Chapter 3 - Affected Environment and Environmental Consequences

This chapter is the scientific and analytic basis for comparing the alternatives (40 CFR 1502.16). It shows the tradeoffs among the alternatives for the public and the forest supervisor. It does not claim to accurately predict the outcomes of the alternatives. Rather, its purpose is to show the relative change among the alternatives. This chapter supports table 10 found at the end of chapter 2. Before describing the anticipated effects of the alternatives, we start by explaining the basic components of an effects analysis.

The Basic Elements of an Effects Analysis

This section explains the basic components of an effects analysis done under the National Environmental Policy Act for those who are not familiar with the process.

The Affected Environment

An effects analysis starts by describing the affected environment. As the name implies, this section describes those parts of the environment or project area that would change as a result of the proposed action. The Council on Environmental Quality describes it this way:

> *"The environmental impact statement shall succinctly describe the environment of the area(s) to be affected or created by the alternatives under consideration. The descriptions shall be no longer than is necessary to understand the effects of the alternatives." (40 CFR 1502.15).*

Using an example of a person wanting to lose weight, the affected environment would be the person's height, weight, percent body fat, and current fitness level. It would not include what kind of car they drive or where they attended grade school, for instance.

In this project, the Santa Fe National Forest proposes to close some roads and trails to motorized use, add some others, and prohibit driving off roads. The affected environment, then, would relate to things that would change by opening or closing roads to driving, such as wildlife habitat and recreational use. Things like the weather would not change no matter what we propose, and will not be discussed as part of the affected environment.

The affected environment describes what is going on now. For this project, we used where people are driving now as the existing condition. The existing condition is the baseline against which to compare the other alternatives. It is alternative 1, no action.

Effects

An effect is the result of an action. If you throw a rock into a pond, it makes ripples. Throwing the rock is the action, and the effect is the ripples. The environmental consequences are all the effects considered together.

The Council on Environmental Quality lists different kinds of effects that need to be analyzed under the National Environmental Policy Act:

1. Direct effects, which are caused by the action and occur at the same time and place.

2. Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.
3. Cumulative effects, which are the sum of the incremental impacts from the action combined with other actions. These are described in the next section.

To illustrate using the example of the person wanting to lose weight, let's say they eat less and exercise more, two actions. The direct effects of these actions might be that the person feels hungry and has sore muscles. The indirect effects, those that happen later in time, would be that the person loses weight and gets stronger. In this example, effects are beneficial (improved fitness) and detrimental (hungry and sore muscles).

The same holds true for environmental effects—they can be both beneficial and detrimental (40 CFR 1508.8). For the travel management project, closing roads to motorized use could improve wildlife habitat (beneficial effect for wildlife species) and reduce the amount of motorized recreational opportunities (detrimental impact to riders).

The regulations do not require agencies to separate the direct and indirect effects, so in this document we describe them together. Cumulative effects have their own section.

Cumulative Effects

The Council on Environmental Quality defines a cumulative effect like this:

> *" 'Cumulative impact' is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." (40 CFR 1508.7).*

To be cumulative, effects must overlap in space and time. Continuing with the example of a person eating less and exercising more, a cumulative effect—if we suppose that many people were eating less and exercising more during the same year—could be a decrease in rates of diabetes.

Cumulative impacts are important because they could cause a tipping point, either beneficial or negative. To illustrate with a hypothetical example, closing roads to motorized use on the Santa Fe National Forest could, at a statewide level, cause the recovery of an endangered species (beneficial effect) or eliminate opportunities for motorcycle riding in New Mexico (detrimental effect to riders).

To analyze cumulative effects, we look at the effects from this proposal and add it to the effects from past, present, and reasonably foreseeable future actions. The next sections briefly summarize how the interdisciplinary team identified and handled the past, present, and reasonably foreseeable future actions. The full text of this discussion is in the project record (USDA Forest Service 2010k).

The Role of Past Actions

The interdisciplinary team considered the effects of past actions from 1987 to the present as part of the existing condition. The current conditions are the sum total of past actions. The Council on Environmental Quality recognizes "agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions" (Council on Environmental Quality 2005). Innumerable actions over the last century and beyond have shaped the Santa Fe National Forest's current designated road system. Attempting to isolate and catalog these individual actions and their effects would be nearly impossible. By looking at current conditions, we capture the effects of past human actions and natural events, regardless of which event contributed those effects. Listing the past actions, however, can show trends. On balance, some past actions increased the amount of motorized use in the Santa Fe National Forest and others decreased it.

Table 11. Past actions from 1987 – 2009 that contributed to the existing condition

Action	Effect or Trend
Subdivision and development of private inholdings	Added roads to the national forest because landowners' request for vehicular access to their property was accommodated .
Road construction for timber sales	Added roads to the national forest for timber extraction. Some temporary roads were decommissioned; others kept.
Mining claims and development of mining	Added roads to the national forest.
Roads to access oil and gas developments and pipelines	Added roads to the national forest.
New Mexico Senate Bill 379 (increased safety and registration requirements for people under 18; restricted OHV use on state game commission and state park lands, except where designated; provided for the addition of state OHV parks; provided for the closure of OHV trails causing irreversible damage; provides for development of overall enforcement across the state; and creates a fund for education, monitoring, and enforcement)	Could reduce motorized cross-country travel on state lands. Increases monitoring, education, and enforcement capabilities statewide.
Jemez National Recreation Act	Reduced the miles of roads open to vehicles on national forest. Also reduced the acres available for motorized cross-country travel.
Wild and Scenic Rivers – Pecos, East Fork, and Rio Chama	Reduced the miles of roads open to vehicles and motorized cross-country travel on the national forest.
Creation of the Valles Caldera National Preserve	Land was private before, so any public use allowed now is an increase.
Land transfers from the Santa Fe National Forest to other entities: San Ildefonso, Santo Domingo, Pecos National Historic Park	Removed land from the national forest, resulting in less motorized access and travel on the national forest.
Respect the Rio Program	Increased public awareness of the effects of motorized use on the national forest, especially near water.
Lower Jemez Complex Development Restoration	Reduced the amount of routes and motorized dispersed camping on the national forest.

Table 11. Past actions from 1987 – 2009 that contributed to the existing condition

Action	Effect or Trend
Acquisition of lands by the Santa Fe National Forest	Increased motorized access to the national forest. Slightly increased the miles of routes on the system in most cases.
Road decommissioning or natural closure (e.g., trees growing in the middle of roads)	Reduced the miles of routes open to motorized use on the national forest system.
New list of sensitive species	Likely to have the effect of reducing the miles open to motorized use in the route system.
Designation of Mexican spotted owl critical habitat	Likely to have the effect of reducing the miles in the route system.
1995 injunction against woodcutting	Reduced motorized cross-country travel.
Technological advances in OHVs (e.g., 3-wheelers, 4-wheelers, side-by-sides, tracked vehicles)	Increased motorized cross-country travel because the smaller vehicles are able to go more places on more terrain.
Forest product collection	Increases motorized cross-country travel. Some occurred in conjunction with specific vegetation management projects.

The Role of Present and Future Actions

Courts have interpreted a "reasonably foreseeable future action" as one that has been proposed and is in the planning stages. For example, a subdivision would not be reasonably foreseeable until the owner submitted plans to the county. To analyze the cumulative effects of present and reasonably foreseeable future actions, each resource specialist looked at the list of projects created by the interdisciplinary team in table 12. They identified the ones expected to cause effects on their resource, such as fish or heritage, at the same time and in the same place as effects from the proposed action or alternatives. Some specialists analyzed additional actions that pertained only to their resource.

Table 12. Present and reasonably foreseeable future actions related to motorized use (2009 –2025). The interdisciplinary team started this list in 2009 and made it final in March 2010.

Action	Effect or Trend
Economic recession	Overall effect hard to determine. It could increase the amount of motorized travel and dispersed camping on the national forest since people might recreate closer to home. It could also reduce the amount of motorized use if people decide not to travel at all.
Increase in state's population	Likely to increase the amount of travel to and on the national forest as more people seek recreational opportunities.
Preparation of travel management plans and motor vehicle use maps by other national forests and agencies	Likely to reduce the amount of motorized cross-country travel on public lands. On some national forests, likely to reduce the miles of routes open for public motorized use. Likely to increase education and awareness of the effects of motorized use on public lands.
Existence or creation of private or state OHV parks	Increases the amount of motorized cross-country travel available.

Table 12. Present and reasonably foreseeable future actions related to motorized use (2009 –2025). The interdisciplinary team started this list in 2009 and made it final in March 2010.

Action	Effect or Trend
Transfer of management of lands in Pecos Canyon from New Mexico Department of Game and Fish to the State Parks	Likely to decrease the amount of motorized use available on state lands.
Development of the Continental Divide Trail on the Santa Fe National Forest	The CDT is nonmotorized, and its creation is likely to affect where motorized routes are designated.
Evolution of recreational preferences among the general public, e.g., mud-bogging, geocaching, hiking	Likely to increase demand for motorized access to the national forest in order to engage in the activity of choice.
Roads and trails having unclear easements on the national forest	Could result in a reduction in motorized access if a private landowner decides, in light of an unclear easement, to gate or restrict access across a Forest Service road or trail.
Road maintenance agreements between the Santa Fe National Forest and counties, permittees, or private landowners	Improves the condition of roads because of regular maintenance stipulated in the agreements.
Volunteer assistance with trail maintenance	Improves the condition of motorized trails.
Availability of state Regional Trail Program funds	Improves the condition of motorized trails.
Routes existing on other jurisdictions within the national forest boundary	Increases the miles of routes within the boundary of the national forest. The condition of the routes will vary by ownership; it is not possible to characterize them in general.
Closure orders	The forest will continue to have the ability to implement closure orders. These will reduce the amount of motorized travel on the national forest.
Projects awarded through the American Recovery and Reinvestment Act	Will improve the condition of trails on the national forest.
Signing roads and trails on the forest	Helps people know where they are.
Projects from the forest's schedule of proposed actions (from 10/2007 to present)[1]	Decrease in routes available for motorized travel, motorized cross-country travel, or motorized dispersed camping opportunities.
Projects from the forest's schedule of proposed actions (from 10/2007 to present)[2]	Increase in routes available for motorized travel, motorized cross-country travel, or motorized dispersed camping opportunities.
Projects from the forest's schedule of proposed actions (from 10/2007 to present)[3]	Improves road or trail condition.

[1] See first list below [2] See second list below [3]See third list below

List 1: Projects decreasing the amount of motorized use on the forest:

- Peralta Watershed Improvement Project
- Oil and Gas Leasing and Roads Management
- San Antonio Watershed Improvement Project

- East Fork Jemez Wild and Scenic River Recreation Management
- Forest Road 10J Decommissioning
- Coyote Ranger District Roads Analysis Project

List 2: Projects increasing the amount of motorized use on the forest:

- 2008/2009 NM Motorcycle Trials Event
- South Pit Pumice Mine Expansion
- Cerro del Pino Pumice Mine
- Gallinas Municipal Watershed WUI Project
- Boone-Duran Pumice Mine EA
- County Line Forest Products
- Rio Chama Wildlife Management Prescribed Fire Project
- Bear Paw Salvage

List 3: Projects improving the condition of roads or trails on the forest:

- Resumidero Campground Improvement Project
- Reconstruction of Forest Roads 612 and 87
- Forest Road 488 Reconstruction and Road Use
- Canones Creek Watershed Restoration Project
- BMG Erosion Repair
- Headquarters Trailhead EA
- State Highway 4 Culvert Replacement (improves fish passage)
- Legacy roads and trails projects (Spence Hot Springs, Forest Roads 376 and 27)

Notes on this Effects Analysis

This draft environmental impact statement looks at effects at the forestwide scale. We aggregated effects of proposed changes to the national forest level rather than describing the site-specific effect at each road or trail. For instance, the fisheries section describes the overall effects of reducing the places people could drive. It does not list every route and predict the effects at that particular site. Specialists, however, sometimes used individual sites as examples.

The analysis in this chapter focuses on the effects of the proposed changes to the current designated system. It does not analyze the effects of the whole designated system. To use a hypothetical example, the effects analysis looks at what happens when 2,000 miles of roads are closed to motorized use, not what happens on the 1,000 miles that remain. The Travel Management Rule does not require the Forest Service to revisit parts of the motorized system it wants to keep as is.

We use the entire designated system to provide context for the change. Adding 50 miles of motorized trail is the change that causes the effects, but whether the system that remains is 55 or 650 miles of motorized trails is the context.

Most specialists used GIS to calculate the miles and areas affected, or to model habitats. We describe other models specialists used if it is other than GIS. The purpose of the effects analysis is to compare alternatives, not to make exact predictions about the future.

To compare "apples to apples," we assumed that motorized use would occur where it is proposed. This way, the effects analysis describes the effects resulting from the change between where people are driving (alternative 1) and where people would drive (alternatives 2 through 5).

This analysis contains uncertainty. For example, the exact location of every road and trail proposed is not likely precise, but certainly is close. We don't know exactly where hunters drive to retrieve big game. The number of people with health problems caused by dust from the forest is not known. The condition of every stream crossing has not been assessed. This kind of precise data is not needed to make an informed decision because the effect of reducing motorized use is well documented. The trends in effects for each alternative are sufficient for the forest supervisor to base his decision on.

Amendments to the Santa Fe National Forest Plan

Proposed amendments to the "Santa Fe National Forest Plan" (forest plan) are the last part of this effects analysis. By law, actions we propose must be consistent with our forest plan or the plan must be changed. For instance, the forest plan prohibits motorized cross-country travel in Management Area I. If an alternative proposes a fixed-distance corridor for motorized access to dispersed camping in Management Area I, then the forest plan would need to be amended because the corridor allows people to drive off the road to camp. When alternatives are consistent with the forest plan, no amendments are needed.

Amendments to the forest plan can have effects because they propose changes in the management of the forest. Not allowing motorized use in places that used to allow it is an example of a change in management that might cause effects. These effects, like those from the proposed action and alternatives, are disclosed as part of the effects analysis for each resource.

Assumptions and Limitations Common to All Resources

The forest's specialists didn't have all the information they needed about all aspects of this project. In order for the effects analysis to make sense, the interdisciplinary team made assumptions to fill in those gaps.

These assumptions and limitations apply to all the resources analyzed. Some specialists made additional assumptions pertaining to their resource.

1. For the purposes of this analysis, the amount of motorized travel on roads and trails is held constant among alternatives.

    - **Discussion:** The Travel Management Rule and the recreation specialist report document an increase in motorized use on national forests nationwide, including the Santa Fe National Forest. Indeed the increase in motorized use gave rise to the rule. Economic conditions, population increase or decrease, and the public's recreational preferences could increase or decrease the overall amount of motorized travel on the forest over time. The effect of these factors, however, would be impossible to predict or accurately quantify for this analysis. By

holding the amount of motorized use constant among alternatives, the interdisciplinary team could better display the effects of the alternative on their resource.

- As discussed in the specialist report for roads (USDA Forest Service 2009l), the amount that traffic would change is not known due to limitations in the way traffic is measured. We propose to close only 5 to 6 percent of the passenger car roads (maintenance levels 3 and 4), depending on the alternative. These roads receive most of the traffic, and use on these roads is not expected to change. Depending on the alternative, 55 to 70 percent of roads for high-clearance vehicles (maintenance level 2) would be closed to motorized use. Based on staff experience on the Santa Fe National Forest, use on high-clearance vehicle roads is regular, but infrequent. It is expected that closing these wouldn't cause a noticeable increase in concentration of traffic on the routes remaining open. For example, on a high-clearance vehicle roads left open, one car per week could increase to two cars per week. Any potential concentration in use would be expected to occur on those kept open.

2. Publishing a system of motorized routes on a map may cause an increase in motorized use on the forest.

    - **Discussion:** Some people believe that displaying previously unknown routes on a map that's available nationwide will draw more motorized use to them. We have no way of knowing whether use on designated routes will change because of being published on a map. Data do not exist to make an accurate prediction.

3. The capability to enforce and the public's compliance with the motor vehicle use map would increase over the present for all action alternatives.

    - **Discussion:** Experience of forest staff shows that after an initial educational period, compliance with new rules and regulations increases over time.

4. The condition of roads and trails kept open for motorized use will stay the same, or slightly improve, over current conditions and over time.

    - **Discussion:** Roads and motorized trails will continue to be maintained as the forest's budget allows. Fewer miles of roads could be designated at the higher maintenance level, so funding could be used on more miles of road or at more frequent intervals (USDA Forest Service 2009l). For motorized trails, the forest anticipates working with the many volunteers who wrote to comment to help with trail maintenance.

5. The effects of motorized trails are the same as the effects of roads.

    - **Discussion:** Though the tread width of a trail is smaller than a road, the incremental difference in effects at the forest scale is assumed to be negligible. The effects of roads and trails may vary greatly at specific locations; however, across the forest, it would not be possible to separate and identify these effects.

6. All motorized vehicles, such as motorcycles, ATVs, trucks, and cars, cause similar impacts to resources. There may be some exceptions for some resources like noise.

- **Discussion:** No clear scientific agreement on the differences between impacts from different kinds of vehicles exists.

7. The approximate 5 acres of areas proposed for motorized dispersed camping will continue to be used for dispersed camping.
    - **Discussion:** It is likely the areas would continue to be used for dispersed camping since they have been used in this manner for upwards of 20 years.

8. In corridors designated for motorized dispersed camping, the use will be motorized dispersed camping.
    - **Discussion:** Experience of forest staff shows that after an initial educational period, compliance with new rules and regulations increases over time.

9. Not every acre of corridors designated for motorized dispersed camping and motorized big game retrieval would be driven on.
    - **Discussion:** Slope and vegetation limit motorized access in many places within the corridors. We proposed fixed-distance corridors in such a manner as to improve peoples' ability to read the map. For instance, the scale of the map would not facilitate designating corridors less than ½ mile in length. As a result, some designated corridors include places where people wouldn't be able to drive (figure 14).

Figure 14. An example of a place in a designated camping corridor where vehicles couldn't drive because there are too many trees and it is too steep. Other parts of the corridor are conducive to driving.

10. The estimated number of motorized trips to retrieve a downed big game animal would not change among alternatives, except for alternative 3, which would not allow it.
    - **Discussion:** We estimate the average number of big game animals taken to be 438 per year (USDA Forest Service 2009i). This estimate is likely low. Because the forest does not have data on the locations of where big game is retrieved, we assumed that it occurs everywhere outside of wilderness.

      Regional guidelines state that hunters should make the minimum number of trips to retrieve an animal. Specialists assumed that people would make less than four trips (up to two in and two out).

11. With a restriction on public use, the amount of driving on roads needed for administrative purposes will be less than the existing use.
    - **Discussion:** The forest does not have data on the frequency with which the administrative roads are presently used, but it is reasonable to assume that by not allowing the public to drive on the roads, use will be less than what occurs now.

12. Temporary roads, trails and areas built to support emergency operations or temporarily authorized in association with contracts, permits, administrative use, or leases are not intended for public use. Any proposal to add these temporary roads, trails, and areas to the system will require a separate NEPA decision and are not part of this analysis.

13. Any routes not included in the decision are not precluded from being added or removed from the forest's transportation system in future travel management decisions.

14. Routes that would not be kept as part of the system would receive no maintenance. Routes closed to all motorized use, but needed for administrative purposes, would only receive basic custodial maintenance sufficient to keep damage to adjacent resources to an acceptable level.

15. An increase or decrease in visitation to the forest because of population change is not predictable.
    - **Discussion:** Though visits to the forest have increased over the last 20 years; however, the future trend cannot be predicted with certainty due to unknown variables like fuel costs, population and demographic change, and personal preferences.

16. Motorized big game retrieval in designated corridors would not result in the creation of new routes.
    - **Discussion:** Retrieving a downed big game animal is not likely to result in repeated trips in the same place year after year because animals are not taken in the same places every year.

17. The amount of administrative motorized use of National Forest System roads is not expected to change among alternatives.
    - **Discussion:** The access and maintenance needed to administer forest activities is expected to remain constant after changes to the designated motorized system are

made. Permits for firewood collection, which could include motorized cross-country travel, would continue until specific collection areas are designated (expected over the next 2 to 5 years). Because the administrative and permitted uses are exempt, they are not included in the analysis.

18. The fixed-distance corridors created for alternative 1 capture the vast majority of the existing motorized dispersed camping on the forest.

    - **Discussion:** Forest staff inventoried the motorized dispersed campsites in 2008 and 2009. The areas identified as having motorized cross-country travel also include motorized dispersed camping. Though we don't have data on the amount of motorized dispersed camping that occurs away from roads, we believe it to be inconsequential when compared to the camping that occurs adjacent to roads.

19. For the purposes of this analysis, the amount of motorized dispersed camping is assumed constant among alternatives.

    - **Discussion:** Assuming a constant use will display the potential effects of concentration, a concern of the public's. Though it is reasonable to assume that publication of fixed-distance corridors on a map will draw more visitors to them, the exact amount of the increase cannot be accurately determined.

20. In alternative 3, should dispersed camping along routes continue, we assume it would occur in the same places as alternative 1 since these sites are already established.

    - **Discussion:** Alternative 3 would not have fixed-distance corridors for motorized dispersed camping. This means people couldn't drive to their campsite. They would, however, be allowed to park next to the road and carry gear to a site by nonmotorized means. Experience of forest staff shows it is reasonable to assume that people would continue camping in places they already know and enjoy. For instance, people continue to camp along the Guadalupe River even though the buck-and-pole fencing prevents them from bringing their vehicles to the campsite.

21. Within designated fixed-distance corridors, motorized dispersed camping is likely to result in the creation of new routes and hardened sites.

    - **Discussion:** This is supported by observations across the forest. While many people camp lightly on the land, sites used repeatedly often become hardened; that is, they have bare soil.

22. Almost all routes proposed for designation have an existing footprint on the ground.

    - **Discussion:** Some exceptions exist. Some routes proposed as open to all vehicles for access to private property currently exist as trails. This analysis examines the motorized use of proposed routes and their effects. Additional NEPA analysis would be required on routes needing physical construction or groundwork.

23. Without motorized use, some routes would naturally revegetate and others would not. Those that don't could continue to erode.

- **Discussion:** The scientific literature on reclaiming routes varies. Some indicates that a route's footprint can remain for decades or centuries. For example, the Oregon Trail is still evident in places. Some literature states that physically decommissioning routes is not always effective at reclaiming them.

  It is safe to say that whether a route revegetates without human intervention depends on its location, slope, soil type, construction, and the weather.

Affected Environment and Environmental Consequences

Spatial and Temporal Bounds of the Analysis

For most resources, the spatial bounds for the direct and indirect effects are the National Forest System lands within the proclaimed boundary of the Santa Fe National Forest. For cultural resources and lands, the bounds include some places adjacent to the forest easily reached by National Forest System routes. The social and economic analysis includes seven counties, those that make up parts of the Santa Fe National Forest and Bernalillo County.

The spatial bounds for the cumulative effects analysis are the same, except for the following resources. Air quality considers cumulative effects to the western states. Recreational opportunities are examined for the 7-county area laid out in the social and economic section. The cumulative effects for hunting and camping are considered statewide.

For all resources, the temporal bound for the direct and indirect effects is from the publication of the motor vehicle use map, anticipated in 2010, through 2025. The temporal bound for the cumulative effects analysis for all resources is from the publication of the forest plan in 1987 through 2025. We chose 2025 because it is the farthest date out we felt it reasonable to make predictions.

Consistency with the Forest Plan and Other Laws

Unless noted in appendix 1, all the alternatives are consistent with standards and guidelines in the "Santa Fe National Forest Plan." All the alternatives are consistent with applicable laws, regulation, and policy unless noted. Please find details in the individual specialist's report.

The remainder of this chapter discusses the predicted effects of the alternatives by resource.

Recreation – Affected Environment

Everything in this section summarizes the specialist reports for recreation and roads located in the project record.

The public and forest employees had six significant issues[1] (1 through 6) and three concerns (7 through 9) about how the proposed action would affect recreation:

[1] The reason six significant issues are listed here is that some of the bullets included in significant issue 1 are itemized separately for the purpose of clarity.

1. *Motorized Opportunity:* The reduction in miles of routes and the prohibition on cross-country travel in the proposed action will adversely affect the quantity of public motorized experiences.
2. *Motorized Big Game Retrieval:* Prohibiting motorized cross-country travel will limit the motorized retrieval of big game, perhaps to an unacceptable level.
3. *Motorized Dispersed Camping:* Designating motorized dispersed camping corridors will increase cross-country travel and the resource damage associated with it and curtail the kind of unrestricted camping that the Santa Fe National Forest currently provides.
4. *Conflicts:* The proposed action, by designating routes uniformly across the forest outside of designated wilderness, will cause conflicts between motorized and non-motorized users because they will be recreating in the same vicinity.
5. *Wilderness:* Designating motorized routes close to wilderness will detract from the wilderness experience because of noise and trespass.
6. *Inventoried Roadless Areas:* Designating motorized routes through or close to inventoried roadless areas will detract from the potential wilderness characteristics of these areas.
7. *Enforcement:* The motor vehicle use map alone will be an inadequate enforcement tool.
8. *Maintenance:* Any reasonable designated motorized trail system will require more maintenance than the Forest Service can provide by itself. An unmaintained system will continue to adversely affect forest resources.
9. *Safety*

Opportunity (Roads, Trails, Areas, and Seasonal Closures) – Affected Environment

People who ride motor vehicles in the forest raised this issue about opportunity:

> *"The reduction in miles of routes and the prohibition on cross-country travel in the proposed action will adversely affect the quantity of public motorized experiences."*

The Santa Fe National Forest, at 1.5 million diverse acres, offers something to every kind of outdoor enthusiast. "Developed" opportunities—such as official campgrounds, trailheads, and the ski area—satisfy people who prefer having facilities. Campgrounds have picnic tables, grills, and tent sites. Trailheads have kiosks with maps and information. We aren't proposing to change any access to the developed opportunities, and won't discuss them further. All routes to developed sites would continue to be open for motorized use.

"Dispersed" opportunities suit people looking for solitude and self-sufficiency. Hunting, collecting firewood, hiking or riding on trails, and camping without amenities are examples of dispersed opportunities. We call some activities, like cutting Christmas trees, dispersed because they are spread out. This project could curtail some dispersed opportunities by restricting the amount of motorized access to and within the Santa Fe National Forest. People use vehicles to get to places where they participate in non-motorized activities, like hiking, camping, or horseback riding.

What do people do now when they come to the Santa Fe National Forest? People's responses to a 2003 survey (USDA Forest Service 2004), which asked them to list all the activities they did, ranked these four at the top: viewing natural features, relaxing, driving for pleasure, and hiking or walking. Almost 25 percent of the respondents had engaged in activities that centered around vehicles, such as riding OHVs, driving for pleasure, or snowmobiling. Just over 90 percent of visitors said they had participated in non-motorized activities like backpacking, hiking, skiing, bicycling, or horseback riding.

When asked to name their primary activity in the Santa Fe National Forest, 34 percent of respondents identified hiking and 17 percent relaxing (the top two). Less than 1 percent identified riding off-highway vehicles and about 3 percent named driving for pleasure as their main activity.

To show how motorized opportunities and access could change among alternatives, we use the miles of roads and trails and the acres of areas open for motorized use because these represent the places people can drive.

Roads

The Forest Service has two types of roads:

1. Roads suitable for passenger cars, and
2. Roads suitable only for high-clearance vehicles.

Roads that are suitable for passenger cars are usually paved or have a gravel surface. On the Santa Fe National Forest, most passenger car roads have a gravel surface. Except for the south end of Road 376 and part of Road 263, most paved roads are in campgrounds or lead to them. Passenger car roads are maintained more frequently because they receive the most use.

High-clearance vehicle roads are usually dirt roads. High-clearance vehicle roads receive little or no maintenance and a pickup truck or a 4-wheel-drive, high-clearance vehicle is required to drive on many of these. At the same time, many sections of the high-clearance vehicle roads are smooth and level and would be suitable for passenger cars, but are not maintained for that use.

Passenger car roads carry the most traffic on the forest. Road 376 on the Jemez Ranger District, for example, appears to be the most heavily traveled National Forest System road on the forest. Traffic counts at the south end of the road near the tunnels show an annual average daily traffic of around 185 vehicles. For comparison, the New Mexico Department of Transportation shows that the annual average daily traffic through Jemez Springs is around 2,600 vehicles. Farther north on Road 376, the average annual daily traffic drops to around 150 vehicles. This is the number of vehicles that go past the counter, regardless of direction. Many of these vehicles will be counted twice because people drive in and out, and don't necessarily drive a looped route.

On the other hand, high-clearance vehicle roads carry fewer cars, sometimes as little as one or none every 2 weeks. On the other side of the forest on the Pecos/Las Vegas Ranger District, Road 79 doesn't get as much traffic as Road 376. Road 79 is a dead end road that serves a trailhead and goes to some private property in the Cañada de Los Alamos area. At the south end of the road near the forest boundary, the average annual daily traffic is 30 vehicles, but at the trailhead, the count is only 15 vehicles. In the Glorieta Mesa area, Road 326's average annual daily traffic is 23.

The forest also has roads people created by driving repeatedly in the same tracks (figure 15). These roads, called unauthorized**,** are not tallied in the forest's database and are not part of the official transportation system. We don't have an inventory of all the unauthorized roads in the forest. People who like to drive in the forest told us of 291 miles of unauthorized roads and trails they use.

Traffic on all forest roads is low compared with city roads. We estimate that people are using 5,118 miles of roads now.

Figure 15. An unauthorized route leading to a camping spot on the Cuba Ranger District

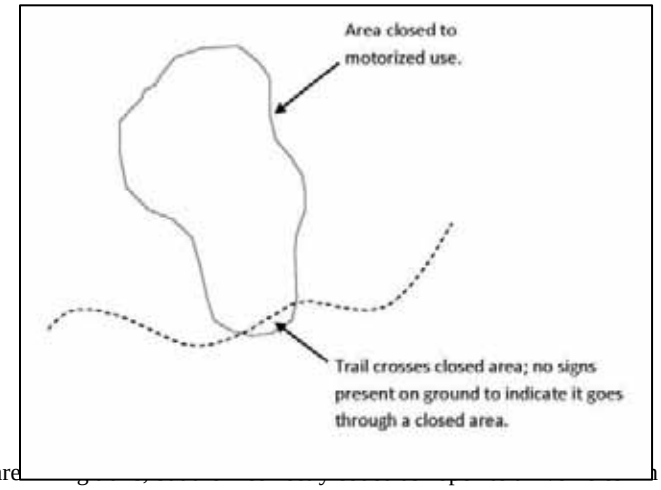
Trails

The Santa Fe National Forest manages 947 miles of system trails. Of these, 460 are in wilderness areas where motorized use is prohibited by law. Trails in wilderness will not be discussed further. The remaining 486 miles of system trails are outside of wilderness areas (figure 16). The Forest Service designs system trails with motorized or non-motorized uses in mind. Some trails are built for both kinds of uses.

Of the 486 miles of trails outside of wilderness areas, the Forest Service designed and built 459 miles for hikers and stock. Most of the 459 miles exist in places where driving a vehicle off the road is allowed, so driving on the trail is also allowed. Though we built the trails for non-

motorized uses, we have not discouraged people from driving on most of them. The Santa Fe National Forest has only 27 miles of trails built specifically for motorized use[2].

Figure 16. A typical National Forest System trail in the Jemez Ranger District. This one is not in a wilderness area.



[2] Aspen Loop and Pajarito Trail, totaling 8 miles, are [illegible] the forest's database, which would mean they should be roads. We keep both counted with the motorized trails so that mileages match among reports.

Figure 17. Example diagram showing how some trails cross non-motorized areas, but for a driver, there would be no way to tell

Some portions of the trails built for non-motorized use cross places where the forest plan or a closure order prohibits motorized use (figure 17). In theory, this means that section would be closed to motorized use, so someone couldn't drive to the end or finish a loop. In practice, however, no one has delineated where the trails cross boundaries into non-motorized areas, so a driver would not know that motorized use wasn't allowed. Thus, we have not calculated the mileage of the segments that are technically closed (as in the little piece shown crossing the non-motorized area in figure 17). Instead, they are included with the miles of non-motorized trail outside of wilderness.

Besides the system trails, unauthorized trails exist on the ground but are not part of the forest's transportation system. People driving in the forest create unauthorized routes. For instance, motorcyclists might follow a cow trail, and after several rides it looks like a motorcycle trail. Or, ATVs could cross a meadow and leave tracks that others follow. Over time, this too would become a trail. Some commenters wrote that all unauthorized trails were illegally created and should not be designated. If a driver was in a part of the forest that allows people to drive off roads (53 percent of the forest's area), then the trail was not illegally created. Some unauthorized routes are well located, provide excellent opportunities for outdoor recreation by motorized and non-motorized users, involve less environmental impact than unrestricted cross-country motor vehicle use, and would enhance the designated system for motorized use. Others are poorly located and cause unacceptable environmental impact.

We do not have an inventory of all the unauthorized routes, and the Travel Management Rule does not require that we do. We proposed to designate some of the routes that people who like to ride in the forest gave us. Of the 1,124 miles of routes provided by motorized user groups, 772 are on system roads, 291 miles are unauthorized routes, and 11 miles are on motorized system trails. In other words, most of the mileage used as motorized "trails" is either roads or trails that are already part of the forest's transportation system.

The chance that what a motorized enthusiast calls a trail is actually a road in the forest's system is three out of four. The motorized trails that people like to drive on are typically closed roads that link trails together (figure 18). In this report, we keep the miles of roads and trails separate in order to count them only once. **This is important since the miles of trail proposed for designation will appear smaller than what people gave us.**

We recognize that the opportunity to drive recreationally now is almost unlimited. Few restrictions exist on the 459 miles of system trail built for non-motorized uses outside of wilderness, and motorized cross-country travel is allowed on 53 percent of the forest. Our baseline, however, is where people drive now on the Santa Fe National Forest. We estimate that people use 338 miles of trails now (table 13).

Table 13. Miles of trails being used now on the Santa Fe National Forest. Does not include any miles of open system roads, even though open roads may connect loops (figure 19).

	Used by Vehicles Less Than or Equal to 50"	Used by Motorcycles	Used by ATVs	Grand Total

	(motorcycles and ATVs)			
Alternative 1	327 (290 are unauthorized)	5	6	338

Roads may complete parts of trails (figure 18) or be coincident with them (figure 19). If a trail is coincident with a road, we counted it as a trail. If we designate a motorized trail that is coincident with a road, we would close the road and convert it to a motorized trail. In other words, only vehicles less than or equal to 50 inches wide would be allowed on a motorized trail (or motorcycles only in some cases).

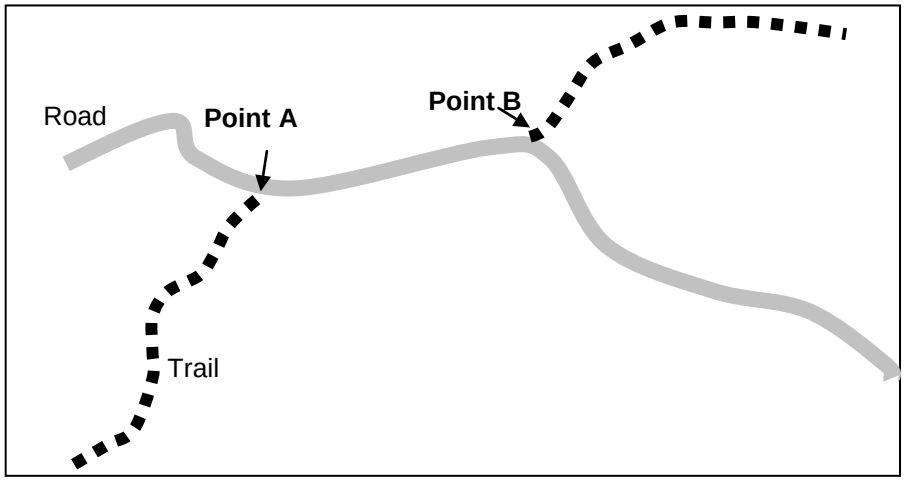


Figure 18. An example where a road connects two trails. To get from Point A to B, you have to drive on a road. To a rider, it might all look like a single, seamless trail.

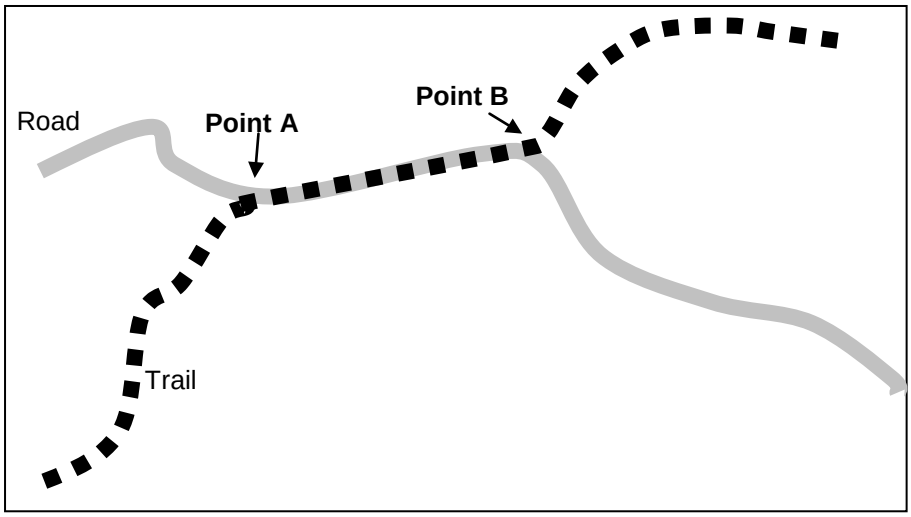


Figure 19. An example of coincident routes. The trail and the road are the same, or coincident, between points A and B.

Areas

Though the "Santa Fe National Forest Plan" allows people to drive off roads on 53 percent (822,000 acres) of the forest, we estimate that people are only doing so on about 29 percent (444,000 acres). People drive off roads to explore, scout for game, retrieve downed game, drive for pleasure, cut firewood, camp, have motorcycle trials competitions, and get to places where they can hike, bike, ride horses, fish, find a geocache, or rock climb and other activities.

Seasonal Closures

No consistent closures for weather or wildlife exist. Ranger district personnel close some roads when they get wet and muddy. Other roads close themselves when they have too much snow or otherwise become impassable (figure 20).

Figure 20. Impassable road due to mud

Opportunity (Roads, Trails, Areas, and Seasonal Closures) – Environmental Consequences

Direct and Indirect Effects, Alternative 1

The opportunities for driving on roads, trails, and in areas would not change from the current condition as just described. Alternative 1 (no action) provides the most miles and acres for people to drive on. Without uniform seasonal closures, people have access to the forest for the longest time.

It is likely that the number of unauthorized routes would grow. Alternative 1 allows travel off routes on more than half the forest. The tracks people leave when driving off road tend to become established paths over time.

The official motorized trail system would remain small at 27 miles. Use on the other 459 miles of trails outside wilderness would be open to vehicles unless posted closed. The Forest Service would not manage these trails for a motorized experience with things like signs, loop markers, and trail maintenance for ATVs and motorcycles. Local riders would have the advantage of knowing where to go, whereas non-local tourists may not.

Cumulative Effects, Alternative 1

The cumulative effects of past and present actions on recreation would continue. This project would not add to or subtract from those effects under alternative 1.

Direct and Indirect Effects, Alternatives 2 Through 5

Alternatives 2 through 5 reduce the places where people could drive on the Santa Fe National Forest (figure 21). Even alternative 4, which leaves the most roads and trails open for motorized use, still reduces open miles by 55 percent. Having fewer miles of roads and trails open means that people may not be able to drive to places they can now. All the action alternatives prohibit driving off roads except in designated areas and corridors solely for motorized access to dispersed camping or big game retrieval. Some people would consider this a loss of opportunity to enjoy their national forest, especially those who participate in dispersed recreational activities.

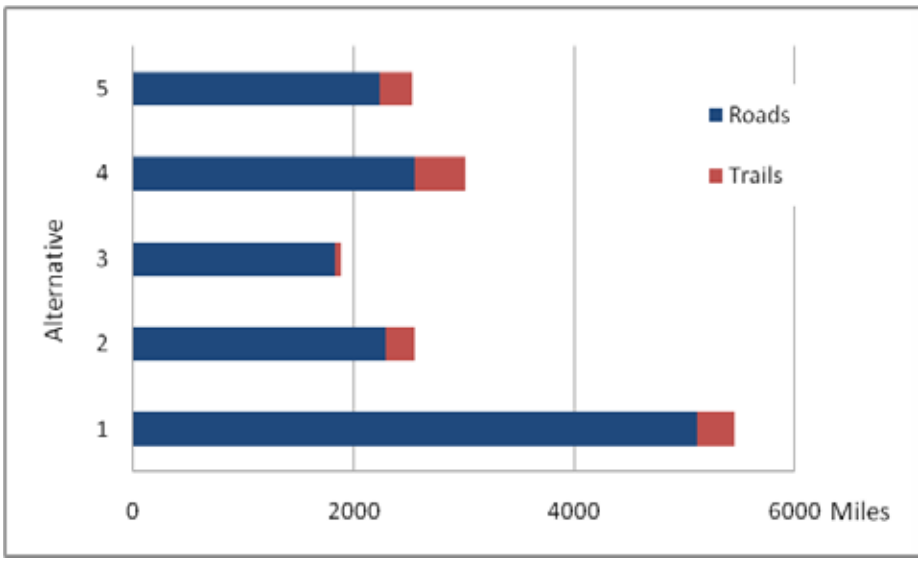


Figure 21. Miles of roads and trails open for motorized use by alternative

Roads

People who use out-of-the-way, challenging, high-clearance roads would no longer have as many of them to drive on. People will no longer be able to ride or explore on infrequently used roads that are not designated. It may be harder for people to go somewhere and be alone, or take longer to get there since they would have to proceed without their car at some point. For people who like to hike, for instance, not being able to drive to an out-of-the-way trail might mean they wouldn't hike there anymore—hiking to the trail would itself become the hike. Restricting where people can drive may affect some hunters who would no longer be able to drive to as many places as

they used to. Other hunters who prefer to walk may appreciate that fewer places will allow motorized use.

Closing more than half the roads to motorized use may not be as drastic as it appears because we propose to close roads that people don't drive on or drive on infrequently. We described earlier how passenger car roads get the most use and high-clearance vehicle roads the least. We propose to keep most passenger car roads open; the bulk of roads we propose to close are high-clearance roads that get little or no use (table 14).

Table 14. Change in roads open to motorized use by alternative. Passenger car roads carry the most traffic on the forest, and few of them would be closed.

	Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5	
	Miles	Percent Change	Miles	Percent Change	Miles	Percent Change	Miles	Percent Change	Miles	Percent Change
Passenger car miles	428	--	408	-5	405	-5	408	-5	403	-6
High-clearance vehicle miles	4,691	--	1,882	-60	1,424	-70	2,140	-54	1,827	-61

Trails

The Santa Fe National Forest manages only 27 miles of motorized system trails, and alternatives 2 through 5 increase the miles of motorized system trail to varying degrees. On the other hand, few restrictions on motorized use exist now, so any designated system restricts the amount of motorized opportunity from what is allowed under alternative 1, the existing condition (table 15, figure 22). Thus, some people will perceive a system of trails designated for motorized use as an increase in motorized opportunities, and others will see it as a decrease. People who prefer to ride on signed, maintained trails will appreciate having more of these. Other people will not be able to ride on trails they've been using, and will see a designated system as a loss of opportunity.

Alternative 4 appears to provide more trails than people drive on now. In reality, many of these trails exist and are being used in alternative 1—it's just that they are National Forest System roads now. Alternative 4, by converting these roads to trails, provides more trails uniquely for vehicles less than or equal to 50 inches in width. (This is also true for the other alternatives. The only difference is that they don't show more motorized trails than are currently being used.)

Table 15. Change in motorized trails by alternative. Alternative 1 shows the miles thought to be driven on now.

Type of Trail	Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5	
	Miles	Percent Change	Miles	Percent Change	Miles	Percent Change	Miles	Percent Change	Miles	Percent Change
Vehicles ≤ 50 inches wide	334	--	122	-63	41	-88	243	-27	167	-50
Motorcycles only	5	--	140	2,700	12	140	219	4,280	138	2,660
TOTAL	339	--	262	-23	53	-84	462	36	305	-10

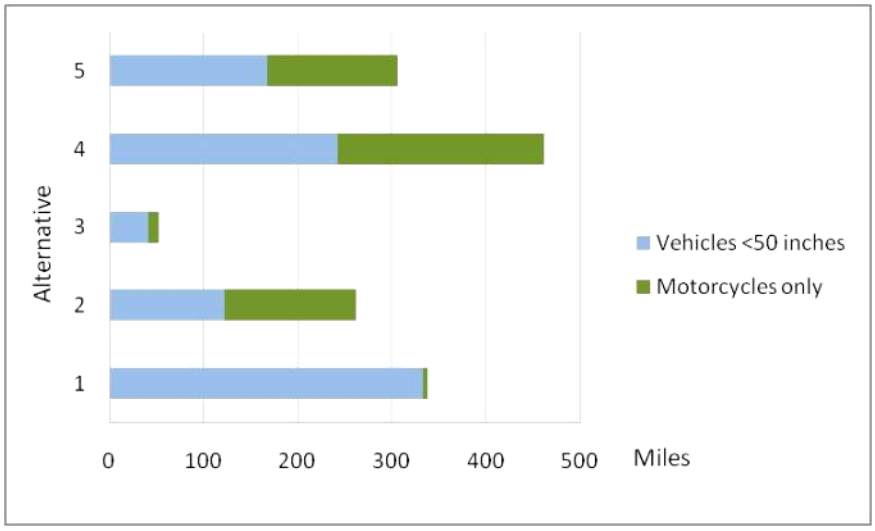


Figure 22. Miles of trail proposed for motorized use by alternative. The resultant system would have more motorized National Forest System trails, but restrict motorized travel from what is happening now.

Alternative 4 also proposes to designate 49 percent of the unauthorized routes motorized users provided, the highest of all the alternatives (figure 23). The rest decrease the trail mileage from what people are driving and riding on now. Alternative 3 does not include any unauthorized routes. This means that motorcyclists and other drivers who gave us their favorite routes would not be able to drive on them, and instead would need to stay on roads. This, in turn, may not provide the kind of experience riders seek.

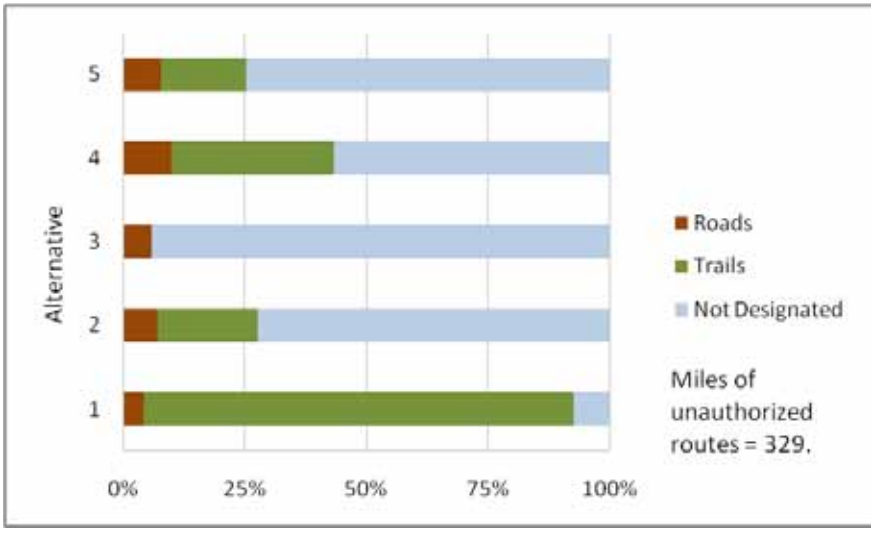


Figure 23. Comparison of how many of the 329 miles of unauthorized routes (291 from riders) are proposed by alternative

Alternatives 2, 4, and 5 propose to allow motorized use on up to 33 miles (depending on the alternative) of system trails built for non-motorized uses. Since people ride on most of these trails now, the change would make them formally open for motorized use. If you hike or walk your dog on these trails now, you would continue to encounter motorcycles or ATVs unless alternative 3 is chosen.

Areas

Alternatives 2 through 5 shrink the amount of motorized opportunity by limiting travel off roads to the designated system, meaning that driving off roads would no longer be allowed. (We will discuss motorized big game retrieval and dispersed camping separately.) Alternatives 2, 4, and 5 propose small areas intended for motorcycle trials and camping, but this is still almost nothing compared to alternative 1, the existing condition (figure 24).

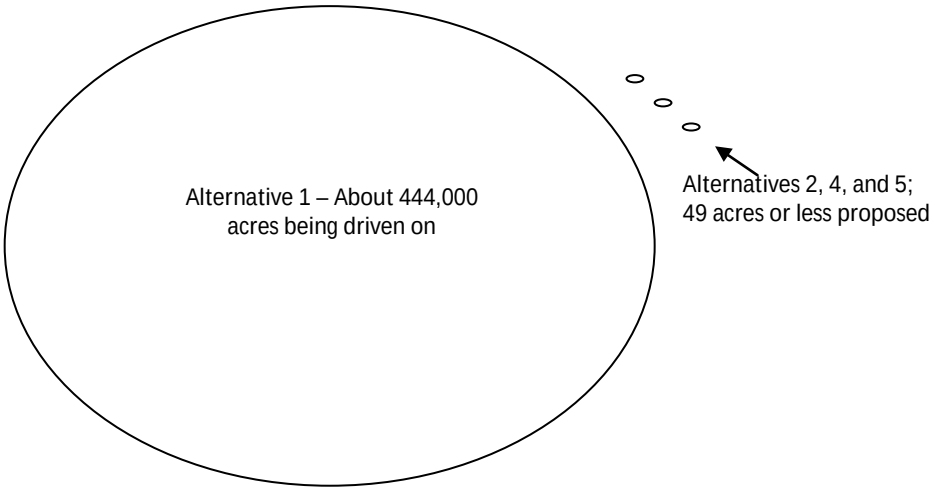


Figure 24. Conceptual illustration of change in acreage open for motorized cross-country travel by alternative (not to scale)

Not being able to drive a vehicle off road means that people's dispersed recreational activities will change. For instance, hunters will not be able to scout for game off roads on ATVs before hunting season, instead having to walk or ride a horse. People will not be able to explore by driving cross-country; they will have to park and walk or ride a bike or a horse. People who drive cross-country to get to places where they rock climb, ride horses, or bicycle will also have to park next to a road and proceed without their cars. So a trip that used to take a day may take longer because of the time required to get to the desired destination without a vehicle. We expect that some people will forego the trip altogether.

Seasonal Closures

Alternatives 2 through 5 propose seasonal restrictions in various combinations to protect wildlife and to prevent driving on routes when they are wet. Having uniform seasonal closures is likely to limit motorized opportunities because closures will exist where they don't now. All the alternatives, however, keep more than 90 percent of the routes open for 7 months or longer (figure 25, table 16). Snow naturally closes the high country for 5 to 7 months, so people would most notice new seasonal closures at lower elevations.

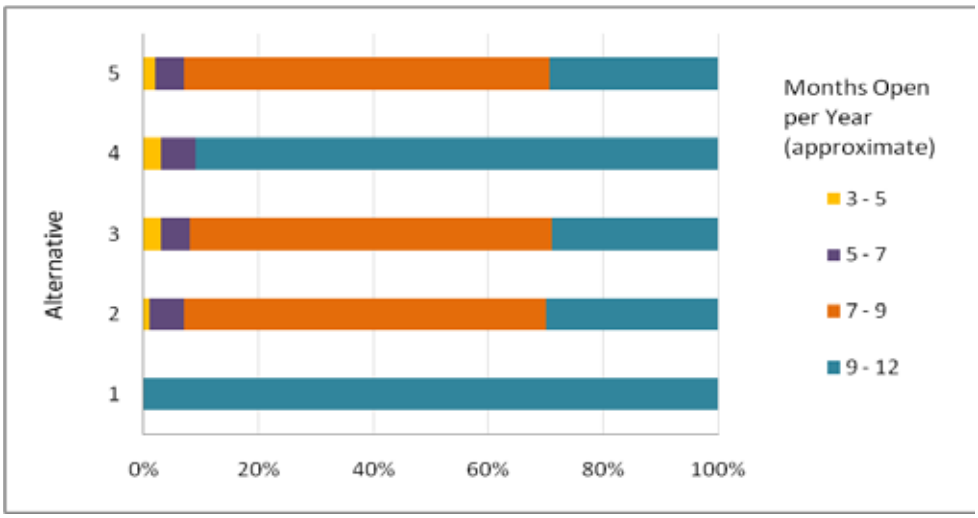


Figure 25. Percent of routes open per year by alternative. Alternative 4 keeps 90 percent of routes open for 9 months or more. By comparison, alternatives 2, 3, and 5 keep about 30 percent of routes open for 9 months or more.

Table 16. Percent of routes open seasonally by alternative. You can see that alternatives 2 through 5 have fewer routes open all year than alternative 1, the existing condition.

Months Open per Year (approximate)	Alternative (Percent of Routes Open)				
	1	2	3	4	5
3 - 5	0	1	3	3	2
5 - 7	0	6	5	6	5
7 - 9	0	63	63	0	63

9 - 12	100	30	29	90	29

In alternative 1, the existing condition, all routes stay open 9 months of the year or more (with the exception of some site-specific forest closure orders which close roads during the winter). The duration routes are open in alternatives 2, 3, and 5 is about the same. Alternative 4, having 90 percent of routes open 9 months or more, has no uniform closures for weather. This means that people would be able to drive on routes until they were snowed out or until the ranger districts put closure orders on them when they had snow or were muddy. Alternative 4 provides the most flexibility for keeping routes open. With uniform seasonal closures, the forest would not be able to open roads earlier than indicated on the motor vehicle use map. For instance, if April 16 is the proposed date to open routes seasonally, they could not be opened earlier even during a dry year.

Table 16 shows that not all routes would be open all year, as now. It groups roads and trails together to show the percent of routes open for different durations. Table 17 breaks out the kind of route and shows the percent that do not have seasonal closures. Using alternative 4 as an example: 92 percent of the roads would be open all year in this alternative, as would 59 percent of the trails for motorcycles only. Alternative 3, conversely, keeps 28 percent of the roads and 34 percent of the motorcycle trails open all year.

Table 17. Percent of routes with no seasonal closures

Type of Route	Percent of Routes with No Seasonal Closure				
	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Roads	100	30	28	92	29
Trails for vehicles ≤ 50 inches wide	100	10	4	85	12
Motorcycles only	100	17	34	59	16
GRAND TOTAL	100	28	28	89	28

To interpret the effect of seasonal closures, both tables should be considered together. For instance, even though alternatives 2, 3, and 5 only have 28 percent of the routes open all year (table 17), more than 90 percent of all the routes are open 7 months or more (table 16).

Cumulative Effects, Alternatives 2 Through 5

The effect of all the action alternatives would be to reduce the opportunity for motorized access and recreation on the forest. The reduction in motorized travel and recreation on the Santa Fe National Forest would cumulatively contribute to a similar reduction in access on other public lands in the 7-county area. The Carson and Cibola National Forests and the BLM are also going through the route designation process, which is expected to also reduce motorized opportunities. Though motorized opportunities on public lands would be reduced overall, they would not be eliminated.

The reduction of motorized access on public lands could be offset by private motorized parks, but the extent of the offset cannot be predicted.

Motorized Big Game Retrieval – Affected Environment

The public raised this issue:

> *"Prohibiting motorized cross-country travel will limit the retrieval of big game, perhaps to an unacceptable level."*

Right now, some hunters use trucks and ATVs for at least two reasons directly related to hunting: to scout for game before season and to pick up large game they have killed. (Camping is discussed in the next section.) As for scouting with a vehicle, we described in the section on "Areas" that driving off roads or trails to scout for game will be prohibited. The Travel Management Rule takes away this ability; vehicles must stay on roads or trails designated for motorized use unless retrieving a big game animal or camping.

"Motorized big game retrieval" means driving a vehicle, such as a truck or an ATV, off a route to pick up a downed big game animal. The New Mexico Department of Game and Fish identifies mule deer and elk as the two types of big game animals people might need a vehicle to get. Bear, though large, do not qualify because people tend to take just the skin and don't eat the meat. Carrying the skin out does not warrant using a vehicle (USDA Forest Service 2009f).

We estimate that hunters took an average of 438 elk and mule deer, combined, during the last two hunting seasons (USDA Forest Service 2009i). We think most people drive straight in, dress and pick up their animal, and drive straight out.

We don't have data on where people kill game animals and then go get them. We are confident that locations change every year. The New Mexico Department of Game and Fish doesn't ask people to report the exact location of their animal or the method they used to get it, just the game management unit where they brought it down. We assumed that hunters drive everywhere except wilderness areas to get their game. This totals 1,267,000 acres—in reality it must be less since some places are too steep or the trees are too thick for driving. Clearly, the majority of hunters follow rules and don't drive where they aren't supposed to.

While 438 hunters driving to get game on 1,267,000 acres may not seem like much, it is a lot to those 438 hunters. It could mean the difference between putting food on the table or not. Some people wrote that without driving, they are physically unable to pick up their animals and likewise can't afford to buy or hire horses.

Finally, the Hunting Heritage and Wildlife Conservation Executive Order 13443 directs agencies to encourage and enhance hunting and wildlife habitat.

Motorized Big Game Retrieval – Environmental Consequences

Direct and Indirect Effects, Alternative 1

There would be no change in how or where game animals are retrieved. Hunters could continue to pick up elk and mule deer, as well as smaller game, using vehicles anywhere on the forest where driving is allowed. Whether people think hunting is enhanced by the proposal to reduce the places where people can drive depends on their perspective. For those who need vehicles to retrieve game, alternative 1 would be best for encouraging hunting. On the other side, people who think that vehicles disturb game would consider alternative 1 less than ideal since it allows the

most motorized use. Alternative 1 is the least effective at conserving and enhancing wildlife habitat for most species (refer to the "Wildlife" section later in this document).

Cumulative Effects, Alternative 1

The only anticipated, cumulative decrease in opportunity to retrieve game with a vehicle would be through closure orders.

The New Mexico Department of Game and Fish issues hunting licenses based on the population of elk and mule deer. Should those populations increase, so might the number of licenses issued. But simply having more licensed hunters would not necessarily increase the number of motorized trips to get game—hunters need to first be successful, and second choose to drive to get their animal. If all these are true, then more trips in vehicles could be the result.

Direct and Indirect Effects, Alternatives 2 Through 5

Alternatives 2 through 5 reduce the distance from a road a person could drive to retrieve a game animal from that happening in alternative 1, the existing condition (figure 26). This means that a hunter might have to walk all or part of the way to pack an animal out. In alternatives 2, 4, and 5, a hunter could drive to the edge of the corridor. If the animal was farther than that, they would have to stop at the edge of the corridor and continue on foot. All the corridors proposed are smaller than the area available and used now. Alternative 4 most closely preserves the places where people can drive to get game now. Alternative 3 does not allow anyone to drive off roads, so hunters would have to walk to get their animals. Alternative 2, which proposes corridors 150 or 300 feet from either side of some roads, severely limits opportunities from the current condition. Alternative 5 represents a middle ground.

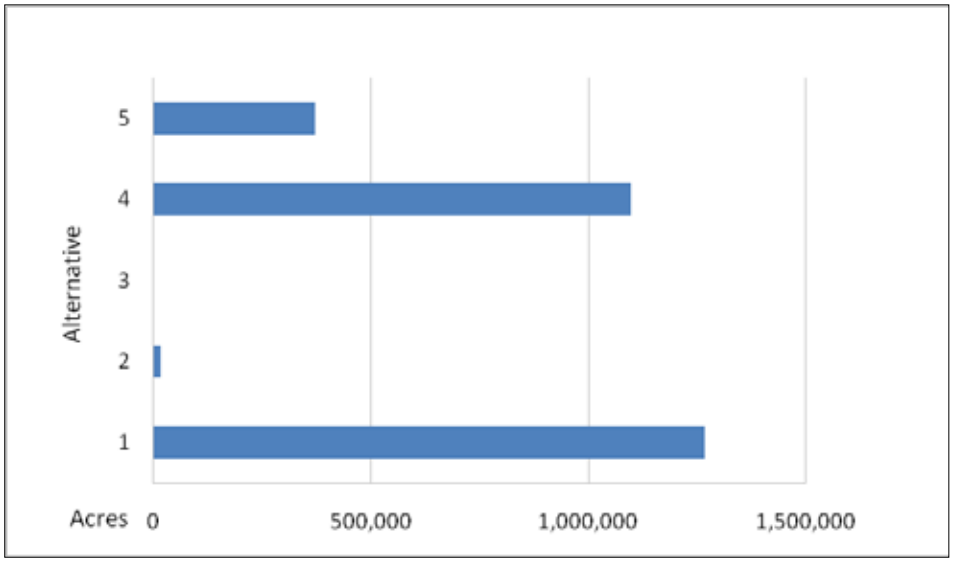


Figure 26. Comparison of acres where people would be allowed to drive to retrieve elk and mule deer

If alternative 2 or 3 was chosen, we anticipate that some hunters would have no way to get their animals due to physical limitations. This would effectively eliminate their ability to hunt and

perhaps have meat in the freezer. On the other hand, some hunters would perceive not having motorized big game retrieval as an improvement; little or no engine noise that would startle game would be present more than 300 feet from roads.

Hunters with physical limitations are likely to prefer alternative 4 or 5 because they provide more places to drive and get game. Hunters who dislike hearing vehicles in the backcountry because they disturb game are likely to think that alternative 4 or 5 decreases the quality of hunting. Alternatives 2 through 5 would improve wildlife habitat for most species (refer to the "Wildlife" section later in this report).

Cumulative Effects, Alternatives 2 Through 5

Selecting any of alternatives 2 through 5 could cumulatively contribute to a statewide reduction in opportunities for hunters to drive to retrieve game on public land. The Bureau of Land Management and the other four national forests in New Mexico (Carson, Cibola, Gila, and Lincoln) are all designating a system of roads, trails, and areas for motorized use. Like in the Santa Fe National Forest, this is expected to limit where people can drive to retrieve game.

Private landowners offer hunting throughout the state. If private landowners allow people to retrieve game with a vehicle, it could offset some of the reduction on public lands.

Motorized Dispersed Camping – Affected Environment

The public and interdisciplinary team both questioned aspects of motorized dispersed camping. We expressed the issue like this:

> *"Designating motorized dispersed camping corridors will increase cross-country travel and the resource damage associated with it and curtail the kind of unrestricted camping that the Santa Fe National Forest currently provides."*

Motorized dispersed camping is a term used in the Travel Management Rule for the activity often called car camping, where people drive to a camping spot, park, and set up their gear close to their vehicles (figure 27).

Figure 27. A motorized dispersed campsite, meaning it has no Forest Service facilities. This site in the Jemez Ranger District is close to trails popular with ATV riders.

Some people expressed a concern that allowing cars to drive off road any distance, even if just for one trip in and one trip out, would damage natural or cultural resources. (Other sections of this document address these types of effects.) Conversely, others felt that limiting where people can camp would change the basic character of camping on National Forest System lands. They didn't like the idea that they wouldn't have unlimited opportunity to drive their cars anywhere outside of wilderness to set up a campsite.

Where do people car camp now? In the summers of 2008 and 2009, we collected data on where people drive to camp (USDA Forest Service 2009g). We found that most camping takes place along 433 miles of routes. By mapping corridors around the sites people camp in now, we estimate that this covers just over 17,000 acres of the forest (figure 5). Most people tend to set up campsites close to roads, often near water or scenic areas (figure 28). During the popular summer months and fall hunting seasons in the forest's busiest stretches, people set up camp anywhere flat enough to pitch a tent or set up an RV. It is common to see more than three cars, a couple of RVs, several tents, and 20 people in a popular site during the summer months. The Rio Guadalupe corridor (Road 376, Jemez District), the Rio Chama (Road 151, Coyote District), and Pecos River (Road 63, Pecos/Las Vegas) are examples of heavily used camping areas. The Jemez and Cuba Ranger Districts reported having the highest number of sites used frequently, and the Pecos/Las Vegas and Española Ranger Districts reported having the highest number of sites not used very often.

Figure 28. A popular camping site near Dalton Creek, Pecos/Las Vegas Ranger District

We tend to see three kinds of car camping: smaller, heavily used sites typically next to water; infrequently used sites, usually used by hunters during hunting season; and group campsites about ¼ acre found on the Pecos/Las Vegas Ranger District.

In most areas of the forest, people can drive and park next to streams to camp (figure 29). Water attracts people, and we commonly see vehicles right next to streams. Through the Respect the Rio Program, we have made a concentrated effort to keep cars out of the riparian areas along Rio Guadalupe and Rio Cebolla (Jemez Ranger District) (figure 30). Buck and pole fencing, backed up by a closure order, allows people to camp close to the water, but blocks vehicles from driving close to streams.

Figure 29. An example of a campsite right next to water

Figure 30. A buck and pole fence that keeps cars away from the stream, but lets people camp close to the stream if they walk

People who prefer isolation drive off roads and camp in the "back forty," often where no one else has camped before. Hunters tend to do this more than the average weekend visitor (figure 31). Ranger district employees estimated that people drive cross country for multiple reasons, including camping, on about 444,000 acres. We observed, however, that the numbers of people who camp farther than 300 feet from roads is very small. In this analysis, we treated that use as

negligible and focused on the places where people camp next to roads. This way each alternative has “corridors” that people can easily compare.

The Pecos/Las Vegas District has several small sites, ranging in size from ¼ to 1 acre that people use as large group campsites. Together these sites total about 5 acres. On summer weekends, these sites host multiple RVs and vehicles.

Figure 31. An example of an infrequently used campsite on the Coyote Ranger District

Motorized Dispersed Camping – Environmental Consequences

Direct and Indirect Effects, Alternative 1

There would be no change in the amount of places for motorized dispersed camping under alternative 1, the existing condition. As happens now, we expect most people would continue to camp in their favorite spots next to roads and water, hunters would search out lightly used places during hunting season, and a small number of people would explore and find campsites farther than 300 feet from a road.

Cumulative Effects, Alternative 1

Alternative 1 would not change the amount of motorized dispersed camping available, so there would be no change in cumulative effects.

Direct and Indirect Effects, Alternatives 2 Through 5

Alternatives 2 through 5, to different degrees, would reduce the amount of places where people could drive and camp. (Note that the places where you can camp will not change—only where

you can drive your car and have it next to you when you camp. In all alternatives, parking next to a road and finding a site on foot is allowed.) The alternatives do this in two ways:

- Not being able to drive off roads farther than the edge of a corridor to find a place to camp. If you like to drive deep into the woods to camp, you won't be able to do this anymore. Instead, you would park next to the side of the road, or at the edge of the corridor, and proceed to find a camping spot without your car.
- Not designating some sites that we think are causing too much resource damage. About 1,000 acres where people camp with their cars now haven't been proposed in any of the alternatives for this reason.

On the other hand, all the alternatives (except 3) propose to keep most of the popular car camping places identified in the 2008-2009 field inventories.

figure 32 and table 18 compare where people could drive their cars and camp for each alternative. Alternative 2 designated almost all the places where we observe people drive and camp now, so it most closely keeps the current opportunities. Alternative 3 is the most restrictive; people could only park next to the side of the road and then move their gear to a campsite on foot—they could not drive to their campsite in any circumstance. Alternative 4 provides more acres for car camping by doubling the width of many corridors proposed in alternative 2 to 300 feet from either side of some designated routes. In this alternative, we'd expect people to spread out and not be as close to others. Alternative 5 proposes about one-third fewer corridors for car camping than where people camp now.

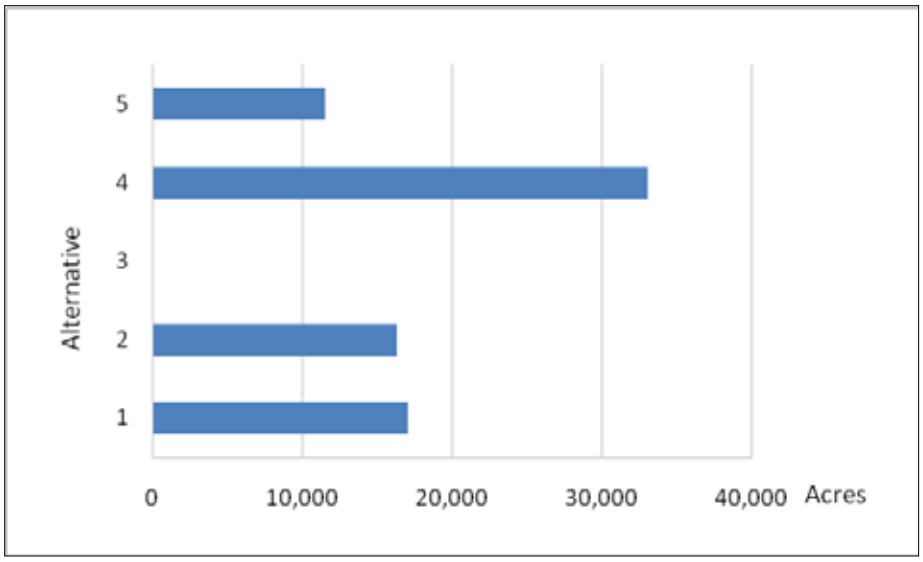


Figure 32. Comparison of acres available for motorized dispersed camping by alternative (acres used in alternative 1)

Table 18. Comparison of acres available (or used—alternative 1) for motorized dispersed camping by alternative

	Alternative				
	1	**2**	**3**	**4**	**5**
Total acres of camping corridors	17,076	16,340	0	33,079	11,546
Percent change in acres of corridors from alternative 1	**--**	**-4**	**-100**	**+94**	**-32**
150-foot corridors, miles	394	393	0	0	269
300-foot corridors, miles	39	29	0	460	26
Acres of areas for motorized dispersed camping	--	5	0	5	0

The reduction in motorized dispersed camping could result in more concentrated use in the fixed-distance corridors or other designated camping areas, though this varies by alternative, depending on how much change from the existing situation is proposed. This kind of use may not appeal to people who like to camp away from other people. There could be a higher demand for developed campsites if people decide to use them instead of dispersed campsites. Some people may feel a loss of freedom by not being able to drive cross country anywhere on the national forest to find a place to camp. Some of the remote campsites used by locals may no longer be driven to.

Cumulative Effects, Alternatives 2 Through 5

Selecting alternative 2, 3 or 5 could cumulatively contribute to a statewide reduction in places to drive and camp next to your car on public land. Selecting alternative 4 would provide a small increase on the Santa Fe, which would somewhat offset other reductions. With the Bureau of Land Management, the other four national forests in New Mexico (Carson, Cibola, Gila, and Lincoln) also will have a designated system of roads, trails, and areas for motorized use. As in the Santa Fe, this will limit where people can drive their cars to camp.

Private landowners offer camping throughout the state. That at least partially offsets any reduction on public lands.

Conflicts between Motorized and Non-Motorized Uses – Affected Environment

About 10 percent of the people commenting on the proposed action mentioned having problems with vehicles in the woods, or user conflict. In response, we wrote this issue statement:

> *"The proposed action, by designating routes uniformly across the forest outside of designated wilderness, will cause conflicts between motorized and non-motorized users because they will be recreating in the same vicinity."*

Though conflict between motorized users also can occur—for instance between people on ATVs and in full-size trucks driving on the same road—we received few comments about it. Thus, we focus on potential conflicts between non-motorized uses (hiking, horseback riding, bicycling, and others) and motorized uses (cars, trucks, ATVs, motorcycles, and others). For example, somebody riding a horse may fear that a motorcycle will spook the horse, which could then hurt someone.

At the same time, the motorcycle rider may also worry about coming around a corner and spooking a horse and, therefore, not enjoy their ride as much as they would otherwise.

The recreation specialist report cites studies about conflicts between visitors; we summarize these in this and the next paragraph. Historically, conflicts happened between those who wanted to use the land for minerals, timber, grazing, and energy and those who wanted to preserve it in its natural state. Similar conflicts have evolved more recently, as off-road motorized use has increased, between those who prefer human-powered transport and recreation and those who like to drive. This schism accounts for most of the reports of conflicts on Federal lands: that between drivers of off-highway vehicles on the one hand, and non-motorized users and adjacent private landowners on the other. Studies show that the conflict tends to be asymmetrical—people who don't use motors are bothered by drivers, but the reverse is not true. To illustrate, sailboats and rowboats on a lake coexist peacefully. Add one jet ski and conflict arises for the boaters, while the jet-skier is not troubled by the boaters.

Though motorized and non-motorized users seek the same setting in which to recreate, research has shown that their values differ enough to cause conflict. Both groups enjoy scenic trails, solitude, places close to water, varied terrain, and large areas in which to travel. They also share a preference for clean, well-managed trails, and like ethical behavior in their counterparts. But, non-motorized groups enjoy slower, more contemplative trips whereas drivers want more speed and freedom. Non-motorized groups expect the forest to be quiet and are annoyed by the noise from motors. Noise, in fact, is one of the biggest sources of conflicts between these two groups.

On the Santa Fe National Forest, we observe that while conflict between motorized and non-motorized users exists, it does not blanket the whole forest. Individual routes and specific areas—namely parts of Jemez and Pecos/Las Vegas Ranger Districts—appear to be the source of most of the discord. People complained about their safety, damage caused by motorized vehicles, trespass into non-motorized zones and private property, disruption of quiet, and being displaced from their favorite areas. We gather from the comments that conflict does seem to be asymmetrical on this forest. Comments from motorized users sometimes minimized or discounted the claims of perceived user conflict.

Even professional researchers find measuring conflicts between users complex since it's defined a number of ways. We chose relative route density—the miles of roads and trails in a given area—as a measure for conflicts between motorized and non-motorized users. Non-motorized users sent comments saying they want to go places where noise from vehicles is absent. Most preferred not to share routes with motorized users. Intuitively, it seems that higher route densities would spread people out, reducing the likelihood that recreationists would encounter one another. Research, however, has shown that non-motorized users prefer to recreate in places separate from motorized users, and that motorized users displace non-motorized users from some shared routes. Therefore, we assume areas with high route densities may not reduce user conflict because non-motorized users cannot completely avoid drivers. Rather, areas with high route densities increase the overall amount of places considered "motorized," and could limit the opportunities that non-motorized recreationists have to themselves.

For this measure, we used these route densities, measured in miles per square mile:

- Low = 0 to 0.4
- Medium = 0.5 to 1.5
- High = 1.6 and greater

Places with high route densities allow for lots of motorized experiences, but provide few areas where people can go and count on not seeing any vehicles at all. Similarly, places with low route densities allow for lots of non-motorized experiences, but provide few opportunities for motorized use. The distribution of places with low, medium, and high route densities also distributes recreational experience and, therefore, potentially reduces conflicts between motorized and non-motorized users.

Conflicts Between Motorized and Non-Motorized Uses – Environmental Consequences

Direct and Indirect Effects, Alternative 1

We expect that alternative 1 has the greatest potential to cause conflicts between motorized and non-motorized groups. Close to 70 percent of the forest has high route densities, meaning someone could expect to see or hear a vehicle in the majority of the forest. Though one quarter of the forest has low route densities, most of this (78 percent) is in the forest's wilderness. The most likely place to avoid hearing or seeing a vehicle, therefore, would be in a wilderness area.

Direct and Indirect Effects, Alternatives 2 Through 5

Regardless of the alternative, we expect having a system of roads, trails, and areas designated for motorized use would reduce conflicts between motorized and non-motorized recreationists. Researchers have found that such a system reduces direct conflicts. Drivers stay on the system, and everyone else knows where to go to avoid them if they choose.

Alternatives 2 through 5 reduce the acres having high route densities, and shift more of them to medium route densities. They also increase the acres having low route densities to more places outside of wilderness (table 19). Together, this means that people wishing to avoid vehicles would have more places to go, and could avoid them without having to go to a wilderness area.

Alternative 4 has the most even balance between high, medium, and low; all represent about one-third of the forest. Alternative 3 would have no areas with high route densities, and is likely to be preferred by people seeking non-motorized experiences. Alternative 5 is the most likely to reduce conflicts between users because it was specifically designed to do so, by geographically grouping motorized uses away from non-motorized uses.

Cumulative Effects, All Alternatives

We expect that alternative 1, cumulatively, would have the most conflicts when combined with the effects of past, present, and reasonably foreseeable future actions described below. We think this because it has the most potential for clashes now, as just described. Alternatives 2 through 5 would all cumulatively reduce the amount of conflicts when combined with the actions below.

Table 19. Percent of forest acres having low, medium, or high route densities. We anticipate more conflicts in places with high route densities.

Route Density, Miles/Square Mile		Alternative				
		1	2	3	4	5
Low (0 - 0.4)	Total acres **Percent of forest**	375,269 24	451,219 29	452,827 29	437,305 28	451,219 29
	Percent of low density places in wilderness	78	65	65	67	65
Medium (0.5 - 1.5)	Total acres **Percent of forest**	80,252 5	731,715 47	1,075,331 69	494,599 32	792,125 51
High (1.6 +)	Total acres **Percent of forest**	1,078,087 69	350,672 23	5,448 0	601,702 39	290,263 19

Subdivision of private property in the forest probably has contributed to conflicts between users in the past, and will continue to do so in the future. In many cases, people who move to the forest expect a quiet setting and become annoyed by vehicles driving near or through their property. The drivers, on the other hand, are used to being able to drive where they want and do not appreciate fences suddenly appearing.

The past construction of roads for timber sales and oil and gas developments may also have contributed to conflicts by putting in roads where they had not previously existed.

Creation of the Jemez National Recreation Area, three wild and scenic rivers, and educational programs such as Respect the Rio likely reduced conflicts by clearly defining what kinds of uses could take place within them. Future closure orders and site-specific projects delineating places to camp and travel would have the same effect.

Technological advances in off-highway vehicles have probably increased conflicts by allowing vehicles to get to places where they hadn't been before.

If the population in the Southwest—and its preference for using off-highway vehicles—continues to increase, we would expect an increase in conflicts between motorized and non-motorized users in alternative 1. People wishing to avoid vehicles altogether might gradually be pushed to wilderness areas exclusively. With a designated system in place, there would be no cumulative change since people would know where to go to avoid vehicles.

Wilderness – Affected Environment

People raised this issue about having motorized use near wilderness areas:

> "*Designating motorized routes close to wilderness will detract from the wilderness experience because of noise and trespass.*"

Only Congress can designate wilderness areas. The Forest Service can't create de facto wilderness areas by buffering them. This section, then, serves to show the potential effects to

someone in a wilderness area. Adverse effects from motorized use can't be used to "extend" wilderness areas.

Congress passed the Wilderness Act in 1964. The definition of wilderness from the act is:

> *"A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain."*

The Wilderness Act prohibits permanent roads, the use of vehicles, and any other forms of mechanized transport in wilderness areas. Even rescue missions need special permission from the Forest Service to land a helicopter in wilderness, and they usually aren't allowed to if there is another way to send help.

The act describes wilderness using these four qualities:

- Untrammeled, meaning free from modern human control or manipulation.
- Natural, where the natural condition of the land, its plants, wildlife, water, soil, air, and the ecological processes are managed, protected, and preserved.
- Undeveloped, retaining its primeval character and influence, and is essentially without permanent improvements or human occupation.
- Solitude or primitive and unconfined recreational opportunities.

Engine noise could carry and disturb somebody in a wilderness area, compromising one or more of these qualities. We chose ½ mile as the maximum distance that engine noise could carry, though it could be less or more depending on topography, vegetation, and the direction of the wind. To measure the possibility of noise reaching wilderness, we tallied all routes and acres within ½ mile of a wilderness boundary for each alternative.

Certainly, seeing a vehicle in wilderness would violate the principles of untrammeled, natural, undeveloped, and primitive. One way a person could drive into wilderness is on a road or trail that dead ends at the wilderness boundary. So, we measured the number of routes that end at a wilderness boundary as a proxy for the potential of illegal trespass. Not all of these, however, are conduits to wilderness. Many end in parking lots and are often impassable to vehicles due to slope, vegetation, terrain, peer pressure, or a combination of these.

Wilderness – Environmental Consequences

Direct and Indirect Effects, Alternative 1

This alternative has the greatest potential for noise to carry into wilderness and for trespass. The number and miles of routes and cross-country travel within ½ mile of wilderness boundaries and any illegal intrusions could affect all four wilderness characteristics.

Under alternative 1, 564 motorized routes totaling 252 miles exist within ½ mile of the Santa Fe National Forest's wilderness areas (table 20). About 70 routes lead to wilderness boundaries. Some of these, like Road 151 leading up the Chama River Canyon or Iron Gate Road to the Pecos Wilderness, provide access to the wilderness itself. People drive these frequently, especially in the summer. Noise from vehicles could carry into the wilderness depending on the specific situation.

The access routes not shown on the forest visitor map are likely not used as often because people don't know about them, so the frequency of disturbance from these would be less.

Table 20. Comparison of motorized use close to wilderness by alternative

	Alternative				
	1	**2**	**3**	**4**	**5**
Total miles of routes within 1/2 mile of wilderness boundary	252	126	94	131	100
Percent reduction	**--**	**-50**	**-63**	**-48**	**-60**
Number (count) of routes within 1/2 mile of wilderness boundary	564	180	120	178	119
Percent reduction	**--**	**-68**	**-79**	**-68**	**-79**
Number of routes ending near wilderness boundary*	70	32	22	34	22
Percent reduction	**--**	**-54**	**-69**	**-51**	**-69**
Acres within 1/2 mile of wilderness boundary where travel off roads is permitted (area or corridor)	66,256	629	0	48,344	15,824
Percent reduction	**--**	**-99**	**-100**	**-27**	**-76**

* Some of these are not on the forest visitor map because that map does not show every route in the forest. Some routes do not provide access into wilderness due to terrain (e.g., a canyon) or do not lead to a system trail that goes into wilderness.

Motorized cross-country travel on 66,256 acres within ½ mile of wilderness boundaries would continue. Visitors in wilderness areas might be able to hear or see vehicles—or drivers could trespass into wilderness from these places because they are adjacent—depending on the terrain.

We've not received any complaints from people in wilderness about noise from cars, so we believe the use near wilderness and the ability to hear noise is low. We have received a few complaints of trespass.

Cumulative Effects, Alternative 1

To have a cumulative effect, effects must overlap in space and time. Though alternative 1 has the most potential for engine noise or trespass in wilderness, these events are not likely to overlap in space or time with other intrusive noises or sights. For example, a person in wilderness would have to hear a car and see an airplane passing at the same time for there to be a cumulative effect. This is possible, of course, but would be of short duration. Such an event would cause an instant of manmade sights and sounds, but would not be permanent. The wilderness would quickly return to its untrammeled state. No other present or reasonably foreseeable future projects would add to the potential of noise or trespass in wilderness areas.

Direct and Indirect Effects, Alternatives 2 Through 5

Alternatives 2 through 5 reduce the miles, acres, and number of routes within ½ mile of wilderness boundaries, and the acres where driving off roads would be allowed. Thus, all would reduce the chance that someone in wilderness would see or hear a vehicle from the wilderness by approximately 50 percent or more compared to alternative 1, the existing condition (table 20).

The action alternatives differ most in the acres next to wilderness where driving off roads would be allowed, with alternative 3 eliminating it completely, and alternative 4 reducing the acres by about one quarter. This reduction, however, could be negligible since use now is low.

Cumulative Effects, Alternatives 2 Through 5

Because the alternatives reduce the chance that a person would hear or see a vehicle, the chance of having a cumulative effect is likewise less.

Inventoried Roadless Areas – Affected Environment

People's concerns about inventoried roadless areas are the same as those they have about wilderness. We wrote the issue this way:

> *"Designating motorized routes through or close to inventoried roadless areas will detract from the potential wilderness characteristics of these areas."*

An inventoried roadless area is a large tract of land whose characteristics resemble wilderness but is usually not as pristine. Though we call them "roadless," many have roads—just not very many compared to other areas of the forest (not including wilderness). States and others have legally challenged the Forest Service's rulemaking for and management of inventoried roadless areas since 2001.

The "inventoried" part of the name comes from the fact that all national forests conducted an inventory in the 1970s and 1980s to find lands that could potentially be recommended as wilderness. Note that the characteristics that follow describe potential wilderness (FSH 1909.12 Ch. 72); those for congressionally designated wilderness areas are different. How well a tract meets these five characteristics would indicate its ability to become wilderness someday. Two inventoried roadless areas in the Santa Fe National Forest are being considered as additions to the Pecos Wilderness. In contrast, if one or more of these characteristics are not currently being met, the area already has poor potential of becoming wilderness, and other future activities would be less significant.

- Natural, being substantially free from the effects of modern civilization.
- Undeveloped, having little or no permanent improvements or human habitation.
- Outstanding opportunities for solitude or primitive and unconfined recreation.
- Special features and values, or the potential to contribute to unique fish, wildlife, and plant species and communities, outstanding landscape features, and significant cultural resource sites.
- Manageability, meaning the area is at least 5,000 acres in size.

The last one, manageability, does not apply because this project does not change the size of any of the inventoried roadless areas.

Using wilderness characteristics is an acceptable way to evaluate inventoried roadless areas because that's why they were created.

Roads and motorized trails through inventoried roadless areas alter wilderness characteristics. Roads and motorized trails aren't natural—people build them. They serve as conduits for

vehicles, which are not natural or primitive and disrupt solitude with engine noise. Depending on their location and how often people use them, roads and trails can detract from plant, fish, and wildlife habitat and damage cultural resource sites. The presence of a road or motorized trail in the visual path of an outstanding landscape feature could diminish its beauty.

Figure 33. The photo on the left is what we mean when we say a route has a footprint on the ground; the photo on the right does not. Neither photo is in an inventoried roadless area.

The Santa Fe National Forest has 55 inventoried roadless areas totaling 241,076 acres. About 293 miles of routes, including system and unauthorized routes, cross them now. We think that people are driving on about 142 miles (48 percent) of these.

Inventoried Roadless Areas – Environmental Consequences

Effects Common to All Alternatives

Routes that go through inventoried roadless areas alter wilderness characteristics more than those within ½ mile of them. Noise is not likely to travel more than ½ mile, especially in steep, densely forested places. Only 3 percent or less of the total miles of routes in the forest cross inventoried roadless areas in any alternative. Only 10 percent or less is within ½ mile.

Proposing fewer of these routes than people are driving on now means that they will be barred from using some trails they like. This is especially true for alternative 3, which proposes no motorized trails in inventoried roadless areas.

All unauthorized and decommissioned routes proposed for designation exist already on the ground (figure 34). Even if we close routes to motorized use, traces will likely remain for a long time, especially those on steep slopes where erosion often prevents plants from growing back (refer to the “Soil and Water” section). From this perspective, no difference among the alternatives exists.

All alternatives except alternative 1 institute some uniform seasonal closures for weather, wildlife, or both. Seasonal closures improve consistency with potential wilderness characteristics by protecting wildlife habitat and preventing erosion.

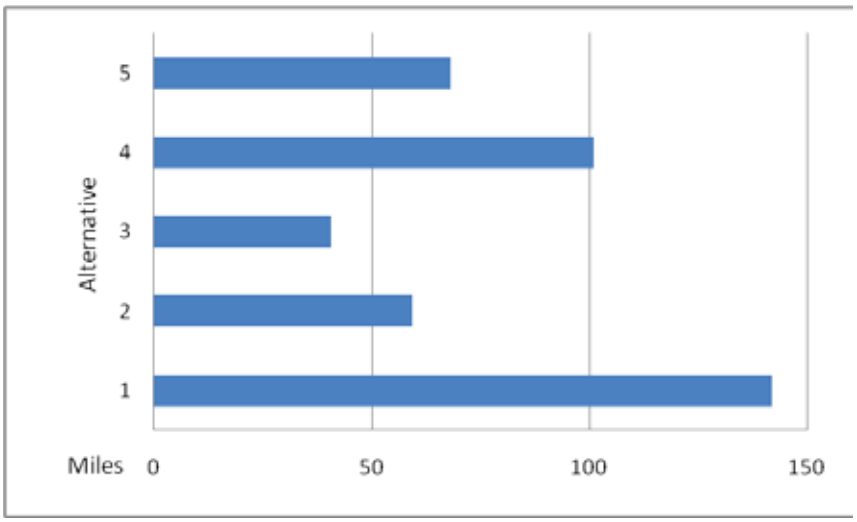


Figure 34. Miles of routes in the forest's inventoried roadless areas by alternative

Direct and Indirect Effects – Alternative 1

No change from the current condition would occur. Alternative 1 is the least consistent with the characteristics of potential wilderness because it allows the most motorized use in and near inventoried roadless areas. We believe, however, that use of routes in the inventoried roadless areas is infrequent. That is, someone might regularly use a particular trail once or twice per month when snow is absent.

Direct and Indirect Effects – Alternatives 2 Through 5

The effect of the alternatives is twofold. First, existing routes on the land contrast with the naturalness that is supposed to be integral to inventoried roadless areas. It is unlikely that removing motorized use will result in most routes healing over within 15 years (refer to the "Soil and Water" section of this report), but it will allow the potential for routes to begin to revegetate. Second, motorized use of routes in inventoried roadless areas causes temporary noise—perhaps 30 seconds or so while the vehicle passes—which is not consistent with the principle of solitude. Reducing the places where people can drive will reduce the places where people will hear noise from engines.

Alternatives 2 through 5 would all be more consistent with the characteristics of potential wilderness than alternative 1. All shrink the number of routes open for motorized use in and within ½ mile of inventoried roadless areas (table 21). This means the instances where someone could hear or see a vehicle in an inventoried roadless area would also diminish.

All the alternatives would allow people to drive on fewer unauthorized routes than they do now, but three of the alternatives would add unauthorized routes in inventoried roadless areas, which are instances that promote "permanent" development and are not consistent with the characteristics of potential wilderness. Only alternative 3 proposes no new routes through inventoried roadless areas.

Table 21. Comparison of routes in and near the forest's inventoried roadless areas by alternative

		Alternative				
		1	**2**	**3**	**4**	**5**
Miles inside IRAs	Roads	101	47	41	63	48
	Trails	41	12	0	38	20
	Total	142	59	41	101	68
	Percent change	**--**	**-58**	**-71**	**-29**	**-52**
Miles of routes within 1/2 mile of IRAs	Total	545	253	194	296	226
	Percent change	**--**	**-54**	**-64**	**-46**	**-59**
Miles of unauthorized and decommissioned in IRAs	Roads	3	0	0	2	0
	Trails	23	3	0	8	2
	Total	26	3	0	10	2
	Percent change	**--**	**-89**	**-100**	**-62**	**-94**

Cumulative Effects – All Alternatives

Noise from vehicles in inventoried roadless areas could cumulatively combine with other noises that are generally considered unacceptable in inventoried roadless areas. Noise from the Gallinas Watershed Thinning Project, airplanes, or helicopters could temporarily add to noise from vehicles, but this effect would be fleeting. Tracks made by machinery in the Gallinas Watershed Project could cumulatively contribute to the appearance of permanent features until the tracks heal over or are removed by the Forest Service.

Enforcement – Affected Environment

The public questioned the Santa Fe National Forest's ability to enforce a system of roads, trails, and areas designated for motorized use:

> *"The motor vehicle use map alone will be an inadequate enforcement tool."*

Implicit in this concern is that if people don't follow the motor vehicle use map, then the effects associated with unregulated motorized use—noise, erosion, conflicts between visitors, harassment of wildlife—would continue.

This discussion focuses on the clarity of the motor vehicle use map rather than how we implement it. People sent us many good ideas for making this project work on the ground: hidden cameras, enforcement "blitzes," signs, permits, officers on ATVs, high fees for violations, self-policing, and others. We will look at these things when we implement this project. For this section, we presume that the easier a map is to follow, the more likely people are to comply with it.

Because we don't have a motor vehicle use map now, people use the forest's visitor map as a guide to where they are allowed to drive. This map shows the forest's main roads and some of the places where motorized use off roads is not allowed. We found that the visitor map is inconsistent with the forest plan and its off-road vehicle use map in some cases, so the visitor map does not

accurately reflect where motorized use should occur. Some visitors encounter closure orders, which are not shown on the visitor map. The boundaries of areas closed to driving off roads are not marked on the ground.

Enforcement – Environmental Consequences

Direct and Indirect Effects, Alternative 1

As just described, no single source would tell people where they are allowed to drive. Inconsistencies between the forest's maps (visitor, ORV, firewood cutting) and the forest plan would continue to exist. The forest would remain open to motorized use unless posted closed. Without signed boundaries, people might drive into closed areas by mistake.

Direct and Indirect Effects, Alternatives 2 Through 5

Having a single source, the motor vehicle use map, to let people know where they can drive would improve compliance and make enforcement easier. The motor vehicle use map follows a national standard, so people's ability to interpret the map would improve because it would be the same for any national forest (figure 35). Driving off roads would not be allowed (except for in designated corridors for camping and retrieving game), so people would not inadvertently drive into closed areas. They would know that any driving off roads is not allowed.

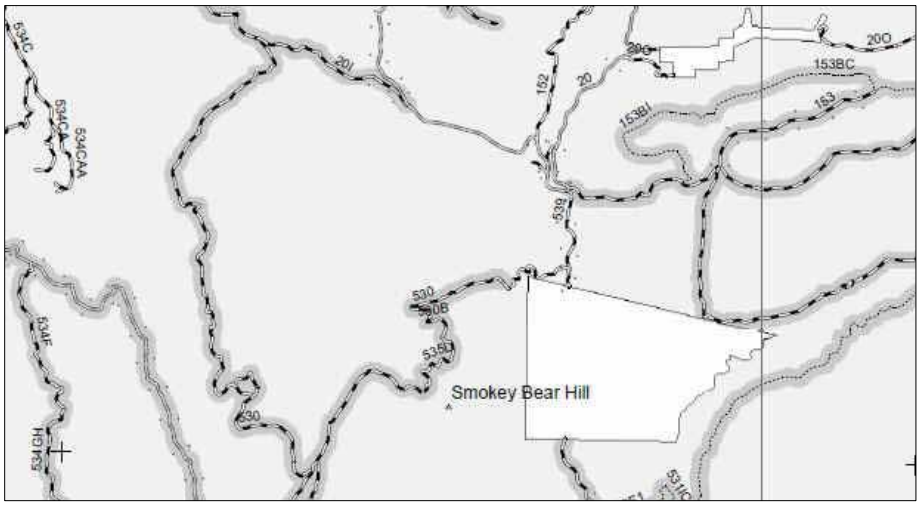


Figure 35. An example of what the Santa Fe National Forest's motor vehicle use map could look like. The symbols and color (black and white) are the same for all national forests.

Despite having a single map that follows a national standard, variations in the alternatives make some easier to read than others (table 22). As a rule, we think it's easier to read maps with fewer variations—the simpler, the better. Thus, alternatives having several corridor widths for different activities would be harder for people to understand. The same goes for seasonal closure dates; having more of them would make the map more difficult to understand. Each time a corridor changes width or closure date, it must be identified on the motor vehicle use map. To do this, we mark each milepost that has a change and put it in a table on the back of the map. This means you

would have to flip back and forth between the front and back, and also know exactly where you were.

Using this metric, the motor vehicle use map for alternative 2 would be the hardest for people to interpret, whereas alternative 3 would be the easiest. Alternatives 4 and 5 are about the same.

Table 22. Number of map variations by alternative. The more variations, the more complicated the map would be to read.

	Alternative				
	1	2	3	4	5
Number of different dates for seasonal closures	0	11	4	5	5
Number of different corridor widths	0	2	0	2	3
Total variations	0	13	4	7	8

Cumulative Effects, All Alternatives

Having a national standard for the motor vehicle use map should cumulatively improve people's ability to interpret and understand the Santa Fe National Forest's map. Because the map will have the same symbology for all national forests, people won't have to learn new symbols for each map. A forthcoming implementation plan, which includes education, engineering, and enforcement, would cumulatively improve the public's compliance with the motor vehicle use map. Educating people about the proper use of off-highway vehicles in the forest helps them do the right thing in the first place. Same with "engineering" controls—signs, gated or bermed roads—or other such thing helps keep people where they are supposed to be. Last, having fines for breaking the rules is a deterrent. All three cumulatively improve the efficacy of the motor vehicle use map.

Maintenance – Affected Environment

As with the topic of enforcement, the public had a lot to say about the Santa Fe National Forest's ability to maintain its route system:

> *"Any reasonable designated motorized trail system will require more maintenance than the Forest Service can provide by itself. An unmaintained system will continue to adversely affect forest resources."*

Roads

In 2009, the road maintenance budget for the Santa Fe National Forest was around $1,500,000. This budget has been stable over the past 10 years. With it, we maintain between 400 and 550 miles of road each year. We spend our money where we have the most traffic—on passenger car roads. We maintain some high-clearance vehicle roads, too; in 2007 we maintained 88 miles and in 2006 we maintained 49 miles. District rangers and the engineering group decide on priorities for maintenance of these high-clearance roads based on needs for resource protection, access, and condition of the roads.

The Santa Fe National Forest is not funded to maintain all its roads every year. With thousands of miles of roads and the funds to maintain only 400 to 550 miles, the maintenance backlog is obvious.

Road maintenance costs cannot be simplified into a “cost per mile” unit and applied to all roads on the forest. The cost to maintain a mile of road varies by the location and type of road. We can, however, determine average needs for certain types of roads. In 2006, the annual maintenance needs for passenger car roads on the Santa Fe National Forest was approximately $11,000 per mile. This is an average amount that includes the cost of brushing and maintenance of drainage, signs, and surface; it is based on a standard method that the Forest Service uses to determine maintenance needs. It is by no means perfect, but it is the best information we have. From information we gathered in 2005, the annual maintenance needs for high-clearance vehicle roads on the forest was approximately $500 per mile.

Trails

As with roads, the Santa Fe National Forest cannot afford to maintain all of its system trails every year, but maintains some every year. We maintain trails the public uses most often, ones that have health and safety concerns, erosion or resource damage first or more frequently. We maintain the ones that get little use, are remote, or don’t have resource damage less frequently, perhaps every 3 to 5 years.

Trail maintenance costs cannot be simplified into a “cost per mile” unit and applied to all trails on the forest. The cost to maintain a mile of trail varies by its location and trail class. We can, however, determine average needs for certain types of trails.

To compare the maintenance needs for a motorized trail system, we use two figures. One is the average cost to maintain an existing system trail, and the other is to convert an unauthorized trail to a system trail. We assume the latter costs more since we might have to build waterbars or other basic structures. We’ve assumed the cost to convert a trail is the same as constructing it to Forest Service standards. This is likely an overestimate—most of these routes have a footprint or are on existing National Forest System roads and don’t require starting from scratch—but this is the most reasonable figure we have. The Santa Fe National Forest does not have enough miles of motorized trail to provide a historical average cost per mile for either maintenance or construction.

Maintenance – Environmental Consequences

Direct and Indirect Effects, All Alternatives

Roads

The road maintenance needs do not significantly vary among the action alternatives (table 23), but all reduce the needed maintenance compared to alternative 1, the existing condition. The forest is not likely to receive funds to maintain all the roads annually no matter what alternative is chosen, but any of the action alternatives should allow the forest to maintain roads more frequently than now. Each alternative has approximately the same number of passenger car miles, and these roads are responsible for the vast majority of the costs. The difference between $5,200,000 for alternative 3 and $5,500,000 for alternative 4 is around 5 percent of the total maintenance needs. This amount could easily be accounted for in the averaging process.

Having seasonal closures would prevent people from driving on wet roads and making ruts. In turn, this would preserve road condition and reduce the need for maintenance. Alternative 4 proposes no weather-related closures, which could result in the greatest need for maintenance.

Table 23. Road maintenance needs on the Santa Fe National Forest by alternative in millions of dollars

	Alternative				
	1	2	3	4	5
Passenger car roads	4.7	4.5	4.5	4.5	4.4
High-clearance vehicle roads	2.3	0.9	0.7	1	0.9
Total	7	5.4	5.2	5.5	5.3

Trails

On one hand, alternatives 2 through 5 reduce the anticipated trail maintenance needs by at least 44 percent compared to alternative 1, the existing condition (table 24). (This assumes a consistent level and standard of maintenance across all five alternatives). Alternative 3 proposes the fewest miles of unauthorized routes, so would have the least cost of all action alternatives. On the other hand, because all the alternatives increase the miles of motorized system trail, all increase costs from what is now maintained. That is, people drive on trails but little or no maintenance occurs because these trails are not part of the motorized system. Once a trail is part of the National Forest System, we maintain it as funds allow.

Having seasonal closures would prevent people from driving on wet trails and making ruts. In turn, this would preserve trail condition and reduce the need for maintenance. Alternative 4 proposes no uniform weather-related closures, instead relying on closure orders. This could result in the greatest need for maintenance if closure orders weren't promptly implemented.

Table 24. Trail maintenance needs on the Santa Fe National Forest by alternative, in thousands of dollars

		Alternative				
		1	2	3	4	5
Trails for vehicles ≤ 50 inches wide	Maintain	17.9*	48	17.2	94.2	66.2
	Construct	873.3*	26.7	0	60.6	32.4
Trails for motorcycles only	Maintain	1.5*	21.5	3.5	34.3	22.9
	Construct	0	200.4	0	313.5	180.6
Total, in thousands of dollars		892.7*	296.6	20.7	502.6	302.1
Percent change from alternative 1		**--**	**-67**	**-98**	**-44**	**-66**

*These costs are theoretical costs computed for comparison purposes only. Obviously, no new trails would be constructed in the no action alternative. These computed costs are what would be required to maintain the existing system of trails at the same standard as assumed for the action alternatives. See the recreation specialist's report for a thorough discussion of the assumptions used in this maintenance cost analysis.

Cumulative Effects, All Alternatives

Roads

Given current levels of funding, we won't be able to maintain every designated road each year in any alternative. None of the past, present, and reasonably foreseeable actions would contribute enough resources to allow us to do so. Cumulatively with other small projects on the forest, more roads would be maintained, but this effect is expected to be negligible when considered over the scale of the whole forest.

People with property in the national forest are responsible for maintaining their roads. Some counties maintain some roads that cross national forest, but this is independent of what the Forest Service maintains. In other words, we don't maintain the same roads as the counties do. Transferring land to other entities means the Forest Service would have fewer roads to maintain. Conversely, acquiring lands could give us more roads to maintain. "Legacy roads and trails" projects, as well as other small road improvement projects on the forest, increase the amount of maintenance.

Trails

For all alternatives, volunteers who maintain trails help stretch our maintenance budget. Volunteers enable us to accomplish more maintenance with fewer dollars. Based on the public's interest in helping maintain trails, we have hired two people to coordinate those efforts and focus on developing stronger ties with our volunteers.

Grants and other sources of funding could be viable options for increasing our ability to maintain system trails. Having a designated motorized trail system increases our chances of obtaining grants. While these cumulatively increase the amount of trails we could maintain, it isn't expected to be enough to maintain every trail on the system each year.

Safety – Affected Environment

Public safety involves the type, amount, and speed of traffic on a forest road. Engineering employees drive the roads on the Santa Fe National Forest on a regular basis, and use that information to evaluate public safety. We also use information from accident fatalities.

In the past 5 years, five fatal accidents have happened in the forest. In three, the drivers were either drunk or under the influence of controlled substances. One of the three accidents involved an off-highway vehicle and both people on the vehicle died. The Sandoval County Sheriff's Office determined that the fifth fatality was a suicide—the accident wasn't discovered until months after it happened.

On most National Forest System roads, the quality of the roads limits the speed. On a road with heavy washboarding, it is impossible to go much over 10 or 15 miles per hour. A well-maintained gravel road allows higher speeds on straight sections, but the curves and hills in the road (the geometry) keep speeds lower. On many dirt roads, you must crawl along at less than 5 miles per hour to keep the wheels out of the erosion channels. The slow speed of traffic usually keeps people from having bad accidents.

Volume refers to the number of vehicles on the road. Except for the main roads on the forest, traffic volumes are low. Even on the busiest roads, it is possible to drive the entire length of the

road and not see another vehicle. Having few vehicles on the road also reduces the chance of accidents.

Composition is the different types of vehicles in the stream of traffic. Though we have no data on composition, we do see different vehicles on forest roads. We see pickup trucks the most, but also passenger cars, ATVs, RVs, and motorcycles.

Distribution of traffic generally means directional distribution—how many vehicles go in each direction. We have no data on distribution. It is, however, safe to assume that people drive onto the forest and then leave. This would tend to indicate that distribution is a fifty-fifty split; half the traffic goes in each direction, even on loops.

The Travel Management Rule requires that we consider compatibility of vehicle class with road geometry and road surfacing. Over 90 percent of the road miles on the forest are dirt. The second most common surface is gravel, at less than 10 percent. Finally, most campground roads and part of Road 376 are paved. The geometry of roads on the forest is fixed. In some cases, we designed the roads and considered things like sight distance and ease of driving. In some cases, the roads came about gradually over many years as people drove on the forest. Sometimes cow trails gradually changed from one track to two tracks and became roads.

Safety – Environmental Consequences

Direct and Indirect Effects, All Alternatives

Alternatives 2 through 5 would be the same as alternative 1, meaning any resultant designated system would be considered safe. None of the action alternatives would change the speed that vehicles travel, so traffic speeds would remain low, which tends to prevent bad accidents.

We don’t expect the volume, composition, or distribution of traffic to change after designation. The passenger car roads that carry the most traffic would continue to carry the most traffic. These roads are safe now, and there is no reason they would become unsafe with changes in route designations.

The geometry of roads would continue to be appropriate for the types of vehicles that drive in the forest. This project proposes no physical construction.

Cumulative Effects, All Alternatives

Past projects shaped the road system we have today, which we consider safe. The action alternatives would keep the same level of safety. None of the present or reasonably foreseeable actions have effects that would overlap in space and time with the safety of a person driving on an individual road. Things the individual could do, like not drink and drive, buckle their seatbelts, and keep their vehicles in proper working order would cumulatively contribute to an individual’s safety when driving a National Forest System road.

Effects of Forest Plan Amendments to Recreation

The effects of the proposed amendments to the forest plan are the same as those described throughout this section.

Social and Economic Environment

People who commented on the proposed action had several concerns that this document addresses in this section:

1. ***Economics.*** *Reducing routes open to motorized use could decrease the amount of motorized recreation in the forest, resulting in negative economic impacts to local businesses.*
2. ***Noise.*** *Any motorized use of the forest could cause undesirable noise from engines, affecting those who visit the forest and in surrounding areas.*
3. ***Property values.*** *The choice of routes designated could affect the property values of lands adjacent or in the forest.*
4. ***Cultural practices and traditions.*** *Reducing routes will limit people's ability to gather forest products like piñon nuts and firewood.*

This section, which summarizes the social and economic analysis specialist report, analyzes all these issues (USDA Forest Service 2009n). The Forest Service also routinely considers environmental justice (how a project could disproportionately affect minority and low-income populations) in its analysis.

Affected Environment

Social and Demographic Environment

For a thorough discussion of the social and demographic affected environment, see the social and economic analysis specialist report, pages 1-4 and 25-29.

Modeling Employment and Income from Motorized Use

To describe the potential economic impacts to businesses from the alternatives, we measure the number of jobs and income generated by motorized recreation in the Santa Fe National Forest.

To get the number of jobs and income associated with motorized recreation, we used two models, IMPLAN (Impact Analysis for Planning, Professional Version 2.0) and RECA (Recreation Economic Contribution Application, called TMECA in the specialist report). These models predict how much employment would result from the demand for goods and services. In this case, the "goods and services" is the opportunity to ride motor vehicles in the Santa Fe National Forest. We assumed that more routes designated for motorized use would lead to more motorized use of the forest. More motorized use could increase local economic activity by leading more people to stay in hotels, creating more jobs to run the hotels, and by people buying meals in local restaurants or spending money on gear or equipment.

The models need several pieces of information, including the area of potential economic impact, industry sector data (how much economic activity happens in a type of business), and demand (the number of people visiting the forest and the activities they participate in). Because we don't

have perfect information about all these things, we used the best available data combined with assumptions. The kinds of information we used to run the models were:[3.]

- **Area of potential economic impact.** Six of the seven counties within which the Santa Fe National Forest is located comprise the area of economic impact. These are Los Alamos, Mora, Rio Arriba, San Miguel, Sandoval, and Santa Fe Counties. We excluded Taos County because the 7,000-acre portion contained in the forest is the Pecos Wilderness, where motorized use is not allowed by law. Whether Bernalillo County was included depends on which type of data characterizing "demand" was used, as described in the third bullet.
- **Industry sector data.** Data from the Bureau of the Census capture most aspects of businesses: shipments, total employment, number of workers, capital expenditures, and imports and exports. These numbers are available in the project record.
- **Demand.** Having data on demand is crucial because the models use it to allocate spending to a motorized or non-motorized category. Of the model's inputs, data on demand is the most uncertain because it is based on survey data. Two different surveys on how people use the forest exist: NVUM (National Visitor Use Monitoring) and ABV (Attitude, Belief, and Value). The model can only use one dataset at a time. Running the NVUM and the ABV produces different results because of each survey's intent and how the data were collected. The ABV data show a higher numbers of jobs and income than the NVUM. Because of these uncertainties, the number of jobs and amount of income are not portrayed as exact predictions; rather, the intent is to show a range and compare the alternatives. The percent change is a better figure to look at since it normalizes the data, comparing numbers on the same scale.

One aspect of the NVUM dataset is that it focuses on the differences between local and non-local spending to illustrate how people spend money while participating in different activities. "Local" is defined as those people surveyed living in a place with a zip code 50 miles or less from the point where the survey was taken. As a result, survey participants living in Bernalillo County are not considered local in this survey. Thus, Bernalillo County is not included in the area of potential economic impact when NVUM data are used as the source of demand.

The ABV survey collected information from people living in Arizona and New Mexico, and did not define what "local" meant. Thus, ABV data can be stratified to include Bernalillo County. Including Bernalillo County increases the predicted number of jobs and amount of income, and is represented by the high end of the range shown.

Demand for Recreation in the Santa Fe National Forest

A vehicle is an integral part of most people's visits to the Santa Fe National Forest, whether getting to a trailhead or ski area, collecting firewood, or driving for the pleasure of it. The kind of activity dictates the type of route used. People going hiking, biking, or horseback riding tend to drive the main roads to get to a trailhead, where they leave their car behind. People collecting firewood follow two tracks or drive off road until they find a likely spot and keep their trucks

[3] Some assumptions used in this analysis differ from the interdisciplinary team's assumptions due to the models' needs. The social and economic analysis specialist report provides the details about the data and the assumptions used.

near. People riding off-highway vehicles for fun tend to prefer challenging terrain, which often means using routes that have less maintenance.

We observe that riding off-highway vehicles recreationally in the forest is a minor but regular use now. We base this conclusion on the comments received during scoping, and the data from the NVUM and ABV surveys. The surveys show that between 4 and 25 percent of visitors use off-highway vehicles and between 20 and 67 percent use them recreationally. That one-quarter or less of the forest's visitors drive off-highway vehicles means it is a minor use of the forest. Though minor, it is also regular. Vehicle counters placed in Cochiti Mesa, for example, show that the most popular trails average 3 to 7 riders on weekends; the highest count recorded in one day was 16. When compared to nationally known trails such as the Paiute Trail in Utah that averages 164 riders per day, use on the Santa Fe National Forest is comparatively low.

Survey data shows that people do not consider the Santa Fe National Forest a nationally known off-highway vehicle destination. The main riders appear to be local residents familiar with the area. The data from the NVUM and ABV surveys demonstrate that most people think of the forest as a place to relax and "get away to nature." There is a lack of off-highway vehicle businesses tied to the forest. For example, between 2008 and 2009, a company providing dirt bike rentals and tours on the Santa Fe National Forest was unable to survive, because despite all efforts to attract business there was no more demand than approximately 15 customers for the entire year. The NVUM data show little or no demand for additional opportunities for riding off-highway vehicles, though this could be because most of the forest is open to motorized use now.

Employment and Income from Motorized Use

Motorized use contributes between 7.4 and 53 jobs and between $187,823 and $1,367,728 of labor income—as opposed to income from pensions or retirement accounts—to the local economy. Using 2008 county employment estimates, this represents approximately 0.03 percent of all jobs and 0.02 percent of all labor income in the 6-county analysis area. In other words, the amount of jobs for motorized recreation on the Santa Fe National Forest is less than one-half of one-tenth of 1 percent when compared to the entire local economy. This would be even smaller if Bernalillo County were included, since this county has almost twice as much employment as the other six counties combined.

Economics – Environmental Consequences

Direct and Indirect Effects, Alternative 1

There would be no change from the existing condition just described.

Direct and Indirect Effects, Alternatives 2 Through 5

Alternatives 2 through 5 would result in an almost imperceptible loss of jobs and income from motorized uses considering the scale of the economy in the 6- or 7-county analysis area (table 25). The maximum predicted job loss from any alternative is far less than one-tenth of a percent, and most likely would be less than that. It is likely that the maximums shown are overestimated because they are generated from the ABV data, which was not as suited for the models as the NVUM data based on the way it was collected.

Table 25. Comparison of maximum amount of job loss and income from motorized recreation by alternative

	Existing Condition 1	Predicted Decrease by Alternative			
		2	3	4	5
Jobs, number	7 - 53	1 - 13	1 - 27	0 - 5	0 - 13
Maximum percent change from alternative 1	--	-0.0065	-0.013	-0.003	-0.0065
Labor income, dollars (rounded to nearest hundred)	187,800 - 1,367,700	--	--	--	--
Maximum dollar loss from alternative 1	--	341,900	683,900	136,800	341,900

These numbers are stated as potential maximum decreases, because the jobs and income would be lost to the local economy only if all motorized users stop this activity on Santa Fe National Forest and all other public lands in the analysis area. More realistically, motorized recreationists would shift to other private or public areas, which may result in a displacement or loss of jobs and labor income. Many people contend that simply the act of designating routes would sharply increase their use; however, scientific and informal studies show no evidence of this (USDA Forest Service 2009n).

Service industries and government dominate employment sectors in northern New Mexico. Thus, losing such a comparatively small number of jobs to the less developed industry of motorized recreation would further diminish the perceived effect.

Cumulative Effects, All Alternatives

Alternative 1 would not change the management of vehicles in the national forest, so there would be no changes in economic effects. Because there would be no changes in economic effects, there would be no cumulative effects.

For any of alternatives 2 through 5, the economic change resulting from decreasing the amount of routes open to vehicles would be so small as to be overshadowed by larger economic trends. The loss of jobs and income for any would be imperceptible at the scale of the local economy, even when combined with unemployment due to the recent economic downturn and other public lands restricting motorized use.

Restricting motorized use could cumulatively have some economic benefits, such as:

- Shifting jobs and income to other public lands with fewer restrictions on motorized use.
- Increasing non-market values—such as clean water—to surrounding areas from having less motorized use on the Santa Fe National Forest.

Some of these potential changes could cumulatively offset the small, negative economic impacts resulting from having fewer routes designated for motorized use on the Santa Fe National Forest.

Noise – Affected Environment

Noise is defined as any unwanted sound. A person's perception—both their ability to hear the sound and to consider it a nuisance—plays a large role in what "noise" is. We break down noise into four components.

Frequency is how often the sound is heard. For this, we use the traffic count data collected by the forest's transportation engineer. At a given spot, the number of times someone can hear an engine depends on how many times a vehicle within earshot goes by. In the Santa Fe National Forest, the major routes carry more vehicles than the smaller ones, and both carry far less traffic than roads in towns. For example, eight vehicles per hour over an 18-hour period traveled on Forest Road 376 north of the Gilman Tunnels. On Forest Trail 113 and Crosstown Trail, only three vehicles per day traveled during the week.

Duration is how long the sound can be heard. Sounds from vehicles in the forest usually last 5 to 30 seconds as a vehicle of any sort tends to be in motion while producing noise.

Magnitude is how loud the sound is, described in decibels. For this we used a model called SPreAD (System for the Prediction of Acoustic Detectability), specifically designed to assess how noise travels in a wildland setting. Though it can't provide a clear and definitive statement about the noise from a source such as an off-highway vehicle, it can illustrate where sounds from motorized use would be greatest and at what levels they could occur.

The loudness of vehicles varies first with the vehicle. Engine noise ranges from 75 decibels for automobiles to 83 decibels for motorcycles. It also varies with distance from the source, atmospheric conditions, weather and wind, vegetation, topography, and ambient noise levels.

Flat, dry, hot, sparsely vegetated landscapes tend to carry sounds the farthest because they present the fewest barriers to it. Softer sounds could be heard from farther away in this kind of setting. For example, the Caja del Rio would be more likely to carry sounds than Cochiti Mesa. Caja del Rio is a sparsely vegetated, hot, and dry mesa top, whereas the Cochiti Mesa area is a densely vegetated, higher elevation area with a series of mesas and ridges cut by steep canyons. In Cochiti Mesa, sound from an automobile or motorcycle would be much more muffled because the vegetation and landscape absorb or deflect the noise. In other words, sound from a motorcycle might be heard on the mesa where it is occurring or even may be heard at a lesser magnitude on a ridgetop a mile away, but may not be heard in a canyon from 200 yards away.

Appropriateness refers to sounds that aren't acceptable in a given setting. For this, we measured the miles of routes traversing and close to primitive and semiprimitive non-motorized areas defined in the forest plan. These are two classes of areas where the probability of isolation from the sights and sounds of people is high, so not having engine noise in these areas is desirable.

Noise – Environmental Consequences

Direct and Indirect Effects Common to All Alternatives

The frequency that sounds are heard is not expected to change perceptibly among alternatives. All the alternatives keep between 94 and 100 percent of the passenger car routes, where the majority of the forest's traffic occurs. The action alternatives propose to close more than half of the high-

clearance vehicle routes, but few people drive on these now. Going from three cars per day to two cars per day is a change that most people would not notice.

The duration of time that vehicles travel (when noise could be heard) is not expected to change because no changes in speed limits are proposed. The magnitude of noise would be the same for all the alternatives because no change in the kinds of vehicles driving in the forest is expected. The other things that govern magnitude, like the weather, topography, and vegetation, are not expected to change.

Alternatives 2 through 5 would diminish the instances where inappropriate noise—as defined by the recreation opportunity spectrum—is heard in a primitive area by roughly the same amount. But because motorized use in and near these areas is considered low now, the reduction is expected to be negligible. All reduce routes designated for motorized use in and near primitive and semiprimitive non-motorized areas (table 26).

Table 26. Miles of routes near primitive and semiprimitive non-motorized areas as a proxy for the appropriateness of noise

Recreational Opportunity Spectrum Designation (ROS)	Alternative (miles)				
	1	2	3	4	5
Miles of routes in primitive ROS	9	4	1	1	1
Percent change from alternative 1	--	**-61**	**-91**	**-87**	**-91**
Miles of routes in semiprimitive non-motorized ROS	36	11	4	23	16
Percent change from alternative 1	--	**-69**	**-88**	**-36**	**-56**
Miles within 1/4 mile of either	263	133	94	144	115
Percent change from alternative 1	--	**-49**	**-64**	**-45**	**-56**

Cumulative Effects, All Alternatives

For noise from any of the alternatives to cause a cumulative effect, a person would have to hear the vehicle at the same time as other noises, such as chain saws or loud campers. Because the sounds of vehicles are usually less than 30 seconds—the time it takes them to pass by—any cumulative effects would also last that amount of time. Any cumulative effects would not be permanent. Nonetheless, alternative 1 would likely have the most instances where people hear cumulative noise since it has the most places and, therefore, opportunities for motorized use to occur.

Environmental Justice – Affected Environment

Simply put, environmental justice means that minority or low-income groups do not suffer more from the government's projects than other groups[4]. In 1994, President Clinton issued Executive

[4] The official definition of environmental justice is that, to the greatest extent practicable and permitted by law, all populations are provided the opportunity to comment before decisions are rendered on, are allowed to share in the benefits of, are not excluded from, and are not affected in a disproportionately high and adverse manner by government programs and activities affecting human health or the environment.

Order 12898 because agencies were repeatedly allowing companies to put harmful things like dumps for toxic waste in low-income or minority communities. The order requires Federal agencies, including the Forest Service, to consider environmental justice when proposing projects.

We used the data from the 2000 census to identify minority populations in the 7-county analysis area. The regulation defining a minority population requires that we look at several scales. Table 27 shows those scales, and also shows the ones that meet the definition of a minority population.

Table 27. Percent of the population by race and ethnicity shown at different scales. Seven (those having a shaded box) meet the definition of a minority population.

Scale or County	Ethnicity		Race		
	Hispanic	Not Hispanic	Native American	White	All Others
State of New Mexico	42	58	10	67	23
Seven-county analysis area	44	56	6	70	25
Bernalillo County	42	58	4	71	25
Los Alamos County	12	88	1	90	9
Mora County	82	18	1	59	40
Rio Arriba County	73	27	14	57	30
Sandoval County	29	71	16	65	19
Santa Fe County	49	51	3	74	23
San Miguel County	78	22	2	56	42

Low income means individuals or households that are below the Federal poverty level. Table 28 shows the percent of the population below the Federal poverty level, and those that meet the definition of low income. To analyze whether any alternative poses issues with environmental justice, we use the projected economic impacts of the alternatives.

Table 28. Percent of the population below the Federal poverty level shown at the state and county levels. Three (those having a shaded box) meet the definition of low income.

County	Percent
State of New Mexico	18
Bernalillo	15
Los Alamos	3
Mora	22
Rio Arriba	21
Sandoval	10
Santa Fe	15
San Miguel	25

Environmental Justice – Environmental Consequences

Direct and Indirect Effects, All Alternatives

Alternative 1 makes no changes to the current designated transportation system, so there would be no changes in motorized access to the forest or employment related to motorized use. As a result, there would be no effects to minority or low-income populations.

Alternatives 2 through 5 would have no measurable effects to low income or other minority populations. The restrictions on motorized use apply to all races and ethnicities, so minorities and

low-income populations would not bear a disproportionate burden. Native Americans and traditional Hispanics in the area frequently supplement their household income with the use and sale of forest products; piñon nuts in particular. Though being able to drive fewer places may limit where they are willing to go to collect piñon, no alternative eliminates this activity. Alternative 3, which is the most restricted in terms of access, would have the largest effect on this activity.

The cost associated with owning and operating a vehicle can be considerable. Low-income households are unlikely to own an off-road vehicle just for recreational driving because they do not have adequate discretionary income to afford to participate in the sport. In this regard, changing motorized access won't affect people who don't ride off-highway vehicles recreationally. Low-income households, however, may use Forest Service roads to acquire firewood and other subsistence products. Because these activities are governed by permit, there would be no change in any of the action alternatives.

Cumulative Effects, All Alternatives

Because there would be no measurable direct or indirect effects from any of the alternatives, there would be no cumulative effects.

Property Values – Affected Environment

The value of private property is tied to people's perceptions. Several studies show that having a natural, protected area like a national forest or national park near private property increases its value. On the other hand, some may perceive activities conducted by the forest or park, such as cutting trees, as undesirable.

Likewise, people could perceive the reduction of roads, trails, and areas designated for motorized use as either negative or positive. Fewer routes to drive on means less access to places in the forest, and people might perceive this as negative. They also might see it as an improvement in things like scenery or water quality, which would be a positive perception.

Some people who live in or next to the Santa Fe National Forest wrote that noise and pollution from off-highway vehicles would decrease the value of their property. No scientific studies show a clear relationship between designating routes for motorized use on public land and property values. In urban environments, studies show that building large infrastructure next to homes (highways and airports, for example) may decrease or increase property values depending on whether the construction is perceived as a benefit or a nuisance.

We don't have the capacity to determine how changing where people can drive in the Santa Fe National Forest will change property values, or even how the current designated system affects property values. The forces that influence property values (like noise, air quality, scenery, water quality, recreational opportunities, wildlife abundance) can act in opposing and potentially unforeseen ways. Though a negative relationship between some characteristics and property prices have been well documented, these correlations are from large transportation and infrastructure construction projects such as highways and airports that are much greater in magnitude and intensity than any potential management changes being considered in this analysis.

Property Values – Environmental Consequences

Direct, Indirect, and Cumulative Effects

As a result of this uncertainty and complexity, we conclude that comparing potential changes in property values is too speculative to analyze in detail. It is possible that changes in route designation could have an impact on private property values; however, research in this area is far from conclusive. Even if economic impacts could be tied to route designation, it is unclear if the overall impact would be discernable, positive, or negative. The impacts of route designation on each property would likely differ with the preferences of those interested in buying property in the area. Because we don't know how property values would be affected, we cannot definitively describe cumulative effects.

Cultural Practices and Traditions – Affected Environment

The Santa Fe National Forest provides the people living in its surrounding small, rural communities the opportunity to engage in activities, such as hunting and gathering piñon and firewood. These activities can provide or supplement a family's income or food. The ABV survey recorded that people living in or near a national forest in northern New Mexico think the Forest Service needs to respect these uses when planning projects and making decisions.

People depend on the national forest for the following activities:

- Grazing livestock
- Collecting firewood, posts, and other small timber products
- Cutting Christmas trees
- Irrigation
- Special uses, like pipelines for drinking water
- Hunting
- Picking piñon nuts
- Collecting non-woody forest products, like edible and decorative plants

Most people use vehicles to participate in these activities. Because all except the last three require permits from the Forest Service, they are exempt under the Travel Management Rule (36 CFR 212.51 (a)(8) and 36 CFR 261.13(h)). This means that people having a permit would continue to be allowed to engage in these activities regardless of which alternative the Forest Service chooses. (The permit must specifically authorize use of routes and areas not on the motor vehicle use map). Please note that we addressed the issue of hunting in the "Recreation" section of this report.

The Santa Fe National Forest has not required or issued permits for picking piñon nuts, herbs, mushrooms, or other plants. To analyze how these might be affected by changing what is designated for motorized use, we measure the miles of roads that go through piñon-juniper woodlands (for piñon nuts) and through mixed-conifer, aspen, and cottonwood forests (for herbs, plants, and mushrooms). Based on our observations, we've concluded that people use roads, not trails, to get to places to collect forest products.

Cultural and Traditional Practices – Environmental Consequences

Direct and Indirect Effects, All Alternatives

None of the alternatives restricts the collection of any forest products, only where you can drive a vehicle to get to them. There would be no change in use for people having a permit from the Forest Service.

We think most people consider vehicles to be a benefit when collecting forest products. However, studies document occasions where drivers interfere with people's activities by littering, dumping waste from storage tanks, or disturbing hunts.

Under alternative 1, there would be no change in how people collect piñon nuts, herbs, and mushrooms. People could continue to drive on open roads, or cross country where it's allowed. Of all the alternatives, it allows people to drive the closest to the products they want to collect, meaning it is not likely they would have to walk to get to a spot if they chose not to.

Alternatives 2 through 5 all reduce the roads open to motorized use by roughly the same amount in the habitats where piñon nuts, herbs, and mushrooms grow (table 29). They also prohibit driving off designated roads. This means that people will not be able to drive as close to the place they want to collect plants, and would have to walk farther to get to their spot. For some, this means getting forest products would be more difficult. Gathering piñon nuts could be authorized under a permit system if needed to facilitate the practice.

Table 29. Comparison of designated roads crossing habitats where people collect forest products

Roads Open to Motorized Use Through Forest Type, Miles	Alternative				
	1	2	3	4	5
Piñon-juniper	844	375	293	432	387
Percent change from alternative 1	--	**-56**	**-65**	**-49**	**-54**
Mixed conifer, aspen, and cottonwood	1,107	440	351	538	457
Percent change from alternative 1	--	**-60**	**-68**	**-51**	**-59**

At the same time, for those who prefer to not be around vehicles and the disturbance that can be associated with them, having fewer roads open to motorized travel would be a benefit.

Cumulative Effects, All Alternatives

Since alternative 1 makes no changes to the way forest products are collected, it has no direct, indirect, or cumulative effects. Alternatives 2 through 5 would incrementally reduce the ease with which people can collect forest products on public land in the state of New Mexico.

Since 1987, the Santa Fe National Forest has implemented a number of laws, regulations, and orders that restrict motorized access: the establishment of the Jemez National Recreation Area, and the East Fork Jemez and Pecos Wild and Scenic Rivers; the development of the lower Jemez Corridor and implementation of the Respect the Rio Program, which have limited vehicular access in stream buffer zones; land transactions removing parts of the southeast part of the Jemez Ranger District from public access and the legislated transfers and exchanges of portions of the

National Forest System to the San Ildefonso Pueblo and the Pecos National Historical Park; and several administrative closures throughout the forest.

Adjacent public land, such as the Bureau of Land Management and the Cibola and Carson National Forests, are also restricting the use of motorized vehicles to designated routes.

Effects of Plan Amendments on Social and Economic Environment

The proposed forest plan amendments would have no effects on economics, noise, property values, cultural and traditional practices, or environmental justice beyond those described.

Lands – Affected Environment

This section focuses on how implementing the Travel Management Rule affects people's access to private land in the Santa Fe National Forest. It summarizes the lands specialist report in the project record (USDA Forest Service 2009k).

Legal Background

The Forest Service is obligated by law to allow access to private land within the boundary of the national forest[5] (figure 36). The requirement to do so, however, is not unqualified. The Forest Service doesn't have to construct the road or pay for it. How and where the road is placed is based on individual facts and circumstances. The Forest Service does not have to approve access that degrades natural resources. For example, if owners have used a route through a riparian area to get to their property, the Forest Service can ask that a new route be constructed and used.

The Forest Service must allow physical access to private property within its boundary. Physical access is usually not sufficient for the "legal access" requirement imposed by mortgage lenders and title companies. Most institutions require a road to have an easement or be an open forest system road. While the law does not obligate the Forest Service to provide legal access, it becomes a practical necessity for landowners whenever they seek to do anything with their land that requires title insurance or a mortgage. The Forest Service authorizes access to private property in three ways: a forest system road open to the public, by special use permit, or by easement. Each type of authorization has benefits and drawbacks, as summarized in table 30.

Figure 36. An example of a short forest system road that leads to private property. The truck is on the main road.

[5] The law that mandates this is ANILCA, the Alaska National Interest Lands Conservation Act of 1980 (P.L. 96-487, 16 U.S.C. 3210).

Table 30. A summary of the benefits and drawbacks to landowners of different kinds of access to private land. This list may not be complete. Some items were raised by the public during the scoping period.

Kind of Road	Benefits	Drawbacks
Open National Forest System road	• It is recognized as legal access by mortgage and title companies. • It is inexpensive; there is no cost to landowner to show road on the motor vehicle use map. • It is quick—the road appears on the motor vehicle use map with the next revision, done annually. • The Forest Service maintains the road.	• The road appears on the motor vehicle use map, meaning the public is allowed to drive on it (cannot be gated). • The maintenance standard for National Forest System roads is resource protection; this often falls short of what landowners desire in an access road.
Private road under special use permit	• The road typically does not appear on the motor vehicle use map, so the public would not be allowed to drive on it. The public could, however, use the road without a vehicle by hiking or biking, for instance.	• It is not recognized as legal access by mortgage and title companies; it is essentially considered a license that does not convey an interest in real property. • It is expensive to obtain a permit; the landowner must pay the Forest Service's time to analyze, prepare, and process the permit. This could be a few thousand dollars for a short road, and many times that for a long or complicated road. It costs almost as much as an easement, but does not carry the legal weight of an easement. • It takes several years for the Forest Service to process and issue the special use permit. • The landowner is responsible for road maintenance.
Private road having an easement	• It is recognized as legal access by mortgage and title companies because it conveys an interest in real property upon transfer. This generally enhances property values. • The road typically does not appear on the motor vehicle use map, so the public would not be allowed to drive on it. The public could, however, use the road without a vehicle by hiking or biking, for instance. • Easements reduce future disagreements about the location and legal status of the road.	• It is expensive to obtain an easement; the landowner must pay for the Forest Service's time to analyze, prepare, and process it, and for a survey and plat; and in some cases, the formation of a road association. This could be quite expensive for even a short road, and prohibitive for most people for a long or complicated road. • It takes several years for the Forest Service to process and issue the easement. • The landowner is responsible for road maintenance. • Easements are not exclusive; the Forest Service may authorize someone else to use the road, and retains the right to use it, too.

The History of Access to Private Land in the Santa Fe National Forest

In the past, access to private lands across the Santa Fe National Forest has often been handled in a casual manner. Though numerous examples of carefully platted and deeded easements exist, it is also not uncommon to find agreements that are generations old, based on nothing more than a handshake.

The forest itself has not been closed to overland travel, so many routes were historically created by the public over the path of least resistance, often to access private lands. Most patented homesteads within the forest lack an easement for access, and instead rely on public and unregulated roads over forest lands.

Changing cultural and legal requirements now mean we're faced with two common problems. In situations where the Forest Service lacks a public road easement across private lands, landowners now tend to gate the road, blocking off all public access, sometimes locking out the public from vast acreages. Conversely, private landowners who have made use of a road without easement across their neighbor's property, now find themselves blocked out and in need of a new road. The Forest Service then is often perceived as the easiest and first choice solution for new access, with the result being many more roads than necessary across public lands.

Figure 37. An example of a historic road that runs through a riparian area leading to private property. It's unlikely this access will be authorized by permit or easement in the future. Another way to the property would need to be found.

As we sought ways to manage the network of roads on the forest, we assigned numbers to almost all roads for the purpose of identification and classification. One consequence of doing this was to give all of these roads status as legal access in the eyes of mortgage lenders and title insurance companies. As a result, landowners have relied upon these roads as evidence of legal access; properties have been bought, sold, appraised, subdivided, mortgaged, and insured for legal access. This backdrop has left us with the following set of circumstances and expectations.

Maintenance Standards. The Forest Service does not have the responsibility to maintain roads for subdivision purposes, and lacks the resources to maintain most roads to the standard desired by most private landowners. Lacking their own ability to absorb maintenance costs, private landowners commonly demand road maintenance be at a higher standard than we can accomplish. Some are willing to pay for and perform maintenance duties under a road use permit.

Exclusive Use. Many landowners who perform their own maintenance expect to have exclusive access and control over the road. They want their own road, and do not want to share their access road with other landowners or the public. They often want to gate and sign the road at some distance from the edge of their private land, in order to discourage trespass, vandalism, and theft from their homes. Prohibiting public use also eliminates the additional maintenance caused by the road-going public.

Physical Location. Many roads originally established by homesteaders or the general public are located in places that cause harm to natural resources (figure 38). Often running through riparian areas, these roads are not appropriate for access, whether used by the public or private landowners. (More detailed information on the consequence to natural resources for poorly situated roads can be found in other specialist's reports).

Financial Implications. Landowners are finding that in order to continue crossing national forest lands, it will cost them significant sums of money to have private access, a privilege they may have enjoyed free for generations.

Figure 38. Gated private road. If this road has an easement, it would not show on the motor vehicle use map. In that situation, a gate is appropriate because the public is not allowed to drive on the road, but could engage in non-motorized activities on the public land behind the gate. That would not change under any alternative.

The Santa Fe National Forest's Approach to Providing Access to Private Property under Travel Management

The right of access to private land is one of the criteria listed in the Travel Management Rule for designating a road system.

The Travel Management Rule prompts a more formal and consistent approach to managing the forest's roads and motorized trails. Roads designated for motorized use can satisfy a landowner's need for legal access. These, however, must be shown on the motor vehicle use map, making them available for use by the public. We heard from many landowners who wished to retain their own private access across national forest land, but wanted to close the road to public use. Assuming the road is not needed for public use, this can be accomplished by issuing a permit or an easement. In the short term, however, the Santa Fe National Forest does not have the capacity to issue authorizations to all the landowners who would want or require one if the road accessing their property is not designated for motorized use. For this reason, we propose to designate roads accessing private inholdings and remove duplicate roads in the action alternatives. Given our clear legal obligation, we chose to err on the cautious side by designating roads, not wanting to risk unintended financial consequences for private landowners.

Motorized Use Near Private Land

Public and private landowners are often surprised to learn that roads leading to private land, which are under easement or permit, are not private in the sense that the public can be excluded from them. If a gate exists across the road, this only reinforces the impression that the road behind the gate is closed to all public use. Only the public's ability to drive on them is restricted. As long as the public does not interfere with the private easement holder's use of the road, the public may continue to walk, bicycle, or ride horses across it. This perception effectively reduces recreational opportunities since most people will not trespass on what is perceived to be private land. Conversely, private landowners often request gates some distance from their boundary to intentionally limit the possibility of trespass and vandalism, or because the terrain lends itself better to a gate and fence. Gates have been placed in the forest with and without the Forest Service's permission.

If these perceptions exist, they exist for all routes to private property that have gates on National Forest System land. The only difference between alternatives would be the number of routes leading to private property by alternative since the law requires a minimum number of routes to be designated as access to private property. At the national forest scale, the difference between the alternatives is negligible.

Lands – Environmental Consequences

Direct and Indirect Effects, Alternative 1

Alternative 1 is the most likely to provide the access needed to private land because it does not change where people can drive now. Because we lack the extensive title, subdivision, and ownership data for the hundreds of blocks of private land in and adjacent to the forest, we don't know who will qualify for ANILCA[6] access rights. As a result, we don't know how many separate access authorizations might ultimately be necessary to address access needs to private lands and, therefore, keeping the system "as is" allows people to continue to get to their land in an unaffected way.

[6] Alaska National Interest Lands Conservation Act (see p. 16)

Direct and Indirect Effects, Alternatives 2 Through 5

Alternatives 2 through 5 attempts to maintain adequate access across National Forest System lands to private property. But each of these alternatives fails to maintain access to certain parcels—some known, some likely unknown.

Table 31. Comparison of the number of routes within 100 feet of private land

	Alternative				
	1	**2**	**3**	**4**	**5**
Number of routes	766	492	463	502	481
Percent change from alternative 1	**--**	**-36**	**-40**	**-34**	**-37**

Some landowners are likely to discover that roads they thought were private are on the motor vehicle use map and open for the public to drive on. The road would remain open to the public unless the landowner obtained an easement, which is a costly and time-consuming process. Those roads not needed for public motorized use and for which the landowner prefers (and is willing to pay for) an easement will eventually be granted an easement. Some landowners will not enjoy the same access that once existed because we have removed a duplicate route, or their land does not fall under the scope of our legal obligation to provide access (figure 39).

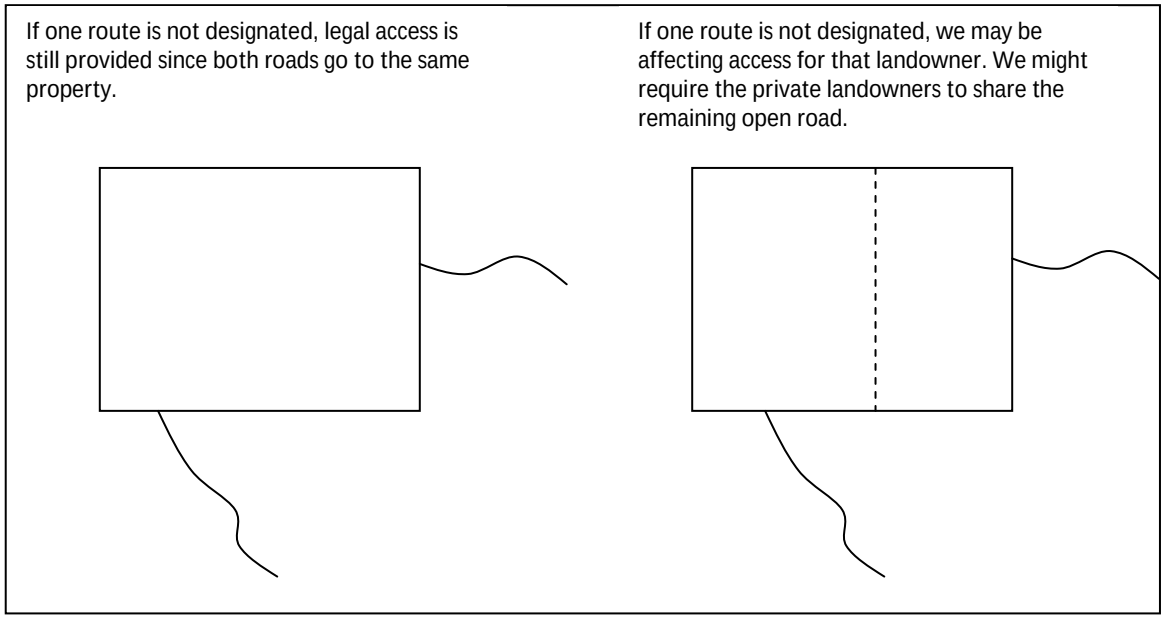


Figure 39. The rectangle represents privately owned land. In theory, both these situations should only have one road leading to them. In practice, the Santa Fe National Forest has allowed situations like that on the right.

Publishing the motor vehicle use map is expected to generate a number of issues about access all at once. In the past, market forces caused the issues to surface over time. Our capacity to address

lands issues is limited, so some people would have an unwanted form of access for an unknown amount of time into the future.

People might mistakenly use the motor vehicle use map as title evidence demonstrating legal access. People have done the same with the forest's visitor map, only to find out that the access did not exist or was not in the correct location. People should continue to consult with the forest's lands staff on matters of legal access.

From an access standpoint, alternatives 2, 4, and 5 all have similar consequences. Because alternative 3 favors resource protection over property rights on certain specific roads, there will be greater interference with access to private lands, if this alternative is chosen.

A few parcels of land, such as those around Bearhead Peak on the Jemez Ranger District or the one near Nambe adjacent to the Pecos Wilderness, are located in inventoried roadless areas. For this reason, alternative 3 does not propose motorized access to these and other parcels in sensitive places, like riparian areas. This is likely to create problems and expense for the landowners should they wish to sell their property.

Alternative 4, on the other hand, does propose motorized access to some of these parcels. As a result, people who are used to hiking to Bearhead Peak could expect to see vehicles, and it would cause motorized use in inventoried roadless areas. We expect that many hikers would consider this a loss of a hiking trail. Some roads provide historical access to landowners, but are situated in a way that causes damage to natural resources (figure 40). Alternative 4 proposes some of these for motorized use.

Figure 40. Road leading to private property that is causing damage to the stream and riparian area

In addition, all of the alternatives take away some discretionary or duplicate roads (table 30). By not designating some roads that exist now, we may have inadvertently removed legal access to some property (figure 39). If this is the case, we would correct the motor vehicle use map to provide the needed access.

Cumulative Effects, All Alternatives

Because issues of access to private land occur over specific roads, they are unique. No additional actions contribute to access issues that are outside the scope of the original issue, so no cumulative effects exist for any of the alternatives.

Effects of Forest Plan Amendments to Lands

The proposed amendments related to lands would make the alternatives consistent with the forest plan. The reason we are not meeting the forest plan's direction relates to how we authorize access to private land. In certain instances, direction has not always been followed, with the result that some blocks of private land have multiple points of access (figure 39). In other cases, private land access has been authorized even though the property does not meet the definition of an inholding.

The direction in the forest plan is now a standard, meaning we must do it. Amending the forest plan by identifying this direction as a "goal," maintains the appropriate direction to the field, while at the same time enabling the forest to achieve compliance. Because of the history of granting access across the forest and the research needed to correct noncompliance, we are not in a position to achieve the standard as written. (We weren't in a position to comply even when the forest plan was written in 1987.) A goal is more appropriate.

Soil and Water – Affected Environment

This section summarizes the soil and water resources specialist report in the project record (USDA Forest Service 2010s).

Two of the significant issues raised by the public relate to soil and water:

1. *"Continued motorized use of routes and areas by the public will cause erosion and soil compaction and degrade water quality and watershed condition."*

2. *"Designating motorized dispersed camping corridors will increase cross-country travel and the resource damage associated with it."*

To compare the effects of the alternatives, we based our measurements on the fifth-field watershed level, the standard size used by a variety of agencies and organizations. Watersheds form the basic unit of the hydrologic system. They naturally divide the landscape into units, draining rainfall and snowmelt into a common stream, stream network, or body of water. Environmental changes commonly accumulate and appear in watersheds. The U.S. Geological Survey developed the system for describing watersheds by different scales, dividing them into progressively smaller, nested watersheds. The first level is the largest. For example, the lower 48 states contain 18 first-field watersheds. The Santa Fe National Forest has ownership in all or parts of 35 fifth-field watersheds.

An important part of the Forest Service's mission is to protect soil and water quality. Congress established our national forests in part to protect the watersheds that provide much of the country's drinking water. Intact soils sustain the plant growth that provides forage, fiber, wildlife habitat, and watershed protection. Healthy, functioning watersheds provide a reliable water supply, protect water quality, and prevent or reduce downstream floods.

Figure 41. Without plant cover to stop it, rain or snowmelt carries soil down this eroded hillside directly into the stream.

How Routes Affect Soil and Water

Bare or eroding soil causes a number of problems. Plants and trees can't take root in moving soil, so the soil is not productive. Without plant cover, rainwater and snowmelt has nothing to slow it down, increasing the chances of flooding and sedimentation (figure 41). When it rains or when snow melts, grass and plants catch and filter water so that it seeps into the soil. This replenishes ground water, checks flooding, and prevents sedimentation, where soil is carried by water into streams.

Roads, trails, and motorized use off roads and trails result in bare soil and increased sedimentation beyond natural conditions. In forested watersheds, roads and trails disrupt a watershed's natural hydrology by presenting ribbons of bare soil that parallel or cross streams. If they are unpaved, rain and snow causes them to erode. Paved or unpaved, they concentrate and accelerate runoff until it leaves the route (figure 42). By channeling and accelerating water, routes can increase the amount of water naturally carried by streams, especially during spring snowmelt and thunderstorms. With more water than usual, streams widen or deepen, which decreases bank stability, increases sediment, and increases the water's temperature.

In compliance with the Clean Water Act, the New Mexico Environment Department lists streams as "impaired" when they exceed certain parameters. Of the 1,206 miles of perennial streams in the Santa Fe National Forest, 260 miles (22 percent) are listed for temperature, sediment, and turbidity[7]. Routes and vehicle use contribute to these three impairments, though other forest activities can, too.

Not all sediment from routes immediately enters perennial streams. Often ephemeral and intermittent channels will capture and temporarily store sediment until a big storm. Then, sediment is flushed and routed to perennial streams lower in the watershed.

[7] The total miles of listed streams for all impairments is 347.

Figure 42. An example of how roads alter the patterns of runoff in a watershed. Water normally flows down a hill in a sheet. Here, the bar ditch adjacent to the road intercepts the water, concentrating it in one fast channel, which is downcutting and carrying sediment. From an engineering perspective, the bar ditch is doing its job: keeping water off the road.

Where and how routes are constructed and maintained makes a difference. Roads or trails constructed next to streams usually take away riparian habitat and alter ground water storage, which reduces the size and function of these places. Routes on steep or unstable slopes can lead to landslides that put a great deal of sediment into streams at once. Even maintaining roads can increase erosion by breaking up the armor that develops over time. Routes built on flat ground or having proper drainage features may cause little or no erosion and sedimentation.

The point where routes cross streams causes the most sedimentation because no vegetation exists to filter it. Because crossings occur over or through water, they deliver sediment directly into streams (figure 43). At low water crossings, wheels going through streams kick up sediment, but this effect tends to be fleeting. The larger effect is from the road approach to the low water crossing.

Figure 43. Route crossing where soil is carried directly into a stream because there is a lack of vegetation to help stop it

How Driving Off Routes in Areas and Corridors Affects Soil and Water

Driving off routes across fresh ground causes soil to compact. This lowers the tracks relative to the adjacent ground. The lower surface then intercepts and drains water, channeling it and causing erosion and pooling in low sections. Drivers tend to avoid muck holes by driving around them, which widens the route and causes more of the same type of resource damage (figure 44). The compacted soil and loss of plant cover caused by driving off roads and trails leaves the soil vulnerable to erosion. Erosion, in turn, produces sediment that degrades water quality when it enters streams.

Figure 44. Photo illustrating the concept of braiding. When the main road is muddy, people drive to the left, widening the road.

Figure 45. Area where repeated camping and parking next to the stream has caused most of the riparian plants to die, resulting in bare ground and a muddy stream

People like to camp close to water. In the Santa Fe National Forest, they often drive their vehicles close to the water's edge to set up camp (figure 45). Over time and with repeated use during the plant's growing season, this causes the riparian vegetation to die. Riparian vegetation is critical for keeping streams healthy by filtering sediment and contaminants, stabilizing banks, reducing water temperature, moderating floods, supplying food for stream organisms, and contributing large woody debris for fish habitat. This loss of riparian vegetation at campsites near water can increase stream temperature and sedimentation, both factors that can cause a stream to be listed as impaired.

Soil and Water – Environmental Consequences

Direct and Indirect Effects Common to All Alternatives

Routes

Removing traffic from National Forest System roads and trails is not expected to change soil or water quality from the existing condition within the 15 years this project analyzes. This means that the effects from the footprints of existing National Forest System roads and system trails are the same for alternatives 2 through 5 as for alternative 1 for the next 15 years. The only difference is that alternatives 2 through 5, by removing traffic from about half the National Forest System routes, allow for the possibility of revegetation or future route decommissioning.

The presence of roads and trails alters the natural hydrological patterns of a watershed. For the effects of roads and trails to entirely disappear, the routes would have to be restored to their natural slope (not have a "bench" that serves to intercept and transport water) and be fully re-vegetated, having little or no bare ground. When some vegetation grows on routes, there is a corresponding improvement, but some effects to soil, water, and natural hydrological processes will continue until the route is returned completely to its original, natural state (figure 46).

Figure 46. Example of a National Forest System road on the Coyote Ranger District that has partially recovered, though bare ground is still present. Having some vegetation, however, is an improvement over having none.

The footprint of engineered roads—those that the Forest Service intentionally builds or maintains, including its main roads and skid trails—last for a long time, and so do their effects to soil and water. (We discuss unauthorized routes in the section on "Areas," below.) The reason for this is that route construction and maintenance compacts soil and removes organic material (replacing it instead with things like base course or gravel) so that they are drivable. Highly compacted soils without organic material are not conducive to plant growth.

Removing traffic from engineered routes allows for the possibility of reclamation, either by natural revegetation or physical decommissioning. Whether plants will colonize an abandoned, engineered route depends on each route's condition, soil type, and location. We expect the time it would take for plants to naturally revegetate on an engineered route would be longer than the 15 years this analysis considers, and could be much longer (figure 47). This is because the tread is subject to the continuing erosional forces of rain, running water, wind, freezing and thawing, and gravity. The soil compaction can persist for years before natural, soil-loosening processes can restore the soil's texture to a point where it supports vegetation.

Figure 47. A National Forest System road that has been closed to use, but continues to erode. There is an erosion channel starting above the horse's right ear and leading to the top of the photo.

In addition, routes closed to traffic won't be maintained, and this means that some roads and trails with problems could continue to erode and deposit sediment into streams (figure 48).

As stated in the "Recreation" section, most of the system routes proposed for closure in the action alternatives are for high-clearance vehicles, and are used infrequently now. Even with infrequent use, most still appear on the landscape, illustrating the principle that it takes a long time for engineered routes to naturally recover.

Some routes, in order to completely return to natural, would require the Forest Service to decommission them (figure 49). Closing them to motorized use is the first step, and it is likely that the forest would decommission some routes within the next 15 years. Sometimes, though, even physical decommissioning does not return a route back to a completely natural state.

Figure 48. A system trail that is incised, forming a channel through which water flows. As the water flows, it pulls more soil down with it. Even without motorized use, this system trail is not likely to revegetate on its own within 15 years.

Figure 49. Example of a route that the Forest Service physically decommissioned

Stream Crossings

Removing traffic from stream crossings on National Forest System roads and trails is not expected to change soil or water quality from the existing condition within the 15 years this project analyzes because it is the physical presence of the stream crossing that causes the biggest effect to soil and water quality. Low water stream crossings are not likely to heal themselves because it is difficult for streambanks to rebuild themselves at crossings. Because this project would not remove or repair any bridges, culverts, and low water crossings, the number would not change between alternatives and, therefore, effects wouldn't either.

Motorized Big Game Retrieval

At the forestwide scale, the impacts to soil and water from retrieving 438 big game animals with a vehicle on an annual basis are likely to be negligible. Taking up to four trips is not likely to compact soil to the point that permanent tracks remain, and hunters take animals in different places every year. Without repeated use, permanent tracks are not likely to form. This is true for alternatives 2, 4, and 5, which allow people to drive off roads solely for retrieving down animals. Alternative 3 eliminates the possibility of new tracks altogether because driving off roads is not allowed at all. Alternative 1, on the other hand, without a restriction of driving off roads, could result in new permanent tracks because people tend to explore by driving on tracks others have made.

Except for alternative 3, which does not allow any driving off roads, all the alternatives could have impacts in specific locations if people drive on sensitive soils, through wet meadows or riparian areas, or ford streams to retrieve game.

Direct and Indirect Effects, Alternative 1

Areas

Alternative 1 is the most likely to cause an increase in erosion and sedimentation, subsequently degrading water quality and watershed condition, because it would allow people to drive off routes on 53 percent of the forest. Driving off routes often creates new, unengineered routes, which compacts soil and exposes it to erosion and sedimentation as described in the "Affected Environment" section. Now, people drive off routes on about 29 percent of the forest. About 43 percent of this use is on sensitive soils, 19 percent within 300 feet of a perennial stream, and 1 percent within 300 feet of an impaired stream. This use is likely to contribute sediment to streams.

Motorized Dispersed Camping

The effects to soil and water quality from motorized dispersed camping under alternative 1 is likely to remain the same or become worse over time because it keeps the existing opportunities in place and does not limit future expansion into new places unless closure orders are issued.

The effects of motorized dispersed camping on soil and water quality are twofold. Vehicles driving close to streams and in riparian areas compact soil and remove vegetation through the shearing action of their wheels. As described elsewhere in this section, bare, compacted soil is prone to erosion, which in turn causes sedimentation. Second, people's activities when camping, such as repeatedly walking and playing in the same places, building campfire rings and campfires, and setting up tents, can remove the vegetation that keeps soil intact.

Motorized dispersed camping near streams and in riparian areas is of particular concern because of its detrimental effects to soil and water (figure 50). The proximity of campsites and bare ground to water means that sediment doesn't have far to travel before entering streams. Motorized dispersed camping is a likely contributor to the causes of listing a stream as impaired for temperature, sediment, and turbidity. Motorized dispersed camping next to unlisted streams is likely contributing sediment that is degrading water quality, which could lead to future stream listings. Right now, 34 percent of the forest's motorized dispersed camping takes place within 300 feet of a stream, 3 percent within 300 feet of an impaired stream, and 14 percent within 100 feet of riparian areas.

Figure 50. Example of where motorized dispersed camping has had detrimental effects on the riparian area. At this site along the Rio de las Vacas, the motorized access to the dispersed camping site has compacted the soil and removed all vegetation. The motorized use goes all the way down to the streambank and the riparian vegetation has been removed within the vicinity of the site.

A few of the fifth-field watersheds have motorized dispersed camping occurring in locations that could be affecting water quality. The Rio Guadalupe and Tecolote Creek watersheds have 11 percent and 10 percent respectively of their total motorized dispersed camping acreage next to impaired streams. Though the majority of the forest's watersheds have less than 15 percent of their dispersed camping acreage within 100 feet of riparian habitat, two—Pojoaque Creek with 54 percent and Rio Guadalupe with 34 percent of their total dispersed camping acreage—have notably more.

Direct and Indirect Effects, Alternatives 2 Through 5

Areas

The benefit of alternatives 2 through 5 is they eliminate the chance of sediment entering streams as a result of new routes being formed by vehicles. All reduce the effects of motorized cross-country use by eliminating (alternative 3) or severely limiting the acres of areas. Alternatives 2, 4, and 5 reduce the acres of areas by 99 percent. Almost no motorized use would be allowed within 300 feet of streams, and none within 300 feet of impaired streams.

The effects associated with past use—such as the two tracks that exist on the landscape now—are likely to continue for some time into the future. Removing motorized use in areas would allow the possibility of natural revegetation, but the subsidence associated with compaction may remain. Because the routes created by cross-country use are not engineered, however, they are more apt to naturally revegetate in a shorter period than constructed routes (figure 51). Some routes may begin revegetating within the 15 years considered in this analysis, but it isn't likely they would completely recover in that time. Again, having some vegetation grow on the routes would incrementally reduce the erosion and sediment that degrade soil and water quality.

Figure 51. Area that used to be a two-track route to a livestock-watering tank (the horse in the picture is standing at the livestock tank). It probably existed in 1987 when the forest plan was adopted, but it has since grown over.

Motorized Dispersed Camping

The intensity of the effects of people's activities on soil and water quality under alternatives 2 through 5 would not change from alternative 1, the existing condition. None of the action alternatives prohibit or limit camping itself, only where vehicles are allowed. The effects of camping itself (aside from the vehicles), varies only by whether people would continue to camp

in places that they could no longer drive to. We'd expect that alternative 3 would have fewer campers because it allows no driving off roads, and some people are, therefore, likely to forego a camping trip entirely.

Because camping itself is not expected to vary greatly, the rest of the effects analysis focuses on where vehicles would be allowed. Overall, experience of forest staff shows that having vehicles next to water causes more degradation of soil and water quality than does people's activities while camping. For example, as part of the Respect the Rio Program, we built buck and pole fencing that allows people to camp next to water, but prevents them from driving close to the stream (figure 30). Without the presence of vehicles—but still having campers—riparian vegetation is returning (U.S. Environmental Protection Agency 2010). Allowing motorized use close to streams and in riparian areas is more detrimental than in upland areas.

Removing motorized use from existing dispersed campsites allows for the possibility that sites will revegetate naturally, or could be rehabilitated by the Forest Service. Like two-track routes formed as a result of motorized cross-country travel, motorized dispersed campsites aren't engineered and constructed like National Forest System routes or developed campgrounds. Thus, the soil can be less compacted and take less time to revegetate than engineered projects. In the 15 years considered in this project, it is likely that natural processes would begin to reclaim upland sites, but not completely restore them. Sites close to streams and in riparian areas are the most likely to grow the most vegetation because of the presence of water, which helps establish vegetation.

Given the factors associated with motorized dispersed camping most likely to degrade soil and water quality (the use of vehicles close to water and in riparian areas) and the changes shown for each alternative in table 32, we can make these conclusions about the alternatives:

- Alternative 2 would slightly reduce the amount of erosion and sediment from the existing condition, but is likely not enough to vastly improve soil and water quality. It reduces the places where people can drive their vehicles close to water and camp by 8 percent and in riparian areas by 20 percent compared to alternative 1. Though it captures most of the existing use, it does eliminate a few sites thought to be causing resource damage.

Table 32. Acres of motorized dispersed camping close to streams and riparian areas by alternative.

	Alternative				
	1	**2**	**3**	**4**	**5**
Acres of motorized dispersed camping within 300 feet of a stream (percent of total proposed)	5,815 (34%)	5,367 (34%)	0 (0%)	10,908 (33%)	4,419 (38%)
Percent change from alternative 1	**--**	**-8**	**-100**	**88**	**-24**
Acres within 300 feet of an impaired stream (percent of total proposed)	447 (3%)	326 (2%)	0 (0%)	652 (2%)	268 (2%)
Percent change from alternative 1	**--**	**-27**	**-100**	**46**	**-40**
Acres within 100 feet of riparian habitat (percent of total proposed)	2,346 (14%)	1,878 (11%)	0 (0%)	3,508 (11%)	1,454 (13%)
Percent change from alternative 1	**--**	**-20**	**-100**	**50**	**-38**

- Alternative 3 is the most likely to reduce the amount of erosion and sediment from the existing condition because it eliminates all forms of driving off roads, including for camping. To camp, people would park their vehicles next to the road, and then bring their gear to their campsite on foot (figure 52). Alternative 3 reduces the places where people could drive their vehicles next to streams and in riparian areas to camp by 100 percent.
- Alternative 4 is the most likely to increase the amount of erosion and sediment from the existing condition because it allows more places where people could drive their vehicles close to water and in riparian areas to camp. Compared to alternative 1, it increases vehicular access within 300 feet of streams by 88 percent and in riparian areas by 50 percent. We expect to see a corresponding increase in the amount of bare soil in the 15 years considered by this analysis, based on staff experience. In terms of motorized access to dispersed camping, alternative 4 is the least protective of soil and water quality and could degrade it as compared to the existing condition.
- Alternative 5 is likely to have a moderately beneficial effect on soil and water quality when compared with alternative 1 because it reduces the places people can drive near streams or in riparian areas by approximately one-third. This would allow those acres to begin to revegetate, which is likely to improve water quality.

Figure 52. This photo illustrates how, in alternative 3, people would not be able to drive their vehicles into their campsite. No bare ground is evident in the campsite, and the riparian vegetation in the middle right part of the photo is present.

Cumulative Effects, All Alternatives

The cumulative effect of past programs and activities was a reduction in soil and water quality that resulted in the listing of 347 miles of stream within the forest by the State of New Mexico's Environment Department. These past actions include subdivision and development of private inholdings and access to them, past road construction and stabilization for access across the

forest, development of access to oil and gas and mining claims, vegetation management and associated road development, grazing, dispersed and developed recreation and associated authorized and unauthorized road development, trail creation and maintenance, and past wildfires.

During the middle to latter part of the period 1987-2009, the forest implemented several programs and activities to improve (or with a side benefit of improving) soil and water resources. These include development of management plans for wild and scenic rivers that restricted the type of access to them, creation of the Jemez National Recreation Area, road decommissioning, improvements to roads and trails impacting watersheds through the 10 Percent Fund (now Legacy Roads program), and finally, development and implementation of Respect the Rio, an education-based program promoting river-friendly camping in the fourth-field Jemez watershed.

In general, present programs and activities are either maintaining or reducing impacts on soil and water, with an overall beneficial effect. These activities include road reconstruction and road decommissioning, stream crossing modification (such as State Highway 4), reanalysis and modification of range management permits, reduced timber harvest, trail improvements and dispersed campsite modification in the Jemez watershed through Respect the Rio (ongoing partnership), and future expansion of this program to the Upper Pecos Watershed. Watershed and aquatic habitat restoration projects, including the Peralta, San Antonio, and Cañones watershed improvement projects, and the Polvadera CWA §319 partnership, provide locally beneficial effects to soil and water resources.

Although some programs and activities may have localized short-term negative effects on soil and water, the cumulative effects of present and reasonably foreseeable programs and activities, including the reduction of open, motorized roads and trails and cross-country travel through designation under the Travel Management Rule, are generally beneficial. Remaining degraded aquatic habitats will continue to be targeted for restoration. Management plans and/or range improvements will be updated in range allotments with degraded riparian and stream habitats, and additional roads and stream crossings will be modified to improve aquatic organism passage and reduce impacts to stream channels and fish habitat.

Effects of Forest Plan Amendments on Soil and Water

The amendment to limit motorized use to the designated system shown on the motor vehicle use map would reduce the impacts to soil and water to varying degrees depending on the alternative. These are the same as described in the direct and indirect effects.

The amendments to allow motorized use in a few places where it had not been previously allowed is the same as described in the direct and indirect effects. The amendments would allow use that has already been occurring and depicted in each alternative. Thus, the effects described for each alternative contain the effects of the amendments.

Consistency with the Forest Plan and Legal Requirements

Appendix 3 contains a detailed analysis of each alternative's consistency with the "Santa Fe National Forest Plan" and other laws. In sum, the amount and location of motorized dispersed camping proposed in alternative 4 does not move the soil and water resource toward a desired condition.

Fisheries

Some people raised the issue that continued motorized use of the Santa Fe National Forest would impair habitat for fish. This section, which summarizes the fisheries specialist report (USDA Forest Service 2010r), analyzes the effects to threatened and endangered, sensitive, management indicator, and native fish species.

Table 33. Fish in the Santa Fe National Forest having special management status

Species	Management Status
Rio Grande cutthroat trout	Management indicator and Regional Forester's sensitive species
Rio Grande silvery minnow	Endangered species
Rio Grande chub	Regional Forester's sensitive species
Rio Grande sucker	Regional Forester's sensitive species

Effects of Routes and Motorized Use on Fish Habitat

The issue related to routes, the use of vehicles, and fish habitat is sediment. Sediment is soil, usually carried by water, that gets into streams. When excessive sediment gets into streams, it does a number of things that degrade fish habitat. Sediment changes the shape of the stream, either widening it so it's shallow and warm, or causing it to become a fast, straight channel. Neither is suitable for fish to live in. Fine sediment covers up pebbles and rocks that fish lay their eggs in, reducing their chance of reproductive success. Sediment also hides food sources for fish, making it harder for them to survive and compete with other fish, especially nonnative species.

Here's how motorized use directly and indirectly increases the chance for sediment to reach streams:

A route's footprint. Roads and trails act like funnels that deliver sediment to streams. When it rains (or during snowmelt), water flows across a slope until it reaches a road or trail. Once it's on the route, water follows the route downhill, collecting sediment as it goes. In the forest, many dirt routes cross streams. When the sediment-filled water reaches the stream, all the water and sediment is deposited into the stream.

Routes that are close to streams tend to contribute the most sediment because it doesn't have far to travel. Vegetation acts like a filter and catches sediment. If little or no vegetation is present, then the chance of sediment getting into the stream is greater. If routes have sufficient drainage, water can be diverted before it reaches streams (figure 53). This helps keep sediment out of streams.

People's activities near water. Routes are conduits for people, and people's activities sometimes contribute to poor fish habitat. When people camp near water, they tend to use large pieces of wood for things like campfires and makeshift benches. These large pieces never make it into the stream as "large woody debris." Fish use large woody debris for cover. They feed on the insects that colonize large woody debris. These large pieces of wood create habitat when the water rushes over and around them and scours out new habitats. Camping often causes the ground to become bare, exposing soil that is then free to move into the adjacent stream. Vegetation on the ground acts like a filter and catches sediment before it hits

streams. Without vegetation, there is nothing to stop it. Unintentionally, people may pollute streams with food, dripping oil from cars, or other things.

Driving off roads. Driving off roads and trails causes the soil under tires to compact. Plants have a hard time growing in compacted soil. Without plants, soil is easily mobilized into wetlands and streams via runoff. With repeated use, these areas of compaction may become channels that transport water and sediment to streams. Sometimes, two tracks become unauthorized routes. Unauthorized routes often direct sediment to streams.

Routes that cross streams. In general, low water crossings don't block fish passage. Culverts do, however, if they are perched, undersized, or too long. Having more crossings increases the potential for having one or more that pose a barrier to fish movement. This reduces genetic variation by promoting inbreeding. Stream crossings make isolated populations more vulnerable to extirpation by extreme events such as mass wasting or ash flow. They have high amounts of fine sediments that cover food sources and habitat. Driving through streams disturbs soils and increases the potential for erosion and sediment in streams. It directly impacts habitat for fish and their prey by disturbing riffle spawning and feeding habitats.

Open road density. The United States Fish and Wildlife Service and National Oceanic and Atmospheric Administration's National Marine Fisheries recommend that a given watershed should have less than 2.5 mi/mi² of roads; if more, it is considered to be not properly functioning. While this recommendation is not a standard in the forest plan, it is a useful benchmark because it indicates whether we comply with the protection of the species under the Endangered Species Act.

Figure 53. Example of a ditch that carries water off the road, so it prevents sediment from being carried to streams

Threatened and Endangered Fish Species

Rio Grande Silvery Minnow – Affected Environment

The Rio Grande silvery minnow (*Hybognathus amarus*) is listed as an endangered species. Historically, it was one of the most widespread and abundant fishes in New Mexico. Today, its habitat is about 7 percent of its former range. The silvery minnow appears to live only in a 163-mile reach of the Rio Grande from around Cochiti Dam downstream to Elephant Butte Reservoir, and a 2.8-mile stretch of the Lower Jemez River between the Jemez Canyon Dam and its confluence with the Rio Grande. No silvery minnows have been found on the Santa Fe National Forest.

Figure 54. A Rio Grande silvery minnow (Photo Aimee Roberson, Courtesy of U.S. Fish and Wildlife Service)

In 2002 and 2003, the United States Fish and Wildlife Service identified critical habitat for the Rio Grande silvery minnow between Cochiti Dam and Elephant Butte Reservoir. The Santa Fe National Forest does not manage lands designated as critical habitat. It does, however, manage three watersheds that feed the middle Rio Grande where critical habitat and the silvery minnow exist. Thus, we look at how the alternatives might protect these watersheds and prevent them from contributing adverse effects downstream.

To measure the effects of closing parts of the forest to motorized use, we use the density of open roads and motorized trails in watersheds that are source to the Middle Rio Grande designated habitat.

Rio Grande Silvery Minnow – Environmental Consequences

Direct Effects Common to All Alternatives

There would be no direct effects to Rio Grande silvery minnow under any alternative because the species is extirpated from the forest. Additionally, the Santa Fe National Forest does not manage lands within the area designated as critical habitat.

Indirect Effects, Alternative 1

For comparison purposes, alternative 1 would have an effects determination of “may affect, not likely to adversely affect” for the Rio Grande silvery minnow. “May effect, not likely to adversely affect” is one category that is assigned during consultation with the U.S. Fish and Wildlife Service about effects to species classified as threatened or endangered under the Endangered Species Act. While there could be adverse effects to the watershed from localized road or trail erosion, the route density of two Forest Service watersheds feeding into critical habitat for the Rio Grande silvery minnow is well below the agency recommendation, and in the headwaters of Galisteo Creek, the route density is slightly over agency recommendations (3.0 mi/mi^2; table 35).

Vehicle use, however, on Forest Service roads and trails here occurs many miles from Rio Grande silvery minnow occupied habitat, and is connected only by intermittent flows. Conchas and other reservoirs serve as a sink for sediment that could negatively affect silvery minnows. As a result, effects should be absent or so small as to be undetectable.

Direct and Indirect Effects, Alternatives 2 Through 5

Alternatives 2 through 5 would have an effects determination of "may affect, not likely to adversely affect" for the Rio Grande silvery minnow. Route densities in the portions of all three watersheds within the forest boundary that feed into Rio Grande silvery minnow critical habitat are well below the threshold of 2.5 mi/mi^2 (table 34). Thus, these watersheds would be considered "properly functioning." Although there could be adverse effects to the watershed from localized road or trail erosion, the route density in watersheds feeding critical habitat for the Rio Grande silvery minnow is well below agency recommendation, and effects should be absent or so small as to be undetectable.

Table 34. Comparison of open route density, by alternative, in watersheds that feed critical habitat for the Rio Grande silvery minnow. Watershed area and route miles are tabulated for the portion of the watershed within the forest boundary only.

Watershed	Alternative				
	1	2	3	4	5
Canada Ancha - Rio Grande	2.0	1.0	0.7	1.3	0.9
Headwaters Galisteo Creek	3.0	1.0	0.8	1.4	1.1
Arroyo Tonque - Rio Grande	1.9	0.9	0.2	1.1	1.1

All action alternatives improve upon the current condition by reducing the miles of roads and trails open to vehicular traffic. Some will revegetate naturally and others won't. Those that do will lessen the amount of sediment that reaches streams.

Sensitive Species – Affected Environment

The Rio Grande chub (*Gila pandora*), Rio Grande sucker (*Catostomus plebeius*), and Rio Grande cutthroat trout (*Oncorhynchus clarki virginalis*) are on the Regional Forester's sensitive species list. In the National Forest System, a sensitive species is a species for which population viability is a concern due to a current or predicted downward trend in population numbers or in habitat capability. The Rio Grande cutthroat trout is also a candidate species for the endangered species list and a management indicator species.

Because excessive fine sediment degrades the habitats of Rio Grande cutthroat trout, chub and sucker, and because roads and trails are a source of sediment, we use the miles of routes and acres of land used by vehicles as a proxy for the effects to these fish species. The streams in which the Rio Grande cutthroat trout, chub and sucker live vary in their quality for fish habitat from poor to excellent.

Rio Grande Cutthroat Trout

On the Santa Fe National Forest, habitat for Rio Grande cutthroat trout occurs in several streams of the Jemez, Rio Chama, Rio Grande, and Rio Puerco watersheds. Approximately 138 miles of 39 streams within the forest are currently known to be occupied by the species. The habitat requirements and quantitative analysis for Rio Grande cutthroat trout is described in the "Management Indicator Species" section. Because it is also a sensitive species, the effects determinations for it in the "Environmental Consequences" section that follows are inclusive of the Rio Grande cutthroat trout.

Rio Grande Chub

On the Santa Fe National Forest, habitat for Rio Grande chub occurs in several streams of the Jemez, Rio Chama, Rio Grande, Cañones, Rio Puerco, and Gallina watersheds. Approximately 250 miles of 12 streams within or proximate to the forest are currently known to be occupied by the species.

Rio Grande Sucker

On the Santa Fe National Forest, habitat for Rio Grande sucker occurs in several streams of the Jemez, Rio Chama, Rio Grande, Cañones, Rio Puerco, and Gallina watersheds. Approximately 299 miles of 18 streams within or proximate to the forest are currently known to be occupied by the species.

Sensitive Species – Environmental Consequences

Direct and Indirect Effects, Alternative 1

Alternative 1 is not likely to result in a trend toward Federal listing or a loss of species viability. Though it has the most motorized use of the alternatives, the amount of occupied habitat potentially impacted by these roads and trails is relatively small, around 10 percent.

The effects to sensitive fish from motorized use described would continue at their present rate. This means that routes, driving cross-country, and people would contribute to habitat degradation in some locations. Other locations would remain inaccessible to people and vehicles and not change. The motorized use in alternative 1 is not likely to greatly improve the conditions of streams—they would remain the same or get worse.

Direct and Indirect Effects, Alternatives 2 Through 5

Alternatives 2 through 5 are not likely to result in a trend toward Federal listing or a loss of species viability because they improve on the current condition. All reduce the amount of motorized use near streams, especially the number of stream crossings open to motorized use and motorized travel off roads (table 35). Having less motorized use near streams reduces the potential for sediment to get to a stream or be stirred up in it, which in turn improves habitat by keeping water clear and not changing the stream's channel.

Table 35. Comparison of the amount of motorized use near streams by alternative

Species	Within 300 feet of Stream Occupied by Sensitive Fish	Alternative				
		1	2	3	4	5
Rio Grande chub	Miles of routes	29	24	22	24	24
	Miles of corridors for camping (DC) or game retrieval (G)	12 (DC)	8 (DC, G)	0	8 (DC) 23 (G)	8 (DC)
	Acres of areas	1,949	0	0	0	0
	Number of stream crossings	31	20	19	27	26
Rio Grande sucker	Miles of routes	35	28	27	29	28
	Miles of corridors for camping (DC) or game retrieval (G)	13 (DC)	9 (DC, G)	0	9 (DC) 27 (G)	9 (DC)
	Acres of areas	2,147	0	0	0	0
	Number of stream crossings	63	26	25	33	32

Reducing the places where people can drive in the forest would allow some routes to revegetate naturally over time; others would not (refer to the "Soil and Water" section for a description of the time and likelihood of routes and areas regenerating). Routes on steep slopes are likely to continue contributing sediment until they are decommissioned.

Alternative 3, because it allows no driving off roads or trails, would be the most likely to have places near streams revegetate. For alternatives 2, 4, and 5, because motorized use near streams (especially for camping) would not be entirely eliminated, neither would the detrimental effects to habitat associated with it; though there would be an improvement when compared to alternative 1.

Limiting camping to fixed-distance corridors is likely to cause an increase in new hardened sites since people won't be able to spread out as much as they do now (assumption No. 21, page 67). As described, this tends to cause a downward trend in habitat condition.

Management Indicator Species – Affected Environment

The Rio Grande cutthroat trout is a management indicator species, and as such, it represents a larger group of fish species presumed to share the same habitat requirements. Rio Grande cutthroat trout is also a sensitive species and a candidate to the endangered species list.

The Rio Grande cutthroat trout represents the quality of aquatic habitat on the Santa Fe National Forest. We manage 1,072 miles of perennial streams. Of these, Rio Grande cutthroat trout lived in approximately 965 miles before 1896, when streams were first stocked with nonnative fish. Data collected in May 2007 by the New Mexico Department of Game and Fish and the Santa Fe National Forest identified 39 streams totaling 138 miles as having Rio Grande cutthroat trout. Of these, 47 miles are considered secure, meaning they aren't invaded by nonnative fish.

Habitat for the Rio Grande cutthroat trout varies in quality. At higher elevations, where recreation and grazing is limited by topography and restrictions associated with wilderness, stream quality is moderate to excellent. At lower elevations used more by people, habitat tends to be poor. Motorized use close to streams tends to cause sedimentation, which degrades fish habitat.

Management Indicator Species – Environmental Consequences

Direct and Indirect Effects, Alternative 1

Alternative 1 is not likely to result in a trend toward Federal listing or a loss of species viability. Though it has the most motorized use of the alternatives and the most miles of motorized routes within 300 feet of occupied Rio Grande cutthroat streams, the number of occupied stream systems (and populations) potentially impacted by these roads and trails is relatively small. Many of the occupied systems are located within designated wilderness or high elevation systems with limited access.

The effects to fish from motorized use described would continue at their present rate. Of particular concern are some routes that cross and parallel streams occupied by the Rio Grande cutthroat trout, such as one off Forest Road 422 which crosses Polvadera Creek several times and has trail segments that run up the streambed itself (figure 55).

Figure 55. Example of trail segment running up a streambed

Polvadera Creek is home to one of the forest's "core conservation" populations of Rio Grande cutthroat trout, meaning this population's genetic purity is greater than 99 percent and is deemed the "the highest priority for long range conservation management" by the New Mexico Department of Game and Fish.

Unfortunately, a number of stressors, including the trail, have combined to create a stream in which riffle sediment content, pool development, and pool quality are not properly functioning. In addition, heightened stream temperatures led to Polvadera Creek being listed as impaired because it is not meeting the designated use set by New Mexico Environment Department as a high quality cold water fishery.

Direct and Indirect Effects, Alternatives 2 Through 5

Alternatives 2 through 5 are not likely to result in a trend toward Federal listing or a loss of species viability because they improve on the current condition, though individual Rio Grande cutthroat trout may be negatively impacted. All reduce the amount of motorized use near streams, especially the number of stream crossings open to motorized use and motorized travel off roads (table 36). Having less motorized use near streams reduces the potential for sediment to get to a stream or be stirred up in it, which in turn improves habitat by keeping water clear and not changing the stream's channel. This improves fish habitat, which could potentially promote the species.

Table 36. Comparison of motorized use close to streams occupied by Rio Grande cutthroat trout

Within 300 feet of Stream Occupied by Rio Grande Cutthroat Trout (RGCT)	Alternative				
	1	2	3	4	5
Miles of routes	34	2	1	6	4
Miles of corridors for dispersed camping (DC) or game retrieval (G)	0	0.3 (DC, G)	0	0.3 (DC) 6 (G)	0.2 (DC)
Acres of areas	998	0	0	0	0
Number of stream crossings (RGCT occupied)	98	4	4	12	10

Alternatives 2 and 3 don't propose the trail in Polvadera Creek, so these would be better at protecting this core population of Rio Grande cutthroat trout. Alternatives 4 and 5 would retain the motorized trail through Polvadera Creek, with the restriction that this trail would only be open seasonally. Under alternatives 4 and 5, the habitat disturbance caused by wheels in the stream is lessened, but still present.

Fish-bearing Streams – Affected Environment

A number of other native fish live in the streams in the Santa Fe National Forest. These include the red and bluntnose shiners, fathead minnow, longnose dace, river carpsucker, mosquitofish, and bluegill. A few, the American eel, bluntnose shiner, speckled chub, and Rio Grande shiner, are likely extirpated or are considered a species of "greatest conservation need" by the State of New Mexico.

Like the special status fish just described, most of these require clear water and unaltered stream channels in order to thrive. The fish-bearing streams in the Santa Fe National Forest vary in their quality for fish habitat from poor to excellent.

Fish-bearing Streams – Environmental Consequences

Direct and Indirect Effects, All Alternatives

Alternative 1 would continue motorized use of the forest at its present rate. This means that routes, driving cross country, and people would contribute to habitat degradation in some locations. Other locations would remain inaccessible to people and vehicles. Alternative 1 is not likely to greatly improve the conditions of streams; they would remain the same or get worse.

Alternatives 2 through 5 would all improve on the current condition because they reduce the amount of motorized use near streams, especially the number of stream crossings open for motorized use and motorized travel off roads (table 37). It is difficult to predict exactly where and to what extent habitat in the forest's streams would improve. Some places would heal, others would remain the same, and because these alternatives don't entirely eliminate motorized use, some places could degrade more (refer to the "Soil and Water" section for a description of the likelihood of routes and areas recovering naturally).

Table 37. Comparison of motorized use close to perennial, native fish-bearing streams

Within 300 feet of Perennial, Native Fish-bearing Streams	Alternative				
	1	2	3	4	5
Miles of routes	366	204	176	229	211
Miles of corridors for dispersed camping (DC) or game retrieval (G)	40 (DC)	34 (DC, G)	0	39 (DC) 198 (G)	28 (DC, G)
Acres of areas	16,803	0	0	0	0
Number of stream crossings (RGCT occupied)	967	479	355	570	561

On balance, having less motorized use near streams reduces the potential for sediment to get to a stream, which in turn improves habitat by keeping water clear and not changing the stream's channel. This improves fish habitat, which could potentially promote the species.

Cumulative Effects to All Fish Species, All Alternatives

The cumulative effects of present and reasonably foreseeable programs and activities, including the reduction of open, motorized roads and trails and cross-country travel through designation under the Travel Management Rule, are generally beneficial. Degraded aquatic habitats will continue to be targeted for restoration. Management plans and range improvements will be updated in allotments with degraded riparian and stream habitats, and additional roads and stream crossings will be modified to improve aquatic organism passage and reduce impacts to stream channels and fish habitat. Some programs and activities may continue to have localized, short-term negative effects on fish and their habitats.

Effects of Forest Plan Amendments on Fish

The proposed amendments to limit motorized travel to the designated system, remove motorized cross-country travel from management areas that allow it now, and remove the lower bound of open road density would have no additional effects on fish or their habitats beyond what was analyzed in the direct and indirect effects by alternative.

Wildlife

Some people wrote that continued motorized use of the Santa Fe National Forest would damage wildlife habitat. We routinely analyze a project's effects on threatened or endangered species, sensitive species, management indicator species, and migratory birds. All are discussed in this section, which summarizes the wildlife specialist report and biological evaluation in the project record (USDA Forest Service 2010a and 2010d).

First, we explain how roads, motorized trails, and vehicles affect wildlife in general. Unless noted, these apply to all species discussed. Then we describe the projects that cumulatively affect all wildlife. Finally, for each species or group of species, we describe its habitat and the anticipated effects from each alternative followed by any cumulative effects specific to it.

Important note: All the tables showing the miles of routes in different species' habitats have a row called "Routes not currently open for motorized use." The kinds of routes compiled in this

category are ones that people aren't supposed to be driving on or unauthorized routes (these are the bulk of them)[8].

How Routes and Vehicles Affect Wildlife

Studies show that roads and motorized trails negatively affect animals, large and small, to varying degrees. Sensitivity to disturbance from routes and vehicles varies by individual animal, population size, species, and type and amount of disturbance. Though the scientific consensus is that routes do disturb animals, pinning down an exact cause and effect relationship can be difficult. Some of the ways that routes and vehicles disturb animals are listed in the next paragraph.

The construction and existence of routes causes a loss of habitat. They create edges, which favor species that use them, such as crows, blue jays, and cowbirds, and harm species that don't, such as neotropical migratory birds. Routes facilitate the spread of nonnative plants and animals that then crowd out native species. Forest roads and trails pose a hazard to amphibians and small mammals, which are likely to be killed by vehicles. Snakes, for instance, sunning themselves on roads are vulnerable to being run over. Roads can act as migration barriers for small mammals that won't cross them. This causes inbreeding and a less healthy population. The slow speed of vehicles on forest roads prevents large mammals, like elk and deer, from being hit very often, but larger animals tend to avoid roads; this fragments populations, increases inbreeding, and results in a loss of genetic variability.

Roads and motorized trails are conduits for people, and the presence of humans disturbs many species. For example, people may bother nests or dens. This disturbance reduces species' breeding success and can alter where they live. Roads tend to facilitate the poaching of deer and elk.

The noise from vehicles can disturb animals, but this varies widely by species and the cause and effect relationship is poorly understood. The impacts from noise take many forms, including changing the habitat used, increased stress, diminished ability to fight off illness, reduced reproductive success, and a higher risk of predation. Some animals, though, become habituated to noise and people, especially where hunting is not allowed or not popular. Motorized use in the Santa Fe National Forest is considered low compared to cities, and infrequent on high-clearance vehicle roads.

Direct and Indirect Effects Common to All Species

Direct and Indirect Effects, Alternative 1

Alternative 1 has the most places where motorized use is allowed. A species' response to routes and vehicles varies, but as just described, is usually negative. Some species thrive and increase in population despite routes and the presence of vehicles; however, we conclude that motorized use is not optimal for most wildlife species.

[8] The specific categories of routes compiled into this row are: closed system, decommissioned, non-system closed, system trails built for non-motorized uses, unauthorized, and undetermined. If any of these are located in a place on the forest where motorized cross-country use is allowed, then use of the route would also be allowed.

Direct and Indirect Effects, Alternatives 2 Through 5

The seasonal closures for each alternative serve to protect wildlife breeding seasons for the Mexican spotted owl, Rocky Mountain elk, northern goshawk, and peregrine falcon. The forest's interdisciplinary team built into each alternative the seasonal closures for wildlife protection listed in the forest plan. The seasonal closures for weather may provide a benefit to those species sensitive to traffic, but species that are sensitive to the footprint of the road itself may derive little benefit from the weather-related closures.

Alternatives 2 through 5 reduce or eliminate the disturbance caused by vehicles driving off roads by limiting the places where people can drive off roads (in corridors only) and the duration they are allowed to drive off roads (seasonal closures or during hunting season). Alternative 3, because it allows no driving off roads and does not designate any unauthorized trails, is the most protective of wildlife habitat. Although alternative 4 allows for longer travel distances for big game retrieval, based on our assumptions, the number of trips is not expected to be greater and the location of game retrieval trips is not known. For these reasons, it is not possible to analyze the differences in effects to any given species, but the differences would appear to be minimal.

Though none of the action alternatives physically decommission roads, all action alternatives reduce the amount of disturbance caused by vehicles and people because all reduce the designated motorized system from its current condition. This diminishes the effects listed in the "Affected Environment" section.

Because they keep some routes and add others, the action alternatives do not entirely eliminate the effects from motorized routes and vehicles. Though they all reduce the total miles of routes in the forest, each alternative proposes to add some unauthorized routes, which adds new miles to the transportation system (even though there is an overall reduction in total miles proposed from now).

Cumulative Effects Common to All Species, for All Alternatives

Unless noted under the discussion of each species, these cumulative effects apply to all wildlife. Cumulative actions that pertain to a specific species are discussed with that species.

Past and future actions that either have cumulatively benefited or may benefit wildlife include: closure orders, road decommissioning, the Lower Jemez Complex Development Restoration, Respect the Rio (which blocks vehicle access to riparian campsites), and all site-specific actions listed by the team that result in a decrease in motorized use on the forest. If a species is listed under the Endangered Species Act, it gains additional protection.

Past and future actions that either have cumulatively detracted or may detract from wildlife habitat include: subdivision and development of private inholdings, road construction for timber sales, development of mining claims, increased demand for forest products, advancement in off-highway vehicle technology, increase in the State's population, road maintenance agreements between the forest and counties, permittees, or private landowners (assuming these agreements result in an increase of road use due to an increase in regular maintenance), and all actions listed by the team that result in an increase in motorized use or road construction on the forest or projects improving the condition of roads or trails for public use. Actions such as development of private inholdings, road construction, and mining and, to a lesser extent, demand for forest products would cumulatively reduce the amount of land available for wildlife resources and

increase fragmentation of habitat within the project area. The other actions have the potential to cumulatively increase disturbance to wildlife resources through increased traffic on motorized routes.

Threatened and Endangered Species

The federally listed species and their critical habitat (if present) in the Santa Fe National Forest are:

- Rio Grande silvery minnow (endangered) – addressed in the "Fish" section of this report
- Mexican spotted owl (threatened)
- Southwestern willow flycatcher (endangered)
- Holy Ghost ipomopsis (endangered)

Mexican Spotted Owl – Affected Environment

The U.S. Fish and Wildlife Service listed the Mexican spotted owl as threatened in 1993. Timber harvest and high-intensity wildfire caused enough change in the Mexican spotted owl's habitat that its population declined.

Figure 56. A Mexican spotted owl (Photo Courtesy of U.S. Fish and Wildlife Service)

Mexican spotted owls live in steep, forested canyons that have high canopy closure, high stand density, a multilayered canopy, snags, and downed logs. They prefer forests dominated by mature Douglas-fir or white fir mixed with other species of pine. They nest in caves, cliff ledges, or old trees in steep canyons. Mexican spotted owls nest and breed in protected activity centers, which forest biologists delineate around nesting sites. The Santa Fe National Forest knows of 49 protected activity centers on about 33,000 acres, identified through annual surveys. The number of protected activity centers has increased from 19 found in 1989, primarily because of better monitoring and survey methods.

Critical habitat for the Mexican spotted owl contains at least one primary constituent element, those physical and biological features that support roosting, nesting, and foraging. Examples of primary constituent elements are forests with trees larger than 12 inches in diameter, water, canyon walls with crevices, or a wide range of tree and plant species. The Santa Fe National Forest contains four critical habitat units, totaling approximately 242,000 acres, in the Cuba, Jemez, and Pecos/Las Vegas Ranger Districts. An estimated 10 to 100 breeding pairs of Mexican spotted owls live in the Santa Fe National Forest.

Habitat in the Santa Fe National Forest for the Mexican spotted owl is declining. Fewer stands reach old-growth status because of past fire suppression, which has resulted in smaller, overcrowded forests (wildfires thin the forest). Younger forests do not provide the habitat required by Mexican spotted owls.

Mexican Spotted Owl – Environmental Consequences

Routes cause a loss of habitat for the Mexican spotted owl by fragmenting intact landscapes into smaller pieces. Because they serve as conduits for people, routes also contribute to habitat loss through wood collection and because owls tend to avoid people. Alternative 1 represents the most disturbances from routes, vehicles, and people because it has the most motorized use.

The reduction of routes and motorized cross-country travel associated with the action alternatives is likely to improve habitat and promote the recovery of the species (table 38). Alternatives 2 through 5 are all an improvement from the current condition, though alternative 3 reduces motorized use and routes the most in Mexican spotted owl habitat. Fewer routes means a more intact habitat without edges, less chance of owls being hit by vehicles, and fewer conduits by which people can disturb nests. All of the action alternatives include seasonal closures on motorized routes in Mexican spotted owl habitat, further reducing impacts to owls during the breeding season. Selection of any of the action alternatives may negatively impact individual Mexican spotted owls, but is not anticipated to appreciably reduce the likelihood of both the survival and recovery in the wild. Additionally, selection of any of the action alternatives will not appreciably diminish the value of constituent elements essential to the Mexican spotted owl's conservation.

Table 38. Comparison of miles of routes and route density in Mexican spotted owl habitat by alternative

		Alternative				
		1	**2**	**3**	**4**	**5**
Protected Activity Centers	Miles of routes not currently open for motorized use	31	6	3	13	7
	Total miles, all routes **Percent change from alternative 1**	117 **--**	37 **-68**	26 **-77**	50 **-57**	34 **-71**
	Route density	2.3	0.7	0.5	1.0	0.7
Critical Habitat	Miles of routes not currently open for motorized use	187	55	16	88	46
	Total miles, all routes **Percent change from alternative 1**	783 **--**	320 **-59**	221 **-72**	402 **-49**	302 **-61**
	Route density	2.1	0.8	0.6	1.1	0.8

Since 1995, timber harvest in the Santa Fe National Forest in Mexican spotted owl habitat has decreased. The U.S. Fish and Wildlife Service designated critical habitat in 2004. Along with shrinking the amount of roads and motorized trails, less timber harvest and designated, protected habitat would provide a cumulative benefit to the Mexican spotted owl and its habitat.

Southwestern Willow Flycatcher – Affected Environment

Southwestern willow flycatchers prefer habitat near gently flowing streams in wide open valleys. They nest in thickets of trees and shrubs and build their nests at ground level up to 13 feet. The average size of a flycatcher's breeding patch is approximately 20 acres, but has been found up to 175 acres in the upper Gila River. Biologists have named several kinds of habitat for the Southwestern willow flycatcher:

- **Currently suitable habitat** is at least 2.5 acres and consists of dense riparian shrubs and patches of trees, with at least 30 feet of riparian patches.
- **Potentially suitable habitat** occurs in flood plains where dense riparian vegetation could grow, but does not currently exist.
- **Unsuitable habitat** would not support dense riparian trees and shrubs.
- **Critical habitat** – The Santa Fe National Forest is in the Rio Grande Recovery Unit, but does not contain any critical habitat for the Southwestern willow flycatcher.

The Santa Fe National Forest has potentially suitable habitat (about 28,000 acres) along the Jemez, Rio Grande, and Pecos Rivers on the Jemez, Española, and Pecos/Las Vegas Ranger Districts.

No known populations of the Southwestern willow flycatcher live in the Santa Fe National Forest, and none has been sighted.

Southwestern Willow Flycatcher – Environmental Consequences

Studies have shown that developed recreational facilities and off-road vehicles threaten the Southwestern willow flycatcher's habitat. Roads in riparian areas bisect, and thus degrade, habitat. People engaging in recreational activities remove riparian vegetation (such as for campfires), which reduces the area flycatchers need to breed and grow and inhibit their behavior.

The brown-headed cowbird is a widespread and significant threat to the Southwestern willow flycatcher. Cowbirds engage in brood parasitism by laying their eggs in flycatcher nests; the unsuspecting flycatcher then raises a cowbird at the expense of her own. Cowbirds thrive in edge habitat along roads and trails. Thus, the number of routes may play a major role in promoting cowbird parasitism.

The miles of routes in potential habitat among alternatives ranges from 6.8 to 8.0 (table 39). The difference between alternatives, therefore, is small. Alternative 1, because it is most permissive about motorized use off roads, would be least effective at promoting suitable habitat for the Southwestern willow flycatcher.

Figure 57. A Southwestern willow flycatcher (Photo Jim Rorabaugh, Courtesy of U.S. Fish and Wildlife Service)

Table 39. Comparison of miles of routes and route density in Southwestern willow flycatcher habitat by alternative

		Alternative				
		1	**2**	**3**	**4**	**5**
Habitat for Southwestern willow flycatcher	Miles of routes not currently open for motorized use in potential habitat	0.1	0.7	0.7	1.1	1.1
	Total miles in potential habitat	8.0	6.8	6.8	7.2	7.2
	Percent change from alternative 1	**--**	**-15**	**-15**	**-10**	**-10**
	Route density	1.4	1.2	1.2	1.2	1.2

Selection of any of the action alternatives may affect, but is not likely to adversely affect the Southwestern willow flycatcher. Alternatives 2 through 5, which reduce motorized use near streams and in riparian areas, would increase the quality of the potential habitat for the Southwestern willow flycatcher. By not allowing driving off roads, the action alternatives also prevent people from driving across streams, which degrades habitat.

Holy Ghost Ipomopsis – Affected Environment

The Holy Ghost ipomopsis is a rare plant that lives in a 2-mile stretch of canyon in the Sangre de Cristo Mountains. It prefers dry, steep, west- and southwest-facing slopes in forests containing ponderosa pine, Douglas-fir, Gambel oak, and quaking aspen. The plants have colonized the cut and fill slopes along a National Forest System road, indicating a preference for open, disturbed areas.

Its small population, road maintenance, recreational activities, and high-intensity wildfires pose the main threats to the Holy Ghost ipomopsis. The entire population consists of 1,200 to 1,500 plants. About 80 percent live on the cut and fill slopes and the other 20 percent in naturally dry and open habitat higher up on canyon slopes.

Holy Ghost Ipomopsis – Environmental Consequences

This project would have no effect on the Holy Ghost ipomopsis because the road along which it lives would remain the same under all the alternatives. Because there are no direct or indirect effects, there would be no cumulative effects.

Sensitive Species – Affected Environment and Environmental Consequences

A sensitive species is one that could become threatened or endangered if its habitat is lost. They tend to be less abundant than management indicator species. The Santa Fe National Forest has 43 sensitive species. Three of them—Botta's pocket gopher, Rocky Mountain bighorn sheep, and Lilljeborg's pea-clam—do not live in places affected by this project, so we won't discuss them further.

We divide the sensitive species into amphibians, birds, mammals, and plants when discussing their habitats and the potential effects from changing the forests' designated motorized system.

The biological evaluation contains a detailed description of habitats. Given the number of species, we have simplified the discussion into tables. Unless noted, the cumulative effects are the same as those described above for all species.

Amphibians

None of the action alternatives is likely to result in a trend toward Federal listing or a loss of species viability (table 40). Individuals may be impacted since motorized use of the forest is not being entirely eliminated. Reducing the places where people can drive in the forest would improve the quality of habitat for amphibians by keeping vegetation in place, lessening erosion, diminishing the chance of being run over, and allowing better movement and dispersal.

Table 40. Comparison of miles of routes in potential amphibian habitat by species and alternative

Species	Habitat	Acres of Potential Habitat	Routes in Potential Habitat, Miles	Alternative				
				1	2	3	4	5
Jemez Mountain salamander	Mixed conifer with rocks and logs, especially north-facing slopes	239,000 (33,100 essential or occupied)	Routes not currently open for motorized use	63	9	0	21	6
			Total **Percent change**	138 **--**	58 **-58**	34 **-76**	70 **-49**	45 **-67**
			Route density	2.7	1.1	0.7	1.4	0.9
Northern leopard frog	Springs, marshes, wet meadows	57,600	Routes not currently open for motorized use	60	23	16	39	32
			Total **Percent change**	342 **--**	200 **-41**	171 **-50**	224 **-35**	206 **-40**
			Route density	3.8	2.2	1.9	2.5	2.3

Birds

None of the action alternatives is likely to result in a trend toward Federal listing or a loss of species viability (table 41). Individuals may be impacted since motorized use of the forest is not being entirely eliminated. Reducing the places where motorized use may occur in the forest would improve the quality of habitat for birds by reducing fragmentation, having fewer interactions with humans, and lessening the chance of direct mortality.

No bald eagle nests are known on the forest, and wintering habitat is limited. Thus, no change is expected by implementing any of the action alternatives.

An activity that could cumulatively offset benefits to the peregrine falcon is the collection of eyases (young hawks) for falconry; the New Mexico Department of Game and Fish permits the collection of up to two eyas annually.

Table 41. Comparison of miles of routes in potential bird habitat by species and alternative

Species	Habitat	Acres of Potential Habitat	Routes in Potential Habitat, Miles	Alternative				
				1	2	3	4	5
White-tailed ptarmigan	Alpine ecosystems above 10,500 feet elevation	137,300	Routes not currently open for motorized use	2	0	0	1	1
			Total	81	30	25	32	27
			Percent change	--	**-62**	**-69**	**-60**	**-67**
			Route density	0.4	0.1	0.1	0.2	0.1
Northern goshawk	Coniferous forests in a variety of structural stages	27,000	Routes not currently open for motorized use	10	5	2	6	5
			Total	90	41	29	46	39
			Percent change	--	**-55**	**-68**	**-49**	**-57**
			Route density	2.1	1.0	0.7	1.1	0.9
American peregrine falcon	Variety of grasslands and forests with cliffs	236,000	Routes not currently open for motorized use	137	31	8	71	27
			Total	496	254	198	298	238
			Percent change	--	**-49**	**-60**	**-40**	**-52**
			Route density	1.3	0.7	0.5	0.8	0.6
Western yellow-billed cuckoo	Mature riparian cottonwood and willow woodlands	2,200	Routes not currently open for motorized use	2	1	1	2	1
			Total	9	6	6	6	6
			Percent change	--	**-37**	**-37**	**-34**	**-37**
			Route density	2.7	1.6	1.6	1.7	1.6
Burrowing owl	Grasslands, open shrublands, and woodlands	70,000	Routes not currently open for motorized use	18	2	1	13	10
			Total	466	207	165	257	236
			Percent change	--	**-56**	**-65**	**-45**	**-49**
			Route density	4.3	1.9	1.5	2.4	2.2
Boreal owl	Spruce-fir forests above 9,500 feet elevation	195,000	Routes not currently open for motorized use	43	24	5	37	28
			Total	179	94	61	116	96
			Percent change	--	**-47**	**-66**	**-35**	**-46**
			Route density	0.6	0.3	0.2	0.4	0.3
Gray vireo	Piñon-juniper woodlands with various shrubs and grasses	199,000	Routes not currently open for motorized use	38	12	7	26	23
			Total	354	173	123	200	189
			Percent change	--	**-51**	**-65**	**-43**	**-47**
			Route density	1.1	0.6	0.4	0.6	0.6

Mammals

None of the action alternatives is likely to result in a trend toward Federal listing or a loss of species viability (table 42). Individuals may be impacted since motorized use of the forest is not being entirely eliminated. Reducing the places where motorized use may occur in the forest

would improve the quality of habitat for mammals by reducing fragmentation and barriers to movement (this improves genetic variation), having fewer interactions with humans, keeping vegetation intact, and lessening the chance of direct mortality.

For the New Mexico meadow jumping mouse, grazing by livestock could cumulatively offset some of the benefits gained from closing routes.

Table 42. Comparison of miles of routes in potential mammal habitat by species and alternative

Species	Habitat	Acres of Potential Habitat	Routes in Potential Habitat, Miles	Alternative				
				1	2	3	4	5
Cinereus (masked) shrew	Riparian areas in subalpine coniferous forest	269,000	Routes not currently open for motorized use	68	32	6	49	31
			Total	413	178	130	223	181
			Percent change	--	**-57**	**-69**	**-46**	**-56**
			Route density	1.0	0.4	0.3	0.5	0.4
Dwarf shrew	Talus and rocky areas in Douglas-fir forests	335,000	Routes not currently open for motorized use	208	83	11	138	74
			Total	1,154	491	334	611	465
			Percent change	--	**-57**	**-71**	**-47**	**-60**
			Route density	2.2	0.9	0.6	1.2	0.9
Water shrew and Preble's shrew	Near perennial streams in Santa Fe National Forest mountain ranges	77,000	Routes not currently open for motorized use	61	23	16	39	32
			Total	345	201	171	224	207
			Percent change	--	**-42**	**-50**	**-35**	**-40**
			Route density	2.9	1.7	1.4	1.9	1.7
Spotted bat	Variety, including riparian, woodlands, and forests	77,000	Routes not currently open for motorized use	61	23	16	39	32
			Total	345	201	171	224	207
			Percent change	--	**-42**	**-50**	**-35**	**-40**
			Route density	2.9	1.7	1.4	1.9	1.7
Pale Townsend's big-eared bat	Areas having caves	303,000	Routes not currently open for motorized use	51	25	17	56	40
			Total	721	342	300	430	368
			Percent change	--	**-53**	**-58**	**-40**	**-49**
			Route density	1.5	0.7	0.6	0.9	0.8

Table 42. Comparison of miles of routes in potential mammal habitat by species and alternative

Species	Habitat	Acres of Potential Habitat	Routes in Potential Habitat, Miles	Alternative				
				1	2	3	4	5
Pika	Talus slopes adjacent to meadows	86,000	Routes not currently open for motorized use	1	0	0	0	0
			Total	39	16	13	16	13
			Percent change	--	**-60**	**-66**	**-60**	**-66**
			Route density	0.3	0.1	0.1	0.1	0.1
Goat Peak pika	Talus slopes adjacent to meadows in the Jemez Mountains	7,000	Routes not currently open for motorized use	6	3	1	3	3
			Total	17	10	7	10	10
			Percent change	--	**-41**	**-60**	**-41**	**-41**
			Route density	1.4	0.9	0.6	0.9	0.9
Snowshoe hare	Dense spruce-fir forest with dense understory	125,000	Routes not currently open for motorized use	2	0	0	1	1
			Total	43	15	14	19	17
			Percent change	--	**-65**	**-68**	**-57**	**-61**
			Route density	0.2	0.1	0.1	0.1	0.1
Yellow-bellied marmot	Sloped alpine tundra, subalpine and montane meadows	35,000	Routes not currently open for motorized use	1	1	0	1	0
			Total	41	24	23	26	24
			Percent change	--	**-41**	**-44**	**-37**	**-43**
			Route density	0.8	0.4	0.4	0.5	0.4
Gunnison's prairie dog	Short- and mid-grass prairies	143,000	Routes not currently open for motorized use	63	16	8	38	28
			Total	915	421	333	517	466
			Percent change	--	**-54**	**-64**	**-44**	**-49**
			Route density	4.1	1.9	1.5	2.3	2.1
NM banner-tailed kangaroo rat	Desert grasslands with scattered shrubs	95,000	Routes not currently open for motorized use	30	5	2	19	15
			Total	538	233	181	298	278
			Percent change	--	**-57**	**-66**	**-45**	**-48**
			Route density	3.6	1.6	1.2	2.0	1.9
Southern red-backed vole	Cool, wet sites in spruce-fir forest	497,000	Routes not currently open for motorized use	229	94	15	154	88
			Total	1,245	541	367	668	516
			Percent change	--	**-57**	**-71**	**-46**	**-59**
			Route density	1.6	0.7	0.5	0.9	0.7

Table 42. Comparison of miles of routes in potential mammal habitat by species and alternative

Species	Habitat	Acres of Potential Habitat	Routes in Potential Habitat, Miles	Alternative				
				1	2	3	4	5
Western heather vole	High-altitude montane forests with dense grasses	292,000	Routes not currently open for motorized use	12	5	2	14	4
			Total	315	111	94	147	112
			Percent change	**--**	**-65**	**-70**	**-53**	**-64**
			Route density	0.7	0.2	0.2	0.3	0.2
Long-tailed vole	Coniferous forest with a grassy floor and near meadows	77,000	Routes not currently open for motorized use	61	23	16	39	32
			Total	345	201	171	224	207
			Percent change	**--**	**-42**	**-50**	**-35**	**-40**
			Route density	2.9	1.7	1.4	1.9	1.7
Meadow (NM) jumping mouse	Near perennial streams in places with wet soils and riparian vegetation	29,000	Routes not currently open for motorized use	40	16	12	25	21
			Total	174	103	87	117	106
			Percent change	**--**	**-41**	**-50**	**-33**	**-39**
			Route density	3.9	2.3	1.9	2.6	2.4
American marten	Old-growth spruce-fir forest	269,000	Routes not currently open for motorized use	65	40	8	58	43
			Total	336	176	114	211	174
			Percent change	**--**	**-48**	**-66**	**-37**	**-48**
			Route density	0.8	0.4	0.3	0.5	0.4
Ermine	High-altitude mixed conifer forest	368,000	Routes not currently open for motorized use	144	64	18	107	71
			Total	846	414	303	497	412
			Percent change	--	-51	-64	-41	-51
			Route density	1.5	0.7	0.5	0.9	0.7
Mink	Close to permanent water sources, such as large rivers	110,000	Routes not currently open for motorized use	73	28	19	48	38
			Total	555	301	250	345	312
			Percent change	**--**	**-46**	**-55**	**-38**	**-44**
			Route density	3.2	1.7	1.4	2.0	1.8

Plants

None of the action alternatives is likely to result in a trend toward Federal listing or a loss of species viability (table 43). Individuals may be impacted since motorized use of the forest is not being entirely eliminated. Reducing the places where people can drive in the forest would improve the quality of habitat for plants by keeping vegetation intact, reducing the competition from invasive species, increasing genetic variability (less fragmented habitat), and lessening the chance of direct mortality by being run over.

Table 43. Comparison of miles of routes in potential plant habitat by species and alternative

Species	Habitat	Acres of Potential Habitat	Routes in Potential Habitat, Miles	Alternative				
				1	2	3	4	5
Tufted sand verbena	Hills and ridges of gypsum	10,000	Routes not currently open for motorized use	4	4	2	5	5
			Total	34	24	21	26	23
			Percent change	--	**-30**	**-38**	**-24**	**-32**
			Route density	2.3	1.6	1.4	1.7	1.5
Greene milkweed	Plains, open hills, and low slopes	32,000	Routes not currently open for motorized use	7	1	0	3	1
			Total	204	77	55	100	91
			Percent change	--	**-62**	**-73**	**-51**	**-56**
			Route density	4.0	1.5	1.1	2.0	1.8
Chaco milkvetch	Outcrops of sandstone in piñon-juniper woodland	108,000	Routes not currently open for motorized use	7	8	4	13	6
			Total	193	102	82	118	94
			Percent change	--	**-47**	**-58**	**-39**	**-51**
			Route density	1.1	0.6	0.5	0.7	0.6
Pecos mariposa lily	High-altitude meadows and aspen glades	52,000	Routes not currently open for motorized use	15	7	1	12	9
			Total	45	21	11	29	22
			Percent change	--	**-52**	**-76**	**-36**	**-51**
			Route density	0.6	0.3	0.1	0.4	0.3
Yellow lady's slipper	Fir, pine, and aspen forests, usually near water	73,000	Routes not currently open for motorized use	61	19	14	35	28
			Total	383	216	185	241	219
			Percent change	--	**-44**	**-52**	**-37**	**-43**
			Route density	3.3	1.9	1.6	2.1	1.9
Robust larkspur	Canyon bottoms and aspen groves	103,000	Routes not currently open for motorized use	68	28	14	45	36
			Total	360	197	161	225	200
			Percent change	--	**-45**	**-55**	**-37**	**-45**
			Route density	2.2	1.2	1.0	1.4	1.2

Table 43. Comparison of miles of routes in potential plant habitat by species and alternative

Species	Habitat	Acres of Potential Habitat	Routes in Potential Habitat, Miles	Alternative				
				1	2	3	4	5
Pecos fleabane	Rocky, open meadows in subalpine coniferous forest	5,000	Routes not currently open for motorized use	0	0	0	0	0
			Total **Percent change**	9 --	5 **-43**	5 **-46**	5 **-43**	5 **-46**
			Route density	1.0	0.6	0.6	0.6	0.6
Wood lily	Well-drained soils rich in humus	63,000	Routes not currently open for motorized use	17	4	2	11	10
			Total **Percent change**	162 --	66 **-59**	50 **-69**	81 **-50**	67 **-58**
			Route density	1.7	0.7	0.5	0.8	0.7
Chama blazing star	Upper Chama River valley on disturbed areas	3,000	Routes not currently open for motorized use	0	0	0	0	0
			Total **Percent change**	5 --	4 **-24**	4 **-24**	4 **-24**	4 **-24**
			Route density	1.0	0.8	0.8	0.8	0.8
Springer's blazing star	Volcanic pumice in piñon-juniper woodlands	16,000	Routes not currently open for motorized use	6	1	2	6	2
			Total **Percent change**	49 --	27 **-46**	21 **-57**	32 **-35**	27 **-44**
			Route density	1.9	1.1	0.8	1.3	1.1
Arizona willow	Sedge meadow and wet drainages in subalpine coniferous forest	14,000	Routes not currently open for motorized use	0	0	0	0	0
			Total **Percent change**	3 --	1 **-77**	1 **-83**	1 **-70**	1 **-70**
			Route density	0.1	0.0	0.0	0.0	0.0

For the tufted sand verbena, an increasing population could increase the demand for this rare plant; collecting plants could cumulatively offset some of the benefits gained by closing routes to motorized use. Similarly, Pueblo people used milkweeds and Arizona willow for food and medicine, and might continue collecting them today. Nonnative people looking to use natural remedies might also put pressure on milkweed and willow populations.

Management Indicator Species – Affected Environment

The Santa Fe National Forest selected its management indicator species to represent certain habitats. A management indicator species acts as a signal for changes in habitat. If the population of a management indicator species changes, it could be a result of forest management. The "Environmental Impact Statement for the Santa Fe National Forest Plan" explains why we chose the management indicator species we did and what habitats they represent.

The forest's management indicator species are: Rocky Mountain bighorn sheep, Rocky Mountain elk, Merriam's turkey, mourning dove, hairy woodpecker, piñon jay, Mexican spotted owl, and Rio Grande cutthroat trout (table 44). Rocky Mountain bighorn sheep live in the Pecos Wilderness, where motorized travel is not allowed. Thus, none of the alternatives would affect its habitat, so we won't discuss it further. We analyzed the effects to Rio Grande cutthroat trout in the "Fisheries" section of this report. Effects to the Mexican spotted owl are described earlier in the "Threatened and Endangered Species" section.

Table 44. The forest's management indicator species, their habitats and population trends

Management Indicator Species	Habitat Type	Acres of Habitat	Habitat Trend	Population Trend	Comment
Rocky Mountain elk	Variety of forested and open landscapes	574,000	Increasing	1,000 to 10,000 breeding females on the forest. Ranked as common.	NM Department of Game and Fish controls population with special hunts.
Mexican spotted owl	Douglas-fir and white fir dominated forest with high canopy closure and stand density; a multilayered canopy; snags and downed logs; steep slopes, canyons, and rocky cliffs.	32,900 in protected activity centers; 242,000 in critical habitat	Declining	10 to 100 breeding pair. There are 47 known PACs on the forest, up from 19 in 1989. This increase is most likely due to better detection.	The most serious threat to Mexican spotted owls is wildfire and timber harvest. Lesser threats are unregulated firewood harvesting, grazing, and ski areas. Data on effects to owls from vehicles is sparse in the scientific literature.
Merriam's turkey	Variety of forested land, especially ponderosa pine with a robust understory, with small clearings and mast-producing trees.	443,000	Stable to increasing	1,000 to 10,000 breeding females on the forest. Ranked as common.	NM Department of Game and Fish controls population by adjusting the length of the hunting season and number of birds allowed to be taken.
Hairy woodpecker	Mature forests and woodlands	857,000	Stable to increasing	10,000 to 100,000 breeding females on the forest. Ranked as abundant.	The hairy woodpecker is a forest generalist, and one of the most common in the Southwest.
Piñon jay	Piñon-juniper woodlands with mast-producing plants	407,000	Declining	1,000 to 10,000 breeding pairs on the forest. Ranked as uncommon to locally abundant, but on a downward trend.	Beginning in 2002, severe drought caused about 65,000 acres of piñon stands on the forest to die.
Mourning dove	Mid- to low-elevation grasslands, woodlands, and ponderosa pine, usually below 7,000 feet.	1,003,000	Abundant	Stable. 1,000 to 10,000 breeding pairs on the forest. Ranked as common.	

Because studies have shown that routes and vehicles disturb wildlife, we use the miles of roads and motorized trails being used or proposed as a proxy for disturbance. We also use open public route density in the species' habitats as modeled by forest personnel. In general, landscapes with a high density of routes diminish habitat for large mammals.

Management Indicator Species – Environmental Consequences

Direct and Indirect Effects, Alternative 1

Alternative 1, the existing condition, would have the most motorized use. Despite this, management indicator species except Mexican spotted owl and piñon jay have sustained or increased their population. This is likely due to factors other than roads and motorized trails, which generally have a negative effect on habitats.

Direct and Indirect Effects Common to All Management Indicator Species, Alternatives 2 Through 5

Since alternatives 2 through 5 reduce the places on the forest where motorized use is allowed, selection of any of the action alternatives is not likely to result in a trend toward Federal listing or loss of viability of any management indicator species. Any of the alternatives may, however, impact individual animals.

Mexican Spotted Owl

The habitat requirements and quantitative analysis for the Mexican spotted owl is described in the "Threatened and Endangered Species" section above. Mexican spotted owls serve as a management indicator for late seral stage mixed conifer habitat. Though Mexican spotted owls are a wide-ranging species influenced by many factors outside the national forest, alternatives 2 through 5 would reduce the miles of motorized routes and limit the amount of driving off road. This will likely improve habitat by reducing disturbance and improve the owl population on the forest.

Rocky Mountain Elk

Alternatives 2 through 5 are likely to improve elk habitat and, therefore, likely to result in an increasing population trend over time. All action alternatives would lessen the disturbance to elk and their habitat from vehicles and people by limiting the miles of routes in calving areas and crucial winter and summer range compared to alternative 1, the existing condition (figure 58). Reducing the miles of routes open to motorized use would reduce the potential for direct mortality, fragmentation of suitable habitat, poaching opportunities, and

Figure 58. Rocky Mountain elk (Photo Courtesy Rocky Mountain Elk Foundation)

displacement or avoidance. The action alternatives also limit driving off roads to corridors (alternatives 2, 4, and 5) or eliminate it altogether (alternative 3). This reduces the effects of motorized use on wildlife described in the affected environment. Seasonal closures for elk calving and in winter range protect the animals from being disturbed by vehicles during these periods of stress.

Table 45. Comparison of miles of routes and route density in Rocky Mountain elk habitat by alternative

		Alternative				
		1	**2**	**3**	**4**	**5**
Calving areas	Miles of routes not currently open for motorized use	123	39	12	81	55
	Total miles, all routes **Percent change from alternative 1**	549 **--**	213 **-61**	145 **-74**	288 **-48**	213 **-61**
	Route density	2.1	0.8	0.5	1.1	0.8
Crucial winter range	Miles of routes not currently open for motorized use	0	0	0	0	0
	Total miles, all routes **Percent change from alternative 1**	36 **--**	28 **-23**	19 **-46**	28 **-23**	28 **-23**
	Route density	1.8	1.4	1.0	1.4	1.4
Crucial summer range	Miles of routes not currently open for motorized use	97	32	14	73	41
	Total miles, all routes **Percent change from alternative 1**	1,250 **--**	522 **-58**	403 **-68**	641 **-49**	489 **-61**
	Route density	1.4	0.6	0.4	0.7	0.5

Merriam's Turkey

Reducing the miles of motorized routes and limiting the amount of driving off roads is likely to improve habitat for and lessen disturbance to Merriam's turkey and, therefore, likely to result in an increasing population trend over time (table 46).

Table 46. Comparison of miles of routes and route density in Merriam's turkey habitat by alternative

		Alternative				
		1	**2**	**3**	**4**	**5**
Habitat for Merriam's turkey	Miles of routes not currently open for motorized use	258	93	39	144	105
	Total miles, all routes **Percent change from alternative 1**	1,989 **--**	958 **-52**	703 **-65**	1,099 **-45**	912 **-54**
	Route density	2.9	1.4	1.0	1.6	1.3

Reducing the places where vehicles can go would cumulatively benefit Merriam's turkey and its habitat. The forest has improved turkey habitat by thinning, building wildlife drinkers, burning in ponderosa pine, and creating piles of slash for nesting habitat. Most of these projects have been less than 100 acres in size. Low-intensity wildfires also benefit turkeys by creating openings. The larger fires, on the other hand, have had a net negative effect because they tend to change the habitat entirely to something else. Livestock grazing is having a slight negative effect, but not enough to affect turkey habitat.

Figure 59. Merriam's turkeys (left) and hairy woodpecker (right) (Photos courtesy of National Wild Turkey Federation and Cornell Lab of Ornithology)

Hairy Woodpecker

Reducing the miles of motorized routes and limiting the amount of driving off roads is likely to improve habitat for and lessen disturbance to the hairy woodpecker and, therefore, likely to result in an increasing population trend over time (table 47).

Table 47. Comparison of miles of routes and route density in hairy woodpecker habitat by alternative

		Alternative				
		1	2	3	4	5
Habitat for hairy woodpecker	Miles of routes not currently open for motorized use	489	189	54	305	197
	Total miles, all routes	3,299	1,527	1,090	1,803	1,453
	Percent change from alternative 1	**--**	**-54**	**-67**	**-45**	**-56**
	Route density	2.5	1.1	0.8	1.3	1.1

Piñon Jay

Though data on the effects of motorized use on jays are limited, reducing the miles of motorized routes and limiting the amount of driving off roads is likely to improve habitat for and lessen disturbance to piñon jay for the general reasons described earlier. This, therefore, is likely to result in an increasing population trend over time.

Cumulatively, reducing the places where people can drive on the forest could slightly offset the detrimental effects of other projects and natural events. Beginning in 2002, severe drought caused about 65,000 acres of piñon stands in the forest to die. Some piñon-juniper stands are being treated with mechanical and fire treatments to restore the land to grassland, which removes the trees the jays depend on. People who collect piñon nuts may also compete for the jay's food source. The forest's managed firewood collection program enhances piñon jay habitat by promoting the growth of large, nut-producing piñon trees and reducing the risk of crown fires.

Table 48. Comparison of miles of routes and route density in piñon jay habitat by alternative

		Alternative				
		1	**2**	**3**	**4**	**5**
Habitat for piñon jay	Miles of routes not currently open for motorized use	64	27	14	55	38
	Total miles, all routes	825	375	277	448	392
	Percent change from alternative 1	**--**	**-54**	**-66**	**-46**	**-53**
	Route density	1.3	0.6	0.4	0.7	0.6

Figure 60. Piñon jay (left) and mourning dove (right) (Photos courtesy of National Park Service)

Mourning Dove

Reducing the miles of motorized routes and limiting the amount of driving off roads is likely to improve habitat for and lessen disturbance to dove by limiting the fragmentation of its habitat. This, therefore, is likely to result in an increasing population trend over time.

Reducing the places vehicles can drive is not likely to cumulatively change the habitat trend or population of mourning doves in the Santa Fe National Forest since they are already abundant and the cumulative effects are minor. Overhunting and loss of habitat to private development are

the primary threats to mourning doves, and neither is occurring in the forest. Burned areas contribute to dove habitat.

Table 49. Comparison of miles of routes and route density in mourning dove habitat by alternative

		Alternative				
		1	2	3	4	5
Habitat for mourning dove	Miles of routes not currently open for motorized use	384	135	32	237	171
	Total miles, all routes **Percent change from alternative 1**	3,716 **--**	1,741 **-53**	1,301 **-65**	2,049 **-45**	1,754 **-53**
	Route density	2.4	1.1	0.8	1.3	1.1

Migratory Birds – Affected Environment

A migratory bird spends all or part of its life in the United States. It is a nongame bird. Many migratory birds need active conservation measures to prevent habitat loss and reduce their likelihood of being listed under the Endangered Species Act. Others, like Canada geese, are thriving without active conservation measures. The migratory birds we consider are the birds of conservation concern, identified jointly by the U.S. Fish and Wildlife Service and the Forest Service. We also looked at important bird areas in the Santa Fe National Forest.

The following birds of conservation concern represent habitat for all migratory birds on the forest: bald eagle, peregrine falcon, yellow-billed cuckoo, burrowing owl, gray vireo, and piñon jay. All except the piñon jay appear on the Regional Forester's sensitive species list as well. The piñon jay is one of the forest's management indicator species. Bald eagle nests have not been found on the forest, but wintering eagles have been documented. Habitat for the other birds ranges from 2,200 to 407,000 acres. Habitat for the piñon jay (407,000 acres) is declining due to the drought that killed about 65,000 acres of piñon trees in 2002.

Figure 61. A long-billed curlew, one of the Southern Rockies/Colorado Plateau Bird Conservation Region's migratory birds (Photo Bob Gress, Courtesy of U.S. Fish and Wildlife Service)

The Santa Fe National Forest lies within the Southern Rockies/Colorado Plateau Bird Conservation Region. The list of birds in this region is in the wildlife specialist report. Of these, the bald eagle, peregrine falcon, yellow-billed cuckoo, burrowing owl, gray vireo, and piñon jay are also on the Regional Forester's sensitive species list. Since these species adequately represent habitat for all migratory birds on the forest, we use them to consider the potential mortality, or take, of all migratory birds from this project. We analyze the effects to these species in the "Sensitive Species" section.

The forest's important bird areas are the Chama River Gorge/Golondrina Mesa and the Caja del Rio plateau. The Chama River Gorge/Golondrina important bird area is in the Chama River

Canyon Wilderness, where no motorized use is allowed so this project will not affect it. The Caja del Rio plateau lies in the southern portion of the Española Ranger District, west of the city of Santa Fe. The Bureau of Land Management and the Santa Fe National Forest manage the land in this important bird area. Most of this area is open to motorized cross-country travel now.

Migratory Birds – Environmental Consequences

All action alternatives are consistent with the 1918 Migratory Bird Treaty Act and the Migratory Bird Executive Order 13186. Alternatives 2 through 5 would reduce motorized use on the forest compared to alternative 1. This, in turn, improves habitat and reduces mortality—or "take"—from collisions with vehicles. Eliminating motorized use off roads (or limiting it to corridors) will reduce the unintentional take caused by wheels crushing ground- and brush-nesting birds, their eggs, and their chicks.

For the reasons just described, the action alternatives would improve habitat for migratory birds and reduce take in the Caja del Rio plateau important bird area. There would be no effect to the Chama River Gorge/Golondrina important bird area. It lies in the Chama River Canyon Wilderness, where motorized use is prohibited by law. None of the action alternatives changes this.

Effects of Forest Plan Amendments on Wildlife

The effect of closing the forest to driving off roads would improve habitat for wildlife and plants, as described throughout this section. The effect of allowing motorized use in some places where it had not been previously allowed would be negligible to wildlife and plants, given the area of their habitats is much greater than these exceptions. These places are already being used, so there would be no change by designating these routes and making them part of the system.

Nonnative Invasive Plants – Affected Environment

This section summarizes the nonnative invasive plant specialist report, located in the project record (USDA Forest Service 2010h).

"Invasive" plants concern some people because they invade and persist in native plant communities, often dominating and displacing the native species. Invasive plants tend to change the character of native ecological communities. When weeds take over, habitats and food for small animals like rodents decline or disappear. This, in turn, means predators like hawks and coyotes also have less food, so the whole balance of the ecosystem is upset. Russian and spotted knapweed (figure 62) and some thistles are common examples of invasive plants around the Santa Fe National Forest.

Figure 62. Spotted knapweed (photo from Noxious and Nuisance Plant Management Information System, USDA-ARS)

The public expressed this concern about nonnative invasive plants:

Continued public motorized use of routes and areas described in the proposed action will adversely affect forest resources. These effects include the spread of invasive plant species.

Roads and trails are pathways along which invasive plants move from one area to another, crossing barriers that would normally stop or slow their spread. As an example, seeds can lodge in tires, travel to the forest, then dislodge along a dirt road. Wind, water, livestock, wildlife, vehicles, pets, and human foot traffic all spread invasive plants. On the Santa Fe National Forest, however, the vast majority of nonnative invasive plants occur along roads and trails. The disturbed ground along roads and trails and in camping areas provides habitat most conducive to invasive plants. Vehicles tend to carry and distribute invasive weeds and their seeds farther and more easily from offsite sources than does hiking, for example. Thus, motor vehicle use of roads and trails would likely lead to an increase in the number and scale of weed populations; this effect has been well documented (Hansen and Clevenger 2005).

To illustrate the potential spread of invasive plants from motorized use among alternatives, we use three measures.

Measure 1: Miles of designated routes and fixed-distance corridors traversing known populations of invasive species. Vehicles are more likely to transport seeds where they encounter existing populations. This measure shows the relative opportunity of weed spread from vehicles crossing existing invasive plant populations.

Measure 2: Miles of routes open to any kind of vehicle use. This shows the difference in potential pathways. It includes any route open to any kind of motorized use since all vehicles are capable of spreading invasive plants.

Measure 3: Acres of areas open to motorized cross-country travel. This measure includes areas and the acres in fixed-distance corridors because the latter allows limited travel off roads for the specific purposes of dispersed camping and retrieval of big game. Driving off road can spread weeds into areas where they did not previously exist, so this measure illustrates the potential for new populations. New user-created routes increase the risk of transport, introduction, and establishment of new populations of invasive species.

Nonnative Invasive Plants – Environmental Consequences

Effects Common to All Alternatives

All alternatives, because they allow people to use the forest, have the potential for new populations of invasive species to become established. The number of new weed populations on the Santa Fe National Forest tends to be greater at lower elevations and in areas with higher open road and trail densities. These sites are warmer, drier, and typically exhibit some level of soil disturbance (USDA Forest Service 2005). Table 50 displays the measures for each of the alternatives, and the relative change from the existing condition, alternative 1.

Table 50. Measures for invasive species analysis

Measure	Alternative				
	1	2	3	4	5
Miles of routes traversing an existing invasive species population	79	57	49	58	54
Percent change from alternative 1	--	**-28**	**-38**	**-27**	**-32**
Miles of routes having any kind of vehicle use	5,457	2,552	1,882	3,010	2,536
Percent change from alternative 1	--	**-53**	**-66**	**-45**	**-54**
Acres where driving off road is allowed (area or fixed-distance corridor)*	1,266,910	16,380	0	1,065,539	377,748
Percent change from alternative 1	--	**-99**	**-100**	**-16**	**-70**

*The nonnative invasive plant report provides an explanation of how the acres in this row are calculated.

The potential increase in invasive plant infestations would be a direct result of seeds being transported along roads, trails, and areas having motorized cross-country travel. Once established, weed populations may spread through other kinds of transport. Along roads, wind, livestock, and vehicles are the most likely carriers. Along trails, hiking or other non-motorized activities could also spread weeds into more ecologically sensitive areas.

Direct and Indirect Effects, Alternative 1

The likelihood and potential extent of weed spread from motorized vehicles is highest under alternative 1, the current condition. Of all the alternatives, it permits the most motorized use on the Santa Fe National Forest. The potential for weeds and seeds to be spread by vehicles is greater due to the high number of open roads and trails in this alternative. Not having any seasonal restriction on motorized cross-country travel may increase the potential for invasives to be transported into previously “clean” areas.

It is not possible to predict how many new weed populations would be established as the result of motorized cross-country travel, but they would likely expand into new places. Off-highway vehicle tracks, with repeated use, can become established routes, which then provide habitat conducive to invasive species establishment.

Cumulative Effects, Alternative 1

There would be no change in the rate of spread of weeds under alternative 1, the existing condition. Even with direct treatment of weeds, the cumulative effect of alternative 1 is that invasive plants are likely to increase in extent and number.

Most of the past, present, and reasonably foreseeable future actions on the Santa Fe National Forest tend to increase the risk of new weed infestations. On the other hand, the direct treatment of weeds can reduce or control weed populations. Currently, the forest can treat weeds if it does a site-specific analysis. It is working on a forestwide environmental impact statement that will propose a full suite of treatment methods, including herbicides, at the forestwide scale. Weed control efforts by other agencies and individuals may reduce the spread of weeds by having fewer weeds entering the forest from adjacent properties.

Direct and Indirect Effects, Alternatives 2 Through 5

All the action alternatives are expected to reduce the risk of new weed populations being established, mainly by preventing motorized cross-country travel. It is not possible to precisely predict how many new populations of invasive species would be prevented. None of the action alternatives would entirely prevent the establishment and spread of invasive species because some level of motorized and human use of the forest would continue.

As stated earlier, motorized travel off roads results in an increased potential for invasive species transport, introduction, and establishment. Alternatives 2, 4, and 5 allow motorized travel off roads in areas for dispersed camping and retrieval of downed big game and, thus, have a higher likelihood of having new weed infestations. Places used for dispersed camping tend to be more easily infested with weeds than do access routes used for motorized big game retrieval. Camping areas are often highly disturbed, lack vegetation, and used frequently, whereas access routes for big game retrieval are not used repeatedly and tend to have minimal ground disturbance. In addition, motorized big game retrieval is limited to hunting season, and no seasonal restriction for dispersed camping exists unless the route itself is closed seasonally.

Under alternative 2, the likelihood and potential extent of weed spread from motorized vehicles is less than alternative 1, and considered moderate overall. Though it continues to allow motorized travel off roads, this is limited primarily to 150- or 300-foot fixed-distance corridors solely for dispersed camping and big game retrieval. Because the motorized use in fixed-distance corridors is restricted—a fixed distance from certain designated routes, and only for those two purposes—it reduces the risk of transport and introduction of invasive species.

Alternative 3 reduces the likelihood and potential extent of weed spread the most as compared to alternative 1. Overall, it would have the lowest risk of potential spread of all the action alternatives because it reduces the miles of designated routes the most (66 percent) and completely eliminates motorized travel off routes for any purpose.

Under alternative 4, the likelihood and potential extent of weed spread from motorized vehicles is less than alternative 1, but more than any of the action alternatives. The amount of motorized travel off roads is less than alternative 1 because it is limited in space to 300-foot corridors for camping and 1-mile corridors for big game retrieval. The latter is also limited in time to hunting season, but the spatial area covered is most of the forest. Because motorized use in fixed-distance corridors is restricted—a fixed distance from certain designated routes, and only for those two purposes—it reduces the risk of transport and introduction of invasive species as compared to alternative 1.

Under alternative 5, the likelihood and potential extent of weed spread from motorized vehicles is less than alternative 1, and considered moderate to high overall compared to the action alternatives. The amount of motorized travel off roads is less than alternative 1 because it is limited in space to 150- or 300-foot corridors for camping and 1-mile corridors off some main routes for big game retrieval. The latter is also limited in time, to hunting season. Because the motorized use in fixed-distance corridors is restricted—a fixed distance from certain designated routes, and only for those two purposes—it reduces the risk of transport and introduction of invasive species as compared to alternative 1. Because the motorized big game retrieval corridors in alternative 5 are limited to main routes, they cover less area than in alternative 4.

Cumulative Effects, All Action Alternatives

The proposal to provide for a designated system of roads, trails, and areas for motorized use could offset other activities that tend to increase weed populations. Combined with direct treatment of weeds, the cumulative effect of any of the action alternatives is to reduce the likelihood and potential extent of the spread of new and existing populations of invasive species. It is unlikely weeds would be completely eliminated.

Most of the past, present, and reasonably foreseeable future actions on the Santa Fe National Forest tend to increase the risk of new weed infestations. On the other hand, the direct treatment of weeds can reduce or control weed populations. The forest's ability to use a full suite of treatment methods is limited until a project-specific environmental analysis analyzing the use of herbicides is finished. Weed control efforts by other agencies and individuals may also be reducing the spread of weeds by having fewer weeds entering the forest from adjacent properties.

Effects of Forest Plan Amendments to Nonnative Invasive Plants

The effects of closing the forest to motorized cross-country travel would apply. The effect of opening non-motorized trails to motorized use would increase the potential for weeds to establish and spread through the mechanisms described in the above sections.

Cultural Resources – Affected Environment

This section summarizes the heritage specialist report, located in the project record (USDA Forest Service 2010m).

The Santa Fe National Forest has approximately 10,000 cultural resources recorded in the New Mexico Cultural Resources Information System database. For the analysis conducted for this project, the total number of sites documented in the database is 9,896 located on forest lands, and 48 sites located on system roads outside of forest lands for a total number of 9,944 sites used in the analysis. The sites are widely distributed across the forest with concentrations occurring in certain parts of the forest that were suitable for occupation.

Between 9000 and 5000 B.C., Paleo-Indian big game hunters occupied the lands of the Santa Fe as indicated by the presence of large projectile points and limited campsites. Around 5500 B.C., occupation and use of the lands in the Santa Fe National Forest changed from Paleo-Indian to Archaic subsistence patterns. This change was reflected in a reduced reliance on large game and more of a reliance on large game and increased use of wild plant foods and small game.

Toward the end of the Archaic Period, there was no clear transition from an Archaic lifestyle to a Pueblo life-way. Between AD 600 and 1300, evidence for Ancestral Pueblo use is poorly represented on the forest. By the end of the 13th century, conditions changed radically in upland situations in the Jemez, along the Rio Chama, in the Pecos Valley, and in the Gallina country. During this time, the size of sites grew exponentially although the number of habitation sites appears to decline as smaller sites were abandoned in favor of aggregation into larger communities, some with over 1,000 rooms. This indication of aggregation supports ideas concerning a rise in population and intensified land use. The mid-15th century represents the pinnacle of Ancestral Pueblo development on forest lands. Similar to earlier times, the Jemez Mesas, Pajarito Plateau, and Rio Chama drainage were the focus of occupation on forest lands.

These communities continued to aggregate, grow, divide, grow again, and develop lands into the historic period.

Initial European settlement of areas around the forest occurred in 1598 with an expedition led by Don Juan de Oñate of Zacatecas who acquired the right to colonize New Mexico in 1595. After 1598, the Spanish consolidated their colony in New Mexico by establishing mission communities and awarding land grants. The Camino Real from Mexico provided the lifeline between the seat of Spanish power in Mexico and the far northern frontier in northern New Mexico. In 1680, the Pueblo populations along the Rio Grande revolted leading to Spanish depopulation of the area until 1692. In 1692, Don Diego de Vargas led forces back into northern New Mexico to reestablish the Spanish capital at Santa Fe. Pueblo communities reacted differently to the reconquest with some capitulating and others establishing refugee communities; this led to a longer period of reconquest that lasted until 1696.

Mexican independence from Spain in 1821 meant Mexico would not have the resources available to manage its far northern communities. Withdrawal of support by the Mexican government led to self-government for communities leading to loss of the recognition of the special status of Native American communities under Spanish rule. This meant nonnative settlement of lands resulted in the expansion of Hispanic communities onto tribal land and further loss of land base for those communities as well as expansion onto lands that were to become the Santa Fe National Forest. The process of granting lands increased and led to growth of Hispanic communities. In addition to the Camino Real, the establishment of trade with the United States to the east via the Santa Fe Trail and to the west via the Old Spanish Trail led to further commercial expansion into New Mexico.

Conflicts over trade and contacts as the area continued to expand led to conflict between the United States and Mexico. The ensuing conflict ended in 1846 with the signing of the Treaty of Guadalupe Hidalgo in which the territory of New Mexico became part of the United States. Population growth and expansion onto forest lands associated with growth and settlement led to intensification of use of lands later to become the national forest. In 1862, the Homesteading Act also resulted in assignment of lands to people, in many cases on lands that were formerly considered grant lands. Population growth at the beginning of the 20th century resulted in continuing expansion onto forest lands. In 1912, New Mexico entered the United States as the 47th state.

Creation of the Santa Fe National Forest from the Pecos River Forest Reserve (1892) and the Jemez Forest Reserve (1905) in 1915 encompassed much of the common lands formerly held by land grants leading to conflicts between land grant communities and forest users. Until extractive activities for timber resources began, use of the forest continued as it had since initial expansion onto forest lands. Commercialization of forest resources, primarily timber, led to expansion of commercial enterprises on the forest.

The Forest Service also contributed to the historic record by construction of Forest Service administrative sites at field locations throughout the forest including ranger district offices, lookouts, permitted recreation residences built by private parties, work stations, recreation sites, and contact stations. Much of the built environment disappeared as locations fell into disuse before historic preservation laws were passed.

The transportation system on the forest, which forms access for much of the motorized activity, resulted from construction of timber sale roads and subsequent use by the public once sales were complete. Many of these roads follow older alignments of wagon roads, trails, and access ways developed by much earlier populations of Native Americans and Hispanics. In addition, the transportation system provided access to forest lands for cross-country travel, dispersed camping, and hunting.

Few national forests have the ethnographic diversity found on the Santa Fe National Forest. Ethnographic use on the forest is of concern from a cultural resource perspective because forest staff have to consider the effects of activities on traditional cultural properties and traditional cultural practices. Native American people have used and occupied the lands of the Santa Fe National Forest for millennia and, in their eyes, since "time immemorial." Many of the archaeological sites, especially the large Classic Period pueblos, were the homes of modern day pueblo people's ancestors. The modern pueblo communities include the Towa speakers of the Pueblo of Jemez living in the modern village of Walatowa, the Keres speakers of the modern day villages of Zia, Santo Domingo and Cochiti, the Tewa speakers of the six villages in the Española Basin including Tesuque, Pojoaque, Nambe, San Ildefonso, Santa Clara and Ohkay Owinge (San Juan), and the Tiwa speaking pueblos of Picuris and Taos. Members of each of these communities have experience with traditional cultural practice on lands associated with the Santa Fe National Forest.

In addition, non-pueblo Native American communities include the Jicarilla Apache, Navajo, Ute Mountain Ute, Southern Ute, and Apache, Kiowa and Comanche Tribes. As with the pueblos, each of these tribes has ancestral ties to certain sites and areas on the forest. The pueblos have the strongest connection by virtue of proximity and ties to the abundance of archaeological resources. Sites associated with the other groups tend to be lower in number because their entry into the area was later and they did not supplant the existing ancestral pueblo populations that were in the area. In addition, the pueblo life way is heavily tied to the landscape, and incorporates the land and landforms into their cosmological understanding of the order of the world. Pueblo life is reliant on ties between sacred locations marked by trails and shrines, as well as other markers. They mark the landscape with prayer and ceremony and incorporate it into their daily lives. Other groups passing through the area may have trails and shrines, but the association with their larger life way does not match that of the pueblos. Many places on forest lands still retain a sense of importance and function for pueblo communities. Access and use of these places is essential for the continuation of pueblo life.

In addition to the Native American communities, the Hispanic communities adjacent to and surrounded by the forest have strong ties to the land primarily as a resource base. Lands that were once on land grants still provide firewood and other plant resources for those communities. The ancestors of these communities lived by extracting timber, game, and subsistence and medicinal resources from forest lands.

In summary, the Santa Fe National Forest *"…embraces and, in turn, is surrounded by lands within the traditional use areas of many of the Native American and Hispanic communities of northern New Mexico."* (Levine 1996:349).

Three concerns related to cultural resources came up during the scoping period:

1. *Motorized use of the forest could damage cultural resource sites.*
2. *Motorized use of the forest could damage traditional cultural properties.*
3. *Reducing the miles of designated routes will restrict access to traditional cultural properties.*

Potential Damage to Cultural Resource Sites

Section 106 of the National Historic Preservation Act requires Federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Properties a reasonable opportunity to comment on such undertakings. To comply with the requirements of Section 106 involves intensive literature review and field evaluation of the direct effects of designation of routes, corridors, and areas. Normally compliance with Section 106 is accomplished by following the direction outlined in 36 CFR 800. However, 36 CFR 800 also enables agencies to develop agreements and protocol to facilitate the special conditions of certain undertakings. In 2007, the Southwestern Region of the Forest Service negotiated a "Standard Consultation Protocol for Travel Management Route Designation" (the protocol) (Dated September 25, 2007) as appendix I to the First Amended Programmatic Agreement Regarding Historic Property Protection and Responsibilities (dated December 24, 2003) between the Region 3 Regional Forester, Arizona State Historic Preservation Officer, New Mexico State Historic Preservation Officer, Oklahoma State Historic Preservation Officer, Texas State Historic Preservation Officer, and Executive Director of the Advisory Council on Historic Preservation. As part of the protocol, the consulting parties determined that existing National Forest System routes, previously authorized fixed-distance corridors, pulloff parking adjacent to roads within a vehicle length, limited-use authorizations covered by other NEPA decisions, decisions not to designate roads trails or areas, and decisions to restrict further travel on existing system roads, trails and areas are exempt from further Section 106 review or consultation. However, previously closed roads and trails not open to motor vehicle use, non-system roads and trails, non-system fixed-distance corridors, areas open to cross-country travel, roads or trails that are considered historic properties, and proposed new construction reroutes and realignments do require consultation under Section 106.

Site-specific effects not exempted under the protocol will be addressed in compliance documentation completed for the inventory, evaluation, and resolution of effects to cultural resources to meet the requirements of Section 106 of the National Historic Preservation Act. The protocol also authorizes phasing of the compliance activities. Completion of these requirements will occur in phases that correspond to editions of the motor vehicle user map over a 3-year period. Only routes and areas meeting the requirements of Section 106, as articulated in the protocol, will be posted to the map.

The Santa Fe National Forest defines a cultural resource site as "a location of purposeful prehistoric or historic human activity [resulting in] a deposit of cultural materials beyond the level of one or a few accidentally lost artifacts." In practical terms, this means a cultural resource site can be things like an old pueblo building, an old homestead, or broken pot shards and arrowheads scattered over the ground. Forest personnel have records for 9,944 cultural resource sites in and near the forest.

The wheels of vehicles can displace small artifacts located on the ground's surface. Repeated use of a route or area removes its vegetation, which can accelerate the erosion of soil that can displace and damage artifacts. Vehicles transporting people to and around the forest can indirectly cause damage to cultural resource sites. For example, people may inadvertently damage sites while camping (figure 63). In other cases, damage appears to be intentional (figure 64).

Under alternative 1, the places on the Santa Fe National Forest where damage to cultural resource sites could occur are unauthorized routes, fixed-distance corridors for motorized access to dispersed camping, and areas open to motorized cross-country use. Table 51 depicts the number of sites existing at each of these locations.

Table 51. Number of cultural resource sites that could be damaged through vehicle use under the existing condition, alternative 1

Location of Cultural Resource Site	Number of Sites at Risk	Percent of all Known Sites	Acreage of Sites at Risk
Within an unauthorized route	147	1	less than 4
In a fixed-distance corridor for motorized dispersed camping	439	4	541
In places currently being used for motorized cross-country travel	4,459	45	7,995

Potential Damage to Traditional Cultural Properties

A traditional cultural property *"… can be defined generally as one that is eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community."* Examples of traditional cultural properties are trails used by the penitents for ceremonial purposes, or sacred sites used by tribes and pueblos.

Vehicles may physically damage traditional cultural properties with their wheels or by facilitating erosion. An indirect way that vehicles cause damage is by transporting people to traditional cultural properties. Sometimes people who do not know about the importance of a traditional cultural property damage them or intrude on them.

The identification of traditional cultural properties used in the analysis resulted from previous documentation of traditional cultural properties identified to forest heritage staff during prior project activities. No traditional cultural properties were identified during scoping conducted for this project, although effects to traditional cultural properties were identified as an issue. Twenty-three traditional cultural properties are documented on or near the Santa Fe National Forest, and the physical manifestation of each one varies in location, physical appearance, and association with traditional use. For instance, at some the presence of "outsiders" can disrupt traditional use, while at others the presence of outsiders is irrelevant. Because of this variability, and based on their experience in prior consultation with traditional and indigenous communities, forest heritage specialists evaluated the documentation for each recorded traditional cultural property and judged whether it would be at risk (table 52). This total is not expected to be a complete inventory of all traditional cultural properties on the forest, but represents those documented up to the date of this analysis.

Figure 63. Fire ring in a dispersed camping area constructed from the foundation stones of an early 20th century cabin, Pecos/Las Vegas District. Foundation is visible in shadows behind the fire ring

Figure 64. Early 20th century Forest Service administrative building near a dispersed camping area, painted with graffiti, Española Ranger District

Table 52. Number of traditional cultural properties that could be damaged through vehicle use under the existing condition, alternative 1

Location of Traditional Cultural Property	Number at Risk	Percent at Risk
Within an unauthorized route, in a fixed-distance corridor for motorized dispersed camping, or in a place where motorized cross-country travel is happening	11	48
Close to any of the above so that unwanted disturbance by outsiders is a possibility	13	57

Access to Traditional Cultural Properties

Under the current designated system, people have nearly unlimited motorized access to traditional cultural properties.

Cultural Resources – Environmental Consequences

Direct and Indirect Effects, Alternative 1

Potential Damage to Cultural Resource Sites and Traditional Cultural Properties

Motorized use of the Santa Fe National Forest under alternative 1 risks damaging or disturbing the sites (or participants at sites) listed in table 51 and table 52 by potentially causing rutting, erosion and surface disturbance, and/or indirectly leading to site deterioration from vandalism.

In table 51, a higher number of sites or acreage is not equivalent to a greater amount of damage. Damage depends on the location of the site relative to the motorized use. Unauthorized routes may skirt the corner of a site or go through the middle of one. Fixed-distance corridors for motorized dispersed camping have a wider footprint (150 or 300 feet from either side of the road), and are, thus, more likely to contain entire sites within their boundary. Sites within motorized dispersed camping corridors are also more likely to be disturbed since the entire site tends to be accessible to campers (figure 63). The potential for damage to sites in places being used for motorized cross-country travel is not uniform because motorized travel in them is not uniform.

Table 52 shows 11 traditional cultural properties falling completely or partially within places where motorized cross-country travel occurs. Unauthorized routes cross three of these, and two are located partially within motorized dispersed camping corridors. As with cultural resource sites, traditional cultural properties located where motorized cross-country travel occurs are not uniformly impacted by vehicles because use in the areas is not uniform. In some cases, overall impacts in cross-country areas may be less than that in unauthorized routes or motorized dispersed camping corridors.

Access to Traditional Cultural Properties

Two properties may not have sufficient motorized access under the current condition. Otherwise, with few restrictions on motorized use, people are able to get to the forest's known traditional cultural properties with vehicles.

Cumulative Effects, Alternative 1

The past, present, and reasonably foreseeable future actions identified by the interdisciplinary team are not anticipated to have adverse effects on cultural resources because the activities proposed will result in determinations of "no historic properties affected" or "no adverse effect."

Direct and Indirect Effects, Alternatives 2 Through 5

Potential Damage to Cultural Resource Sites and Traditional Cultural Properties

The potential for damage to cultural resource sites or traditional cultural properties is reduced under any of the action alternatives because effects to sites would be mitigated (see "Mitigations" section in chapter 2, page 39) resulting in restricted motorized use. Direct impacts would be minimized by avoiding site and/or using protective measures. Santa Fe National Forest archaeologists have determined that motorized big game retrieval does not pose a threat to either type of site. This activity is similar in its spatial extent and impact to districtwide or areawide personal use firewood collection. It has been programmatically determined that there are no substantial impacts to cultural resource sites from personal use districtwide or areawide firewood collection ("Region 3 Programmatic Agreement," appendix A, II, P). Because motorized big game retrieval is similar in impact and is much less in yearly occurrence than districtwide or areawide firewood permits, it is reasonable to assume that there would be no substantial impact to cultural resource sites from motorized big game retrieval. Therefore, there would be no differences in potential impacts between alternatives. Motorized big game retrieval is considered an undertaking that does not have the potential to affect cultural resources (Amended PA, appendix A, sections IIA, O, P and Q). For all other activities, the change from the current condition would be a 100 percent reduction in risk of damage to cultural resource sites and traditional cultural properties because motorized travel would be restricted to routes and corridors that have heritage clearance.

Access to Traditional Cultural Properties

No effect on access to traditional cultural properties exists because the Santa Fe National Forest would issue permits to those who require access. This means there would be no change from the current condition because people who need to would continue to be able to drive to traditional cultural properties.

Cumulative Effects, Alternatives 2 Through 5

Activities associated with the list of cumulative activities would result in avoidance or mitigation measures resulting in determinations of "no historic properties affected" or "no adverse effect to historic properties." No historic properties would be adversely affected by cumulative effects given the list of activities.

Effects of Forest Plan Amendments to Cultural Resources

The management areas in the forest plan having an emphasis on cultural resources are I, P, Q, R, and S. This discussion is limited to these management areas. The cultural resources report contains a detailed discussion of these effects beginning on page 36.

Limiting motorized travel to a designated system of roads, trails, and areas reduces the potential for vehicles to damage cultural resource sites in Management Areas P, Q, R, and S. Motorized big

game retrieval corridors are not considered here because the forest's archaeologists determined that impacts associated with game retrieval are negligible when compared to comparable activities that are exempted from consultation under the Region 3 Programmatic Agreement. Depending on the management area, between 17 and 82 percent of it is currently being used for motorized cross-country travel and 0.5 to 2 percent is used for motorized dispersed camping. Both would be reduced to a low potential for impact under any of the action alternatives by not allowing off-road driving or by putting mitigations in place for dispersed camping.

The forest proposes a number of amendments specific to one or more action alternatives. Though most allow some kind of motorized use where it had not been previously allowed, we don't expect any effect to cultural resources. Following the mitigations would prevent any potential damage to cultural resource sites or, as in the case of motorized big game retrieval, cultural resources would not be affected.

Air Quality – Affected Environment

This section on air quality summarizes the report "Air Quality and Climate Change" located in the project record (USDA Forest Service 2009j).

The public expressed this concern about air quality:

> *"Motorized travel causes fugitive dust and vehicle emissions that are harmful to human health and contribute to climate change."*

In addition to effects on health and climate change, the Forest Service also considered how dust and emissions caused by vehicles could affect visibility in the Class I portions of airsheds over wilderness areas.

The miles of unpaved roads and trails in the Santa Fe National Forest serve as a proxy for the amount of dust and emissions potentially generated. Vehicles driving on unpaved roads and trails stir up dust, so the number of miles approximates the total area on the forest that produces dust. The routes act as corridors for vehicles' emissions, which contain pollutants like carbon monoxide (CO), nitrogen oxide (NO and NO_2, referred to as NO_x), and volatile organic compounds (VOCs).

Mileage is an imperfect measure of dust and emissions, but we do not have sufficient data on traffic counts, miles traveled, and average vehicle speed for each route to make calculations. Such measurements, though useful, are not practical or economically feasible to obtain. In addition, the fate, transport, and dispersion of dust and air pollutants are highly complex, depending on things like terrain, wind speed and direction, atmospheric stability, and distance to the affected person.

Portions of five airsheds, which are delineated by the New Mexico Environment Department's Air Quality Bureau, cover the Santa Fe National Forest (table 53). You can see in the table's far right column that the forest is a small part of each airshed. About half of the Santa Fe National Forest lies in the Upper Rio Grande airshed. This airshed includes Santa Fe, Los Alamos, Española, and Taos.

Table 53. Airsheds composing the Santa Fe National Forest. Numbers are rounded to the nearest percent.

Airshed	Total Acres in Airshed	Percent of Airshed Composed of Santa Fe National Forest
Upper Rio Grande	5,445,887	16
Middle Rio Grande	7,542,212	4
Pecos River	16,266,076	3
Canadian River	11,314,854	1
San Juan River	6,159,079	0

The airsheds composing the Santa Fe National Forest attained national air quality standards in 2009. The U.S. Environmental Protection Agency gives this rating. Air quality in New Mexico is good compared to other states.

All vehicles pollute the air with NO_x, CO, and VOCs. The Environmental Protection Agency found that an unregulated recreational vehicle with a 2-stroke engine can cause as much pollution as 20 automobiles. On dirt roads and trails, all vehicles raise dust if conditions are right. Silty soils cause the most dust.

The volume of traffic on the Santa Fe National Forest composes a minor source of dust and vehicle emissions within the five airsheds, which include Santa Fe, Albuquerque, Española, Los Alamos, and Pecos, along with State Highway 285 and Interstate 25. Traffic counts on routes in the Santa Fe National Forest show that highly used roads have less than 200 vehicles per day. Many forest roads have one vehicle or less per day. For comparison, about 2,600 vehicles drive through the village of Jemez Springs per day and the average daily traffic on Interstate 25 between Santa Fe and Albuquerque for the last 3 years is approximately 18,300 vehicles (New Mexico Department of Transportation 2009).

Health

Dust from roads is composed of particulates. The finest particulate matter, called $PM_{2.5}$, if embedded in people's lungs, can impair breathing. Studies show that dust raised by vehicles can go more than 300 feet from the road, depending on season, location, and speed and volume of traffic. To cause health problems, people must be exposed regularly to dust. The Santa Fe National Forest has no data on whether dust has caused people to have health problems.

We consider the amount of traffic on the Santa Fe National Forest to be low, so the amount of dust generated is also low. For example, the kinds of dust storms seen blowing across Albuquerque in May are extremely rare in our forested setting. Trees block wind that carries dust.

Climate Change

All vehicles emit greenhouse gases that contribute to global warming. Information to quantify the amount of emissions, such as actual miles driven, from the Santa Fe National Forest does not exist.

Visibility

Three of the forest's airsheds contain Class I areas: the Pecos, San Pedro Parks, Chama River Canyon, and Dome Wilderness areas. All met national ambient air quality standards in the United States Environmental Protection Agency's 2009 assessment. This means that air quality and visibility in the forest's wilderness areas are good.

Air Quality - Environmental Consequences

Direct and Indirect Effects, Alternative 1

Health

Alternative 1, which is where people drive now, has the most miles of unpaved roads and trails. This means it has the most potential to cause dust over the largest area. As noted in the "Affected Environment," however, we consider the amount of dust raised now very low. No negative change in people's health would happen, but we do not have data on whether anybody has health problems from dust caused by driving in the forest.

Climate Change

We predict that the forest's contribution to global warming from vehicles is negligible now, and would continue to be negligible under alternative 1. The number of vehicles driving in the national forest is an extremely small part of the daily traffic in the five airsheds.

Visibility

Visibility in the forest's Class 1 airsheds—its wilderness areas—would remain good because they meet national ambient air quality standards now.

Direct and Indirect Effects, Alternatives 2 Through 5

Alternatives 2 through 5 reduce the miles of unpaved routes that people could drive on. This reduces the miles of unpaved routes in the forest's five airsheds (table 54). Alternative 3 reduces it the most; alternative 4 the least.

Table 54. Change in the miles of unpaved routes in the Santa Fe National Forest's airsheds. Numbers are rounded to the nearest percent.

Airshed	Miles	Percent Change from Alternative 1			
	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Upper Rio Grande	2,675	-46	-60	-38	-50
Middle Rio Grande	1,368	-56	-69	-47	-52
Pecos River	1,267	-66	-74	-57	-63
Canadian River	87	-51	-52	-39	-51
San Juan River	61	-62	-72	-54	-59

Where dust and emissions go varies greatly with weather, topography, and road condition. All the alternatives reduce the mileage of unpaved routes, but saying that dust and emissions would also decrease may not be accurate. A dry, windy summer coupled with a lot of visitors might cause a lot of dust and pollution under any of the alternatives. Conversely, the proposed closures for wet weather would have no effect because no dust rises from mud.

We can say that having fewer unpaved routes available would reduce the locations where dust and emissions occur. An exception is the uniform ban on motorized cross-country travel, which tends to cause new routes. New routes increase the chance of dust by removing vegetation and lowering the threshold at which particles become airborne. Not allowing motorized cross-country travel would decrease the amount of dust and locations in which it could be generated.

Because we assume the amount of motorized use would be the same, no change in the emission of pollutants from vehicles would occur.

Health

The effect of any of the action alternatives on people's health is difficult to predict. The surface area that could cause dust would be reduced, but the amount of dust generated is not expected to change. Whether people are affected depends on how often they breathe dust, which we cannot predict in this analysis.

Climate Change

Because we assumed that the amount of motorized use of the Santa Fe National Forest would not change, the pollutants emitted by vehicles in the forest that cause global warming would also not change. We predict that the forest's contribution to global warming from vehicles is negligible now, and would continue to be negligible under alternatives 2 through 5. The number of vehicles driving in the national forest is an extremely small part of the daily traffic in the five airsheds.

Visibility

Visibility in the Class I areas is already good. Alternatives 2 through 5 would reduce the miles of unpaved routes close to the forest's Class 1 areas. We expect all of the action alternatives to improve visibility, but the change would likely not be noticeable since the forest's overall contribution to air pollution is already small. For example, alternative 2 reduces the miles in the Pecos River airshed by 66 percent, but the forest comprises only 3 percent of that airshed. The Pecos River airshed contains the Pecos Wilderness.

Cumulative Effects, All Alternatives

Health

We don't know how many people have health problems caused by dust, so we can't make a prediction about how other actions would cumulatively affect people's health. Many other factors, like diet and lifestyle, play into a person's health.

Climate Change

The pollution that causes global warming under any alternative would be negligible. The cumulative effect, when combined with other sources of global warming in the western United

States, would not change the course of history. Keeping or changing the Santa Fe National Forest's current designated route system would make no difference since it would not change the amount of motorized use.

Visibility

None of the alternatives would cause a cumulative effect on visibility. Alternative 1 would result in no change in visibility, so there would be no cumulative effect. Alternatives 2 through 5 could improve the visibility of Class I areas, but to such a small degree as to not be noticeable.

Effects of Forest Plan Amendments to Air Quality

The amendment prohibiting motorized cross-country travel could improve air quality by reducing the potential for new sources of dust, as described earlier. The amendments proposing to change acreage from one management area to another would have no effect because the proposed changes reflect motorized use that already occurs.

Wildfires - Affected Environment

This section summarizes the wildfire report located in the project record (USDA Forest Service 2010i).

People raised these two concerns about wildfires:

1. *Closing routes to motorized use increases the chance of having larger wildfires because it would take longer for firefighters to get to them.*
2. *Motorized use of the forest increases the risk of wildfires caused by peoples' activities.*

Firefighters' Response Time: The time it takes firefighters to get to wildfires varies greatly depending on the fire's location. Firefighters can easily drive to abandoned campfires in Forest Service campgrounds, for example. On the other hand, they must hike or fly to fires located in a wilderness area. Driving and flying to fires tends to be quicker than hiking, but again that depends on how far away the fire is from a staging area.

Number and Causes of Wildfires: Lightning and people caused all of the wildfires on the Santa Fe National Forest during the last 10 years (table 55). Lightning accounted for 77 percent of all the wildfires, and people the remaining 23 percent. A variety of human activities contributed to the wildfires, but campfires caused the most by a wide margin.

At least one study documents that off-highway vehicles can directly cause wildfires when grasses and forest litter come in contact with hot exhaust systems, exhaust, and hot manifolds for an extended period of time (Baxter 2002). This study, however, does not examine the probability of ignition over a wide range of conditions, and forest fuels only catch fire in very specific conditions.

Number of human-caused wildfires started within 300 feet of all existing roads: 133

Percent that were campfires: 71

Number of human-caused wildfires in alternative 1 camping corridors: 18

Percent that were campfires: 72

Number of human-caused wildfires started in areas where motorized cross-country travel is allowed: 207

Percent of wildfires started by humans from campfires: 66

Vehicles indirectly aid in starting wildfires by transporting people to and around the forest. Campfires comprise the main source of all human-caused wildfires in the last 10 years at 66 percent. Arson, downed power lines, chainsaws, and smoking also contributed. Santa Fe National Forest fire personnel have not documented any instances where a vehicle's exhaust system has directly caused a wildfire. We do not collect data on whether vehicles were indirectly associated with the cause of a wildfire. For example, we can't determine the number of wildfires that hunters retrieving their downed game caused, because it would have been attributed to smoking or a campfire.

Table 55. Summary of number and causes of wildfires in the Santa Fe National Forest, 1998 - 2007

Cause	Total Number of Recorded Wildfires, 1998 - 2007	Percent of Total Wildfires 1998 - 2007
Lightning	1,085	77
All human caused	321	23
Fires caused by campfires only	212	15

Wildfires - Environmental Consequences

Direct and Indirect Effects, Alternative 1

Firefighters' Response Time – With no change in the designated route system, firefighters are expected to get to fires in the same amount of time as they do now. As just described, this varies depending on the location of the fire.

Number and Causes of Wildfires – The wildfires caused by people would remain the same as shown in table 55 because motorized use of the forest would not change.

Cumulative Effects, Alternative 1

Because no change in response time or the numbers and causes of wildfires is expected under alternative 1, there would be no cumulative effect.

Direct and Indirect Effects, All Action Alternatives

Firefighter's Response Time – The time it takes for firefighters to arrive at a fire could slightly increase, slightly decrease, or remain the same. It could increase slightly if the routes closed to motorized use become impassable by engines over time due to vegetation or severe erosion from lack of maintenance. This, however, could be offset by the other means, like helicopters, firefighters have to get to fires. Should the condition of routes closed to motorized use remain the same, there would be no change in response time because vehicles responding to emergencies like wildfires are exempt from the designations under the Travel Management Rule. With improved maintenance on routes open to motorized use, firefighters could conceivably get to wildfires more quickly.

Number and Causes of Wildfires – No change in wildfires caused by lightning is expected as a result of having a designated system of roads, trails, and areas because lightning is a natural

event. No change in the number of human-caused fires associated with exempted uses, like wood-cutting with a permit, would occur unless fewer permits were issued, or the restrictions on driving written into permits increase.

For alternatives 2 through 5, it is likely that campfires would continue to be the main source of human-caused fires since the amount of camping on the national forest overall is not expected to change. This project reduces where people can drive to camp, but doesn't restrict their ability to camp.

For alternatives 2 through 5, with the prohibition on motorized cross-country travel, we expect to see a small decrease in the number of human-caused fires away from routes since some people will no longer drive off road, and some places that had been accessible with a vehicle will no longer be. If people park next to the road and go into the backcountry on foot, the number of human-caused wildfires could remain the same, but there is no way to predict how many people will forfeit a visit because they can't drive, or how many would choose to walk into the backcountry.

No change from alternative 1 in the number of wildfires caused by campfires in the fixed-distance corridors is expected for any of the action alternatives. The proposed corridors in all the action alternatives capture the existing motorized dispersed camping, which is not expected to change even if people need to walk their gear to a campsite.

The number of wildfires caused by hunters retrieving game is not known, but is expected to be very small since no fires have been attributed directly to a vehicle, and less than 2 percent to smoking and equipment combined. Since the number of trips to retrieve game is not expected to vary enough among the alternatives (even alternative 3, where someone might walk in) to be material, there would be no change in the number of potential wildfires caused by motorized big game retrieval.

Cumulative Effects, All Action Alternatives

The time it takes for firefighters to get to a fire is not expected to change enough to be substantial, so there would be no cumulative effects.

We expect a slight reduction in the number of human-caused wildfires from the prohibition on motorized cross-country travel. Combined with the forest's other prevention efforts like thinning and prescribed burning and education campaigns such as Smokey Bear, there could be a cumulative reduction in wildfires for all the action alternatives. Because, however, lightning causes most of the wildfires, the overall reduction in the number of wildfires on an annual basis would probably not be noticeable.

Effects of Forest Plan Amendments to Wildfires

The effects of the amendments to the forest plan are the same as the direct and indirect effects just described.

Visual Quality - Affected Environment

The full text of this section is located in the project record in the report called "Visual Quality" (USDA Forest Service 2009m).

The Santa Fe National Forest routinely considers a project's effects on visual quality. The interdisciplinary team wrote this concern:

> *"Closing routes to motorized use could affect visual quality."*

A forest's visual quality combines its scenic attractiveness with the public's visual expectations. Scenic attractiveness could be a view of the mountains, a stream draped over boulders, a waterfall, or a meadow full of wildflowers. The public expects to see natural things like these in a forest, rather than ATMs, traffic lights, strip malls, or anything else commonly found in cities.

The number of scenic places in the Santa Fe National Forest attests to the importance of its visual quality: two scenic byways, three research natural areas, a national recreation area, four wilderness areas, and three wild and scenic rivers. In 2004, the National Visitor Use Monitoring Survey showed that one of the top five recreational activities was looking at scenery.

The distance between a person and what they are looking at affects their perception of visual quality (figure 65). Someone looking at the Santa Fe National Forest's mountains from Interstate 25 would not notice a campsite having bare ground and trash. This sort of unnatural feature is more noticeable when you are close to it.

Visual effects, such as erosion from roads and trails, usually happen when the route has not been designed for resource protection. Some system and unauthorized routes degrade visual quality by not being in the right place and receiving little maintenance, which causes erosion and rutting and strips vegetation from the sides. Motorized cross-country travel can create these kinds of routes.

Figure 65. A view of Cerro Pedernal. Even though camping happens in these mountains, you can't see it from far away

Visual Quality - Environmental Consequences

Effects Common to All Alternatives

Routes in poor condition will degrade visual quality until they grow vegetation, or until the Forest Service repairs or decommissions them. Some routes, because of their location and construction, would not naturally revegetate and could erode more, continuing to degrade visual quality.

Uniform seasonal closures during muddy seasons, proposed in all except alternative 4, help limit rutting and erosion on muddy roads. Alternative 4 would use closure orders to protect routes, so the opening of routes would be tailored to the season and the route, and still prevent erosion on muddy routes. Preventing such problems on routes helps keep visual quality intact.

Direct and Indirect Effects, Alternative 1

Alternative 1, where motorized cross-country travel occurs on about 29 percent of the forest, is most likely to create new routes that aren't designed by the Forest Service. The effects from erosion and bare soil that would result from these routes would tend to degrade visual quality. Depending on their location, some may not meet management objectives for visual quality. Depending on the number of routes, some portions of the forest might not meet objectives for visual quality over time.

Direct and Indirect Effects, Alternatives 2, 4, and 5

Limiting motorized cross-country travel to fixed-distance corridors for motorized dispersed camping would improve visual quality by preventing the creation of new routes on the rest of the forest. Visual quality in these camping corridors, however, could be degraded as a result of bare ground, trampled vegetation, and other alterations of the natural conditions. For people looking at the corridors from a distance, the loss of vegetation would be less noticeable. Camping corridors, because they allow people to drive to a campsite, could encourage the creation of new routes with accompanying erosion and bare ground. As described, this could detract from visual quality over time, but less than under alternative 1.

The fixed-distance corridors for motorized big game retrieval would not degrade visual quality. The number of motorized trips to retrieve downed big game is not likely to result in the creation of new routes.

Alternatives 2, 4, and 5 propose about 40 acres of areas each. About 35 acres of these are for motorcycle trials and are located mostly on rock, so rutting and erosion is not likely unless on a trail that connects the rocks. The remaining 5 acres are camping areas in the Pecos/Las Vegas Ranger District. Visual quality here could appear degraded when seen onsite from erosion and rutting. Because the total amount of areas is less than 0.01 percent of the forest, any visual degradation to the forest overall would be negligible.

Direct and Indirect Effects, Alternative 3

Alternative 3 is the most likely to improve visual quality because no new routes, which contribute the most to poor visual quality, would be created. This alternative allows no motorized travel off roads at all.

Cumulative Effects, All Alternatives

For alternative 1, the cumulative effect on visual quality would remain about the same. The effect of alternative 1 is to degrade visual quality. Other projects managed by the Forest Service, such as oil and gas pipelines, thinning and prescribed burning, and those done through the American Recovery and Reinvestment Act, mitigate visual impacts and keep or improve visual quality. The creation of the Valles Caldera National Preserve also improves visual quality by reducing the places where people can drive on that large tract of land. Mining projects degrade visual quality; mitigations are not sufficient to offset these effects.

For alternatives 2 through 5, the cumulative effect on visual quality would be a slight improvement over time. Benefits of not creating new, unauthorized, motorized routes and not allowing motorized use on poorly maintained routes would happen immediately. Otherwise, the landscape would remain the same until routes grew vegetation or the Forest Service repaired them.

Effects of Forest Plan Amendments to Visual Quality

The amendment to prohibit motorized cross-country travel at large would improve visual quality as just described.

Forest plan amendments to allow motorized use in places where it has been prohibited would slightly reduce visual quality in specific sites, but not change the forest's visual quality overall.

Short-term Uses and Long-term Productivity

The change in driving on National Forest System roads and trails created by any of the action alternatives does not jeopardize the long-term productivity of the Santa Fe National Forest. As described throughout chapter 3, implementing any of the action alternatives would improve resources such as wildlife habitat, cultural resource sites, and others.

Unavoidable Adverse Impacts

Designating unauthorized routes could spread invasive plants to new locations and cause a loss of soil productivity. Alternative 4, which is expected to result in more bare ground from motorized dispersed camping, would also result in a loss of soil productivity.

Irreversible and Irretrievable Commitments of Resources

An irreversible commitment of a resource is one that cannot be regained, such as the extinction of a species. An irretrievable commitment is one where the value of the resource is lost for a period of time, such as the loss of soil productivity from the existence of a road.

Alternative 1 could result in the irreversible loss of cultural resource sites. By definition, cultural resource sites and traditional cultural properties are not renewable and damage to them cannot be reversed. Alternatives 2 through 5 would have no irreversible commitments of resources.

All the alternatives would result in the irretrievable commitment of some of the forest's soil productivity. This commitment, however, would be negligible when considered at the scale of the

forest. All alternatives designate unauthorized routes, which commits the soil to use as a route rather than for growing plants. All alternatives continue to allow camping, which also tends to commit soil to that use. Alternative 4, which is expected to result in more bare ground from motorized dispersed camping, could irretrievably reduce visual quality in some places. This would also be negligible at the scale of the forest.

Other Required Disclosures

NEPA at 40 CFR 1502.25(a) directs “to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with other environmental review laws and executive orders.” We’ve prepared this statement in accordance with the National Historic Preservation Act, which governs ground disturbance in historical places, and the Endangered Species Act, which covers projects that have threatened or endangered species in its boundaries.