated disturbances.

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

All Forest users (such as hunters, bicylcles, OHVr's) travel the arterial/collector roads (level 3-5 maintenance levels). Level 2 roads, give dispersed recreationists access into otherwise inaccessible areas. Many bicyclists and horseback riders, for instance, use these roads for riding. Road decommissioning would be contentious for these users, depending on the road. Conversely, some users would not welcome a road into their favorite unroaded area.

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

Users are very attached to existing roads. Forest roads are a form of recreation for most visitors. Sight-seeing, hunting, fishing, camping, day trips are among the recreational uses of these roads. Forest products such as fuel wood, pinyon picking, Christmas tree cutting and others are practical uses that people in the southwest use these roads to access.

UR(6): How is developing new roads into unroaded areas affecting the Scenic Integrity Objective, SIO(s)? Note: Some forests are still using the Visual

Management System (VMS). If that is the case, substitute Visual Quality Objective (VQO) for SIO. (Region 2 added this question. There is no corresponding National direction).

At the current time there are no proposals to develop roads into unroaded areas, therefore there would be no effect.

Road-Related Recreation (RR)

RR(1): Is there nor or will there be in the future excess supply or excess demand for roaded recreation opportunities?

There is not currently, nor is there expected to be, an excess supply or demand for roaded recreation opportunities. Population trends indicate more people are moving to the southwest, to smaller communities. It is predicted that the demand for roaded recreation opportunities will increase in the future.

RR(2): Who participates in roaded recreation in the areas affected by road construction, changes in road maintenance, or road decommissioning?

Sightseers, hunters, all recreation users, wood cutters, rockhounds, campers, trail bikes, ATVs, horse back riders, virtually all recreationists.

RR(3): What are these participants' attachments to the area, how strong are their feelings, and are alternative opportunities and locations available?

Users are very attached and accustomed to existing road system..

RR(4): How does the road system affect the Scenic Integrity Objective, SIO(s)? Note: Some forests are still using the Visual Management System (VMS). If that is the case, substitute Visual Quality Objective (VQO) for SIO. (Region 2 added this question. There is no corresponding National direction).

There would be no significant effect.

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Passive-Use Value (PV)

PV(1): Do areas planned for road constructing, closure, or decommissioning have unique physical or biological characteristics, such as unique features and threatened or endangered species?

The area being assessed for this road analysis includes habitat for several threatened and endangered species. The species that were used in this analysis and for development of the risk assessment include; Mexican Spotted Owl, Southwestern willow flycatcher, Chiricahua leopard frog, loach minnow, spikedace, Gila trout, Gila chub, Northern Goshawk, Peregrine Falcon, and Bald Eagle. Each road was individually assessed to determine if a road posed a high or low level of risk to each species. An overall ranking for each road was also provided based on the risk to all species.

PV(2): Do areas planned for road construction, closure, or decommissioning have unique cultural, traditional, symbolic, sacred, spiritual, or religious significance?

Many groups claim affinity with the land that is now the Gila National Forest, among them people who have lived on, ranched, hunted, gathered, logged, or farmed in the area. Specific groups who have expressed this relationship with the Gila are the Pueblo of Zuni, Hopi Tribe, Pueblo of Acoma, Fort Sill Chiricahua Warm Springs Apache Tribe, Mescalero Apache Tribe, San Carlos Apache Tribe, White Mountain Apache Tribe, and the Ramah and Alamo Chapters of the Navajo Tribe. Local ranchers have expressed their value for a traditional land-based lifestyle, custom, and culture. In both historic and modern times, Hispanic, Anglo, and African-American groups made their homes and livelihoods in the Gila country. No "traditional cultural properties" (TCPs) have thus far been identified in the roads analysis area. However, Native American consultation and public scoping are currently ongoing and incomplete, and may yield information relevant to identifying such properties.

PV(3): What, if any, groups of people (ethnic groups, subcultures, and so on) hold cultural, symbolic, spiritual, sacred, traditional, or religious values for area planned for road entry or road closure?

See PV(2).

PV(4): Will constructing, closing, or decommissioning roads substantially affect passive-use value?

See PV(2)

Social Issues (SI)

SI(1): What are people's perceived needs and values for roads? How does road management affect people's dependence on, need for, and desire for roads?

People's needs and values for roads are very diverse. Some people become very attached to the road access that is available, and tend to desire the status quo. Some people prefer that roads be available, but be in a condition that makes driving them a challenge. Some people would like to reduce the amount of roads, and therefore vehicles and other people in the Forest. Some people want certain roads improved. Many people hold deep and strong feelings about roads and road management. Change in road management is often upsetting to some people if it results in a change in any one road user's previous behavior.

SI(2): What are people's perceived needs and values for access? How does road management affect people's dependence on, need for, and desire for access?

People's needs and values for access is diverse. It ranges from people who want to be able to access all areas of the National Forest on motorized vehicles to people who want no (human) access at all. Most people's needs or values fall somewhere in the middle, valueing a mix of motorized and non-motorized access. Many people hold deep and strong feelings about roads and road management. Change in road management is often upsetting to some people if it results in a change in any one's previous behavior.

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

The existing Gila National Forest road system provides increased access to both identified and unidentified historic, archeological, and paleontological sites. Such access, as well as any additional or improved access that may be developed, can result in vandalism, illegal collection activities, and illegal excavation of these resources.

SI(4): How does the road system affect cultural and traditional uses (such as plant gathering, and access to traditional and cultural sites) and American Indian treaty rights?

At present, the road system neither prohibits nor encourages access to, or use of, traditional areas. Currently, no locations of traditional or cultural use have been identified on the Gila National Forest, and there are no treaties known to exist that provide treaty rights on lands administered by the Gila National Forest.

SI(5): How are roads that constitute historic sites affected by road management?

A number of historic roads are still in use on the Gila National Forest. Generally, road management within existing historic alignments helps preserve the location and

traditional use of these roads. However, road maintenance, improvements, closure and obliteration may alter the significant historic characteristics of a road. Specific effects to specific roads from specific activities are determined on a case-by-case basis as part of the cultural resource compliance process.

SI(6): How is community social and economic health affected by road management (for example, lifestyles, businesses, tourism industry, infrastructure maintenance)?

Road management is subtle, yet necessary to forest management. Use of the Gila National Forest is dependent on proper, timely road management. Commodity users rely on the existing road system, just as pleasure seekers do. For many communities in the West, the road system is the backbone of commerce, providing for the movement of products, services, and people through the Forest. Most of the roads on the Forest were built to facilitate log hauling or accessing homesteads. Today, recreation traffic is added to the importance of these roads.

SI(7): What is the perceived social and economic dependency of a community on an unroaded area versus the value of that unroaded area for its intrinsic existence and symbolic values?

The Gila has the largest number of Wilderness acres in the southwest. The local populations are very attached to the existing roads for several purposes including social and economic. Dependancy on the existing roads is very high.

SI(8): How does road management affect wilderness attributes, including natural integrity, natural appearance, opportunities for solitude, and opportunities for primitive recreation?

The only affect roads have on the wilderness areas of the Gila are to provide access to trail heads and in this aspect they are very important to the administration of these areas and to users of the wilderness.

SI(9): What are traditional uses of animal and plant species in the area of analysis?

Use of animal and plant species on the Gila National Forest dates back to hunters and gathers that occupied areas on the forest. Evidence of hunting and gathering camps (200 – 500 AD) is common throughout the Gila). Hunter-gatherer groups used upland areas where they could find a variety of edible plants and wildlife habitats within a relatively small area . With the advent of more permanent settlements and the advent of agriculture, people supplemented their crops by hunting local game.

SI(10): How does road management affect people's sense of place?

People's sense of place is directly tied to the aspects of an area, including the area within a road corridor, that invoke a special feeling or attachment to the area. Factors include the area's vegetation, the amount of sunlight available, the views, the solitude, the opportunities that make it a destination, and the overall familiarity. The road itself facilitates a person's enjoyment of the area by providing for driving comfort, the amount and type of use, and any number of aesthetic attributes visible alongside the road. These attributes are directly related to road management. Any change in road management of the development of a road without taking these things into consideration will create a change in current use.

Examples of these effects include those used in the discussion in recreation. If a road is managed as a Level 3 and the decision is made to upgrade it, more and different users might begin to use the area. This will change the character for users who consider the area to be special; it will change their experience and may displace current users to other areas for their recreation. Likewise, if a road is currently managed as a Level 5 and the decision is made to downgrade maintenance, the road will not be drivable, and the area becomes inaccessible for some current users. This problem is especially evident for the elderly, a group that has used the area for years. Rough roads are hard on bones, and users have to be considered in these decisions. Because a variety of different people use the existing road system, they need to be considered before changing road management.

This question is best answered at the watershed scale.

Civil Rights and Environmental Justice (CR)

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

The road system is used by all groups of people. There is a lack of known data to document effects of different groups of people. It is possible that closing a road, if it is then used (legally or illegally) a motorized trail, provides forest access to people with more disposable income. Low income groups who can not afford to have and use recreational motorized all-terrain vehicles (ATVs) will not enjoy this same level of access to the Forest.

Appendix C: Right-of-Way Acquisition Needs

Acquisition of Right-of-Way is needed on approximately 44 miles of objective maintenance level 3-5 roads.

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RD#	NAME	ANALYZED LENGTH	RIGHT OF WAY NEEDED
11	ALAMOCITO	12.82	0.44
111	ANTELOPE MESA	3.70	0.81
136	TYRONE	12.27	1.84
141	RESERVE BEAVERHEAD	39.55	1.17
150	NORTH STAR	51.11	4.06
150 A	COONEY PLACE	2.73	0.17
152	MCKNIGHT	17.49	0.36
155	TURKEY CREEK	10.15	0.08
157	KINGSTON	16.83	0.39
172	ALLEN SPRING	2.32	0.30
18	DD BAR	9.64	2.77
225	LINK	6.07	0.00
226	SILVER MONUMENT	30.09	0.76
231	CORDUROY CANYON	14.47	4.23
233	POLK MESA	12.17	1.08
28	BURSUM	24.07	0.03
289	SAND CANYON ROAD	17.40	0.00
30	O BAR O	9.79	5.19
366 A	FS ADMIN SITE	0.70	0.00
40 E	LADRONE	1.42	1.35
4002 L	VEGA SPRINGS	0.73	0.60
4003 A	JONES SPRING	0.33	0.02
4019 U	ROMERO LAKE	0.86	0.01
4033 P	GREEN GATE	1.76	0.44
4040 U	RANCHO GRANDE	0.54	0.50
4042 L	MCCARTY	1.04	1.06
4087 X	KINGSTON	0.28	0.28
4161 V	RESERVE TOWN ROAD	0.21	0.04
4184 H	AGUA FRIA	0.16	0.01
4202 C	PICTOGRAPH	0.01	0.04
4202 Y	CAMP T BIRD	0.41	0.40
4229 K	W-S RANCH	0.14	0.17
4230 V	GLENWOOD	0.16	0.16
RD#	NAME	ANALYZED LENGTH	RIGHT OF WAY NEEDED
4301 S	HEART BAR WILDLIFE	0.18	0.18
4318 N	RODEO TRAILER	0.28	0.28
4318 O	RODEO PARKING	0.20	0.20

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4318 P	TULAROSA CABIN	0.61	0.34
4319 Q	RESERVE	0.80	0.80
47	LONG CANYON	8.85	0.07
49	TORIETTE LAKE	11.39	0.51
503	RAINY MESA	0.56	0.09
521	ADOBE RANCH	8.48	0.79
522	TIERRA BLANCA	1.43	0.02
528	EAST FORK ROAD	1.86	0.76
540	BEARDON	0.91	0.90
665	GROGAN CANYON	6.73	0.21
729	MOON RANCH	0.60	0.06
73	GEORGETOWN	6.00	1.43
730	CIRCLE SEVEN	1.72	0.06
754	NINE-SIXTEEN	0.48	0.00
755	WORTHY	1.18	0.45
770	FOX MOUNTAIN	5.61	0.57
777	WINDMILL PASTURE	1.75	0.03
778	HANOVER CANYON	1.82	0.11
808	CYPRESS	1.93	0.01
819	SHRINE MINE	3.40	0.84
837	C BAR RANCH	2.83	0.01
838	WALKING X	0.79	0.59
841 A	841 A	1.07	0.46
849	AXLE CANYON	2.21	0.11
851	REDROCK	11.74	2.55
853	BEAR MTN	7.01	0.00
859	MILL CANYON	6.11	0.30
861	KNIGHT CANYON	5.00	0.58
888	BERENDA	0.80	0.17
93	SLAUGHTER MESA	17.53	0.37
94	COX CANYON	23.38	0.64
953	ADAMS PLACE	1.26	0.31
970 F	GILA PUMP HOUSE	0.15	0.00
973 C	WOODY'S CORRAL TRAILHEAD	0.13	0.30
973 F	GILA DUMP STATION	0.06	0.07
99	DEEP CREEK ROAD	0.31	0.27

Appendix D: Conveyance (Jurisdiction) Assessment Needs

A total of 121 miles of Forest Service jurisdiction roads are identified to be conveyed to Grant, Hidalgo and Sierra Counties.

ID	NAME	LENGTH	OBJECTIVE MAINTENANCE LEVEL
111	ANTELOPE MESA	3.700	4
136	TYRONE	5.000	3
136	TYRONE	5.400	4
155	TURKEY CREEK	9.110	3
155	TURKEY CREEK	0.950	4
157	KINGSTON	11.638	3
226	SILVER MONUMENT	30.090	3
40 E	LADRONE	1.420	4
4055 H	GLENWOOD BRUSHY	1.490	3
4090 A	BURRO MTN HOME (SILBY)	0.160	3
4090 B	4090 B	0.129	3
522	TIERRA BLANCA	1.060	3
536	FT. BAYARD	3.010	4
729	MOON RANCH	0.600	3
729 A	CUTOFF	0.230	3
73	GEORGETOWN	4.590	4
754	NINE-SIXTEEN	0.480	4
755	WORTHY	1.180	3
775	CRUMBLEY	1.700	4
803	OWENS	0.410	4
804	CLEVELAND MINE	0.250	4
808	CYPRESS	0.430	3
809	GILA RIVER	2.840	4
837	C BAR RANCH	2.830	4
838	WALKING X	0.220	4
843	CURETON	1.170	4
851	REDROCK	11.370	4
852	RIDGE	2.830	4
853	BEAR MTN	7.080	4
859	MILL CANYON	0.990	3
860	GOLD GULCH	6.390	3
886	ROYAL JOHN	2.373	3

Appendix E: IDT Membership

Joe Encinas	**GIS Coordinator**
Gail Firebaugh-Smith	**Forest Archaeologist**
Lawrence Garcia	**Fire, Hazardous Fuels**
Delbert Griego	**Recreation/Wilderness/Timber/Heritage Staff Officer**
Carolyn Koury	**Forest Hydrologist**
Danny Montoya	**Engineering/Lands/Minerals Staff Officer**
Rex Null	**Road/Transportation Engineer**
Art Telles	**Biologist – Planning**

Appendix F: Location Map

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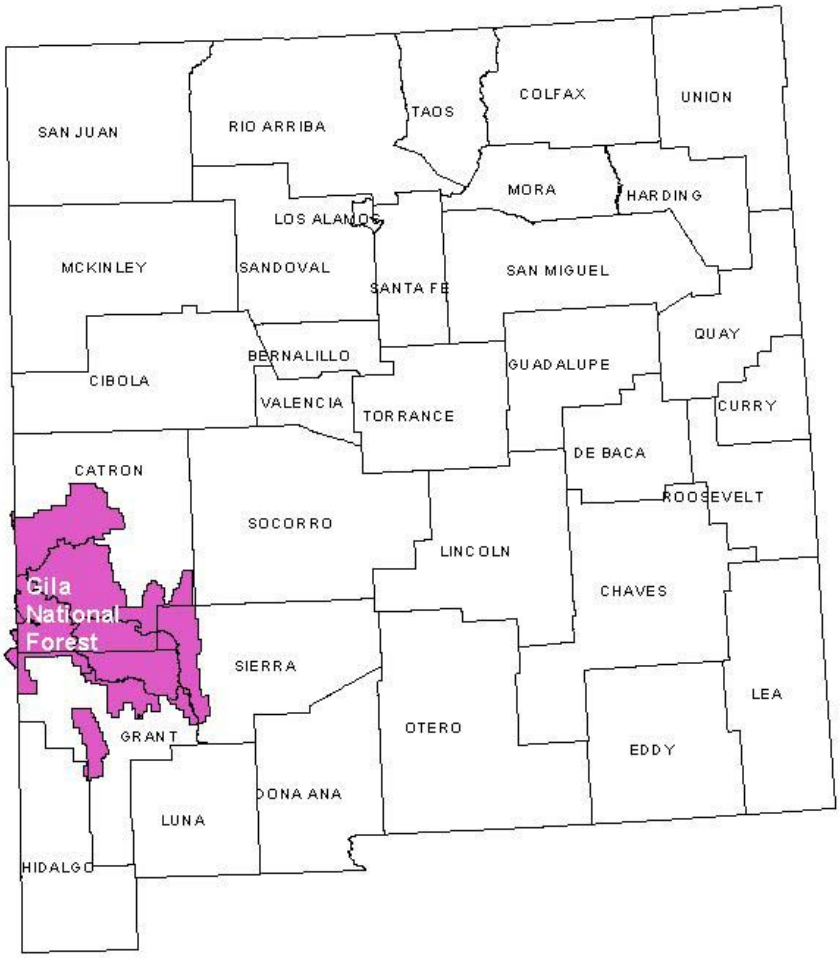
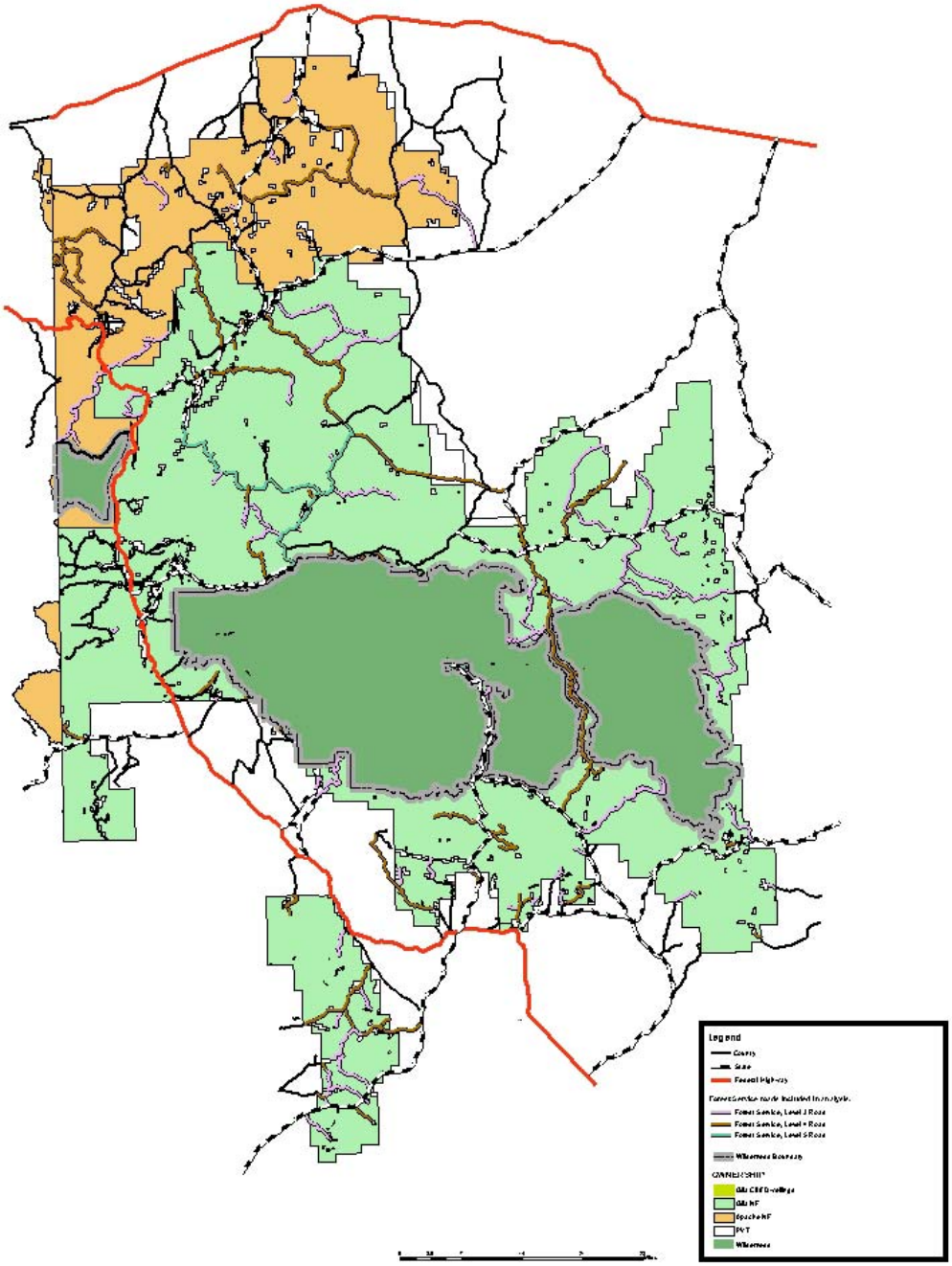
Appendix G: Roads Analysis Map