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# Travel Management – Soil and Water Resources

## A. Introduction

This report addresses the environmental consequences on soil and water resources as a result of implementing the Travel Management Rule. It includes the potential effects of various modes of travel (i.e., motorized roads and trails, motorized dispersed camping corridors, motorized big game retrieval areas, and areas designated specifically to provide motorized cross-country travel) on the Santa Fe National Forest.

***Significant Issues Addressed in this Specialist Report***

1. Continued public motorized use of routes and areas described in the proposed action will adversely affect forest resources. These effects include:
    - Erosion, soil compaction, and degradation of water quality and watershed condition;
    - Degradation of fish and wildlife habitat;
    - Damage to cultural resource sites;
    - Spread of traditional cultural properties;
    - Damage to rare plants; and
    - Compromising the character of wilderness and inventoried roadless areas.

4. 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.

***Alternatives Considered and Evaluated***

<u>Alternative 1 (No Action)</u>
The No Action alternative provides a starting point for evaluating the other alternatives to. The No Action alternative is based on the motorized use currently occurring on the SFNF. The Travel Management Rule would not be implemented, no changes would be made to the transportation system, no permanent prohibition on motorized cross-country travel would exist, and no designated route system would be established. Public motor vehicle use of unauthorized routes would continue.

The Travel Management Rule does not allow for adoption of the No Action Alternative in full. However, it is important to understand the existing condition in order to be able to understand the percent change each alternative represents for each indicator measure.

<u>Alternative 2 (Corrected Proposed Action)</u>
The Corrected Proposed Action incorporates minor changes to the Proposed Action based on public comment and the forest's field verification. For example, it removes proposed designations from roads that do not exist, or proposes to designate the more traveled route as identified on the ground. It corrects alignments of routes and makes minor adjustments in the dispersed camping corridors.

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Alternative 2 also adds motorized big game retrieval corridors in the same locations as the dispersed camping corridors to illustrate the effects of having some motorized big game retrieval as opposed to none (Alternative 3) or having it on all designated roads (Alternative 4).

Alternative 2 reduces the number of roads available for public motor vehicle use, increases the number of motorized forest system trails, and prohibits cross-country travel by motor vehicles. The fixed distance corridors are in two widths, 150- and 300 feet on either side of the road.

Alternative 3

Alternative 3 responds to concerns about negative impacts to natural resources from motorized use (Significant Issues #1 and #4). This alternative would designate the fewest miles of motorized routes, have no motorized dispersed camping or motorized big game retrieval, and no areas. Alternative 3 also expanded some larger blocks of non-motorized areas by proposing no or a bare minimum of roads and motorized trails in them.

Alternative 4

Alternative 4 responds to the concerns about a lack of motorized access and recreational opportunities (Significant Issues #2 and #3). Of the action alternatives, it proposes the most routes and areas desired by the public. It increases the amount of motorized dispersed camping available by including those places suitable for it but not currently being used as such and expanding the corridors to 300 feet on either side of motorized routes. This alternative also proposes to allow motorized big game retrieval up to 1 mile off of either side of any designated route during hunting season. Alternative 4 would provide more general access to the forest by designating more routes and increases the mileage of motorized trails and number of loops over Alternative 2.

Alternative 5

Alternative 5 responds to the issue of conflict between motorized and non-motorized users (Significant Issue #5). Alternative 5 would designate more motorized use in some parts of the forest, and less in others to enhance everyone's recreational experience. This alternative does not place any limits on non-motorized use; hikers, mountain bikers, and equestrians would still be able to use those routes designated for motorized use. Alternative 5 proposes some motorized dispersed camping, and some motorized big game retrieval within 1 mile of either side along major forest roads only.

***Applicable Laws, Regulations, Policy, and Forest Plan Direction***

National Forest Management Act 1976

The National Forest Management Act of 1976 ensures that forest planning and management activities provide for the conservation and sustained yield of soil and water resources.

Clean Water Act

The Clean Water Act (CWA) is the primary federal law in the United States governing water pollution. The principal body of law currently in effect is based on the Federal Water Pollution Control Amendments of 1972, which significantly expanded and strengthened earlier legislation. Major amendments were enacted in the Clean Water Act of 1977 and the Water Quality Act of 1987. The CWA regulates discharges of pollutants from point sources through a permitting system. Nonpoint source pollution is controlled through the use of best management practices (BMPs) per State nonpoint source management plans.

The US Forest Service, Southwestern Region and the State of New Mexico Environment Department have a draft Memorandum of Understanding to respond to the water quality objectives defined by Congress in the Clean Water Act. The MOU states, "The Forest Service and the Environment Department share the common objective of improving and protecting the quality of New Mexico's waters by implementing progressive watershed-based restoration protection programs to meet applicable water quality standards."

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Executive Order 11988 – Floodplain Management

Executive Order 11988 requires Federal agencies to avoid to the extent possible long- and short-term adverse impacts associated with the occupancy and modification of floodplains, and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. In accomplishing this objective, "each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by flood plains in carrying out its responsibilities" for the following actions (1) acquiring, managing, and disposing of Federal lands and facilities; (2) providing federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing activities (FEMA 2008a)[i].

Executive Order 11990 – Protection of Wetlands

The purpose of Executive Order 11990 is to "minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands". To meet these objectives, the Order requires Federal agencies, in planning their actions, to consider alternatives to wetland sites and limit potential damage if an activity affecting a wetland cannot be avoided. The Order applies to: (1) acquisition, management, and disposition of Federal lands and facilities construction and improvement projects which are undertaken, financed or assisted by Federal agencies and (2) Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing activities (FEMA 2008b)[ii].

Forest Plan Direction

Presented here are the Forest Plan standards that directly apply to travel management relating to soil and water resources.

- Provide direction and support to all resource management activities with emphasis on maintaining the soil resource, water quality, and water quantity.
- Maintain water quality to meet or exceed state water quality standards.
- Identify and protect wetlands and floodplains.
- Achieve satisfactory condition in riparian ecosystems. Maintain areas that are currently in good condition.
- Minimize disturbances due to resource activities and other uses in the riparian zone.
- Manage riparian areas in accordance with legal requirements regarding floodplains, wetlands, wild and scenic rivers, and cultural and other resources. Protect the productivity and diversity of riparian-dependent resources and emphasize the protection of soil, water, vegetation, wildlife, and fish resources prior to implementing projects. Give preferential consideration to resources dependent on riparian areas over other resources when conflicts among uses arise. Riparian areas should be managed toward meeting the following guidelines:
    - Ground cover: Provide average ground cover of plants and litter at 80 percent of natural levels.
    - Shade: Provide shading over perennial and intermittent water surfaces that is 80 percent of natural levels considering unit reaches of about two miles in length.
    - Bank cover: Provide shrub and tree cover along bank lengths that is 80 percent of natural levels. Give emphasis to the protection of streambank stability provided by woody plant roots, particularly on outside bends of stream channel meanders.
    - Streambed sedimentation Composition of sand, silt, and clays within streambeds should not exceed 20 percent of natural levels.
    - Plant composition: Provide at least 60 percent of the woody plant composition in three or more riparian species.
- Cooperate in the implementation of the comprehensive watershed management plan. Maintain or improve high water quality conditions.
- Close or obliterate unneeded travel-ways. Consider areas of watershed resource damages and develop management strategies to improve such areas and reduce additional adverse impacts.

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## B. Methodology

### *Analysis Area*

Direct and Indirect Effects

The spatial bounds for the direct and indirect effects is the National Forest System lands (having species and habitats) within the proclaimed boundary of the Santa Fe National Forest because this is where the Forest has jurisdiction to designate motorized routes. The temporal bounds are from the publication of the motor vehicle use map, anticipated around 2010, to approximately 2025. The effects of this project will start with the publication of the motor vehicle use map, and 2025 is the next most likely time the Forest would reassess its method of managing motorized travel. Further, some routes would have revegetated or been repaired by that time.

Cumulative Effects

The spatial bounds for the cumulative effects analysis is the National Forest System lands within the proclaimed boundary of the Santa Fe National Forest because this is where the Forest has jurisdiction to designate motorized routes. The temporal bounds for the cumulative effects analysis is from 1987 through 2025 (refer to "Temporal Bounds and List of Projects for Cumulative Effects Analysis" in the project record).

### *Assumptions*

A number of assumptions regarding roads and trails have been developed by the Santa Fe National Forest Travel Management Team to facilitate the analysis of environmental impacts. The following assumptions were used in the development of this specialist report:

1. For the purposes of this analysis, the amount of motorized travel on roads and motorized trails is held constant among alternatives.
   *Discussion:* The Travel Management Rule and the Recreation Specialist Report document an increase in motorized use on forests nationwide and the Santa Fe National Forest, respectively. 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. 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.

   As discussed in the Roads Report (project record), the amount that traffic would change is not known due to limitations in the way use is measured. Based on staff experience on the Santa Fe National Forest, use on high-clearance vehicle roads is regular, but infrequent. It is expected that any concentration in use would not be noticeable, e.g., one car per week could increase to two cars per week. The Forest proposes to designate 94 to 95% of its 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 (Roads Report). Depending on the alternative, 30 to 45% of roads for high-clearance vehicles (maintenance level

2. Publishing a system of motorized routes on a map may cause an increase in motorized use on the Forest.
   *Discussion:* Some commenters believe that displaying previously unpublished routes on a map available nationwide will draw more motorized use. The Forest has no way of knowing whether use on designated routes will change because of being published on a map. Data does not exist to make an accurate prediction. On the Santa Fe National Forest, 75% of the motorized use is local (Social & Economic Specialist Report), meaning that local users know where the routes are now.

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3. The capability to enforce and the public's compliance with the motor vehicle use map would increase over the existing situation for all action alternatives.
   *Discussion:* Experience on the Forest shows that after an initial educational period, compliance with new rules and regulations increases over time.

4. The condition of roads and trails designated 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 (Roads Report). 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 less 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 resource impacts. There may be some exceptions for some resources (e.g. noise).
   *Discussion:* No clear scientific agreement on the differences between vehicles exists for the forest to quantify differences in impacts between vehicle types.

7. The approximately 5 acres of areas proposed for 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 dispersed camping, the use will be dispersed camping.
   *Discussion:* Refer to assumption #4.

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. The Forest 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.

10. The estimated number of motorized trips to retrieve a downed big game animal would not change between alternatives, except for Alternative 3, which does not allow it.
    *Discussion:* The Forest has estimated the average number of downed big game animals at 438 per year (No Action Description, project record). This is likely to be a low estimate. Because the Forest does not have data on the locations of where big game is retrieved, we assumed that it occurred in the same places identified as having motorized cross-country travel, approximately 443,000 acres.

11. With a restriction on public use, use on roads needed for administrative purposes will be less than the existing use.
    *Discussion:* Pursuant to 36 CFR 212.5, the Forest estimated needing 1,428 miles of roads for administrative use (Travel Analysis Process Report). These "administrative" roads fall under the exemptions listed in the Travel Management Rule (36 CFR 212.51 (a)(1) through (8)). Most of these roads are currently open to the public as well as the Forest Service and its permittees. After the designation process, use on the administrative roads would be limited to **only** the Forest Service and its permittees for things like repairing stock tanks or going to

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telecommunications sites. The Forest does not have data on the frequency with which the administrative roads are presently used, but it is reasonable to assume that use will decrease when public access is restricted.

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 NEPA decision and are not part of this analysis.

13. Any routes not included in the decision are not precluded from consideration for addition to or obliteration from the Forest's transportation system in future travel management actions.

14. If a road is considered for decommissioning and closed to all motorized use, it would not receive maintenance. As a result, the road could revegetate, remain in its current condition, or erode, depending on its location and soil type (Roads Report). Roads needed for administrative purposes would not be allowed to revegetate.

15. An increase or decrease in visitation to the Forest because of population change is not included in this analysis.
*Discussion:* Visits to the Forest have increased over the last 20 years; however, the future trend cannot be predicted 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 forest system roads is not expected to change among alternatives.
*Discussion:* The access and maintenance needed to administer the forest is expected to remain constant. Permits for firewood collection, which could be modified to 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 in Alternative 1 (No Action) captures the vast majority of the motorized dispersed camping on the forest.
*Discussion:* Forest staff inventoried the motorized dispersed campsites in 2008 and 2009, and believes most of them were identified. The areas identified as having motorized cross-country travel (the tan shapes on the map) also include motorized dispersed camping. Though the Forest has no data on the amount of motorized dispersed camping that occurs away from roads, this use is believed 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, it is assumed to occur in the same places as Alternative 1 since these sites are already established.
*Discussion:* Alternative 3 would not designate fixed distance corridors for motorized dispersed camping. People would be allowed, however, to park next to the road and camp, either next to their vehicles or by carrying gear in further by non-motorized means. Experience on the Forest shows it is reasonable to assume that people

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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 (have bare soil).

22. The vast majority of 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. Some motorized trails could not be located during site visits. This analysis, however, analysis examines the motorized use of proposed routes and their effects. Additional NEPA would be required on routes needing physical construction or groundwork.

23. The Santa Fe National Forest does not have an accurate assessment of road/stream crossings. Therefore, the number of stream crossings presented in this document was estimated using Geographic Information System (GIS) data layers. There are some limitations with the data – for example, if a road segment comes close enough to the stream, GIS will mark it as a crossing, even though it may not actually cross the stream. An assumption is made that while the route may not actually cross the stream, its close proximity likely represents an area of acute road impacts (compaction, run-off). So while the absolute counts presented here may not be accurate, the data is considered sufficient to display effects because the same data sets were used for each alternative.

***Indicator Measures***

All indicator measures were analyzed for all fifth- field watersheds that SFNF has ownership in. GIS was used to map the miles and acres for motorized routes, motorized cross-country use, and motorized dispersed camping corridors associated with each alternative. These values were then in turn intersected with the specific information used for each indicator measure (i.e. TES soil limitations, 300' stream buffers (both streams in general and impaired streams), stream crossings, etc.). The numbers derived for each indicator measure are then displayed by each fifth-field watershed. These values are not to be considered as absolute or conclusive, rather they should be viewed as relative and a means for comparing the effects of the proposed actions by alternative and fifth-field watershed.

<u>Motorized Routes Indicator Measures</u>

1. Total miles of routes. Miles within each watershed dedicated to this use.

2. Miles of routes within 300 feet of streams. To best estimate effects to water resources, all roads and trails within 300 feet of streams were mapped, as scientific literature suggest roads and trails close to streams are often primary sediment contributors. (MacDonald and Stednick 2003)[iii]

   Roads constructed near a stream pose a greater risk to water quality and to modifying hydrologic response of streamflow from runoff events. When located close to a stream channel, there is less available buffering to capture or hinder the transport of eroded material and other pollutant runoff to the stream.

   Additional studies have shown that road-related sediment can move as far as 300 feet via overland flow (Burroughs and King 1989[iv], Belt, O'Laughlin and Merrill 1992[v]).

3. Miles of routes within 300-ft of impaired streams. To best estimate effects to water resources, all roads and trails within 300 feet of streams were mapped, as scientific literature suggest roads and trails close to streams

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are often primary sediment contributors. Additional studies have shown that road-related sediment can move as far as 300 feet via overland flow (Burroughs and King, 1989, Belt, O'Laughlin and Merrill, 1992).

260 miles of the impaired streams within the SFNF boundaries are impaired for temperature, turbidity, or sediment (or a combination of these impairments and others). These 260 miles are the only streams evaluated in this indicator measure because temperature, turbidity, and sediment are impairments that could be affected by the proximity of motorized routes.

4. Number of route/stream crossings. Swift (1985)[vi] states, "The stream crossing is the most critical section of the road influencing water quality." Because crossings occur over water, they are efficient sites for sediment delivery directly into streams.

5. Route density. Route density takes into account watershed size and the concentration of the potential effects from the number of routes. The amount of routes (roads and trails) within a given area (expressed as route density) can be an indication of runoff, erosion, modified hydrology, and water quality impacts. High route densities can compound the effects of infrequent, high intensity precipitation events. Routes can increase surface and subsurface drainage efficiency, routing upslope waters to natural channels at higher rates and increasing sediment and floodwater levels (Gucinski et al. 2001[vii], Trombulak and Frissell 2000[viii], Furniss et al. 2000).

Motorized Cross-Country Use

6. Acres of motorized cross-country use. Acres within each watershed dedicated to this use.

7. Acres of motorized cross-country use on soils with a severe wheeled off-road vehicle limitation. Wheeled off-road vehicle (WORV) recreational use is limited by conditions of climate, soil properties, and terrain affecting soil productivity. This rating provides for determining WORV impacts on soils. It is most useful in selection of areas to designate for this recreational activity. A rating of severe indicates risk for impairment of soil productivity by WORV is a major concern. Any WORV activity will result in significant site degradation. (USDA FS 1993)

8. Acres of motorized cross-country use within 300-ft of streams. As with routes close to streams, motorized cross-country use near streams would be a primary sediment contributor.

9. Acres of motorized cross-country use within 300-ft of impaired streams. As with routes close to streams, motorized cross-country use near streams would be a primary sediment contributor. 260 miles of the impaired streams within the SFNF boundaries are impaired for temperature, turbidity, or sediment (or a combination of these impairments and others). These 260 miles are the only streams evaluated in this indicator measure because temperature, turbidity, and sediment are impairments that could be affected by the proximity of motorized cross-country use.

Motorized Dispersed Camping Corridors

10. Acres of motorized dispersed camping corridors. Acres within each watershed dedicated to this use.

11. Acres of motorized dispersed camping corridors on soils with a moderate or severe erosion hazard rating. Erosion hazard is the probability of soil loss resulting from complete removal of vegetation and soil litter. A rating of moderate indicates that rates of soil loss will result in lowering of site productivity if left unchecked. A rating of severe indicates that rates of soil loss have a high probability of lowering site productivity before mitigating measures can be applied (USDA FS 1993). This means that without measures to prevent it, removal of topsoil will be faster than the soil forming processes can replace it.

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12. Acres of motorized dispersed camping corridors within 300-ft of streams. As with routes close to streams, motorized dispersed camping corridors near streams would be a primary sediment contributor.

13. Acres of motorized dispersed camping corridors within 300 feet of impaired streams. As with routes close to streams, motorized dispersed camping corridors near streams would be a primary sediment contributor. 260 miles of the impaired streams within the SFNF boundaries are impaired for temperature, turbidity, or sediment (or a combination of these impairments and others). These 260 miles are the only streams evaluated in this indicator measure because temperature, turbidity, and sediment are impairments that could be affected by the proximity of motorized dispersed camping corridors.

14. Acres of motorized dispersed camping corridors within 100 feet of riparian habitat. The Forest Service Manual (Section 2526.03 Riparian Management Policy) defines the riparian area as at least 100 feet from the edges of streams, lakes, and other bodies of water.

## C. Affected Environment

### *Project Area Description*

The Santa Fe National Forest encompasses approximately 1,684,536 acres within its proclaimed boundary. Of this, 131,110 acres are owned by entities other than the Forest Services. National Forest System lands within the proclaimed boundary total approximately 1,553,426 acres.

Aquatic Ecosystems

Aquatic ecosystems are water dependent and the main areas of concern of streams. Streams are classified as perennial, intermittent, or ephemeral.

**Perennial stream** – A stream or reach of a channel that flows continuously or nearly so throughout the year.

**Intermittent stream** – A stream or reach of a stream channel that flows, in its natural condition, only during certain times of the year or in several years. Characterized by interspersed, permanent surface water areas containing aquatic flora and fauna adapted to the relatively harsh environmental conditions found in these types of environments.

**Ephemeral stream** – A stream that flows only in direct response to precipitation in the immediate locality.

There are approximately 6,280 miles of drainages on the Santa Fe National Forest. There is an estimated 1,206 miles of perennial streams. The remaining 5,074 miles are composed of intermittent and ephemeral channels. Analyzing motorized use interactions with ephemeral and intermittent channels is important because these headwater channels often temporarily retain sediment and then route it down to the mainstream perennial channels during high-flow events.

Watersheds

Watersheds are natural divisions of the landscape and the basic functioning unit of the hydrologic system. Watersheds drain rainfall and snowmelt into a common stream, stream network, or body of water. Environmental changes commonly accumulate and appear on a watershed basis. A system of describing watersheds in terms of scale was developed by the U.S. Geological Survey, dividing them into progressively smaller nested watersheds with the first level being the largest land area relative to watersheds of successive levels. Each level is identified systematically be a hydrologic unit code number (HUC). For the purpose of analyzing the effects to soil and water resources from the proposed action and alternatives, the analysis will be presented at a fifth-field watershed level. Fifth-field watersheds have become the standard size used for research and projects by a variety of agencies and organizations. Therefore, it is



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convenient for fifth-field watershed to be the unit used for this analysis. There are 35 fifth-field watersheds that contain SFNF lands.

**Table 1. Fifth-field watersheds with Santa Fe National Forest Ownership**

| HUC 5 | HUC 5 Name | Acres of SFNF in HUC |
|---|---|---|
| 1108000402 | SAPELLO RIVER | 42,222 |
| 1108000403 | UPPER MORA RIVER | 31,370 |
| 1302010110 | SANTA CRUZ RIVER | 69,832 |
| 1302010111 | RIO CHAMA-RIO GRANDE | 3,277 |
| 1302010112 | POJOAQUE CREEK | 46,041 |
| 1302010113 | RIO TESUQUE-RIO GRANDE | 41,599 |
| 1302010204 | EL VADO RESEVOIR | 201 |
| 1302010205 | RIO CEBOLLA | 321 |
| 1302010206 | RIO GALLINA | 138,960 |
| 1302010207 | RIO GALLINA-RIO CHAMA | 35,402 |
| 1302010208 | RIO PUERCO | 103,357 |
| 1302010210 | ABIQUIU RESERVOIR | 106,106 |
| 1302010212 | EL RITO-RIO CHAMA | 34,529 |
| 1302010216 | RIO OJO CALIENTE-RIO CHAMA | 56,086 |
| 1302020101 | SANTA FE RIVER | 35,964 |
| 1302020102 | CANADA ANCHA-RIO GRANDE | 99,365 |
| 1302020103 | HEADWATERS GALISTO CREEK | 44,016 |
| 1302020104 | OUTLET GALISTO CREEK | 614 |
| 1302020106 | ARROYO TONQUE-RIO GRANDE | 34,582 |
| 1302020201 | RIO GUADALUPE | 168,657 |
| 1302020202 | UPPER JEMEZ RIVER | 42,133 |
| 1302020203 | RIO SALADO | 2,465 |
| 1302020204 | MIDDLE JEMEZ RIVER | 51,736 |
| 1302020205 | LOWER JEMEZ RIVER | 1,083 |
| 1302020401 | ARROYO SAN JOSE-RIO PUERCO | 57,785 |
| 1302020402 | LA CANADA DE LA LENA-RIO PUERCO | 5,471 |
| 1306000101 | COW CREEK | 76,946 |
| 1306000102 | COW CREEK-PECOS RIVER | 184,562 |
| 1306000103 | TECOLOTE CREEK | 45,477 |
| 1306000104 | TECOLOTE CREEK-PECOS RIVER | 41,306 |
| 1306000105 | HEADWATERS CANON BLANCO | 22,706 |
| 1306000106 | OUTLET CANON BLANCO | 21,907 |
| 1306000108 | HEADWATERS GALLINAS RIVER | 32,975 |
| 1408010302 | CANADA LARGA | 7,929 |
| 1408010303 | TAPICITO CREEK | 2,638 |

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Impaired Streams

Section 303(d) of the Clean Water Act (CWA) directs states to list water quality impaired streams and develop strategies to control the non-point source pollutants causing loss of beneficial uses. The 2008-2010 State of New Mexico CWA §303d/§305*(b) Integrated Report[ix] is used in this report. There are approximately 347 miles of streams listed as impaired within the boundaries of the Santa Fe National Forest and as directed by the CWA, it is the responsibility of the Forest to not further degrade these impaired streams.

260 miles of the impaired streams within the SFNF boundaries are impaired for temperature, turbidity, or sediment (or a combination of these impairments and others). These 260 miles are the only streams evaluated in this analysis because temperature, turbidity, and sediment are impairments that could be affected by motorized use.

Soils

Soils on the Santa Fe National Forest (SFNF) have been mapped and described in the Terrestrial Ecosystem Survey (TES) of the Santa Fe National Forest (USDA FS 1993)[x]. These descriptions include soil type, texture class, mineral class, soil depth class, rock fragments, slope, soil development class, and soil properties such as erosion hazard. Based on these soil conditions limitation ratings for various uses including wheeled-off-road vehicles were developed for each soil map unit. These soil condition limitations direct the land manager towards soil types that could have detrimental soil loss from various types of land management activities.

Climate

The SFNF occurs within the central portion of the Northern Mountains climatological division of New Mexico. The climate is variable as a consequence of the uneven topography and wide range of elevation. The climate varies from cool grasslands at the lower elevations to Alpine tundra at the higher elevations.

Average annual precipitation ranges from 32 to over 88 centimeters (12.6 to 34.6 inches). Approximately 50 percent of the average annual precipitation occurs during the low-sun half year period of 01 October to 31 March. Mean annual snowfall ranges from 70 to over 200 centimeters (27.6 to 78.7 inches). However, at the lower elevations snow cover does not persist for more than a few days. The increase in precipitation with increasing elevation is primarily due to snow pack buildup during the winter and mountain thunderstorms induced by the onset of the monsoon every summer.

Roads and Trails

The Santa Fe National Forest estimates that approximately 5,119 miles of roads are currently being used by the public. This includes 14 miles of unauthorized roads. Estimates also indicate that around 440 miles of closed forest roads are in used. Closed system roads are not maintained or intended for public or agency use, except in emergencies. A number of roads on the Forest are closed seasonally by closure order.

The Santa Fe National Forest currently manages 947 miles of forest trails, ranging in type from very primitive to paved. Of the 937 miles, 460 are in wilderness areas. The Forest has received reports of motorized use occurring in wilderness. Approximately 486 miles of forest trails are located in areas shared with motorized uses. There is no prohibition against motorized use on them, and it does occur. The Forest has approximately 27 miles of trails designed and managed for motorized use. Unauthorized trails also exist. Unauthorized trails are not built to Forest standards or maintained by the Forest Service. Groups who ride motorized vehicles on the Forest, provided digital data on 291 miles of trails, not already on forest roads or trails, they use.

Motorized Areas

The Santa Fe National Forest estimates that motorized cross-country use occurs on approximately 29% (443,848 acres) of the Forest. This estimate was derived by staff on the Forest's five ranger districts. The observations of Forest staff show that, generally and depending on the weather, cross-country use occurring once or twice a year leaves almost no signs of use, but frequent cross-country travel has resulted in the formation of unauthorized trails and roads, either by repeated use or in some cases unauthorized trail construction. Unauthorized routes also develop when drivers go

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around a muddy spot. Flat, open areas such as Cuba Mesa on the Cuba Ranger District, the Caja del Rio on the Espanola Ranger District, and Glorieta Mesa on the Pecos/Las Vegas Ranger District are susceptible to the creation of unauthorized routes due to cross-country travel.

Motor Vehicle Use for Big Game Retrieval

Current impacts from motorized big game retrieval are limited to the number of big game animals retrieved in hunting units within the Forest, which average 438 per year (see Description of No Action Alternative). Motorized big game retrieval consists of a single or multiple cross-country trips to retrieve a downed animal. Not all permits issued result in a cross-country trip to retrieve an animal, because not all permits result in successful hunts (no animal to retrieve), and because some animals can be retrieved without a vehicle. There is insufficient information to identify where cross country trips take place, so even distribution across the Forest is assumed.

Motor Vehicle Use for Dispersed Camping

A "dispersed campsite" is a place where people camp that is not in a developed campground. Dispersed campsites may not have picnic tables or metal fire rings provided by the Forest Service, but may have rock fire rings built by a camper. Usually dispersed camping is free of cost. Dispersed campsites exist across the Forest. "Motorized dispersed camping," also known as car camping, is when people drive their cars, trucks, RVs, or ATVs off a road to a campsite and camp with their vehicles close by.

The Santa Fe National Forest currently provides motorized dispersed camping opportunities that the public values greatly. Frequently, used motorized dispersed campsites, where evidence of camping can be seen, tend to occur along existing roads. Forest staff estimate that about 433 miles of roads on the Forest have frequently used motorized dispersed campsites located within 100 to 200 feet of either side of a roadway. Across the Forest, frequently used motorized dispersed campsites located further than 200 feet from a road usually have a short spur road leading to them. In addition, Forest staff estimate that infrequent motorized dispersed camping, where evidence of camping is not apparent, occurs on approximately 29% (443,848 acres) of the Forest, the same areas where people are driving cross-country.

**D. Analysis of Environmental Effects**

***Effects Common to All Alternatives***

Effects to Soil and Water Quality from Motorized Routes:

Motorized routes provide access for forest management activities and for public recreation. In forested watersheds, road and trail systems are a primary influence on stream health and habitat quality through sediment contributions (Furniss et al. 2000)[xi]. Routes disrupt a watershed's natural hydrology. Unpaved, they are vulnerable to rainfall and runoff eroding their surface. Paved or unpaved, they serve to concentrate and accelerate runoff, which can erode unarmored surfaces such as road fills and hillslopes.

The maintenance and use of routes lead to direct losses in soil productivity. Management activities associated with roads, trails, and cross-country motor vehicle use can accelerate erosion and sediment beyond the historic range of variation and geological rate (Satterlund and Adams 1992)[xii]. Luce and Black (2001) state, "Maintenance keeps roads in a condition suitable for travel and prevents severe erosion from failure of the [road] drainage system. Unfortunately, road grading can break up armor layers on the road surface or the ditch and temporarily increase road surface erosion."

Soil compaction also leads to surface subsidence – the lowering of the road or trail relative to the adjacent ground surface. Trails can then become entrenched due to the lowered surface. This lower surface then intercepts and drains water from adjacent surfaces and channels that flow along the road or trail. This increases the risk of water erosion on sloped areas and the pooling of water in low-lying sections. As a road or trail surface degrades due to rutting or the formation of muck holes, users often widen the trail. (Meyer 2002)[xiii]



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Designated transportation facilities such as roads and trails are considered "dedicated use" for lands that comprise the road and trail prism. In this context, impacts to soil productivity resulting directly from the presence of system roads and trails are not evaluated because the affected land is managed for transportation and is not managed for site productivity.

Concentrated runoff is the primary agent of erosion on native surfaced roads and trails. Physical displacement of soil by motor vehicle traffic is also important, although most displaced soil is ultimately transported by concentrated runoff. Displacement is the mechanical movement of soil particles. Soil displacement becomes more severe as route gradients become excessively steep.

Routes primarily intercept overland flow. Water intercepted by a road or trail prism is often concentrated and channelized until it leaves the road. Water intercepted and concentrated by roads can periodically increase the amount of flow naturally carried by streams, especially during large runoff events such as spring snowmelt and thunderstorms (King and Tennyson 1984)[xiv]. Stream channels will respond to significant increases in flow rates by widening or deepening in order to carry these greater flow rates (MacDonald and Stednick 2003). This widening and deepening can decrease bank stability, increase sediment input, and increase the water's temperature.

Below is an example of how a road (FR 376) can intercept overland flow and channel it.

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Routes can also increase deposition of sediment into stream systems. Sediment can be described as suspended solids in the form of silt, clays, and other fine materials that cause temporary to permanent turbidity or murkiness. Unchecked, routes can directly convey eroded sediments into a stream system. Roads constructed on unstable slopes can add to structural instability of these areas, leading to landslides and greater sources of sediment. (MacDonald and Coe 2008)[xv]

Not all sediment from routes immediately enters perennial streams. Often headwater streams (ephemeral and intermittent channels) will capture and temporarily store sediment. Sediment may then be flushed from these channels during storm events and be routed down to perennial streams lower in the watershed. (Bilby et al. 1989)[xvi]

Routes can contribute to a reduction of riparian, wetland and aquatic habitat. Roads or trails constructed adjacent to a stream system can impede functional riparian habitat. Surface and subsurface water that supports wetlands and riparian areas can also be disrupted by a road and may reduce the size and function of these resources.

The most hydrologic connection between disturbed soils of routes and stream channels occurs at route/stream crossings due to the minimal amount of vegetation filtering occurring at these sites. Because crossings occur over water, they are efficient sites for sediment delivery directly into streams. Sediment produced at these sites originates from two primary sources: the stream-crossing structure (which includes unimproved fords) and the road approach to the crossing. (Taylor et al. 1999)[xvii] At low water crossings, vehicles going through streams stir up sediment, but this effect tends to be fleeting. The larger effect is from the road or trail approach to the low water crossing.

Route impacts can persist long after a route is closed unless measures are taken to disconnect runoff pathways into a stream channel and/or onto a road surface. (Leung and Marion 1996)[xviii]

<u>Effects to Soil and Water Quality from Motorized Cross-Country Use (Motorized Areas, Motorized Dispersed Camping Corridors, Motorized Big Game):</u>
Direct and indirect impacts to soil resources from motorized cross-country use can include compaction, shearing, displacement, disruption of surface water flow, reduction in infiltration, surface ponding, and the loss of water-holding capacity (Meyer 2002). Compaction reduces soil porosity and causes surface settling while shearing is the destructive transfer of force through the soil.

Many of the soil textures and soil types located in riparian and upland landscape positions across the SFNF are susceptible to detrimental increases in soil compaction after multiple vehicle trips. Motorized cross-country use can degrade soil productivity. Soil productivity includes the inherent capacity of a soil to support the growth of specified plants or plant communities. Decreases in soil productivity and increases in soil compaction reduce the ability of the areas used for motorized cross-country use to revegetate between uses.

At the water's edge, riparian vegetation stabilizes banks and reduces water temperatures. Riparian vegetation influences light and temperature, supplies food for stream organisms, and contributes large woody debris. Healthy riparian areas filter out large quantities of sediments, nutrients, and other contaminants. Riparian ecosystems also can moderate flooding and provide a steady low flow during dry periods. (Obedzinski et al. 2001)[xix]

The effects on riparian soils associated with vehicle traffic can include compaction, destruction of soil organisms, and increased erosion (National Research Council 2002)[xx]. The effects associated with vehicle traffic can include the physical alteration of riparian and aquatic habitats (broken vegetation, disruption of the stream bed, etc.) and habitat modification (soil compaction, increased turbidity of water, increased erosion of stream banks, etc.) (Johnson and Carothers 1982)[xxi].

Motorized vehicle use in riparian areas can adversely affect water quality through the following mechanisms. Vehicle use within riparian areas compact the soil and disturb the vegetation. This degrades the riparian area by decreasing the ability of ground cover and canopy vegetation to grow. Vehicle traffic impacts vegetation by: (1) reducing density and



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diversity of herbaceous ground cover, (2) lowering tree vigor, and (3) eliminating seedlings and saplings (Johnson and Carothers 1982). This reduction in vegetation reduces the riparian area's ability to filter sediment from overland flow, provide bank stability, and provide canopy shade. This then results in a reduction in water quality from higher levels of sediment entering the stream from overland flow or from stream banks collapsing. The reduction in canopy shade results in an increase in stream temperature.

Rasmussen and Padgett (1994)[xxii] comment, "The presence of water and shading vegetation, along with the associated fish and wildlife, attracts people to riparian ecosystems for recreation." They go on to say, "There is, however, a tremendous effect on riparian areas throughout the West from recreational use." Within the currently used dispersed campsite corridors, most users drive directly to their campsites with their vehicles. These campsites tend to be very close to streams and riparian habitat. The existing parking or vehicle access roads associated with motorized dispersed camping are generally detrimentally compacted and have reduced vegetative cover. Recovery of vegetation on these sites is generally slow due to the compacted ground and continual traffic during the growing season.

The following photo is an example from the Rio de las Vacas of how many users drive directly to their campsites with their vehicles. These campsites are often very close to the riparian area.

Decreases in infiltration rates and the loss of effective vegetative cover capable of reducing raindrop impacts and filtering sediment from overland flows directly increases the potential to source and route sediment from areas

impacted by motorized vehicle traffic. Erosion losses from these sites can produce sediment that can affect water quality and fish habitat when routed to streams.

The photo below is a good example of how erosion can route sediment to streams from areas that have lost their vegetative cover due to motorized vehicle traffic.

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Not all sediment from motorized cross-country use immediately enters perennial streams. Often headwater streams (ephemeral and intermittent channels) will capture and temporarily store sediment. Sediment may then be flushed from these channels during storm events and be routed down to perennial streams lower in the watershed. (Bilby et al. 1989)

***Alternative 1 (No Action)***

Motorized Routes (Roads and Trails)

The table below (Table 2) shows the values for each route indicator measure for the existing use. One watershed, El Vado Reservoir (1302010204), has no miles of routes currently being used. The remaining 34 fifth-field watersheds have motorized routes ranging from 1.4 miles in the Rio Cebolla (1302010205) to 841.7 miles in the Rio Guadalupe (1302020201).

Routes close to streams are often primary sediment contributors (MacDonald and Stednick 2003, Furniss et al 2000). Currently, 36% of the motorized routes are `within 300 feet of a stream, but only 2% are within 300 feet of a listed stream.

Tabulating the number of stream crossings by routes provides an estimate of the potential for disruption of streamflow rates and sediment input. Eaglin and Hubert (1993)[xxiii] found that sediment delivery into stream channels was increased by the number of times routes crossed watercourses. Where routes run downhill to culverts or other crossings, ditches and road surfaces may serve as ephemeral channels for water. Soil particles from the road or trail bed, ditches, and other disturbed areas are carried by water during spring snowmelt or thunderstorms into the watercourse.

A watershed risk assessment was conducted for linear road and trail density in each 5th-level watershed. A poor rating indicates the greatest potential for adverse route impacts to watershed condition. Conversely, a good rating indicates less potential for adverse route impacts to watershed condition. Risk ratings were defined as follows from the "Implementation Guide for Assessing and Tracking Changes to Watershed Condition" developed by the National Stream Systems Technology Center which is a partnership between National Forest Systems and Research and Development:

- Good (highlighted in green): Watersheds with less than 1 mile of roads and trails per square mile;
- Fair (highlighted in yellow): Watersheds with 1 – 2.4 miles of roads and trails per square mile;
- Poor (highlighted in orange): Watersheds with more than 2.4 miles of roads and trails per square mile.

Fifteen of the 35 watersheds have a route density over 2.4 miles per square-mile which is considered in the Poor range. Only 8 watersheds have a route density less than 1 mile per square-mile which is considered in the Good range.

**Table 2. Motorized Routes**

| HUC 5 | HUC 5 Name | Alt 1 |
|---|---|---|
| 1108000402 | SAPELLO RIVER | |
| | M1. Total miles | 28.6 |
| | M2. Miles within 300' of streams | 11.0 |
| | M3. Miles within 300' of impaired streams | 0.0 |
| | M4. Number of stream crossings | 46 |
| | M5. Route density | 0.4 |
| 1108000403 | UPPER MORA RIVER | |
| | M1. Total miles | 55.7 |
| | M2. Miles within 300' of streams | 13.8 |
| | M3. Miles within 300' of impaired streams | 0.0 |
| | M4. Number of stream crossings | 34 |
| | M5. Route density | 1.1 |
| 1302010110 | SANTA CRUZ RIVER | |
| | M1. Total miles | 44.3 |
| | M2. Miles within 300' of streams | 11.2 |

| HUC 5 | HUC 5 Name | Alt 1 |
|---|---|---|
| 1302020106 | ARROYO TONQUE-RIO GRANDE | |
| | M1. Total miles | 123.1 |
| | M2. Miles within 300' of streams | 60.1 |
| | M3. Miles within 300' of impaired streams | 0.0 |
| | M4. Number of stream crossings | 321 |
| | M5. Route density | 2.3 |
| 1302020201 | RIO GUADALUPE | |
| | M1. Total miles | 841.7 |
| | M2. Miles within 300' of streams | 339.2 |
| | M3. Miles within 300' of impaired streams | 38.1 |
| | M4. Number of stream crossings | 1180 |
| | M5. Route density | 3.2 |
| 1302020202 | UPPER JEMEZ RIVER | |
| | M1. Total miles | 128.0 |
| | M2. Miles within 300' of streams | 25.1 |

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| | M3. Miles within 300' of impaired streams | 0.0 |
| | M4. Number of stream crossings | 36 |
| | M5. Route density | 0.4 |
| 1302010111 | RIO CHAMA-RIO GRANDE | |
| | M1. Total miles | 17.9 |
| | M2. Miles within 300' of streams | 1.8 |
| | M3. Miles within 300' of impaired streams | 0.0 |
| | M4. Number of stream crossings | 7 |
| | M5. Route density | 3.5 |
| 1302010112 | POJOAQUE CREEK | |
| | M1. Total miles | 25.6 |
| | M2. Miles within 300' of streams | 10.6 |
| | M3. Miles within 300' of impaired streams | 0.0 |
| | M4. Number of stream crossings | 46 |
| | M5. Route density | 0.4 |
| 1302010113 | RIO TESUQUE-RIO GRANDE | |
| | M1. Total miles | 142.3 |
| | M2. Miles within 300' of streams | 45.7 |
| | M3. Miles within 300' of impaired streams | 0.0 |
| | M4. Number of stream crossings | 197 |
| | M5. Route density | 2.2 |
| 1302010205 | RIO CEBOLLA | |
| | M1. Total miles | 1.4 |
| | M2. Miles within 300' of streams | 1.1 |
| | M3. Miles within 300' of impaired streams | 0.0 |
| | M4. Number of stream crossings | 4 |
| | M5. Route density | 2.9 |
| 1302010206 | RIO GALLINA | |
| | M1. Total miles | 504.3 |
| | M2. Miles within 300' of streams | 4.2 |
| | M3. Miles within 300' of impaired streams | 4.3 |
| | M4. Number of stream crossings | 1392 |
| | M5. Route density | 2.3 |
| 1302010207 | RIO GALLINA-RIO CHAMA | |
| | M1. Total miles | 176.8 |
| | M2. Miles within 300' of streams | 93.1 |
| | M3. Miles within 300' of impaired streams | 0.0 |
| | M4. Number of stream crossings | 499 |
| | M5. Route density | 3.2 |
| 1302010208 | RIO PUERCO | |
| | M1. Total miles | 501.5 |
| | M2. Miles within 300' of streams | 100.6 |
| | M3. Miles within 300' of impaired streams | 7.1 |
| | M4. Number of stream crossings | 331 |
| | M5. Route density | 3.1 |
| 1302010210 | ABIQUIU RESERVOIR | |
| | M1. Total miles | 413.8 |
| | M2. Miles within 300' of streams | 115.0 |
| | M3. Miles within 300' of impaired streams | 8.4 |
| | M4. Number of stream crossings | 308 |
| | M5. Route density | 2.5 |
| 1302010212 | EL RITO-RIO CHAMA | |
| | M1. Total miles | 82.4 |
| | M2. Miles within 300' of streams | 26.7 |
| | M3. Miles within 300' of impaired streams | 0.2 |
| | M4. Number of stream crossings | 96 |

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| | M3. Miles within 300' of impaired streams | 5.5 |
| | M4. Number of stream crossings | 86 |
| | M5. Route density | 1.9 |
| 1302020203 | RIO SALADO | |
| | M1. Total miles | 5.4 |
| | M3. Miles within 300' of streams | 2.1 |
| | M4. Miles within 300' of impaired streams | 0.0 |
| | M5. Number of stream crossings | 26 |
| | M6. Route density | 1.4 |
| 1302020204 | MIDDLE JEMEZ RIVER | |
| | M1. Total miles | 154.4 |
| | M2. Miles within 300' of streams | 62.0 |
| | M3. Miles within 300' of impaired streams | 0.0 |
| | M4. Number of stream crossings | 198 |
| | M5. Route density | 1.9 |
| 1302020205 | LOWER JEMEZ RIVER | |
| | M1. Total miles | 1.6 |
| | M2. Miles within 300' of streams | 1.2 |
| | M3. Miles within 300' of impaired streams | 0.0 |
| | M4. Number of stream crossings | 6 |
| | M5. Route density | 0.9 |
| 1302020401 | ARROYO SAN JOSE-RIO PUERCO | |
| | M1. Total miles | 228.6 |
| | M2. Miles within 300' of streams | 93.6 |
| | M3. Miles within 300' of impaired streams | 0.0 |
| | M4. Number of stream crossings | 352 |
| | M5. Route density | 2.5 |
| 1302020402 | LA CANADA DE LA LENA-RIO PUERCOS | |
| | M1. Total miles | 16.7 |
| | M2. Miles within 300' of streams | 5.3 |
| | M3. Miles within 300' of impaired streams | 0.0 |
| | M4. Number of stream crossings | 17 |
| | M5. Route density | 2.0 |
| 1306000101 | COW CREEK | |
| | M1. Total miles | 315.7 |
| | M2. Miles within 300' of streams | 92.2 |
| | M3. Miles within 300' of impaired streams | 11.2 |
| | M4. Number of stream crossings | 356 |
| | M5. Route density | 2.6 |
| 1306000102 | COW CREEK-PECOS RIVER | |
| | M1. Total miles | 278.1 |
| | M2. Miles within 300' of streams | 86.1 |
| | M3. Miles within 300' of impaired streams | 3.5 |
| | M4. Number of stream crossings | 292 |
| | M5. Route density | 1.0 |
| 1306000103 | TECOLOTE CREEK | |
| | M1. Total miles | 178.3 |
| | M2. Miles within 300' of streams | 46.1 |
| | M3. Miles within 300' of impaired streams | 3.2 |
| | M4. Number of stream crossings | 211 |
| | M5. Route density | 2.5 |
| 1306000104 | TECOLOTE CREEK-PECOS RIVER | |
| | M1. Total miles | 171.8 |
| | M2. Miles within 300' of streams | 46.3 |
| | M3. Miles within 300' of impaired streams | 0.0 |
| | M4. Number of stream crossings | 151 |

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| | M5. Route density | 1.5 |
| 1302010216 | RIO OJO CALIENTE-RIO CHAMA | |
| | M1. Total miles | 61.7 |
| | M2. Miles within 300' of streams | 17.7 |
| | M3. Miles within 300' of impaired streams | 0.0 |
| | M4. Number of stream crossings | 82 |
| | M5. Route density | 0.7 |
| 1302020101 | SANTA FE RIVER | |
| | M1. Total miles | 39.9 |
| | M2. Miles within 300' of streams | 6.6 |
| | M3. Miles within 300' of impaired streams | 0.0 |
| | M4. Number of stream crossings | 34 |
| | M5. Route density | 0.7 |
| 1302020102 | CANADA ANCHA-RIO GRANDE | |
| | M1. Total miles | 317.7 |
| | M2. Miles within 300' of streams | 90.4 |
| | M3. Miles within 300' of impaired streams | 0.5 |
| | M4. Number of stream crossings | 393 |
| | M5. Route density | 2.1 |
| 1302020103 | HEADWATERS GALISTO CREEK | |
| | M1. Total miles | 211.9 |
| | M2. Miles within 300' of streams | 54.1 |
| | M3. Miles within 300' of impaired streams | 0.0 |
| | M4. Number of stream crossings | 279 |
| | M5. Route density | 3.1 |
| 1302020104 | OUTLET GALISTO CREEK | |
| | M1. Total miles | 6.5 |
| | M2. Miles within 300' of streams | 0.8 |
| | M3. Miles within 300' of impaired streams | 0.0 |
| | M4. Number of stream crossings | 1 |
| | M5. Route density | 6.7 |

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|---|---|---|
| | M5. Route density | 2.7 |
| 1306000105 | HEADWATERS CANON BLANCO | |
| | M1. Total miles | 176.6 |
| | M2. Miles within 300' of streams | 65.9 |
| | M3. Miles within 300' of impaired streams | 0.0 |
| | M4. Number of stream crossings | 366 |
| | M5. Route density | 5.0 |
| 1306000106 | OUTLET CANON BLANCO | |
| | M1. Total miles | 113.4 |
| | M2. Miles within 300' of streams | 25.3 |
| | M3. Miles within 300' of impaired streams | 0.0 |
| | M4. Number of stream crossings | 113 |
| | M5. Route density | 3.3 |
| 1306000108 | HEADWATERS GALLINAS RIVER | |
| | M1. Total miles | 34.2 |
| | M2. Miles within 300' of streams | 10.6 |
| | M3. Miles within 300' of impaired streams | 7.1 |
| | M4. Number of stream crossings | 32 |
| | M5. Route density | 0.7 |
| 1408010302 | CANADA LARGA | |
| | M1. Total miles | 51.6 |
| | M2. Miles within 300' of streams | 36.5 |
| | M3. Miles within 300' of impaired streams | 0.0 |
| | M4. Number of stream crossings | 207 |
| | M5. Route density | 4.2 |
| 1408010303 | TAPICITO CREEK | |
| | M1. Total miles | 5.7 |
| | M2. Miles within 300' of streams | 3.2 |
| | M3. Miles within 300' of impaired streams | 0.0 |
| | M4. Number of stream crossings | 5 |
| | M5. Route density | 1.4 |

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Motorized Big Game Retrieval

Current impacts from motorized big game retrieval are limited to the number of big game permits issued for units within the Forest, which average 438 per year (see Social and Economic Analysis Specialist Report). Motorized big game retrieval consists of a single or multiple cross-country trips to retrieve a downed animal. Not all permits issued result in a cross-country trip to retrieve an animal, because not all permits result in successful hunts (no animal to retrieve), and because some animals can be retrieved without a vehicle. There is insufficient information to identify where cross country trips take place, so even distribution across the Forest is assumed.

Motorized Cross-Country Use

The table below (Table 3) shows the values for each motorized cross-country use indicator measures for the current use. Three watersheds, El Vado Reservoir (1302010204), Rio Cebolla (1302010206), and Canada Larga (1408010302) do not have current motorized cross-country use.

Thirty-three fifth-field watersheds currently do have at least some motorized cross-country use. Approximately 43% of this current cross-country use is on soils with a severe wheeled off-road vehicle (WORV) limitation and 19% of it is within 300' of streams. Currently, only 1% of the cross-country use is within 300' of an impaired stream.

**Table 3. Motorized Cross-Country Use**

| HUC 5 | HUC 5 Name | Alt 1 |
|---|---|---|
| 1108000402 | SAPELLO RIVER | |
| | M6. Total acres available | 39 |
| | M7. Acres with severe WORV limitation | 0 |

| HUC 5 | HUC 5 Name | Alt 1 |
|---|---|---|
| 1302020106 | ARROYO TONQUE-RIO GRANDE | |
| | M6. Total acres available | 12511 |
| | M7. Acres with severe WORV limitation | 4063 |

| | | |
|---|---|---|
| | M8. Acres within 300' of streams | 0 |
| | M9. Acres within 300' of impaired streams | 0 |
| 1108000403 | UPPER MORA RIVER | |
| | M6. Total acres available | 1932 |
| | M7. Acres with severe WORV limitation | 1101 |
| | M8. Acres within 300' of streams | 317 |
| | M9. Acres within 300' of impaired streams | 0 |
| 1302010110 | SANTA CRUZ RIVER | |
| | M6. Total acres available | 12663 |
| | M7. Acres with severe WORV limitation | 6784 |
| | M8. Acres within 300' of streams | 2253 |
| | M9. Acres within 300' of impaired streams | 0 |
| 1302010111 | RIO CHAMA-RIO GRANDE | |
| | M6. Total acres available | 2226 |
| | M7. Acres with severe WORV limitation | 121 |
| | M8. Acres within 300' of streams | 172 |
| | M9. Acres within 300' of impaired streams | 0 |
| 1302010112 | POJOAQUE CREEK | |
| | M6. Total acres available | 3186 |
| | M7. Acres with severe WORV limitation | 1414 |
| | M8. Acres within 300' of streams | 519 |
| | M9. Acres within 300' of impaired streams | 0 |
| 1302010113 | RIO TESUQUE-RIO GRANDE | |
| | M6. Total acres available | 22234 |
| | M7. Acres with severe WORV limitation | 14088 |
| | M8. Acres within 300' of streams | 4427 |
| | M9. Acres within 300' of impaired streams | 0 |
| 1302010204 | EL VADO RESEVOIR | |
| | M6. Total acres available | 0 |
| | M7. Acres with severe WORV limitation | 0 |
| | M8. Acres within 300' of streams | 0 |
| | M9. Acres within 300' of impaired streams | 0 |
| 1302010205 | RIO CEBOLLA | |
| | M6. Total acres available | 0 |
| | M7. Acres with severe WORV limitation | 0 |
| | M8. Acres within 300' of streams | 0 |
| | M9. Acres within 300' of impaired streams | 0 |
| 1302010206 | RIO GALLINA | |
| | M6. Total acres available | 12417 |
| | M7. Acres with severe WORV limitation | 5903 |
| | M8. Acres within 300' of streams | 4722 |
| | M9. Acres within 300' of impaired streams | 121 |
| 1302010207 | RIO GALLINA-RIO CHAMA | |
| | M6. Total acres available | 1732 |
| | M7. Acres with severe WORV limitation | 344 |
| | M8. Acres within 300' of streams | 963 |
| | M9. Acres within 300' of impaired streams | 0 |
| 1302010208 | RIO PUERCO | |
| | M6. Total acres available | 7806 |
| | M7. Acres with severe WORV limitation | 6392 |
| | M8. Acres within 300' of streams | 1381 |
| | M9. Acres within 300' of impaired streams | 247 |
| 1302010210 | ABIQUIU RESERVOIR | |
| | M6. Total acres available | 26596 |
| | M7. Acres with severe WORV limitation | 16962 |
| | M8. Acres within 300' of streams | 4555 |

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|---|---|---|
| | M8. Acres within 300' of streams | 3510 |
| | M9. Acres within 300' of impaired streams | 0 |
| 1302020201 | RIO GUADALUPE | |
| | M6. Total acres available | 44452 |
| | M7. Acres with severe WORV limitation | 26640 |
| | M8. Acres within 300' of streams | 14063 |
| | M9. Acres within 300' of impaired streams | 1595 |
| 1302020202 | UPPER JEMEZ RIVER | |
| | M6. Total acres available | 4534 |
| | M7. Acres with severe WORV limitation | 3049 |
| | M8. Acres within 300' of streams | 317 |
| | M9. Acres within 300' of impaired streams | 50 |
| 1302020203 | RIO SALADO | |
| | M6. Total acres available | 400 |
| | M7. Acres with severe WORV limitation | 231 |
| | M8. Acres within 300' of streams | 127 |
| | M9. Acres within 300' of impaired streams | 0 |
| 1302020204 | MIDDLE JEMEZ RIVER | |
| | M6. Total acres available | 12006 |
| | M7. Acres with severe WORV limitation | 7428 |
| | M8. Acres within 300' of streams | 3463 |
| | M9. Acres within 300' of impaired streams | 0 |
| 1302020205 | LOWER JEMEZ RIVER | |
| | M6. Total acres available | 520 |
| | M7. Acres with severe WORV limitation | 0 |
| | M8. Acres within 300' of streams | 82 |
| | M9. Acres within 300' of impaired streams | 0 |
| 1302020401 | ARROYO SAN JOSE-RIO PUERCO | |
| | M6. Total acres available | 6907 |
| | M7. Acres with severe WORV limitation | 1570 |
| | M8. Acres within 300' of streams | 1964 |
| | M9. Acres within 300' of impaired streams | 0 |
| 1302020402 | LA CANADA DE LA LENA-RIO PUERCOS | |
| | M6. Total acres available | 25 |
| | M7. Acres with severe WORV limitation | 25 |
| | M8. Acres within 300' of streams | 0 |
| | M9. Acres within 300' of impaired streams | 0 |
| 1306000101 | COW CREEK | |
| | M6. Total acres available | 18440 |
| | M7. Acres with severe WORV limitation | 11685 |
| | M8. Acres within 300' of streams | 4363 |
| | M9. Acres within 300' of impaired streams | 163 |
| 1306000102 | COW CREEK-PECOS RIVER | |
| | M6. Total acres available | 22519 |
| | M7. Acres with severe WORV limitation | 11166 |
| | M8. Acres within 300' of streams | 5210 |
| | M9. Acres within 300' of impaired streams | 221 |
| 1306000103 | TECOLOTE CREEK | |
| | M6. Total acres available | 18707 |
| | M7. Acres with severe WORV limitation | 11617 |
| | M8. Acres within 300' of streams | 4151 |
| | M9. Acres within 300' of impaired streams | 53 |
| 1306000104 | TECOLOTE CREEK-PECOS RIVER | |
| | M6. Total acres available | 27889 |
| | M7. Acres with severe WORV limitation | 13407 |
| | M8. Acres within 300' of streams | 6658 |

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|---|---|---|
| | M9. Acres within 300' of impaired streams | 524 |
| 1302010212 | EL RITO-RIO CHAMA | |
| | M6. Total acres available | 21781 |
| | M7. Acres with severe WORV limitation | 7958 |
| | M8. Acres within 300' of streams | 3799 |
| | M9. Acres within 300' of impaired streams | 196 |
| 1302010216 | RIO OJO CALIENTE-RIO CHAMA | |
| | M6. Total acres available | 24501 |
| | M7. Acres with severe WORV limitation | 11485 |
| | M8. Acres within 300' of streams | 4915 |
| | M9. Acres within 300' of impaired streams | 0 |
| 1302020101 | SANTA FE RIVER | |
| | M6. Total acres available | 13223 |
| | M7. Acres with severe WORV limitation | 6962 |
| | M8. Acres within 300' of streams | 1773 |
| | M9. Acres within 300' of impaired streams | 150 |
| 1302020102 | CANADA ANCHA-RIO GRANDE | |
| | M6. Total acres available | 56282 |
| | M7. Acres with severe WORV limitation | 44225 |
| | M8. Acres within 300' of streams | 10498 |
| | M9. Acres within 300' of impaired streams | 48 |
| 1302020103 | HEADWATERS GALISTO CREEK | |
| | M6. Total acres available | 23967 |
| | M7. Acres with severe WORV limitation | 3305 |
| | M8. Acres within 300' of streams | 5503 |
| | M9. Acres within 300' of impaired streams | 0 |
| 1302020104 | OUTLET GALISTO CREEK | |
| | M6. Total acres available | 502 |
| | M7. Acres with severe WORV limitation | 432 |
| | M8. Acres within 300' of streams | 107 |
| | M9. Acres within 300' of impaired streams | 0 |

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|---|---|---|
| | M9. Acres within 300' of impaired streams | 195 |
| 1306000105 | HEADWATERS CANON BLANCO | |
| | M6. Total acres available | 22641 |
| | M7. Acres with severe WORV limitation | 1156 |
| | M8. Acres within 300' of streams | 5873 |
| | M9. Acres within 300' of impaired streams | 0 |
| 1306000106 | OUTLET CANON BLANCO | |
| | M6. Total acres available | 20093 |
| | M7. Acres with severe WORV limitation | 819 |
| | M8. Acres within 300' of streams | 3447 |
| | M9. Acres within 300' of impaired streams | 0 |
| 1306000108 | HEADWATERS GALLINAS RIVER | |
| | M6. Total acres available | 1111 |
| | M7. Acres with severe WORV limitation | 1088 |
| | M8. Acres within 300' of streams | 94 |
| | M9. Acres within 300' of impaired streams | 0 |
| 1408010302 | CANADA LARGA | |
| | M6. Total acres available | 0 |
| | M7. Acres with severe WORV limitation | 0 |
| | M8. Acres within 300' of streams | 0 |
| | M9. Acres within 300' of impaired streams | 0 |
| 1408010303 | TAPICITO CREEK | |
| | M6. Total acres available | 8 |
| | M7. Acres with severe WORV limitation | 3 |
| | M8. Acres within 300' of streams | 3 |
| | M9. Acres within 300' of impaired streams | 0 |

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Motorized Dispersed Camping Corridors

The table below (Table 4) shows the values for each fifth-code watershed with existing motorized dispersed camping use. Seven watersheds, Santa Cruz River (1302010110), Rio Chama-Rio Grande (1302010111), El Vado Reservoir (1302010204), Rio Cebolla (1302010206), Outlet Galisto Creek (1302020104), Rio Salado (1302020203), and Lower Jemez River (1302020205) do not currently have motorized dispersed camping corridors. The remaining 28 fifth-field watersheds do currently have motorized dispersed camping use.

The majority of the 28 watersheds with dispersed camping corridors have much of this use on soils with a moderate or high erosion hazard. This means that these areas have a high probability of soil loss due to the removal of vegetation and soil litter. This is important because much of the dispersed camping corridors are within 300 feet of streams. A high potential for soil loss and proximity to streams means that there is a higher probability that some of these sites are actively delivering sediment to stream systems. Ouren (2007)[xxiv] states that, "The generally impervious nature of soils compacted by OHV traffic enhances gully formation, thus promoting additional flows of sediments and suspended solids into aquatic systems, effectively extending the drainage network of a given watershed."

The majority of the watersheds have very few dispersed camping corridor acres within 300 feet of an impaired stream. The exception to that would be Rio Guadalupe (1302020201) with 11% and Tecolote Creek (1306000103) with 10% of the total acreage is within 300' of impaired streams.

Another indicator measure of importance to watershed condition is the total acreage of dispersed camping corridors within 100 feet of riparian habitat in each watershed. The majority of the watersheds have less than 15% within 100 feet

of riparian habitat. However, there are two watersheds with considerably higher acreage of dispersed camping corridors within 100 feet of riparian habitat. These watersheds are Pojoaque Creek (1302010112) with 54% and Rio Guadalupe (1302020201) with 34% of the total acreage used for dispersed camping corridors within 100 feet of riparian habitat. This is an important indicator because riparian vegetation filters sediment and provides shade to streams. Removal of this vegetation due to motorized dispersed camping activities reduces the capability of the riparian habitat to function and thus jeopardizes water quality.

**Table 4. Motorized Dispersed Camping Corridors**

| HUC 5 | HUC 5 Name | Alt 1 |
|---|---|---|
| 1108000402 | SAPELLO RIVER | |
| | M10. Total acres available | 17 |
| | M11. Acres with moderate or severe EH | 17 |
| | M12. Acres within 300' of streams | 0 |
| | M13. Acres within 300' of impaired streams | 0 |
| | M14. Acres within 100' of riparian habitat | 0 |
| 1108000403 | UPPER MORA RIVER | |
| | M10. Total acres available | 310 |
| | M11. Acres with moderate or severe EH | 310 |
| | M12. Acres within 300' of streams | 52 |
| | M13. Acres within 300' of impaired streams | 0 |
| | M14. Acres within 100' of riparian habitat | 24 |
| 1302010112 | POJOAQUE CREEK | |
| | M10. Total acres available | 178 |
| | M11. Acres with moderate or severe EH | 178 |
| | M12. Acres within 300' of streams | 126 |
| | M13. Acres within 300' of impaired streams | 0 |
| | M14. Acres within 100' of riparian habitat | 97 |
| 1302010113 | RIO TESUQUE-RIO GRANDE | |
| | M10. Total acres available | 7 |
| | M11. Acres with moderate or severe EH | 7 |
| | M12. Acres within 300' of streams | 0 |
| | M13. Acres within 300' of impaired streams | 0 |
| | M14. Acres within 100' of riparian habitat | 0 |
| 1302010206 | RIO GALLINA | |
| | M10. Total acres available | 1373 |
| | M11. Acres with moderate or severe EH | 1373 |
| | M12. Acres within 300' of streams | 780 |
| | M13. Acres within 300' of impaired streams | 4 |
| | M14. Acres within 100' of riparian habitat | 122 |
| 1302010207 | RIO GALLINA-RIO CHAMA | |
| | M10. Total acres available | 529 |
| | M11. Acres with moderate or severe EH | 529 |
| | M12. Acres within 300' of streams | 288 |
| | M13. Acres within 300' of impaired streams | 0 |
| | M14. Acres within 100' of riparian habitat | 15 |
| 1302010208 | RIO PUERCO | |
| | M10. Total acres available | 1482 |
| | M11. Acres with moderate or severe EH | 1405 |
| | M12. Acres within 300' of streams | 443 |
| | M13. Acres within 300' of impaired streams | 52 |
| | M14. Acres within 100' of riparian habitat | 242 |
| 1302010210 | ABIQUIU RESERVOIR | |
| | M10. Total acres available | 2662 |
| | M11. Acres with moderate or severe EH | 2655 |

| HUC 5 | HUC 5 Name | Alt 1 |
|---|---|---|
| 1302020201 | RIO GUADALUPE | |
| | M10. Total acres available | 3157 |
| | M11. Acres with moderate or severe EH | 2687 |
| | M12. Acres within 300' of streams | 1450 |
| | M13. Acres within 300' of impaired streams | 329 |
| | M14. Acres within 100' of riparian habitat | 1079 |
| 1302020202 | UPPER JEMEZ RIVER | |
| | M10. Total acres available | 133 |
| | M11. Acres with moderate or severe EH | 133 |
| | M12. Acres within 300' of streams | 12 |
| | M13. Acres within 300' of impaired streams | 0 |
| | M14. Acres within 100' of riparian habitat | 0 |
| 1302020204 | MIDDLE JEMEZ RIVER | |
| | M10. Total acres available | 512 |
| | M11. Acres with moderate or severe EH | 511 |
| | M12. Acres within 300' of streams | 265 |
| | M13. Acres within 300' of impaired streams | 0 |
| | M14. Acres within 100' of riparian habitat | 39 |
| 1302020401 | ARROYO SAN JOSE-RIO PUERCO | |
| | M10. Total acres available | 1085 |
| | M11. Acres with moderate or severe EH | 1030 |
| | M12. Acres within 300' of streams | 450 |
| | M13. Acres within 300' of impaired streams | 0 |
| | M14. Acres within 100' of riparian habitat | 115 |
| 1302020402 | LA CANADA DE LA LENA-RIO PUERCOS | |
| | M10. Total acres available | 30 |
| | M11. Acres with moderate or severe EH | 30 |
| | M12. Acres within 300' of streams | 24 |
| | M13. Acres within 300' of impaired streams | 0 |
| | M14. Acres within 100' of riparian habitat | 0 |
| 1306000101 | COW CREEK | |
| | M10. Total acres available | 773 |
| | M11. Acres with moderate or severe EH | 773 |
| | M12. Acres within 300' of streams | 107 |
| | M13. Acres within 300' of impaired streams | 0 |
| | M14. Acres within 100' of riparian habitat | 10 |
| 1306000102 | COW CREEK-PECOS RIVER | |
| | M10. Total acres available | 581 |
| | M11. Acres with moderate or severe EH | 581 |
| | M12. Acres within 300' of streams | 171 |
| | M13. Acres within 300' of impaired streams | 0 |
| | M14. Acres within 100' of riparian habitat | 0 |
| 1306000103 | TECOLOTE CREEK | |
| | M10. Total acres available | 251 |
| | M11. Acres with moderate or severe EH | 251 |

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|---|---|---|
| | M12. Acres within 300' of streams | 525 |
| | M13. Acres within 300' of impaired streams | 15 |
| | M14. Acres within 100' of riparian habitat | 412 |
| 1302010212 | EL RITO-RIO CHAMA | |
| | M10. Total acres available | 770 |
| | M11. Acres with moderate or severe EH | 770 |
| | M12. Acres within 300' of streams | 271 |
| | M13. Acres within 300' of impaired streams | 0 |
| | M14. Acres within 100' of riparian habitat | 11 |
| 1302010216 | RIO OJO CALIENTE-RIO CHAMA | |
| | M10. Total acres available | 572 |
| | M11. Acres with moderate or severe EH | 572 |
| | M12. Acres within 300' of streams | 111 |
| | M13. Acres within 300' of impaired streams | 0 |
| | M14. Acres within 100' of riparian habitat | 0 |
| 1302020101 | SANTA FE RIVER | |
| | M10. Total acres available | 24 |
| | M11. Acres with moderate or severe EH | 25 |
| | M12. Acres within 300' of streams | 0 |
| | M13. Acres within 300' of impaired streams | 0 |
| | M14. Acres within 100' of riparian habitat | 0 |
| 1302020102 | CANADA ANCHA-RIO GRANDE | |
| | M10. Total acres available | 777 |
| | M11. Acres with moderate or severe EH | 756 |
| | M12. Acres within 300' of streams | 165 |
| | M13. Acres within 300' of impaired streams | 23 |
| | M14. Acres within 100' of riparian habitat | 72 |
| 1302020103 | HEADWATERS GALISTO CREEK | |
| | M10. Total acres available | 437 |
| | M11. Acres with moderate or severe EH | 437 |
| | M12. Acres within 300' of streams | 87 |
| | M13. Acres within 300' of impaired streams | 0 |
| | M14. Acres within 100' of riparian habitat | 0 |
| 1302020106 | ARROYO TONQUE-RIO GRANDE | |
| | M10. Total acres available | 132 |
| | M11. Acres with moderate or severe EH | 132 |
| | M12. Acres within 300' of streams | 4 |
| | M13. Acres within 300' of impaired streams | 0 |
| | M14. Acres within 100' of riparian habitat | 4 |

| | | |
|---|---|---|
| | M12. Acres within 300' of streams | 80 |
| | M13. Acres within 300' of impaired streams | 24 |
| | M14. Acres within 100' of riparian habitat | 33 |
| 1306000104 | TECOLOTE CREEK-PECOS RIVER | |
| | M10. Total acres available | 511 |
| | M11. Acres with moderate or severe EH | 511 |
| | M12. Acres within 300' of streams | 164 |
| | M13. Acres within 300' of impaired streams | 0 |
| | M14. Acres within 100' of riparian habitat | 65 |
| 1306000105 | HEADWATERS CANON BLANCO | |
| | M10. Total acres available | 408 |
| | M11. Acres with moderate or severe EH | 409 |
| | M12. Acres within 300' of streams | 70 |
| | M13. Acres within 300' of impaired streams | 0 |
| | M14. Acres within 100' of riparian habitat | 3 |
| 1306000106 | OUTLET CANON BLANCO | |
| | M10. Total acres available | 114 |
| | M11. Acres with moderate or severe EH | 114 |
| | M12. Acres within 300' of streams | 10 |
| | M13. Acres within 300' of impaired streams | 0 |
| | M14. Acres within 100' of riparian habitat | 0 |
| 1306000108 | HEADWATERS GALLINAS RIVER | |
| | M10. Total acres available | 65 |
| | M11. Acres with moderate or severe EH | 62 |
| | M12. Acres within 300' of streams | 10 |
| | M13. Acres within 300' of impaired streams | 0 |
| | M14. Acres within 100' of riparian habitat | 0 |
| 1408010302 | CANADA LARGA | |
| | M10. Total acres available | 172 |
| | M11. Acres with moderate or severe EH | 172 |
| | M12. Acres within 300' of streams | 144 |
| | M13. Acres within 300' of impaired streams | 0 |
| | M14. Acres within 100' of riparian habitat | 3 |
| 1408010303 | TAPICITO CREEK | |
| | M10. Total acres available | 12 |
| | M11. Acres with moderate or severe EH | 12 |
| | M12. Acres within 300' of streams | 6 |
| | M13. Acres within 300' of impaired streams | 0 |
| | M14. Acres within 100' of riparian habitat | 0 |

***Alternative 2***

<u>Motorized Routes (Roads and Trails)</u>

Since this alternative would not immediately affect the size of the road or trail system or the number of stream crossings on the landscape, those processes and impacts associated with the current road and trail system would continue much the same until route surface conditions change or decommissioning activities occur. This is because once a trail or road becomes established; the soil of the tread is subject to the continuing erosional forces of rainfall, running water, wind, freeze/thaw cycles, and gravity, and to some extent is maintained in an unvegetated, disturbed, condition. (Leung and Marion 1996) Natural recovery of roads is often impaired by highly compacted soils. (Elseroad et al. 2003)[xxv]

A route designation decision does have the potential to affect soil and water resources indirectly to the extent that it affects the concentration of use on roads and trails, the levels of maintenance needed, and the potential for damaged areas to recover. The magnitude of the indirect effects on soil and water resources will depend on how well routes

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closed to public motorized use recover on their own without restoration treatments and how many routes' current condition worsen from lack of attention and maintenance. Since these factors are unknown at this time, for the purposes of this analysis, the condition of the designated and non-designated routes on the landscape will be assumed to stay equal to the current condition.

The numbers of stream crossings (bridges, culverts, low-water crossings) would be the same as before project implementation. This project does not propose to repair or remove stream crossings on routes not designated under this decision. Removing traffic from stream crossings on forest system roads and trails is not expected to change soil or water quality conditions because it is the physical presence of the stream crossing that causes the largest 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.

Motorized Big Game Retrieval

Effects to soils, water quality, and overall watershed condition from motorized big game retrieval (MBGR) across the Forest are expected to result in limited impact at the fifth-field watershed scale. However, this does not mean that MBGR may not have detrimental impacts to soils and water quality at a localized scale. If the path the motor vehicle takes for MBGR runs through sensitive soils, wet meadows, riparian habitats, stream fords, etc, it could detrimentally impact these local resources.

Motorized Cross-Country Use

The reduction in acres available for motorized cross-country use from the current use (Alternative 1) is approximately 99.95% for Alternative 2. As shown in Table 5, the difference in effects (as seen by looking at the indicator measures for cross-country areas) averages to 99.98%.

However, those watersheds that will discontinue cross-country use will still have effects associated with the past use. Areas currently compacted and devoid of vegetation would continue in that condition until, over time, natural processes or active restoration efforts reduce the compaction and revegetate these areas. Removing motorized cross-country use in all, but two watersheds would allow the time frame to start on these natural processes.

**Table 5. Alternative 2 - Cross-Country Areas Indicator Measures Summary**

| | Alt 2's Average % Change from Alt 1 |
|---|---|
| M6. Total acres available | -99.95 |
| M7. Acres with severe WORV limitation | -99.98 |
| M8. Acres within 300' of streams | -99.98 |
| M9. Acres within 300' of impaired streams | -100.00 |
| **Average for all Measures** | **-99.98** |

Table 6 shows the fifth-field watersheds that will continue to have limited cross-country use in Alternative 2.

**Table 6. Alternative 2 - Motorized Cross-Country Use Indicator Measures**

| HUC 5 | HUC 5 Name | Alt 1 | Alt 2 | Change in Acres from Alt 1 to Alt 2* | % Change |
|---|---|---|---|---|---|
| 1302020201 | RIO GUADALUPE | | | | |
| | M6. Total acres available | 44452 | 35 | -44417 | -99.92 |
| | M7. Acres with severe WORV limitation | 26640 | 13 | -26627 | -99.95 |
| | M8. Acres within 300' of streams | 14063 | 5 | -14058 | -99.96 |
| | M9. Acres within 300' of impaired streams | 1701 | 0 | -1701 | -100.00 |
| 1306000102 | COW CREEK-PECOS RIVER | | | | |
| | M6. Total acres available | 22519 | 5 | -22514 | -99.98 |
| | M7. Acres with severe WORV limitation | 11166 | 0 | -11166 | -100.00 |
| | M8. Acres within 300' of streams | 5210 | 0 | -5210 | -100.00 |

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|---|---|---|---|---|---|
| | M9. Acres within 300' of impaired streams | 221 | 0 | -221 | -100.00 |

* "Change in Acres" column: (-) reflects a decrease in acres (+) reflects an increase in acres.

Motorized Dispersed Camping Corridors

There is a 3% expected improvement for the motorized dispersed camping corridor indicator measures for Alternative 2. Overall, this is not enough change from the current use to improve the condition of water and soil resources being currently impacted by motorized dispersed camping corridors.

**Table 7. Alternative 2 - Dispersed Campsite Corridors Indicator Measures Summary**

| | Alt 2's Average % Change from Alt 1 |
|---|---|
| M10. Total acres available | -2 |
| M11. Acres on soils with a moderate or severe EH | -2 |
| M12. Acres within 300' of streams | -3 |
| M13. Acres within 300' of impaired streams | -6 |
| M14. Acres within 100' of riparian habitat | -4 |
| Average for all Measures | -3 |

As was the case in Alternative 1, there are seven watersheds that will continue to not have dispersed camping corridors within them.

Eighteen watersheds that currently have dispersed camping corridors would not see a change in acreage with the implementation of Alternative 2. These watersheds are: Sapello River (1108000402), Upper Mora River (1108000403), Rio Tesuque-Rio Grande (1302010113), El Rito-Rio Chama (1302010212), Rio Ojo Caliente-Rio Chama (1302010216), Santa Fe River (13020200101), Headwaters Galisto Creek (1302020103), Arroyo Tonque-Rio Grande (1302020106), La Canada de la Lena-Rio Puerco (1302020402), Cow Creek (1306000101), Cow Creek-Pecos River (1306000102), Tecolote Creek (1306000103), Tecolote Creek-Pecos River (1306000104), Headwaters Canon Blanco (1306000105), Outlet Canon Blanco (1306000106), Headwaters Gallinas River (1306000108), Canada Larga (1408010302), and Tapicito Creek (1408010303).

Table 8 shows the watersheds that will have a change in dispersed camping corridors with the adoption of Alternative 2. Eight watersheds show slight decreases in acres for motorized dispersed camping corridors. Two watersheds, Rio Gallina-Rio Chama (1302010207) and Arroyo San Jose-Rio Puerco (1302020401), show slight increases.

**Table 8. Alternative 2 - Motorized Dispersed Camping Corridor Indicator Measures**

| HUC 5 | HUC 5 Name | Alt 1 | Alt 2 | Change in Acres from Alt.1 to Alt. 2 | % Change |
|---|---|---|---|---|---|
| 1302010112 | POJOAQUE CREEK | | | | |
| | M10. Total acres available | 178 | 159 | -20 | -11 |
| | M11. Acres on soils with a moderate or severe EH | 178 | 159 | -20 | -11 |
| | M12. Acres within 300' of streams | 126 | 123 | -3 | -3 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 97 | 96 | -1 | -1 |
| 1302010206 | RIO GALLINA | | | | |
| | M10. Total acres available | 1373 | 1295 | -78 | -6 |
| | M11. Acres on soils with a moderate or severe EH | 1373 | 1295 | -78 | -6 |
| | M12. Acres within 300' of streams | 780 | 735 | -46 | -6 |
| | M13. Acres within 300' of impaired streams | 4 | 0 | -4 | -100 |
| | M14. Acres within 100' of riparian habitat | 122 | 106 | -16 | 13 |
| 1302010207 | RIO GALLINA-RIO CHAMA | | | | |
| | M10. Total acres available | 529 | 541 | +12 | 2 |
| | M11. Acres on soils with a moderate or severe EH | 529 | 541 | +12 | 2 |



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|---|---|---|---|---|---|
| | M12. Acres within 300' of streams | 288 | 297 | +9 | 3 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 15 | 20 | +5 | 36 |
| 1302010208 | RIO PUERCO | | | | |
| | M10. Total acres available | 1482 | 1445 | -37 | -3 |
| | M11. Acres on soils with a moderate or severe EH | 1405 | 1386 | -9 | -1 |
| | M12. Acres within 300' of streams | 443 | 407 | -36 | -8 |
| | M13. Acres within 300' of impaired streams | 52 | 53 | +1 | 2 |
| | M14. Acres within 100' of riparian habitat | 242 | 208 | -34 | -14 |
| 1302010210 | ABIQUIU RESERVOIR | | | | |
| | M10. Total acres available | 2662 | 2429 | -233 | -9 |
| | M11. Acres on soils with a moderate or severe EH | 2655 | 2422 | -233 | -9 |
| | M12. Acres within 300' of streams | 525 | 401 | -124 | -24 |
| | M13. Acres within 300' of impaired streams | 15 | 15 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 412 | 212 | -200 | -49 |
| 1302020102 | CANADA ANCHA-RIO GRANDE | | | | |
| | M10. Total acres available | 777 | 764 | -13 | -2 |
| | M11. Acres on soils with a moderate or severe EH | 756 | 743 | -13 | -2 |
| | M12. Acres within 300' of streams | 165 | 159 | -6 | -4 |
| | M13. Acres within 300' of impaired streams | 23 | 13 | -10 | -43 |
| | M14. Acres within 100' of riparian habitat | 72 | 60 | -12 | -17 |
| 1302020201 | RIO GUADALUPE | | | | |
| | M10. Total acres available | 3157 | 2893 | -264 | -8 |
| | M11. Acres on soils with a moderate or severe EH | 2687 | 2535 | -152 | -6 |
| | M12. Acres within 300' of streams | 1450 | 1271 | -179 | -12 |
| | M13. Acres within 300' of impaired streams | 329 | 241 | -88 | -27 |
| | M14. Acres within 100' of riparian habitat | 1079 | 888 | -191 | -18 |
| 1302020202 | UPPER JEMEZ RIVER | | | | |
| | M10. Total acres available | 133 | 132 | -1 | -1 |
| | M11. Acres on soils with a moderate or severe EH | 133 | 132 | -1 | -1 |
| | M12. Acres within 300' of streams | 12 | 12 | 0 | 0 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 0 | 0 | 0 | 0 |
| 1302020204 | MIDDLE JEMEZ RIVER | | | | |
| | M10. Total acres available | 512 | 407 | -105 | -21 |
| | M11. Acres on soils with a moderate or severe EH | 511 | 405 | -105 | -21 |
| | M12. Acres within 300' of streams | 265 | 201 | -64 | -24 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 39 | 20 | -19 | -49 |
| 1302020401 | ARROYO SAN JOSE-RIO PUERCO | | | | |
| | M10. Total acres available | 1085 | 1088 | +3 | 0.25 |
| | M11. Acres on soils with a moderate or severe EH | 1030 | 1032 | +3 | 0.25 |
| | M12. Acres within 300' of streams | 450 | 450 | 0 | 0 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 115 | 115 | 0 | 0 |

* "Change in Acres" column: (-) reflects a decrease in acres (+) reflects an increase in acres.

***Alternative 3***

Motorized Routes (Roads and Trails)

Since this alternative would not immediately affect the size of the road or trail system or the number of stream crossings on the landscape, those processes and impacts associated with the current road and trail system would continue much the same until route surface conditions change or decommissioning activities occur. This is because once a trail or road becomes established; the soil of the tread is subject to the continuing erosional forces of rainfall, running water, wind,

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freeze/thaw cycles, and gravity, and to some extent is maintained in an unvegetated, disturbed, condition. (Leung and Marion 1996) Natural recovery of roads is often impaired by highly compacted soils. (Elseroad et al. 2003)

A route designation decision does have the potential to affect soil and water resources indirectly to the extent that it affects the concentration of use on roads and trails, the levels of maintenance needed, and the potential for damaged areas to recover. The magnitude of the indirect effects on soil and water resources will depend on how well routes closed to public motorized use recover on their own without restoration treatments and how many routes' current condition worsen from lack of attention and maintenance. Since these factors are unknown at this time, for the purposes of this analysis, the condition of the designated and non-designated routes on the landscape will be assumed to stay equal to the current condition.

The numbers of stream crossings (bridges, culverts, low-water crossings) would be the same as before project implementation. This project does not propose to repair or remove stream crossings on routes not designated under this decision. Removing traffic from stream crossings on forest system roads and trails is not expected to change soil or water quality conditions because it is the physical presence of the stream crossing that causes the largest 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.

Motorized Big Game Retrieval

There is no motorized big game retrieval (MBGR) proposed for Alternative 3.

Motorized Cross-Country Use

There is no motorized cross-country use proposed for Alternative 3. The 33 watersheds that currently have motorized cross-country use would see a 100% improvement in the indicator measures.

However, the watersheds that had cross-country use, but will discontinue this use will still have effects associated with the past use. Areas currently compacted and devoid of vegetation would continue in that condition until, over time, natural processes or active restoration efforts reduce the compaction and revegetate these areas. Removing motorized cross-country use in all watersheds would allow the time frame to start on these natural processes.

Motorized Dispersed Camping Corridors

There are no motorized dispersed camping corridors proposed for Alternative 3. The 28 watersheds that currently have motorized dispersed campsite corridors would see a 100% improvement in the indicator measures.

However, the watersheds that had cross-country use, but will discontinue this use will still have effects associated with the past use. Areas currently compacted and devoid of vegetation would continue in that condition until, over time, natural processes or active restoration efforts reduce the compaction and revegetate these areas. Removing motorized dispersed camping use in all watersheds would allow the time frame to start on these natural processes.

***Alternative 4***

Motorized Routes (Roads and Trails)

Since this alternative would not immediately affect the size of the road or trail system or the number of stream crossings on the landscape, those processes and impacts associated with the current road and trail system would continue much the same until route surface conditions change or decommissioning activities occur. This is because once a trail or road becomes established; the soil of the tread is subject to the continuing erosional forces of rainfall, running water, wind, freeze/thaw cycles, and gravity, and to some extent is maintained in an unvegetated, disturbed, condition. (Leung and Marion 1996) Natural recovery of roads is often impaired by highly compacted soils. (Elseroad et al. 2003)

A route designation decision does have the potential to affect soil and water resources indirectly to the extent that it affects the concentration of use on roads and trails, the levels of maintenance needed, and the potential for damaged areas to recover. The magnitude of the indirect effects on soil and water resources will depend on how well routes closed to public motorized use recover on their own without restoration treatments and how many routes' current condition worsen from lack of attention and maintenance. Since these factors are unknown at this time, for the purposes of this analysis, the condition of the designated and non-designated routes on the landscape will be assumed to stay equal to the current condition.

The numbers of stream crossings (bridges, culverts, low-water crossings) would be the same as before project implementation. This project does not propose to repair or remove stream crossings on routes not designated under this decision.

Motorized Big Game Retrieval

Effects to soils, water quality, and overall watershed condition from motorized big game retrieval (MBGR) across the Forest are expected to result in limited impact at the fifth-field watershed scale. However, this does not mean that MBGR may not have detrimental impacts to soils and water quality at a localized scale. If the path the motor vehicle takes for MBGR runs through sensitive soils, wet meadows, riparian habitats, stream fords, etc, it could detrimentally impact these local resources.

Motorized Cross-Country Use

The reduction in acres available for motorized cross-country use from the current use (Alternative 1) is approximately 99.96% for Alternative 4. As shown in Table 9, the difference in effects (as seen by looking at the indicator measures for cross-country areas) averages to 99.97%.

However, those watersheds that will discontinue cross-country use will still have effects associated with the past use. Areas currently compacted and devoid of vegetation would continue in that condition until, over time, natural processes or active restoration efforts reduce the compaction and revegetate these areas. Removing motorized cross-country use in all, but three watersheds would allow the time frame to start on these natural processes.

**Table 9. Alternative 4 - Cross-Country Areas Indicator Measures Summary**

| | Alt 4's Average % Change from Alt 1 |
|---|---|
| M6. Total acres available | -99.96 |
| M7. Acres with severe WORV limitation | -99.97 |
| M8. Acres within 300' of streams | -99.95 |
| M9. Acres within 300' of impaired streams | -97.65 |
| **Average for all Measures** | **-99.97** |

Table 10 shows the fifth-field watersheds that will continue to have limited cross-country use in Alternative 4.

**Table 10. Motorized Cross-Country Use Indicator Measures for all Alternatives**

| HUC 5 | HUC 5 Name | Alt 1 | Alt. 4 | Change in Acres from Alt 1 to Alt 4* | % Change |
|---|---|---|---|---|---|
| 1302020102 | CANADA ANCHA-RIO GRANDE | | | | |
| | M6. Total acres available | 56282 | 6 | -56276 | -99.99 |
| | M7. Acres with severe WORV limitation | 44225 | 0 | -44225 | -100.00 |
| | M8. Acres within 300' of streams | 10498 | 6 | -10492 | -99.94 |
| | M9. Acres within 300' of impaired streams | 270 | 0 | -270 | -100.00 |
| 1302020201 | RIO GUADALUPE | | | | |
| | M6. Total acres available | 44452 | 37 | -44415 | -99.92 |
| | M7. Acres with severe WORV limitation | 26640 | 14 | -26626 | -99.95 |
| | M8. Acres within 300' of streams | 14063 | 6 | -14057 | -99.96 |

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|---|---|---|---|---|---|
| | M9. Acres within 300' of impaired streams | 1701 | 0 | -1701 | -100.00 |
| 1306000102 | COW CREEK-PECOS RIVER | | | | |
| | M6. Total acres available | 22519 | 5 | -22514 | -99.98 |
| | M7. Acres with severe WORV limitation | 11166 | 0 | -11166 | -100.00 |
| | M8. Acres within 300' of streams | 5210 | 0 | -5210 | -100.00 |
| | M9. Acres within 300' of impaired streams | 221 | 0 | -221 | -100.00 |

* "Change in Acres" column: (-) reflects a decrease in acres (+) reflects an increase in acres.

Motorized Dispersed Camping Corridors

The acres available for motorized dispersed camping corridors (Measure 11) in Alternative 4 are over twice those currently available (Alternative 1). There is a 74% expected regression for the motorized dispersed camping corridor indicator measures for Alternative 2.

**Table 11. Dispersed Campsite Corridors Indicator Measures Summary**

| | Alt 4's Average % Change from Alt 1 |
|---|---|
| M10. Total acres available | 107 |
| M11. Acres on soils with a moderate or severe EH | 113 |
| M12. Acres within 300' of streams | 88 |
| M13. Acres within 300' of impaired streams | 10 |
| M14. Acres within 100' of riparian habitat | 53 |
| Average for all Measures | **74** |

As was the case in Alternative 1 and 2, there are seven watersheds that will continue to not have dispersed camping corridors within them. Shown in Table 12 are the twenty-eight watersheds that will have dispersed camping corridors in Alternative 4. All watersheds, but one (Santa Fe River – 1302020101), show an increase in acres from Alternative 1 to Alternative 4.

Most of the new acreage used for dispersed camping corridors would be on soils with a moderate or high erosion hazard. Also, many of these new acres are located within 300' of streams. A high potential for soil loss and proximity to streams means that there is a higher probability that some of these sites would deliver sediment to stream systems.

Another concern with this large increase in acreage is that for 15 of the 28 watersheds, much of the increase is within 100' of riparian habitat (Measure 14). For example, the Rio Guadalupe watershed (1302020201) has a 30% increase in acres within 100' of riparian habitat for a total of almost 1538 acres. As previously stated, this is an important indicator because riparian vegetation filters sediment and provides shade to streams. Removal or degradation of this vegetation due to motorized dispersed camping activities reduces the capability of the riparian habitat to function and thus jeopardizing water quality.

Even though, the number of motorized campers are expected to remain the same, it is expected that the the increase in acreage in the motorized dispersed camping corridors would be used due to recreational displacement. Green (1998)[xxvi] states:

> "Deterioration of recreational sites has negative impacts on the recreation experience. As a site becomes increasingly damaged, recreationalists might be displaced. Recreation displacement is defined as a change in recreational behavior in response to changes in the recreational environment. Displacement of recreation to other less damaged areas might increase the real extent of damage. "

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Table 12. Alternative 4 - Motorized Dispersed Camping Corridors

| HUC 5 | HUC 5 Name | Alt. 1 | Alt. 4 | Change in Acres from Alt. 1 to Alt. 5 | % Change |
|---|---|---|---|---|---|
| 1108000402 | SAPELLO RIVER | | | | |
| | M10. Total acres available | 17 | 38 | +20 | 115 |
| | M11. Acres on soils with a moderate or severe EH | 17 | 37 | +20 | 117 |
| | M12. Acres within 300' of streams | 0 | 0 | 0 | 0 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 0 | 0 | 0 | 0 |
| 1108000403 | UPPER MORA RIVER | | | | |
| | M10. Total acres available | 310 | 602 | +292 | 94 |
| | M11. Acres on soils with a moderate or severe EH | 310 | 602 | +292 | 94 |
| | M12. Acres within 300' of streams | 52 | 89 | +37 | 70 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 24 | 39 | +15 | 61 |
| 1302010112 | POJOAQUE CREEK | | | | |
| | M10. Total acres available | 178 | 503 | +324 | 182 |
| | M11. Acres on soils with a moderate or severe EH | 178 | 503 | +325 | 182 |
| | M12. Acres within 300' of streams | 126 | 266 | +140 | 111 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 97 | 139 | +42 | 43 |
| 1302010113 | RIO TESUQUE-RIO GRANDE | | | | |
| | M10. Total acres available | 7 | 17 | +10 | 135 |
| | M11. Acres on soils with a moderate or severe EH | 7 | 17 | +10 | 136 |
| | M12. Acres within 300' of streams | 0 | 0 | 0 | 0 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 0 | 0 | 0 | 0 |
| 1302010206 | RIO GALLINA | | | | |
| | M10. Total acres available | 1373 | 2678 | +1305 | 95 |
| | M11. Acres on soils with a moderate or severe EH | 1373 | 2678 | +1305 | 95 |
| | M12. Acres within 300' of streams | 780 | 1469 | +689 | 88 |
| | M13. Acres within 300' of impaired streams | 4 | 0 | -4 | 100 |
| | M14. Acres within 100' of riparian habitat | 122 | 204 | +82 | 68 |
| 1302010207 | RIO GALLINA-RIO CHAMA | | | | |
| | M10. Total acres available | 529 | 898 | +368 | 70 |
| | M11. Acres on soils with a moderate or severe EH | 529 | 898 | +369 | 70 |
| | M12. Acres within 300' of streams | 288 | 498 | +210 | 73 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 15 | 34 | +19 | 132 |
| 1302010208 | RIO PUERCO | | | | |
| | M10. Total acres available | 1482 | 2962 | +1480 | 100 |
| | M11. Acres on soils with a moderate or severe EH | 1405 | 2863 | +1458 | 104 |
| | M12. Acres within 300' of streams | 443 | 804 | +362 | 82 |
| | M13. Acres within 300' of impaired streams | 52 | 98 | +46 | 88 |
| | M14. Acres within 100' of riparian habitat | 242 | 394 | +153 | 63 |
| 1302010210 | ABIQUIU RESERVOIR | | | | |
| | M10. Total acres available | 2662 | 4378 | +1717 | 64 |
| | M11. Acres on soils with a moderate or severe EH | 2655 | 4366 | +1711 | 64 |
| | M12. Acres within 300' of streams | 525 | 757 | +232 | 44 |
| | M13. Acres within 300' of impaired streams | 15 | 27 | +13 | 88 |
| | M14. Acres within 100' of riparian habitat | 412 | 394 | -19 | 4 |
| 1302010212 | EL RITO-RIO CHAMA | | | | |
| | M10. Total acres available | 770 | 836 | +66 | 9 |
| | M11. Acres on soils with a moderate or severe EH | 770 | 835 | +66 | 9 |
| | M12. Acres within 300' of streams | 271 | 295 | +24 | 9 |

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|---|---|---|---|---|---|
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 11 | 11 | 0 | 0 |
| 1302010216 | RIO OJO CALIENTE-RIO CHAMA | | | | |
| | M10. Total acres available | 572 | 915 | +342 | 60 |
| | M11. Acres on soils with a moderate or severe EH | 572 | 915 | +342 | 60 |
| | M12. Acres within 300' of streams | 111 | 166 | +55 | 50 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 0 | 0 | 0 | 0 |
| 1302020101 | SANTA FE RIVER | | | | |
| | M10. Total acres available | 24 | 24 | 0 | 0 |
| | M11. Acres on soils with a moderate or severe EH | 25 | 25 | 0 | 0 |
| | M12. Acres within 300' of streams | 0 | 0 | 0 | 0 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 0 | 0 | 0 | 0 |
| 1302020102 | CANADA ANCHA-RIO GRANDE | | | | |
| | M10. Total acres available | 777 | 1558 | +781 | 100 |
| | M11. Acres on soils with a moderate or severe EH | 756 | 1473 | +717 | 95 |
| | M12. Acres within 300' of streams | 165 | 382 | +217 | 132 |
| | M13. Acres within 300' of impaired streams | 23 | 23 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 72 | 180 | +108 | 150 |
| 1302020103 | HEADWATERS GALISTO CREEK | | | | |
| | M10. Total acres available | 437 | 873 | +436 | 100 |
| | M11. Acres on soils with a moderate or severe EH | 437 | 1473 | +1036 | 237 |
| | M12. Acres within 300' of streams | 87 | 167 | +80 | 92 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 0 | 0 | 0 | 0 |
| 1302020106 | ARROYO TONQUE-RIO GRANDE | | | | |
| | M10. Total acres available | 132 | 255 | +123 | 93 |
| | M11. Acres on soils with a moderate or severe EH | 132 | 255 | +123 | 93 |
| | M12. Acres within 300' of streams | 76 | 141 | +64 | 84 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 4 | 10 | +6 | 130 |
| 1302020201 | RIO GUADALUPE | | | | |
| | M10. Total acres available | 3157 | 6679 | +3522 | 112 |
| | M11. Acres on soils with a moderate or severe EH | 2687 | 6068 | +3381 | 126 |
| | M12. Acres within 300' of streams | 1450 | 2893 | +1443 | 100 |
| | M13. Acres within 300' of impaired streams | 329 | 463 | +134 | 41 |
| | M14. Acres within 100' of riparian habitat | 1079 | 1538 | +459 | 43 |
| 1302020202 | UPPER JEMEZ RIVER | | | | |
| | M10. Total acres available | 133 | 651 | +518 | 390 |
| | M11. Acres on soils with a moderate or severe EH | 133 | 651 | +518 | 390 |
| | M12. Acres within 300' of streams | 12 | 54 | +42 | 359 |
| | M13. Acres within 300' of impaired streams | 0 | 2 | +2 | 100 |
| | M14. Acres within 100' of riparian habitat | 0 | 0 | 0 | 0 |
| 1302020204 | MIDDLE JEMEZ RIVER | | | | |
| | M10. Total acres available | 512 | 1222 | +710 | 139 |
| | M11. Acres on soils with a moderate or severe EH | 511 | 1190 | +679 | 133 |
| | M12. Acres within 300' of streams | 265 | 585 | +320 | 121 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 39 | 172 | +132 | 338 |
| 1302020401 | ARROYO SAN JOSE-RIO PUERCO | | | | |
| | M10. Total acres available | 1085 | 2148 | +1063 | 98 |
| | M11. Acres on soils with a moderate or severe EH | 1030 | 2049 | +1019 | 99 |
| | M12. Acres within 300' of streams | 450 | 834 | +384 | 85 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 115 | 200 | +85 | 74 |

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|---|---|---|---|---|---|
| 1302020402 | LA CANADA DE LA LENA-RIO PUERCOS | | | | |
| | M10. Total acres available | 30 | 60 | +30 | 99 |
| | M11. Acres on soils with a moderate or severe EH | 30 | 60 | +30 | 99 |
| | M12. Acres within 300' of streams | 24 | 40 | +16 | 66 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 0 | 0 | 0 | 0 |
| 1306000101 | COW CREEK | | | | |
| | M10. Total acres available | 773 | 1549 | +775 | 100 |
| | M11. Acres on soils with a moderate or severe EH | 773 | 1549 | +775 | 100 |
| | M12. Acres within 300' of streams | 107 | 227 | +120 | 112 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 10 | 18 | +8 | 79 |
| 1306000102 | COW CREEK-PECOS RIVER | | | | |
| | M10. Total acres available | 581 | 1130 | +549 | 94 |
| | M11. Acres on soils with a moderate or severe EH | 581 | 1130 | +549 | 94 |
| | M12. Acres within 300' of streams | 171 | 318 | +147 | 86 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 0 | 0 | 0 | 0 |
| 1306000103 | TECOLOTE CREEK | | | | |
| | M10. Total acres available | 251 | 519 | +269 | 107 |
| | M11. Acres on soils with a moderate or severe EH | 251 | 519 | +269 | 107 |
| | M12. Acres within 300' of streams | 80 | 142 | +61 | 76 |
| | M13. Acres within 300' of impaired streams | 24 | 39 | +15 | 63 |
| | M14. Acres within 100' of riparian habitat | 33 | 60 | +27 | 83 |
| 1306000104 | TECOLOTE CREEK-PECOS RIVER | | | | |
| | M10. Total acres available | 511 | 1011 | +500 | 98 |
| | M11. Acres on soils with a moderate or severe EH | 511 | 1011 | +500 | 98 |
| | M12. Acres within 300' of streams | 164 | 304 | +140 | 85 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 65 | 104 | +39 | 60 |
| 1306000105 | HEADWATERS CANON BLANCO | | | | |
| | M10. Total acres available | 408 | 816 | +407 | 100 |
| | M11. Acres on soils with a moderate or severe EH | 409 | 816 | +407 | 100 |
| | M12. Acres within 300' of streams | 70 | 146 | +76 | 108 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 3 | 7 | +4 | 125 |
| 1306000106 | OUTLET CANON BLANCO | | | | |
| | M10. Total acres available | 114 | 222 | +108 | 95 |
| | M11. Acres on soils with a moderate or severe EH | 114 | 222 | +108 | 95 |
| | M12. Acres within 300' of streams | 10 | 22 | +12 | 112 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 0 | 0 | 0 | 0 |
| 1306000108 | HEADWATERS GALLINAS RIVER | | | | |
| | M10. Total acres available | 65 | 174 | +108 | 167 |
| | M11. Acres on soils with a moderate or severe EH | 62 | 170 | +108 | 174 |
| | M12. Acres within 300' of streams | 10 | 20 | +10 | 101 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 0 | 0 | 0 | 0 |
| 1408010302 | CANADA LARGA | | | | |
| | M10. Total acres available | 172 | 342 | +169 | 98 |
| | M11. Acres on soils with a moderate or severe EH | 172 | 342 | +169 | 98 |
| | M12. Acres within 300' of streams | 144 | 276 | +132 | 91 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 3 | 4 | +1 | 43 |
| 1408010303 | TAPICITO CREEK | | | | |
| | M10. Total acres available | 12 | 21 | +10 | 82 |

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|---|---|---|---|---|---|
| | M11. Acres on soils with a moderate or severe EH | 12 | 21 | +10 | 83 |
| | M12. Acres within 300' of streams | 6 | 13 | +7 | 125 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 0 | 0 | 0 | 0 |

* "Change in Acres" column: (-) reflects a decrease in acres (+) reflects an increase in acres.

***Alternative 5***

Motorized Routes (Roads and Trails)

Since this alternative would not immediately affect the size of the road or trail system or the number of stream crossings on the landscape, those processes and impacts associated with the current road and trail system would continue much the same until route surface conditions change or decommissioning activities occur. This is because once a trail or road becomes established; the soil of the tread is subject to the continuing erosional forces of rainfall, running water, wind, freeze/thaw cycles, and gravity, and to some extent is maintained in an unvegetated, disturbed, condition. (Leung and Marion 1996) Natural recovery of roads is often impaired by highly compacted soils. (Elseroad et al. 2003)

A route designation decision does have the potential to affect soil and water resources indirectly to the extent that it affects the concentration of use on roads and trails, the levels of maintenance needed, and the potential for damaged areas to recover. The magnitude of the indirect effects on soil and water resources will depend on how well routes closed to public motorized use recover on their own without restoration treatments and how many routes' current condition worsen from lack of attention and maintenance. Since these factors are unknown at this time, for the purposes of this analysis, the condition of the designated and non-designated routes on the landscape will be assumed to stay equal to the current condition.

The numbers of stream crossings (bridges, culverts, low-water crossings) would be the same as before project implementation. This project does not propose to repair or remove stream crossings on routes not designated under this decision.

Motorized Big Game Retrieval

Effects to soils, water quality, and overall watershed condition from motorized big game retrieval (MBGR) across the Forest are expected to result in limited impact at the fifth-field watershed scale. However, this does not mean that MBGR may not have detrimental impacts to soils and water quality at a localized scale. If the path the motor vehicle takes for MBGR runs through sensitive soils, wet meadows, riparian habitats, stream fords, etc, it could detrimentally impact these local resources.

Motorized Cross-Country Use

The reduction in acres available for motorized cross-country use from the current use (Alternative 1) is approximately 99.96% for Alternative 5. As shown in Table 13, the difference in effects (as seen by looking at the indicator measures for cross-country areas) averages to 99.97%.

However, those watersheds that will discontinue cross-country use will still have effects associated with the past use. Areas currently compacted and devoid of vegetation would continue in that condition until, over time, natural processes or active restoration efforts reduce the compaction and revegetate these areas. Removing motorized cross-country use in all but one watershed would allow the time frame to start on these natural processes.

**Table 13. Alternative 5 - Cross-Country Areas Indicator Measures Summary**

| | Alt 5's Average % Change from Alt 1 |
|---|---|
| M6. Total acres available | -99.95 |
| M7. Acres with severe WORV limitation | -99.98 |
| M8. Acres within 300' of streams | -99.98 |

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|---|---|
| M9. Acres within 300' of impaired streams | -100.00 |
| **Average for all Measures** | **-99.98** |

Table 14 shows the one fifth-field watershed that will continue to have limited cross-country use in Alternative 5.

**Table 14. Motorized Cross-Country Use Indicator Measures for all Alternatives**

| HUC 5 | HUC 5 Name | Alt 1 | Alt. 5 | Change in Acres from Alt. 1 to Alt. 4* | % Change |
|---|---|---|---|---|---|
| 1302020201 | RIO GUADALUPE | | | | |
| | M6. Total acres available | 44452 | 35 | -44417 | -99.92 |
| | M7. Acres with severe WORV limitation | 26640 | 13 | -26627 | -99.95 |
| | M8. Acres within 300' of streams | 14063 | 5 | -14058 | -99.96 |
| | M9. Acres within 300' of impaired streams | 1701 | 0 | -1701 | -100.00 |

* "Change in Acres" column: (-) reflects a decrease in acres (+) reflects an increase in acres.

Motorized Dispersed Camping Corridors

Implementation of Alternative 5 would be approximately a 36% improvement over the current condition (Alternative 1). The acres available for motorized dispersed camping corridors (Measure 11) in Alternative 5 would be almost 60% of those acres currently available (Alternative 1).

**Table 15. Alternative 5 - Dispersed Campsite Corridors Indicator Measures**

| | Alt 5's Average % Change from Alt 1 |
|---|---|
| M10. Total acres available | -41 |
| M11. Acres on soils with a moderate or severe EH | -41 |
| M12. Acres within 300' of streams | -41 |
| M13. Acres within 300' of impaired streams | -22 |
| M14. Acres within 100' of riparian habitat | -33 |
| Average for all Measures | -36 |

Six watersheds, Santa Cruz River (1302010110), Rio Chama-Rio Grande (1302010111), El Vado Reservoir (1302010204), Rio Cebolla (1302010206), Outlet Galisto Creek (1302020104), and Lower Jemez River (1302020205) would continue to not have motorized dispersed camping corridors.

Twelve watersheds that currently have dispersed camping corridors would not see a change in acreage with the implementation of Alternative 2. These watersheds are: Sapello River (1108000402), Upper Mora River (1108000403), Rio Tesuque-Rio Grande (1302010113), El Rito-Rio Chama (1302010212), Rio Ojo Caliente-Rio Chama (1302010216), Santa Fe River (13020200101), Arroyo Tonque-Rio Grande (1302020106), La Canada de la Lena-Rio Puerco (1302020402), Tecolote Creek-Pecos River (1306000104), Headwaters Canon Blanco (1306000105), Outlet Canon Blanco (1306000106), Canada Larga (1408010302).

Table 16 depicts the change implementation of Alternative 5 would have for seventeen watersheds in terms of dispersed camping corridors.

In three watersheds, Pojoaque Creek (1302010112), Rio Gallina-Rio Chama (1302010207), and Tapicito Creek (1408010303), dispersed camping corridors would be eliminated. One watershed, Rio Salado (1302020203), would go from having no camping in Alternative 1 to 27 acres of camping in Alternative 5.

Thirteen watersheds would have varying levels of decreases in acreage available for dispersed camping corridors with the implementation of Alternative 5. These watersheds are: Rio Gallina (1302010206), Rio Puerco (1302010208), Abiquiu Reservoir (1302010210), Canada Ancha-Rio Grande (1302020102), Headwaters Galisto Creek (1302020103), Rio

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Guadalupe (1302020201), Upper Jemez River (1302020202), Middle Jemez River (1302020204), Arroyo San Jose-Rio Puerco (1302020401), Cow Creek (1306000101), Cow Creek-Pecos River (1306000102), Tecolote Creek (1306000103), and Headwaters Gallinas River (1306000108).

Many of the watersheds seeing a reduction of acres for dispersed camping corridors also see a corresponding reduction in acres located on soils with a moderate or high erosion hazard and those within 300' of streams. This should correspond to a reduction in sediment deposition in streams.

Total acreage of motorized dispersed camping corridors within 100' of riparian habitat (Measure 14) would be greatly reduced for 4 watersheds that will still have motorized dispersed camping corridors in Alternative 5. Rio Gallina (1302010206) would see a 91% decrease from Alternative 1, Rio Puerco (1302010208) a 71% decrease, Abiquiu Reservoir (1302010210) a 96% decrease, and Tecolote Creek (1306000103) a 100% decrease from Alternative 1. These reductions would help improve conditions in riparian habitats within these watersheds, which in turn will help improve water quality over time.

**Table 16. Alternative 5 - Motorized Dispersed Camping Corridors**

| HUC 5 | HUC 5 Name | Alt 1 | Alt 5 | Change in Acres from Alt. 1 to Alt. 5 | % Change |
|---|---|---|---|---|---|
| 1108000403 | UPPER MORA RIVER | | | | |
| | M10. Total acres available | 310 | 310 | 0 | 0 |
| | M11. Acres on soils with a moderate or severe EH | 310 | 310 | 0 | 0 |
| | M12. Acres within 300' of streams | 53 | 53 | 0 | 0 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 24 | 24 | 0 | 0 |
| 1302010112 | POJOAQUE CREEK | | | | |
| | M10. Total acres available | 178 | 0 | -178 | -100 |
| | M11. Acres on soils with a moderate or severe EH | 178 | 0 | -178 | -100 |
| | M12. Acres within 300' of streams | 126 | 0 | -126 | -100 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 97 | 0 | -97 | -100 |
| 1302010206 | RIO GALLINA | | | | |
| | M10. Total acres available | 1373 | 587 | -786 | -57 |
| | M11. Acres on soils with a moderate or severe EH | 1373 | 587 | -786 | -57 |
| | M12. Acres within 300' of streams | 780 | 273 | -508 | -65 |
| | M13. Acres within 300' of impaired streams | 4 | 0 | -4 | -100 |
| | M14. Acres within 100' of riparian habitat | 122 | 11 | -110 | -91 |
| 1302010207 | RIO GALLINA-RIO CHAMA | | | | |
| | M10. Total acres available | 529 | 0 | -529 | -100 |
| | M11. Acres on soils with a moderate or severe EH | 529 | 0 | -529 | -100 |
| | M12. Acres within 300' of streams | 288 | 0 | -288 | -100 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 15 | 0 | -15 | -100 |
| 1302010208 | RIO PUERCO | | | | |
| | M10. Total acres available | 1482 | 252 | -1229 | -83 |
| | M11. Acres on soils with a moderate or severe EH | 1405 | 226 | -1179 | -84 |
| | M12. Acres within 300' of streams | 443 | 44 | -398 | -90 |
| | M13. Acres within 300' of impaired streams | 52 | 0 | -52 | -100 |
| | M14. Acres within 100' of riparian habitat | 242 | 71 | -170 | -71 |
| 1302010210 | ABIQUIU RESERVOIR | | | | |
| | M10. Total acres available | 2662 | 1537 | -1124 | -42 |
| | M11. Acres on soils with a moderate or severe EH | 2655 | 1533 | -1122 | -42 |
| | M12. Acres within 300' of streams | 525 | 89 | -436 | -83 |
| | M13. Acres within 300' of impaired streams | 15 | 15 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 412 | 17 | -395 | -96 |

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|---|---|---|---|---|---|
| 1302020102 | CANADA ANCHA-RIO GRANDE | | | | |
| | M10. Total acres available | 777 | 594 | -183 | -24 |
| | M11. Acres on soils with a moderate or severe EH | 756 | 574 | -183 | -24 |
| | M12. Acres within 300' of streams | 165 | 139 | -26 | -16 |
| | M13. Acres within 300' of impaired streams | 23 | 13 | -10 | -45 |
| | M14. Acres within 100' of riparian habitat | 72 | 57 | -15 | -20 |
| 1302020103 | HEADWATERS GALISTO CREEK | | | | |
| | M10. Total acres available | 437 | 282 | -155 | -35 |
| | M11. Acres on soils with a moderate or severe EH | 437 | 282 | -155 | -36 |
| | M12. Acres within 300' of streams | 87 | 33 | -54 | -62 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 0 | 0 | 0 | 0 |
| 1302020201 | RIO GUADALUPE | | | | |
| | M10. Total acres available | 3157 | 3046 | -111 | -4 |
| | M11. Acres on soils with a moderate or severe EH | 2687 | 2732 | +46 | -2 |
| | M12. Acres within 300' of streams | 1450 | 1411 | -40 | -3 |
| | M13. Acres within 300' of impaired streams | 329 | 240 | -89 | -27 |
| | M14. Acres within 100' of riparian habitat | 1079 | 923 | -156 | -14 |
| 1302020202 | UPPER JEMEZ RIVER | | | | |
| | M10. Total acres available | 133 | 132 | -1 | -1 |
| | M11. Acres on soils with a moderate or severe EH | 133 | 132 | -1 | -1 |
| | M12. Acres within 300' of streams | 12 | 12 | 0 | 0 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 0 | 0 | 0 | 0 |
| 1302020203 | RIO SALADO | | | | |
| | M10. Total acres available | 0 | 27 | +27 | 100 |
| | M11. Acres on soils with a moderate or severe EH | 0 | 27 | +27 | 100 |
| | M12. Acres within 300' of streams | 0 | 27 | +27 | 100 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 0 | 0 | 0 | 0 |
| 1302020204 | MIDDLE JEMEZ RIVER | | | | |
| | M10. Total acres available | 512 | 442 | -70 | -14 |
| | M11. Acres on soils with a moderate or severe EH | 511 | 441 | -70 | -14 |
| | M12. Acres within 300' of streams | 265 | 236 | -29 | -11 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 39 | 52 | +13 | -32 |
| 1302020401 | ARROYO SAN JOSE-RIO PUERCO | | | | |
| | M10. Total acres available | 1085 | 1040 | -45 | -4 |
| | M11. Acres on soils with a moderate or severe EH | 1030 | 985 | -45 | -4 |
| | M12. Acres within 300' of streams | 450 | 421 | -29 | -7 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 115 | 111 | -4 | -3 |
| 1306000101 | COW CREEK | | | | |
| | M10. Total acres available | 773 | 242 | -532 | -69 |
| | M11. Acres on soils with a moderate or severe EH | 773 | 242 | -532 | -69 |
| | M12. Acres within 300' of streams | 107 | 81 | -26 | -25 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 10 | 10 | 0 | 0 |
| 1306000102 | COW CREEK-PECOS RIVER | | | | |
| | M10. Total acres available | 581 | 168 | -413 | -71 |
| | M11. Acres on soils with a moderate or severe EH | 581 | 168 | -413 | -71 |
| | M12. Acres within 300' of streams | 171 | 108 | -64 | -37 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 0 | 0 | 0 | 0 |
| 1306000103 | TECOLOTE CREEK | | | | |
| | M10. Total acres available | 251 | 66 | -184 | -74 |

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|---|---|---|---|---|---|
| | M11. Acres on soils with a moderate or severe EH | 251 | 66 | -185 | -74 |
| | M12. Acres within 300' of streams | 80 | 0 | -80 | -100 |
| | M13. Acres within 300' of impaired streams | 24 | 0 | -24 | -100 |
| | M14. Acres within 100' of riparian habitat | 33 | 0 | -33 | -100 |
| 1306000104 | TECOLOTE CREEK-PECOS RIVER | | | | |
| | M10. Total acres available | 511 | 511 | 0 | 0 |
| | M11. Acres on soils with a moderate or severe EH | 511 | 511 | 0 | 0 |
| | M12. Acres within 300' of streams | 164 | 17 | -147 | -90 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 65 | 65 | 0 | 0 |
| 1306000108 | HEADWATERS GALLINAS RIVER | | | | |
| | M10. Total acres available | 65 | 51 | -14 | -22 |
| | M11. Acres on soils with a moderate or severe EH | 62 | 48 | -15 | -23 |
| | M12. Acres within 300' of streams | 10 | 10 | 0 | 0 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 0 | 0 | 0 | 0 |
| 1408010302 | CANADA LARGA | | | | |
| | M10. Total acres available | 172 | 172 | 0 | 0 |
| | M11. Acres on soils with a moderate or severe EH | 172 | 172 | 0 | 0 |
| | M12. Acres within 300' of streams | 144 | 144 | 0 | 0 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 3 | 3 | 0 | 0 |
| 1408010303 | TAPICITO CREEK | | | | |
| | M10. Total acres available | 12 | 0 | -12 | -100 |
| | M11. Acres on soils with a moderate or severe EH | 12 | 0 | -12 | -100 |
| | M12. Acres within 300' of streams | 6 | 0 | -6 | -100 |
| | M13. Acres within 300' of impaired streams | 0 | 0 | 0 | 0 |
| | M14. Acres within 100' of riparian habitat | 0 | 0 | 0 | 0 |

* "Change in Acres" column: (-) reflects a decrease in acres (+) reflects an increase in acres.

***Conclusions***

Of the four alternatives, Alternative 2, is the most likely to sustain current soil and water quality conditions. The current effects from constructed routes would stay the same, motorized cross-country use would be eliminated in all but two watersheds, and there would be little change to the acres available for motorized dispersed camping.

Alternative 3 is the most likely of the four alternatives to improve soil and water quality conditions. The current effects from constructed routes would stay the same, but motorized cross-country use and motorized dispersed camping would be eliminated.

Alternative 4 is the most likely of the four alternatives to decrease soil and water quality conditions. The current effects from constructed routes would stay the same and motorized cross-country use would be eliminated in all but three watersheds. However, there would be over twice as many acres available for motorized dispersed camping.

Of the four alternatives, Alternative 5 is the most likely to sustain current soil and water quality condition, with the potential to improve over time. The current effects from constructed routes would stay the same, motorized cross-country use would be eliminated in all but one watershed, and there would be approximately a third less acres available for motorized dispersed camping.

***Cumulative Effects***

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Cumulative effects are the combined impacts of past, present and reasonably foreseeable events on soil and water resources. These resources have been altered in many cases by mining, recreation, grazing, vegetation management, road and trail construction, and other factors.

The document, "Santa Fe National Forest Travel Management Planning Temporal Bounds and List of Projects for Cumulative Effects Analysis" is as complete a list of past, present, and reasonably foreseeable actions that have or will take place on National Forest System lands. However, the document does not list activities that have occurred, are occurring, or will occur on non-Forest System lands because of a lack of information regarding multiple landowners. Therefore, analyzing the effects from projects located across multiple jurisdictions for this project is not possible.

Activities considered in the cumulative effects analysis include those directly and indirectly modifying soil and water resources. These activities include past road construction and stabilization, 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. The following analysis was derived by reviewing the compilation of past, present, and reasonably foreseeable programs and activities.

Past Actions (1987 – 2009)

Past actions on the Santa Fe National Forest that are relevant to the discussion of cumulative effects on soil and water resources 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. The cumulative effect of these past programs and activities was a reduction in soil and water quality which resulted in the listing of 347 miles of stream within the Forest by the State of New Mexico's Environment Department.

During the mid-to-latter part of this period 1987-2009, the Forest implemented several programs and activities to improve (or with a side benefit of improving) management of soil and water resources. These included development of management plans for Wild and Scenic rivers that restricted the type of access in those Management Areas, creation of the Jemez National Recreation Area, road decommissioning and obliteration, improvements to roads and trails impacting watersheds through the 10% 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.

Present or Reasonably Foreseeable Actions (2009-2025)

In general, present programs and activities are either maintaining or reducing impacts on soil and water resources, with an overall beneficial effect. These activities include road reconstruction and road decommissioning (i.e. Forest Roads 612, 87, 488, 10J), stream crossing modification (i.e. 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 the future expansion of this program to the Upper Pecos Watershed. Watershed and aquatic habitat restoration projects, including the ones 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 resources, 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

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additional roads and stream crossings will be modified to improve aquatic organism passage and reduce impacts to stream channels and fish habitat.

***Proposed Best Management Practice (BMP) for All Alternatives.***

1. No vehicles are allowed within 200 feet from the edge of streams and lakes.
   *Discussion:* This BMP provides a 100-ft buffer to protect riparian habitat and streambanks from impacts associated with vehicles. Riparian refers to the zone of direct interaction between terrestrial and aquatic environments. The Forest Service Manual (Section 2526.03 Riparian Management Policy) defines the riparian area as at least 100 feet from the edges of streams, lakes, and other bodies of water.

   O'Laughlin and Belt (1995)[xxvii] state that, "buffer strips protect water quality and fish habitat by providing shade, producing organic debris (large and small), and regulating sediment and nutrient flows." Riparian vegetation shade is vital for regulating in-stream plant growth and moderating water temperature. O'Laughlin and Belt also state that a 200-foot buffer would effectively remove sediment from overland flow in most situations.

   The photo below shows an 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 stream bank and the riparian vegetation has been removed within the vicinity of the site.

The following photos from the Rio Guadalupe and the Rio Cebolla, are examples of how the proposed BMP would work. Vehicles are allowed to pull off to the side of the road and then campers are able to walk their camping gear closer to the stream in order to camp.

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## D. Consistency with Forest Plan, Laws, and Regulations

### Santa Fe National Forest Plan

**Table 17. Travel Management Project Consistency with Forest Plan Direction**

| Page | Forest Plan Direction | Mgt Area | Travel Management Project Compliance |
|---|---|---|---|
| 20 | Provide direction and support to all resource management activities with emphasis on maintaining the soil resource, water quality, and water quantity. | All | Of the four alternatives, Alternative 2, is the most likely to sustain current soil and water quality conditions.<br><br>Alternative 3 is the most likely of the four alternatives to improve soil and water quality conditions.<br><br>Alternative 4 is the most likely of the four alternatives to decrease soil and water quality conditions.<br><br>Of the four alternatives, Alternative 5 is the most likely to sustain current soil and water quality condition, with the potential to improve over time. |
| 20 | Maintain water quality to meet or exceed state water quality standards. | All | Of the four alternatives, Alternative 2, is the most likely to sustain current water quality conditions.<br><br>Alternative 3 is the most likely of the four alternatives to improve water quality conditions.<br><br>Alternative 4 is the most likely of the four alternatives to decrease water quality conditions.<br><br>Of the four alternatives, Alternative 5 is the most likely to sustain current water quality condition, with the potential to improve over time. |
| 20 | Identify and protect wetlands and floodplains. | All | In all alternatives, travel routes that are currently within or near wetlands and floodplains would continue to impact these resources.<br><br>Of the four alternatives, Alternative 2, is the most likely to sustain current wetland and floodplain conditions.<br><br>Alternative 3 is the most likely of the four alternatives to improve wetland and floodplain conditions.<br><br>Alternative 4 is the most likely of the four alternatives to decrease wetland and floodplain conditions.<br><br>Of the four alternatives, Alternative 5 is the most likely to sustain wetland and floodplain conditions, with the potential to improve over time. |
| 20 | Achieve satisfactory condition in riparian ecosystems. Maintain areas that are currently in good condition. | All | In all alternatives, travel routes that are currently within or near riparian ecosystems would continue to impact these resources.<br><br>Of the four alternatives, Alternative 2, is the most likely to sustain current riparian ecosystem conditions.<br><br>Alternative 3 is the most likely of the four alternatives to improve riparian ecosystem conditions.<br><br>Alternative 4 is the most likely of the four alternatives to decrease riparian ecosystem conditions. |

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| | | | Of the four alternatives, Alternative 5 is the most likely to sustain riparian ecosystem conditions, with the potential to improve over time. |
| 20 | Minimize disturbances due to resource activities and other uses in the riparian zone. | All | In all alternatives, travel routes that are currently within or near riparian ecosystems would continue to impact these resources.<br><br>f the four alternatives, Alternative 2, is the most likely to sustain current riparian ecosystem conditions.<br><br>Alternative 3 is the most likely of the four alternatives to improve riparian ecosystem conditions.<br><br>Alternative 4 is the most likely of the four alternatives to decrease riparian ecosystem conditions.<br><br>Of the four alternatives, Alternative 5 is the most likely to sustain riparian ecosystem conditions, with the potential to improve over time. |
| 79 | Manage riparian areas in accordance with legal requirements regarding floodplains, wetlands, wild and scenic rivers, and cultural and other resources. Protect the productivity and diversity of riparian-dependent resources and emphasize the protection of soil, water, vegetation, wildlife,and fish resources prior to implementing projects. Give preferential consideration to resources dependent on riparian areas over other resources when conflicts among uses arise. Riparian areas should be managed toward meeting the following guidelines:<br><u>Ground cover</u>: Provide average ground cover of plants and litter at 80 percent of natural levels. <u>Shade:</u> Provide shading over perennial and intermittent water surfaces that is 80 percent of natural levels considering unit reaches of about two miles in length.<br><u>Bank cover:</u> Provide shrub and tree cover along bank lengths that is 80 percent of natural levels. Give emphasis to the protection of streambank stability provided by woody plant roots, particularly on outside bends of stream channel meanders.<br><u>Streambed Sedimentation:</u> Composition of sand, silt, and clays within streambeds should not exceed 20 percent of natural levels.<br><u>Plant Composition:</u> Provide at least 60 percent of the woody plant composition in three or more riparian species. | All | In all alternatives, travel routes that are currently within or near riparian ecosystems would continue to impact these resources.<br><br>f the four alternatives, Alternative 2, is the most likely to sustain current riparian ecosystem conditions.<br><br>Alternative 3 is the most likely of the four alternatives to improve riparian ecosystem conditions.<br><br>Alternative 4 is the most likely of the four alternatives to decrease riparian ecosystem conditions.<br><br>Of the four alternatives, Alternative 5 is the most likely to sustain riparian ecosystem conditions, with the potential to improve over time. |
| Replace -ment page 141 | Cooperate in the implementation of the comprehensive watershed management plan. Maintain or improve high water quality conditions. | J | Of the four alternatives, Alternative 2, is the most likely to sustain current water quality conditions.<br><br>Alternative 3 is the most likely of the four alternatives to improve water quality conditions.<br><br>Alternative 4 is the most likely of the four alternatives to decrease water quality conditions. |

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|---|---|---|---|
| | | | Of the four alternatives, Alternative 5 is the most likely to sustain current water quality condition, with the potential to improve over time. |
| Page 145 | Close or obliterate unneeded travel-ways. Consider areas of watershed resource damages and develop management strategies to improve such areas and reduce additional adverse impacts. | K | The purpose of this project is to close unneeded travel-ways. No obliteration would occur with this decision. All action alternatives reduce unneeded travel-ways. |

Legal Consistency

- National Forest Management Act 1976, which ensures that forest planning and management activities provide for the conservation and sustained yield of soil and water resources.
    - Compliance: Of the four alternatives, Alternative 2, is the most likely to sustain current soil and water quality conditions.

      Alternative 3 is the most likely of the four alternatives to improve soil and water quality conditions.

      Alternative 4 is the most likely of the four alternatives to decrease soil and water quality conditions.

      Of the four alternatives, Alternative 5 is the most likely to sustain current soil and water quality condition, with the potential to improve over time.

- Clean Water Act of 1972, which was created to restore and maintain the chemical, physical and biological integrity of the Nation's Waters (Section 101(a)). Section 303(d) directs states to list water quality impaired streams and develop total maximum daily loads to control the non-point source pollutants causing loss of beneficial uses. Section 404 regulates the discharge of dredged or fill material into navigable waters (waters of the U.S.).
    - Compliance: Of the four alternatives, Alternative 2, is the most likely to sustain current water quality conditions.

      Alternative 3 is the most likely of the four alternatives to improve water quality conditions.

      Alternative 4 is the most likely of the four alternatives to decrease water quality conditions.

      Of the four alternatives, Alternative 5 is the most likely to sustain current water quality condition, with the potential to improve over time.

- Executive Order 11990, 1977; (Wetlands Management) requires federal agencies to follow avoidance, mitigation, and preservation procedures with public input before proposing new construction in wetlands. To comply with Executive Order 11990, the federal agency would coordinate with the Army Corps of Engineers under Section 404 of the CWA and mitigate for impacts to wetland habitats.
    - Compliance: In all alternatives, travel routes that are currently within or near wetlands would continue to impact these resources.

      Of the four alternatives, Alternative 2, is the most likely to sustain current wetland conditions.

      Alternative 3 is the most likely of the four alternatives to improve wetland conditions.

      Alternative 4 is the most likely of the four alternatives to decrease wetland conditions.

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Of the four alternatives, Alternative 5 is the most likely to sustain wetland conditions, with the potential to improve over time.

- Executive Order 11998, 1977; (Floodplain Management) requires all federal agencies to take actions to reduce the risk of flood loss, restore and preserve the natural and beneficial values in floodplains, and minimize the impacts of floods on human safety, health and welfare.
    - Compliance: In all alternatives, travel routes that are currently within or near floodplains would continue to impact these resources.

      Of the four alternatives, Alternative 2, is the most likely to sustain current floodplain conditions.

      Alternative 3 is the most likely of the four alternatives to improve floodplain conditions.

      Alternative 4 is the most likely of the four alternatives to decrease floodplain conditions.

      Of the four alternatives, Alternative 5 is the most likely to sustain floodplain conditions, with the potential to improve over time.

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.

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