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Environmental Assessment

Alamo, Bear Springs, Bland, and Del Norte Range Allotment Analysis

**Jemez Ranger District, Santa Fe National Forest
Sandoval County, New Mexico**

Township 18 North, Range 4 East, Sections 1-4, 8, 10-15, 17, 22-27, 29,
32, and 34-36

Township 18 North, Range 5 East, Sections 4-36

Township 17 North, Range 4 East, Sections 1-3, 5, 12, 17, 25-36

Township 17 North, Range 5 East, Sections 1-18

Township 16 North, Range 4 East, Sections 4-9, 17

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1.0 PURPOSE OF AND NEED FOR ACTION

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from implementation of the proposed action and alternatives. The purpose of this analysis is to inform the decision-making process and disclose expected effects of each alternative to the public. Supporting documentation, including more detailed analyses of project-area resources, interdisciplinary team meeting notes, references, and public comments are on file in the project planning record at the Jemez Ranger District Office in Jemez Springs, New Mexico.

1.1 Proposed Action

The Jemez Ranger District, Santa Fe National Forest proposes to continue to authorize livestock grazing on the Alamo, Bear Springs, Bland, and Del Norte allotments under the following terms:

- **Season of Use.** Anticipated normal season start and end dates are listed in table 1.¹ Actual start dates may vary annually in response to range readiness or other management concerns. Range readiness will be the primary determining factor for earliest entry dates and those dates may be adjusted annually up to two weeks earlier than the dates listed or to delay entry by 30 days depending on climate and plant growth. Season end dates may occur 30 days prior to or after the listed date, depending on ecological conditions as determined through monitoring, including forage utilization levels.
- **Animal Unit Months (AUM).**² The anticipated range of annual AUMs to be authorized for each allotment is listed in Table 1. Due to the implementation of an adaptive management framework, authorized AUMs will be determined annually based on precipitation measures. The annually authorized AUM number must be within the authorized range of AUMs in the permit, unless conditions (such as drought) require authorized AUMs to be below the analyzed range. Authorization will not exceed the high end of the range that is analyzed within this document.

The authorized range of AUMs is determined according to forage production estimates that are calculated from precipitation measurements from the nearest local weather station. Forage production estimates are calculated as a percent of normal (average) forage production for a 30 year period (1975 to 2005). The maximum and minimum of these forage production estimates for the last ten years are then used to determine the authorized range of AUMs for the ten year grazing permit.

The authorized range of AUMs for the Alamo, Del Norte, Bland, and Bear Springs allotments is 60 to 130 percent of the authorized number of AUMs written in the permit. These ranges were calculated from precipitation data gathered from the Los Alamos and

¹ Under an adaptive management framework, the number of permitted cattle, season of use, and total head months can vary from year to year based on resource conditions. Forage availability, range readiness, and utilization are some of the parameters monitored to determine resource conditions. In a given year, there may be changes in the season of use, pasture rotation schedule, and the number of authorized cattle.

²An AUM is the amount of oven-dry forage (forage demand) required by one animal unit for a standardized period of 30 animal unit days. An animal unit is considered to be one mature cow of approximately 1,000 pounds, either dry or with calf up to six months of age, or their equivalent. The average value for an animal unit month is 780 pounds of oven dry forage.

Cochiti Dam weather stations.

Table 1. Proposed Authorization

Allotment	Normal Season	Range of Authorized AUMs	Permitted AUMs
Alamo	6/1 – 10/31	260 to 565	435
Bear Springs	6/1 – 10/31	90 to 195	150
Bland	6/1 – 10/31	60 to 130	99
Del Norte	6/1 – 10/31	265 to 575	442

- **Infrastructure improvement.** The following facilities work would be accomplished to address various grazing management, watershed and wildlife objectives. They are presented in greater detail in Table 2:
 - Develop two springs³ on the Alamo allotment
 - Construct one trick tank⁴ on the Alamo allotment
 - Install one cattle guard on the Alamo allotment
 - Decommission one earth tank⁵ on the Alamo allotment
 - Reconstruct one corral on the Bland allotment
 - Construct one earthen tank on the Del Norte allotment
 - Reconstruct three miles of boundary fence along the western boundary of the Del Norte Allotment
- **Change from Existing Conditions.** The Proposed Action would result in a change from existing conditions as a result of proposed range improvements meant to promote better distribution of livestock in areas with suitable grazing resources and the decommissioning of a water trough on the Alamo allotment meant to prevent potential impacts to an identified archeological site.

The current permitted range of AUMs for the Alamo, Bland, Bear Springs, and Del Norte would be the same as current management. Annual AUMs authorized per year by the Forest Service would be derived from precipitation data and within the range of authorized AUMs. This process of setting an authorized level of AUMs from an authorized range of AUMs is based on the implementation of adaptive management techniques, which depends on annual monitoring of climate, forage, and ecological conditions based on utilization and stubble height monitoring as explained in section 2.3.2 Monitoring.

1.2 Purpose and Need

The purpose and need of this proposed action is for authorization of livestock grazing in a manner that moves toward Forest Plan objectives and desired conditions. Authorization is needed on these allotments because:

Where consistent with other multiple use goals and objectives there is Congressional intent to allow grazing on suitable lands (*Multiple Use Sustained Yield Act of 1960, Wilderness Act of 1964, Forest and Rangeland Renewable Resources Planning Act of*

³ Developing a spring involved placing a section of culvert into the ground to hold water from a nearby spring

⁴ A trick tank is an above ground 5,000 gallon capacity storage tank with an inverted umbrella on top to collect rain water. Trick tanks do not collect runoff.

⁵ An earthen tank is a water catchment created from digging a hole in the soil. This catchment is designed to collect water runoff from upslope areas.

1974, Federal Land Policy and Management Act of 1976, National Forest Management Act of 1976).

The allotments contain lands identified as suitable for domestic livestock grazing in the Santa Fe National Forest Plan and continued domestic livestock grazing is consistent with the goals, objectives, standards, and guidelines of the forest plan.

It is Forest Service policy to make forage available to qualified livestock operators from lands suitable for grazing consistent with land management plans (*FSM 2203.1; 36 CFR 222.2 (c)*).

It is Forest Service policy to continue contributions to the economic and social well being of people by providing opportunities for economic diversity and by promoting stability for communities that depend on range resources for their livelihood (*FSM 2202.1*).

Need for change. There is a need for change from current management for all allotments. Specific desired conditions not being met are as follows:

- Management flexibility to respond to changing resource conditions (all allotments)
- Relative distribution of livestock grazing (Del Norte and Alamo allotments)
- There is a need to protect archeological resources from potential impacts due to livestock use within a known archeological site in the Alamo allotment.

Table 2. Facilities - Purpose and Need

Allotment	Proposed Action	Need	Purpose (Objective)
Alamo	Develop 2 springs (Alamo Spring and Silva Spring) and construct 1 Trick Tank.	Water developments are limiting within this pasture causing cattle to congregate around the few available water developments, thus use is not evenly distributed.	Increase distribution throughout allotment.
Alamo	Install 1 Cattle guard on Forest road 289 near Cerro Balitas.	There is sufficient forage and water to hold cattle south of Cerro Balitas, but due to being able to walk FR 289 unrestricted, it is difficult to keep cattle in this area.	Increase distribution throughout allotment.
Alamo	Decommission one earthen stock tank.	It was determined that an earthen water tank was constructed within the boundaries of an archeological site. Date of construction is unknown.	Reduce impacts to this archeological site.
Bland	Reconstruct Bland Corral	In 2002 the Cochiti Fire started in Bland Canyon and burned a portion of this corral. This is the only holding facility for the Bland allotment.	Facilitate movement of livestock on and off the Bland Canyon allotment.
Del Norte	Construct a dirt water tank in Section 19 of the Cochiti Mesa pasture.	Water developments in the Northern portion of the Cochiti Mesa pasture receive a high amount of use due to lack of water in the southern portion of the pasture. Thus, use is not evenly distributed.	Increase distribution in the Cochiti Mesa pasture.
Del Norte	Reconstruct three miles of boundary fence between the Del Norte and Peralta allotments.	In the early 1990's this fence was partially removed. It has become apparent that it is still needed.	Reduce drift of livestock from one allotment to the other.

1.3 Existing Situation

Location - the four allotments are located along the eastern most portion of the Jemez Ranger District, Santa Fe National Forest in:

- Township 18 North, Range 4 East, Sections 1-4, 8, 10-15, 17, 22-27, 29, 32, and 34-36
- Township 18 North, Range 5 East, Sections 4-36
- Township 17 North, Range 4 East, Sections 1-3, 5, 12, 17, 25-36
- Township 17 North, Range 5 East, Sections 1-18
- Township 16 North, Range 4 East, Sections 4-9, 17

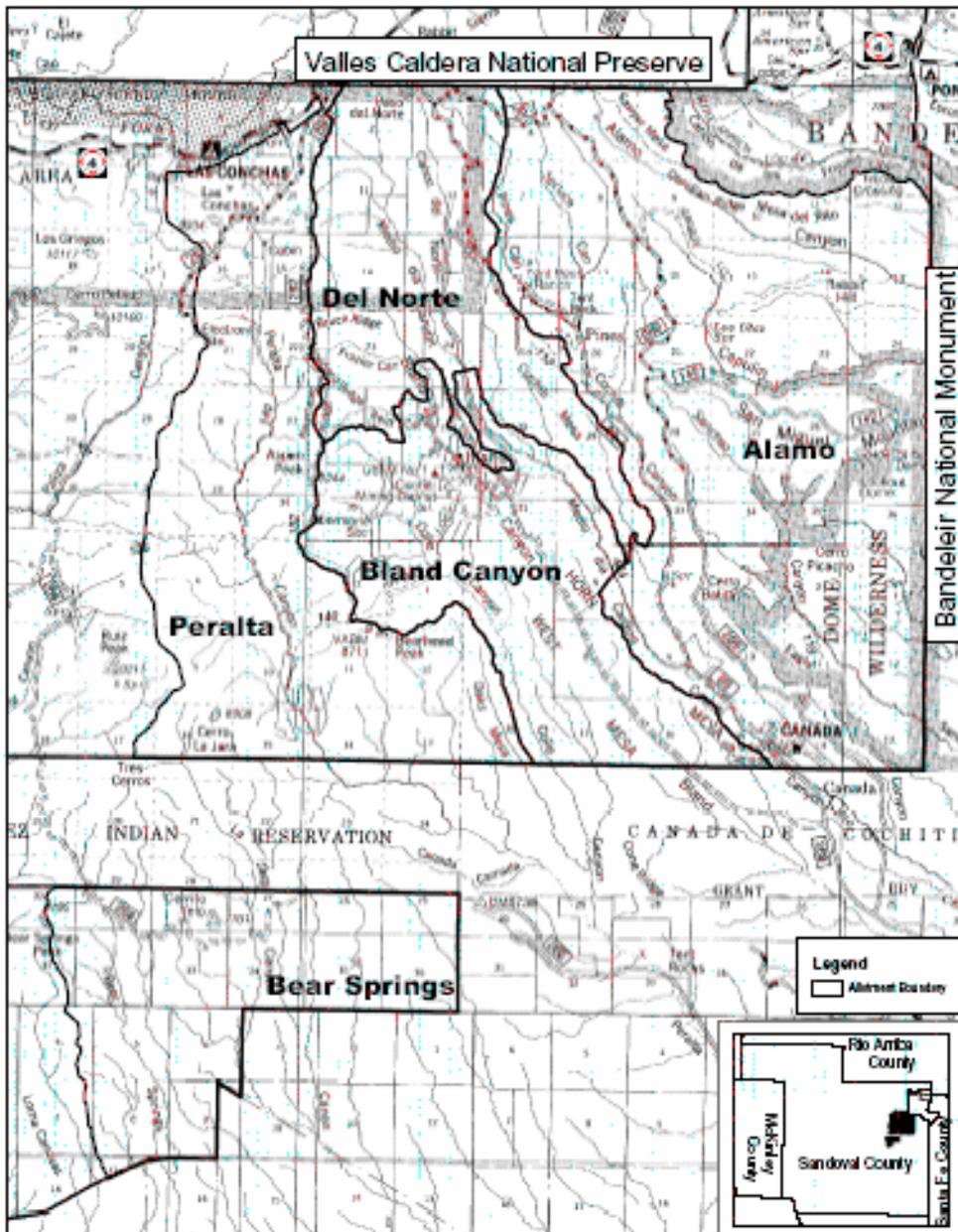


Figure 1. Location of project area and included grazing allotments

Setting – three allotments share common boundaries, the exception is the Bear Springs allotment which is separated by a tract of land owned by the Pueblo of Jemez. Combined, they encompass approximately 43,400 acres (approximately 2,328 of which are located on private lands; not under the jurisdiction of the Forest Service). The allotments are bounded on the north by the Valles Caldera National Preserve, to the south by tribal lands, to the east by Bandleir National Monument, and to the west by National Forest Service land. Interspersed throughout the four allotments are private land inholdings. State Highway 4 runs along the northern portion of the allotments and Forest Roads (FR) 142, 266, 268, 286, and 289 are a few of the more traveled additional access roads used by the allotment permittees.

The allotments are located in the Jemez Mountains where topography is characterized by mountainous terrain in the higher elevations, steep sided canyons, and flat mesa tops in the lower elevations all with interspersed small mountain meadows or grassy canyon bottoms.

The **Alamo allotment** contains several major canyons, Alamo Canyon, Capulin Canyon, Cochiti Canyon and Sanchez Canyon. Other canyons within the Alamo allotment include Eagle Canyon, Spruce Canyon, and Pines Canyon. In general, these canyons run in a north/south direction eventually draining into the Rio Grande six miles away at its closest point. Most of the canyons have intermittent stream flows within National Forest System (NFS) lands with the exception of Silva, Spruce and Pines which are perennial throughout the majority of their lengths; and Capulin which becomes perennial at its lower reaches on National Forest Service lands. Many of the canyons contain spring systems, some of which are developed for wildlife and livestock use.

The **Bear Springs allotment** contains two main canyons, Bear Springs Canyon and Seguro Canyon. These canyons run in a north/south direction eventually draining into the Rio Grande seven miles away at its closest point. There are other unnamed canyons within the allotment that drain into the two main canyons. Neither of the two main canyons contains perennial stream flows. Some of the canyons have spring systems, two of which are developed for wildlife and livestock use.

The **Bland allotment** has three main canyons, Bland Canyon, Colle Canyon, and Medio Dia Canyon. These canyons run in a north/south direction eventually draining into the Rio Grande seven miles away at its closest point. Bland and Colle canyons have perennial reaches in the upper sections which become intermittent in the lower sections. Medio Dia Canyon is perennial within the Bland allotment. Two main mesas, West Mesa and Horn Mesa are within this allotment but due to lack of water are not available for domestic livestock use.

The **Del Norte allotment** has one main canyon, Medio Dia Canyon with several other canyons that feed it, such as Del Norte Canyon and Frazier Canyon. Medio Dia canyon has perennial reaches at various locations throughout the allotment. One main mesa, Cochiti Mesa is located within this allotment. There are springs and man-made water sources that make most of the grazeable areas available to domestic livestock.

Elevations range from high mountain peaks including one at 9,300 feet above mean sea level (Del Norte allotment) to canyon bottoms at 6,100 feet above mean sea level (Bland allotment). Numerous ephemeral drainages run through the allotments; however, only those already mentioned are perennial or intermittent.

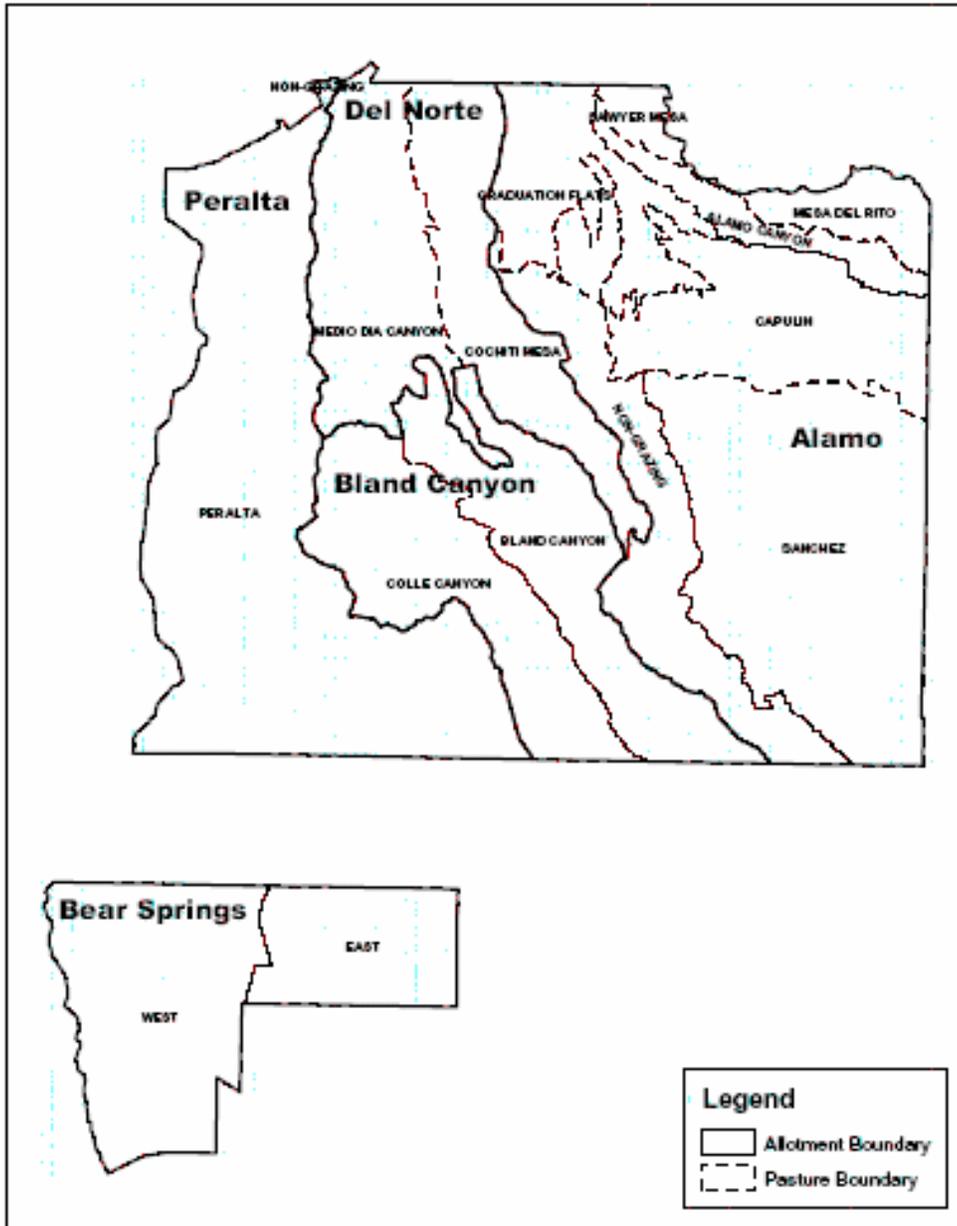


Figure 2. Existing grazing allotment and pasture boundaries

Grazing Management - Table 3 displays information regarding current grazing management on all four allotments. The current grazing management system and the average annual authorized AUMs of grazing use are displayed in this table. Start dates for the season of use may vary from two weeks earlier to one month later than the average date shown based on a range readiness determination that indicates resources are in a condition capable of supporting the beginning of the grazing season. Similarly the actual end date may vary by up to one month depending on resource conditions.

Table 3. Existing Situation

	Alamo	Bear Springs	Bland	Del Norte
Total Acres (including pvt)	19,074	7,636	8,808	7,904
National Forest	18,664	7,636	8,193	6,601
Private	410	0	615	1,303
<u>Range Management Status*</u>				
Satisfactory	91%	60%	100%	87%
Unsatisfactory	9%	40%	0%	13%
No. of Pastures/Use Areas	5	2	2	2
<u>Range Structures</u>				
Springs Developments	3	2	0	3
Earthen Tanks	7	4	0	2
Restoration Dams	0	0	0	0
Corrals	1	4	1	0
Wells	0	0	0	0
Storage Tanks	0	1	0	0
Fences (miles)	19.5	17	0.3	5
Grazing System	5 pasture – Summer-Deferred Rotation	2 pasture – Summer-Deferred Rotation	2 pasture – Summer-Deferred Rotation	2 pasture – Summer-Deferred Rotation
Authorized AUMs	435	150	99	442
Normal Season	6/1 – 10/31	6/1 – 10/31	6/1 – 10/31	6/1 – 10/31

* Only reflects full and potential capability acres (See table 20 for more information)

1.4 Management Direction

The Santa Fe National Forest Plan (Forest Plan) identifies the national forest lands within the four allotments as suitable for domestic livestock grazing. The project proposal and action alternatives were designed to conform to Forest Plan direction, goals, and standards and guidelines, which are incorporated by reference. The allotments fall within Forest Plan Management Areas C, H, I, L, N, P, R, and X where emphasis is on the following:

Table 4. Distribution of each allotment within Forest Plan designated Management Areas

Allotment	Percent Management Area within each Allotment								
	C	H	I	L	N	P	R	S	X
Alamo	19	23	2	0	1	0	55	0	0
Bear Springs	0	0	0	0	0	42	0	58	0
Bland Canyon	1	0	4	34	13	0	48	0	0
Del Norte	1	0	0	0	9	0	39	0	51

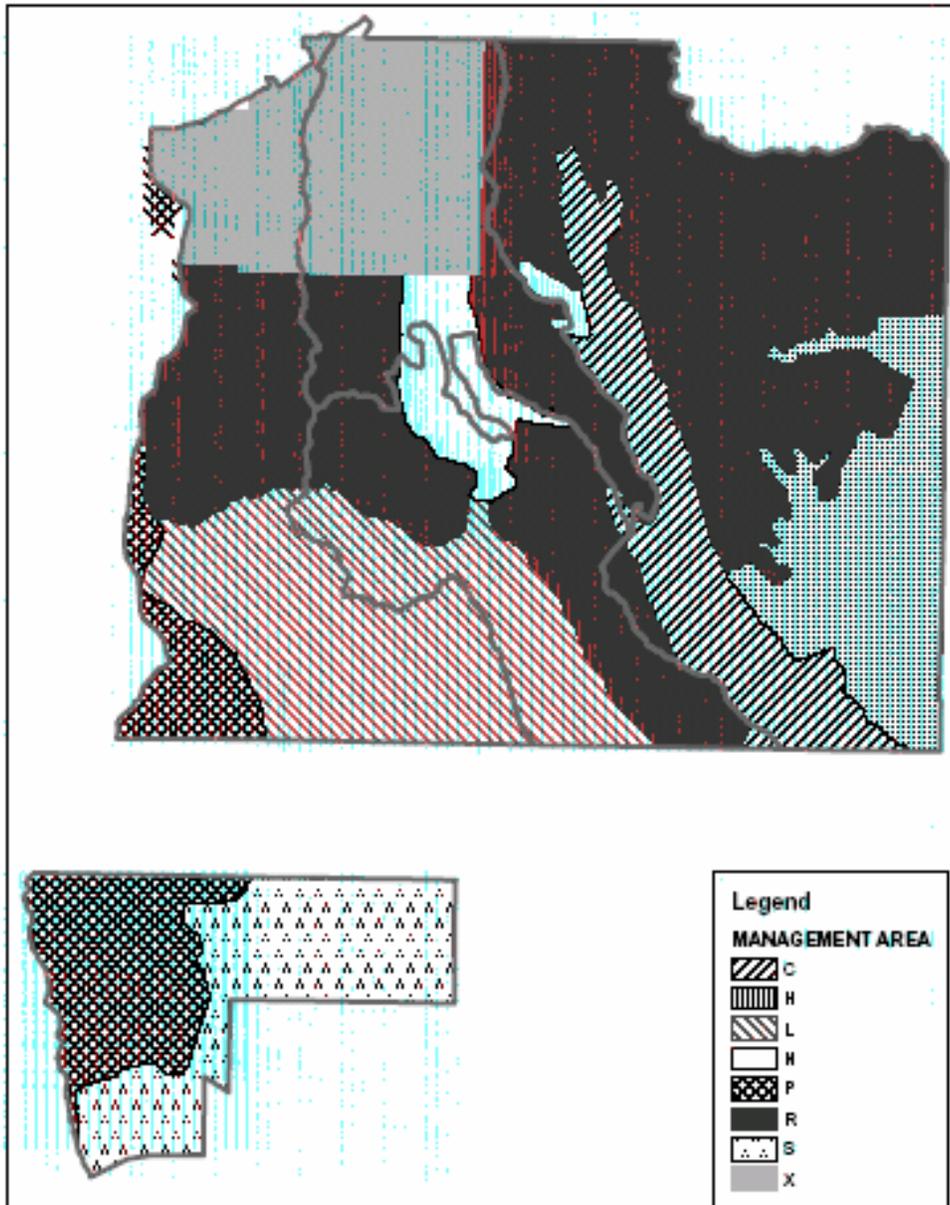


Figure 3. Management Areas within the project boundaries
(Management Area I not pictured)

Management Area C - Emphasis in this area is on enhancement of visual quality and developed recreation opportunities while protecting essential wildlife habitat and riparian zones. Grazing activities occur where consistent with the primary emphasis of this area (USDA-FS 1987, pg 106). Standards and Guidelines related to range management include:

Within approved allotment management plans, emphasis will be given to proper utilization of the riparian zone (USDA-FS 1987, pg 109).

Management Area H – Management emphasis in this area is to preserve wilderness character and values. They will be managed to retain their primeval wild character and influence, without permanent improvements or habitations and ... protected... to preserve their natural conditions. Grazing will occur only when consisted with these values and where historically established (USDA-FS 1987, pg 127). Standards and Guidelines related to range management include:

Extensive livestock management systems which use range riders or other techniques to minimize structural development are preferred.

Construction or replacement of improvements will be done for purposes of resource protection and more effective livestock management and not to accommodate increased numbers of livestock.

All improvements will be consistent with wilderness values.

Avoid management practices which tend to concentrate grazing livestock in sensitive areas such as riparian zones and wet meadows (USDA-FS 1987, pg 127).

Management Area I - Emphasis is on providing active management of cultural (heritage) resources including protection, stabilization, interpretation, evaluation, and opportunities for research. Use restrictions will be imposed as necessary to protect the cultural values (USDA-FS 1987, pg 135). Standards and Guidelines related to range management include:

Locate range structures to avoid the concentration of livestock on identified cultural resources (USDA-FS 1987, pg 137).

Management Area L - Emphasis is on providing semi-primitive non-motorized recreation opportunities. Range management may occur where consistent with this emphasis. These areas are closed to motorized travel and are identified as a roadless area in the Forest Service Roadless Area Conservation Final Environmental Impact Statement Volume 2 – Maps of Inventories Roadless Areas (USDA-FS 2000, pg 133). Standards and Guidelines related to range management include:

Emphasize use of native or natural materials such as local rock, logs, and indigenous plant species for structural projects or facilities (USDA-FS 1987, pg 147).

Management Area N – Emphasis is on management that protects and enhances essential wildlife habitat. Grazing may occur when consistent with the protection emphasis of this area (USDA-FS 1987, pg 152)

Management Area P – Emphasis is cultural resource location, inventory, and protection. Grazing capacity is generally transitory in nature but there are allotments in intermingled grasslands (USDA-FS 1996, replacement pg 157)

Management Area R - Cultural resource location, inventory, nomination, and protection are emphasized. The emphasis is also on wildlife habitat improvement and essential habitat protection and enhancement. Grazing activities occur where compatible with the primary emphasis of this area (USDA-FS 1987, pg 165).

Management Area S – Cultural resource site location, inventory, nomination and protection are emphasized. Emphasis in this area is also on key wildlife habitat protection, habitat improvement, forage, and firewood production (USDA-FS 1987, pg 170). Standards and Guidelines related to range management include:

Grazing management should maintain or enhance woody shrubs and half shrubs such as winter fat and bitterbrush for wildlife forage or cover (USDA-FS 1987, pg 172).

Management Area X - Emphasis in this area is on conserving, protecting, and restoring recreational, ecological, cultural, religious, and wildlife resource values. Grazing is permitted in the Jemez National Recreation Area (Public Law 103-104).

1.5 Decision Framework

The District Ranger is the responsible official who will decide whether or not to approve the proposal. The District Ranger may select any of the three alternatives, or a combination thereof. The District Ranger also has the authority to determine what, if any, mitigation measures, monitoring, or other specifications are necessary for the implementation of a chosen alternative.

1.6 Public Involvement

This project was scoped under the name “Jemez 5 Allotments.” Peralta was removed from this analysis and will be analyzed according to the National Environmental Policy Act in a separate analysis.

The proposed project was listed in the Santa Fe National Forest Schedule of Proposed Actions in 10/01/2005 to 12/31/2005 edition. This list is distributed to numerous individuals and can be accessed on the Santa Fe National Forest Website at the following link: <http://www.fs.fed.us/r3/sfe/projects/projects/index.html>. A detailed project proposal was provided to 29 individuals, agency representatives, and interested tribes for comment during scoping in February 2005. Seven responses were received. Throughout the planning process, meetings have been held with the allotment permittees. This project was also included on a list of proposed activities submitted to interested tribes.

Using the comments from the public and other agencies, an interdisciplinary team developed a list of issues to address. This list was then used along with applicable NEPA regulations and Forest Service policy (FSH 1909.15) to develop this Draft EA.

In compliance with 36 CFR 215, a description of the proposed action, some possible alternatives, and anticipated effects were made available for a 30-day public comment period via a legal notice published in the Albuquerque Journal on February 14, 2005. Comments were received from four different parties. Comments received were discussed with the ID Team and changes were made to the final EA to address these comments.

The final EA will be the primary document used to inform the decision-making process. A decision based on this assessment is subject to appeal pursuant to regulations at 36 CFR 215. A legal notice of the Decision Notice was published in the Albuquerque Journal on June 4, 2006.

1.7 Issues

The Forest Service interdisciplinary team grouped and sorted comments (both internal and external) received during the scoping period and 30-day comment period into issues and non-issues. Issues are defined as a concern or debate about the effects of the proposal. Issues were further categorized as key issues (used to develop alternatives to the proposed action) and other issues (addressed through mitigation measures common to all alternatives). The effects related to all issues are discussed in Section 3. Comments not considered issues to analyze in this EA were those:

1. Outside the scope of the proposed action/purpose and need, thus irrelevant to the decision being made;
2. Already decided (impacts avoided) by law, regulation, or other higher-level decision; or
3. Conjectural and not supported by scientific or factual evidence.

1.7.1 Key Issues

No key issues were identified for this project.

1.7.2 Other Issues

Other issues were noted and are discussed below. Mitigation measures were developed to address these *other issues*. A list of non-issues and reasons regarding their categorization is in the project record.

- **Soil and Vegetation** – continued grazing may result in over utilization on some allotments, particularly in view of the on-going drought.
- **Water (riparian resources)** – water sources (springs) and surrounding resources (vegetation and wildlife) can be adversely affected by grazing associated disturbances.
- **Wildlife** – construction activities associated with range improvements (noise and ground disturbance from use of heavy equipment) may disturb wildlife species during breeding season, resulting in unsuccessful reproduction.
- **Heritage Resources** – activities associated with grazing (trampling, bedding down, and congregating near salt, water developments, and corrals) have the potential to affect archaeological sites by damaging surface and sub-surface artifacts and features.
- **Economics** – range improvements can be costly to the government or to the permittee, or both.

2.0 ALTERNATIVES, INCLUDING THE PROPOSED ACTION

This chapter describes and compares the alternatives considered for management of the Alamo, Bear Springs, Bland, and Del Norte. This section presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker. This chapter also identifies mitigation measures.

2.1 Alternatives Eliminated from Detailed Study

Alternatives eliminated from detailed study are those issues received during the scoping process that were first considered and then eliminated from study via the National Environmental Policy Act analysis process. The following project alternative was received during scoping:

2.1.1 – Realign the Alamo and Del Norte allotment boundaries back to the original boundary.

This proposed alternative focuses on returning Alamo and Del Norte allotment boundaries back to their original shapes, which were changed in the 1980s. This alternative was dropped because it is outside the scope of this analysis. There is no desire to alter allotment boundary lines to previous boundaries at this time.

2.2 Alternatives Considered in Detail

2.2.1 Alternative 1 – No Grazing

Cattle grazing would no longer be authorized on these allotments. Grazing permittees would be required to remove all cattle from the allotment when their current term grazing permit expires. No new permits would be issued. All range facilities would revert to the Forest Service where they would be evaluated for wildlife, watershed, and soil protection needs. Allotment boundary fences would not be removed, as they would be needed to prevent excess use by livestock from adjacent active allotments. Pasture fences would be removed as appropriate.

Table 5. Permit Expiration Dates

Allotment	Last Permit Expires
Alamo	12/31/2008
Bear Springs*	No Active Permit
Bland**	12/31/2012
Del Norte	12/31/2012
	12/31/2012

* Bear Springs allotment has not been grazed since 1999

** The Bland Allotment has not been grazed since 1998 due to non-use status

2.2.2. Alternative 2 – Current Management

The current allotment management plans would continue to guide management on the allotments. No change would be made to the current operations. No new range facilities would be constructed. Grazing would continue to be administered according to Forest Service policy. Use would be permitted seasonally according to an adaptive management framework with livestock numbers adjusted to meet appropriate carrying capacities as displayed in table 6.

Table 6. Current Management

	Alamo	Bear Springs*	Bland**	Del Norte
No. of Pastures	5	2	2	2
New Range Structures				
Earthen Tanks	0	0	0	0
Restoration Dams	0	0	0	0
Corrals	0	0	0	0
Wells	0	0	0	0
Fences (miles)	0	0	0	0
Grazing System	5 pasture – Summer-Deferred Rotation	2 pasture – Summer-Deferred Rotation	2 pasture – Summer-Deferred Rotation	2 pasture – Summer-Deferred Rotation
Authorized AUM Range	260 to 565	90 to 195	60 to 130	265 to 575
Permitted AUMs	435	150*	99	442
Normal Season	6/1 to 10/31	6/1 to 10/31	6/1 to 10/31	6/1 to 10/31

* Bear Springs allotment has not been grazed since 1999

** The Bland Allotment has not been grazed since 1998 due to non-use status

2.2.3. Alternative 3 – Proposed Action

This alternative is similar to Current Management, except for the following changes:

Figure 4 displays existing and proposed range facilities. Specific to range facilities, this alternative includes:

- Development of two springs on the Alamo allotment
- Construction of one trick tank on the Alamo allotment
- Installation of one cattle guard on the Alamo allotment
- Decommissioning of one earthen tank on the Alamo allotment
- Reconstruction of one corral on the Bland allotment
- Construction of an earthen stock water pond on the Del Norte allotment
- Reconstruction of three miles of fence on the western boundary of the Del Norte allotment (along its border with the Peralta allotment).

Work on individual facilities will only be initiated when such work will help move the range resources toward desired conditions. Monitoring data indicating resource responses to other changes in management (the number of permitted cattle, season of use, and total head months, rotation system, etc.) will be factored into decisions regarding whether or not to proceed with work on individual facilities. Work on individual facilities will then be initiated as funds become available.

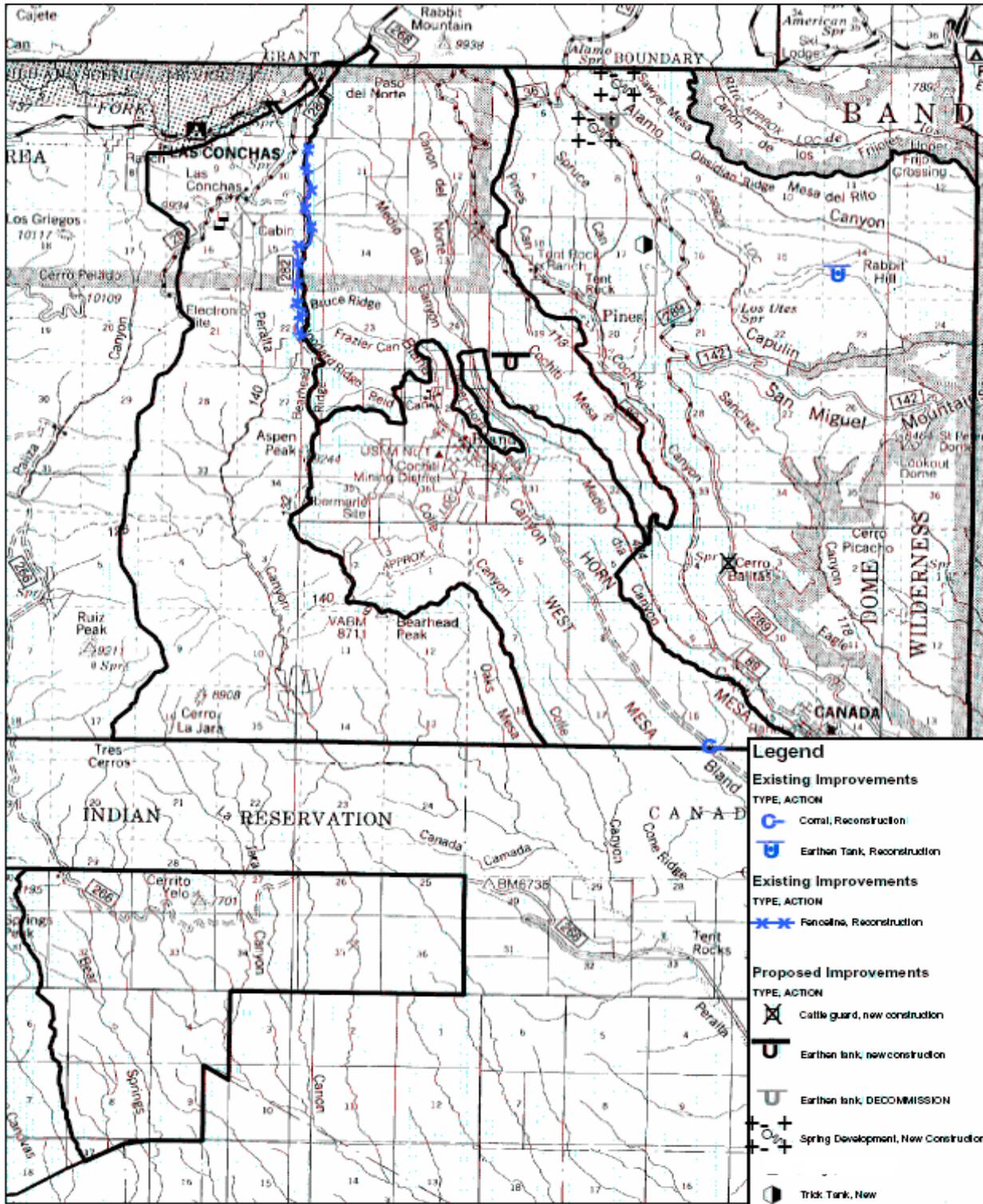


Figure 4. Proposed range improvements under the proposed action

Table 7. Proposed Action

	Alamo	Bear Springs*	Bland**	Del Norte
No. of Pastures	5	2	2	2
<u>New Range Structures</u>				
Earthen Tanks	0	0	0	1
Tank Decommissioning	1	0	0	0
Water Troughs	0	0	0	0
Corrals – New/Recon.	0	0	1	0
Trick Tanks	1	0	0	0
Spring Developments	2	0	0	0
Cattle guards	1	0	0	0
Fences (miles)	0	0	0	3
Grazing System	5 pasture – Summer-Deferred Rotation	2 pasture – Summer-Deferred Rotation	2 pasture – Summer-Deferred Rotation	2 pasture – Summer-Deferred Rotation
Authorized AUM Range	260 to 565	90 to 195	60 to 130	265 to 575
Authorized AUMs in Permit	435	150*	99	442
Normal Season	6/1 to 10/31	6/1 to 10/31	6/1 to 10/31	6/1 to 10/31

* Bear Springs has not been grazed since 1999

** The Bland Allotment has not been grazed since 1998 due to non-use status

2.3 Mitigation and Monitoring Requirements

2.3.1 Mitigation Measures

To mitigate resource impacts, the following measures will be implemented under all alternatives. The mitigation measures included here are limited to those for which the Forest Service has authority. These mitigation measures have been used on previous projects and are considered to be effective in reducing environmental impacts. With full implementation of applicable Forest Plan standards and guidelines, project design criteria, and the prescribed mitigation measures, no potentially significant adverse environmental affects would be expected to occur.

Soil, Water and Vegetation – the objective is to mitigate soil, water, and vegetation impacts from cattle grazing and range facility construction through incorporating elements of adaptive management.

- Cattle will not be moved onto an allotment or pasture until range readiness and facility inspections indicate that appropriate conditions exist;
- Key herbaceous riparian vegetation, will have a minimum stubble height of four inches on the stream bank, along the green line, after the growing season and during spring runoff;
- Key riparian browse vegetation will not be used at levels exceeding 50 percent of the current annual twig growth that is within reach of the animals;
- Key herbaceous riparian vegetation on riparian areas, other than the stream banks, will not be grazed more than 30 percent during the growing season or 40 percent during the dormant season;
- Stream bank instability attributable to grazing livestock will be less than ten percent on a stream segment.

- Upland range resource values will be protected from unacceptable grazing effects as determined through monitoring (see above). Livestock grazing will be managed at a level corresponding to conservative intensity. Minimum acceptable stubble heights have been developed by the Forest Service for certain species (see section 3.5.1 Vegetation – Affected Environment). Residual plant material should not be reduced below those levels. Cattle will be moved when utilization of key forage species in key use areas approaches established standards.
- Salt will be placed so as to minimize impacts to riparian zones, meadow ecosystems, and other forest resources (USDA-FS 1987, pg 68). Salting locations will vary annually and will not be located within ½ mile of water sources when possible.

Wildlife – the objective is to mitigate impacts to wildlife from continued cattle grazing and from disturbance associated with the location and construction of range facilities.

- Construction and maintenance of range facilities will be evaluated and executed to have no adverse effect on threatened and endangered species (USDA-FS 1996, pg 68). If any listed or proposed Threatened, Endangered, or Sensitive species are found during project activities, work in the immediate vicinity of the sighting will stop until a Forest Service wildlife biologist has resurveyed the area and any newly recommended mitigation measures have been implemented.
- Allotment fence management will meet wildlife standards that allow easy migration and passage. All fences should be built to wildlife specifications (USDA-FS 1996, pg 66 and 67):
 - height – 40-42 inches,
 - spacing between top wire and second wire equals at least 12 inches,
 - bottom wire should be 16 inches from the ground,
 - all new fence sections should be marked with flagging to alert wildlife of new barrier, and
 - fences and loose wires will be removed as they are abandoned.
- Non-game entrance and escape ramps will be provided on water developments intended for livestock and wildlife use (USDA-FS 1996, pg 66). New and reconstructed livestock water developments will include wildlife access, cover, and escape considerations (USDA-FS 1996, pg 67).
- Cattleguards should be designed to prevent small animal entrapment.

Mitigations specific to the northern goshawk

- Proposed construction activities (fences, corrals, earthen tanks, trick tanks, etc.) planned within suitable habitat should occur October 1 through February 28 to avoid disturbance during breeding season. If goshawk surveys were done in May/June at each project site and were negative for response, then construction *at that site* can proceed with no seasonal restrictions.

Mitigations specific to the Mexican spotted owl

- Construct cattle guard on boundary of Medio Dia Protected Activity Center (PAC) between August 30 and March 1, to eliminate any potential for disturbance during the Mexican spotted owl nesting season.
- Monitor use below Silva Spring development; if increased hiking/biker use is noted, construct fence across canyon below Silva Spring development to prevent cattle from trailing down canyon.
- Permittees should not use ATVs for any range activities within canyons in PACs during the breeding season from March 1 through August 30.

Mitigations specific to the peregrine falcon

- To avoid disturbance during potential falcon nesting for projects in designated suitable breeding habitat, mitigations will be carried out at specific site locations as documented in the Biological Assessment/Biological Evaluation.

Heritage Resources – the objective is to protect heritage resources (archaeological sites) from direct or indirect impacts caused by ground disturbing activities associated with the construction of range facilities.

- Range structures will be located so as to avoid concentrations of livestock on identified heritage resource sites. No ground disturbing activities will be conducted within known site boundaries.
- No salting will occur within or immediately adjacent to site boundaries.
- If any unrecorded sites are discovered during the course of project implementation, all project activities in the vicinity of the site(s) will cease and the District or Forest Archaeologist will be notified.
- The Forest will conduct a program of monitoring in the area as part of this project to determine the extent of grazing impacts on heritage resources. At a minimum, monitoring will occur halfway through the life of permit reissuance and just prior to reissuance in the future.
- Any additional range improvements not covered by this report will require additional heritage resource survey and/or clearance prior to construction.

Recreation – the objective is to reduce encounters between recreation users and cattle and minimize impacts to scenic quality.

- Within Management Area L (portions of Bland allotment), emphasize use of native or natural materials such as local rock, logs, and indigenous plant species for structural projects or facilities (USDA-FS 1996, pg 147).

2.3.2 Monitoring

The objective of monitoring is to evaluate the abilities of all parties involved in planning and implementing the grazing program.

Implementation monitoring will include periodic inspections to ensure compliance with permit terms and conditions such as salting locations, seasonal restrictions, utilization, and any mitigation measures that are approved in the project decision. Stock checks will also be conducted to assure that only permitted livestock enter the allotment, the allotment is occupied only within the permitted time periods, and use occurs only within the approved areas within each allotment.

Effectiveness monitoring will determine if grazing standards and guidelines, grazing prescriptions, and Allotment Management Plan practices are effective in accomplishing the planned objects. Effectiveness monitoring is essential for determining the annual amount of authorized AUMs according to an adaptive management framework where each permit includes a range of authorized AUMs.

Range readiness will be monitored before permitted livestock enter the allotment at the beginning of the season to assess whether the soil is too wet and that sufficient forage growth has occurred.

Utilization monitoring measures forage utilization, riparian vegetation impacts, and condition of stream banks at the end of the season to assess whether standards and guidelines set in the

Forest Plan are attained. *Stubble heights* of forage species may be measured during the grazing season for these same purposes. Stubble height measurements usually occur in the middle and end of the grazing season, unless resource conditions require more regular monitoring. These measurements will occur in key areas.

A key area is a portion of range which, because of its location, grazing or browsing value, and/or use, serves as an indicative sample of range conditions, trend or degree of seasonal use. It guides the general management of the entire area of which it is part. Key area locations are evaluated annually during development of the Annual Operating Instructions. Changes in management actions (installation or removal of range facilities, season of use, number of animals, etc) can alter grazing patterns within a pasture and the degree to which a previously selected key area is representative of the current years planned use. Likewise, non-grazing management related changes in land use may also affect grazing patterns.

If deemed necessary, key area locations may be modified. Reconsideration of key area locations identified by the Forest Service and the permittees will adhere to the following guidelines:

- They are between 0.25 and 1.00 mile from livestock water sources, on slopes less than 15 percent, on satisfactory or impaired soils, and are greater than five acres in size.
- The key area must provide an indicative sample of range conditions, trend or degree of seasonal use.
- Potential key areas are not low production sites (< 100 pounds/acre), within 100-yards of roads or fences, nor on land controlled by another entity.

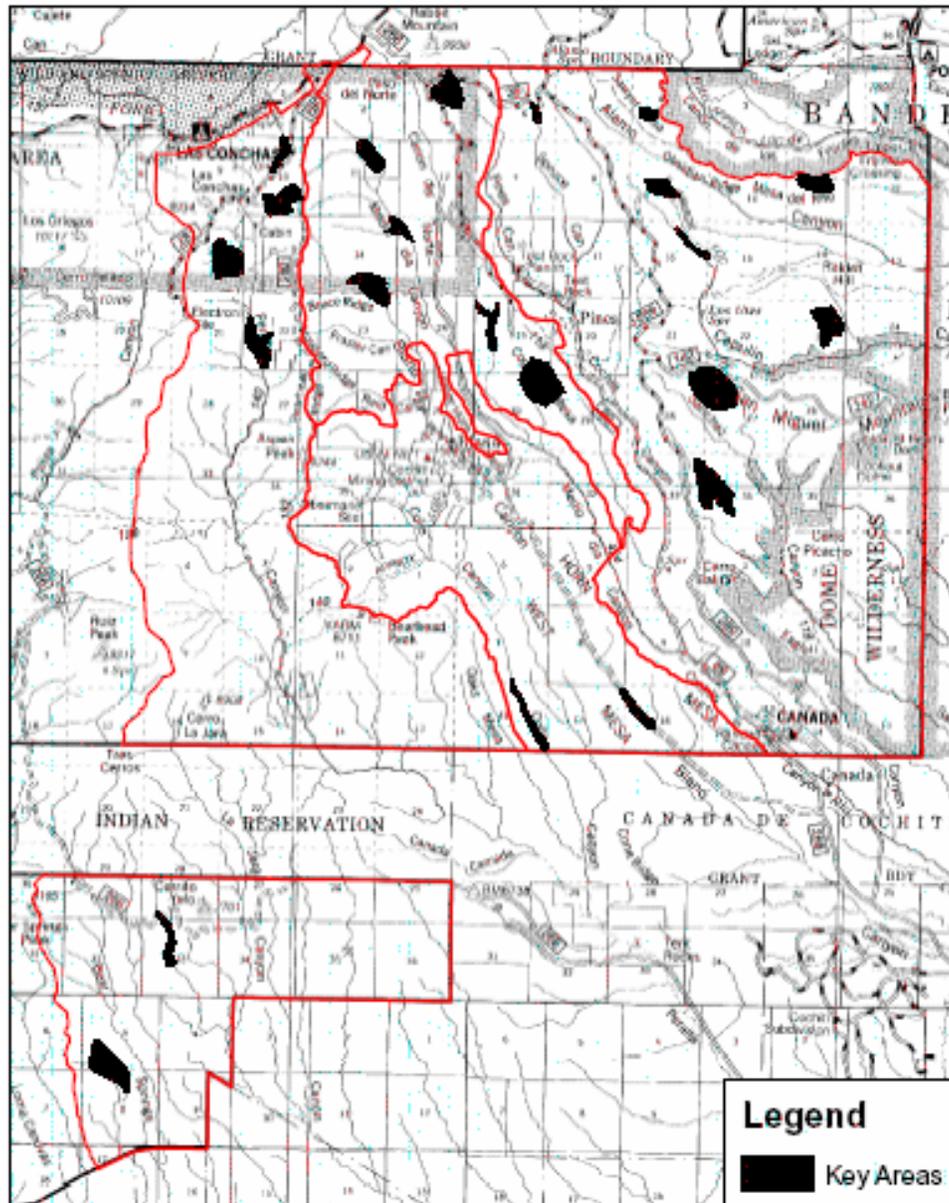


Figure 5. Key areas used for rangeland condition monitoring

Specific management goals (riparian areas, Endangered Species Act consultations, etc.) may require selection of monitoring locations that do not meet the previously listed criteria for a key area. The rationale behind selection of these critical areas should be documented.

Vegetation composition and trend will be monitored at five-year intervals using benchmarks. Benchmarks are reference points based on scientific literature or that are sensitive to management changes. For example, a common benchmark used in analysis of grazing impacts is a grazing utilization amount of 30 to 40 percent use, which is considered conservative use of resources based on current scientific literature (Holechek et al., pp. 11-14. 2000). Vegetation monitoring last done in 1970s, and a reassessment of vegetation competition and trend in the project area was completed for this project.

Validation monitoring will determine if the stocking rates are appropriate by comparing actual use records and effectiveness monitoring results. This is usually completed on an annual basis with data collected from utilization and stubble height monitoring.

2.4 Comparison of Alternatives

This section compares the effects of implementing each alternative, to provide decision makers and the public a clear basis for choice. Table 8 summarizes the more detailed effects analysis descriptions contained in Section 3.0.

Table 8. Comparison of Alternatives

Objective	Alternative 1	Alternative 2	Alternative 3
	No Grazing	Current Management	Proposed Action
<p>Consistency with Forest Plan</p> <ul style="list-style-type: none"> Forest Service policy to make forage available to qualified livestock operators from lands suitable for grazing consistent with land management plans 	<p>This alternative would not comply with guidance in the Forest Plan, Forest Service policy, and federal regulations (<i>FSM2203.1; 36 CFR 222.2 (c)</i>)</p>	<p>This alternative would make forage available to qualified livestock operators from lands suitable for grazing and consistent with the Forest Plan.</p>	<p>This alternative would make forage available to qualified livestock operators from lands suitable for grazing and consistent with the Forest Plan.</p>
<p>Provide for management flexibility to respond to changing resource conditions while maintaining satisfactory range management status and distribution of cattle</p>	<p>N/A</p>	<p>Incorporating adaptive management will allow for management discretion in periods of drought, fire, or other events.</p>	<p>Incorporating adaptive management, as well as reconstructing 3 miles of pasture fence, installing 1 cattle guard, will maintain or improve the number of acres in satisfactory range management status; developing 2 springs, constructing 1 trick tank, constructing 1 earth tank, and reconstructing 1 corral will provide for better distribution of cattle and allow for management discretion in periods of drought, fire, or other events. These factors will result in maintaining satisfactory range management status throughout the allotments. This alternative does not include a specific time table for completing facility work; rather, work on individual facilities will only be initiated when such work will help move the range resources toward desired conditions based on the results of monitoring.</p>
<p>Protect archeological resources from impacts due to livestock use within known archeological sites</p>	<p>All potential impacts would be removed.</p>	<p>Maintaining an earthen tank that is located on an identified archeological site would result in potential impacts from concentrated cattle use surrounding the tank.</p>	<p>Under this alternative decommissioning of one earthen tank will alleviate impacts to a known archeological site.</p>

3.0 ENVIRONMENTAL CONSEQUENCES

This section summarizes the physical, biological, social and economic environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives presented in the chart above. This section is organized by resource. Within each section, the affected environment is briefly described, followed by the environmental consequences (effects) of implementing each alternative.

3.1 PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIVITIES USED FOR CONSIDERATION OF CUMULATIVE EFFECTS

Discussion of environmental effects in Chapter 3 is placed in the context of past, present, and future environmental change through a cumulative effects analysis. This section discusses past, present, and reasonably foreseeable activities that will be discussed in consideration with the expected effects of alternatives.

The following activities have been identified as potentially contributing to the effects analyzed herein. These activities and occurrences have been part of the incremental change in ecological conditions in the project area, and may continue to influence conditions in the project area over the term of the project. Foreseeable future actions are those for which a proposed action has been approved or those proposed for NEPA analysis in the near future. Other possible future actions are considered too speculative to include in the analysis.

Grazing – The ranching tradition began in northern New Mexico with Spanish colonization in 1598. Grazing practices in the northern mountains intensified until the late 19th century, which at its greatest intensity resulted in the establishment of arroyos and severe erosion throughout the mountainous landscape. Around the turn of the century, much of the land in the current project area was transferred to federal ownership, and eventually came under the management of the Forest Service.

The Forest Service, including the Santa Fe National Forest, began to address the problems of land condition in the early part of the 20th century through grazing improvement programs and grazing permit reductions. Beginning in the 1920s and continuing throughout the 1960s, there was a continuous decline in the number of grazing permits and the number of animals permitted (Raish and McSweeney 2003). Allotments within the proposed project area; however, have experienced a net increase of permitted AUMs since the mid 1950s (Table 9).

Permitted AUMs. Permitted grazing has changed in several allotments since the 1950s and 1960s for the proposed project area. Table 9 shows ‘snapshots’ of permitted grazing in the proposed project area from various years in the past and compares it to permitted numbers in the present.

Table 9. Change in Permitted Animal Unit Months (AUMs)

Allotment	AUMs/Year	AUMs/Present	Difference (AUMs)
Alamo	580/1968	435/2005	-145
Bear Springs*	150/1974	150/2005	0
Bland**	115/1954	99/2005	-16
Del Norte	80/1957	442/2005	+362
TOTAL	935/Varies	1126/2005	+201

* Bear Springs Allotment *authorized* AUMs have not changed; however, these AUMs have not been actually grazed since 1999

** Despite the Bland Allotment is currently authorized for 99 AUMs, it has been in non-use since 1998

The differences in permitted AUMs primarily occur in the Alamo and Del Norte allotments. The Bear Springs allotment is the only allotment where permitted grazing has remained the same. The Alamo allotment was decreased in permitted AUMs due to an allotment boundary change which moved a portion of the available forage into the Del Norte allotment boundary. The increase in permitted AUMs in the Del Norte (above the 145 AUMs moved from Alamo) is a result of modifications made because of a grazing utilization analysis completed for each allotment in 1974.

Invasive Species. The presence of invasive species may affect the ecological condition of natural areas by adding stress on existing ecological relationships between species, modifying environmental conditions beyond the tolerance levels of native species, or directly competing with native species for available resources.

Past invasive species surveys indicated a 42-acre area that included the presence of bull thistle - a common invasive specie throughout the southwest. The bull thistle is located in the Alamo allotment, straddling the border of the Dome Wilderness. A population has also been reported to exist between FR 289 and Sanchez Canyon. No treatments have been planned to eradicate the bull thistle in this area.

Additionally, responses to the Draft Environmental Assessment for the Alamo, Bear Springs, Bland, and Del Norte allotments pointed out that cheatgrass and downy brome have grown substantial populations in the lower elevations of some of these allotments, specifically along the lower elevations of FR 289. Similarly, there are currently no plans for treating these invasive populations.

A Record of Decision for the Environmental Impact Statement to analyze the effects of invasive plant control treatments throughout the Santa Fe National Forest was made available in September 2005 and was successfully appealed. As a result of the appeal, the decision was remanded and the Forest is currently undergoing additional analysis in order to issue a new decision. A decision affirming the Record of Decision would provide the authority required to use one or more noxious weed treatments to control identified noxious weed populations within the propose project area.

Fish and Wildlife. Fish and wildlife management activities may affect the status or trend in the populations of one or more species. One reasonably foreseeable fish management activity

relevant to the analysis of the proposed alternative is the planned reintroduction of Rio Grande cutthroat trout to a seven-mile length of Capulin Creek within the Alamo Allotment. The reintroduction would take place from Capulin Canyon to the Bandelier National Monument. The planned reintroduction is expected to begin with the release of Rio Grande cutthroat trout in spring 2006. A monitoring program will be implemented to monitor reintroduction success and to determine if other native species should be added as well.

Vegetation Treatment. The Cochiti Wildland Urban Interface (WUI) Fuels Reduction project, located adjacent to the community of Vallecitos, is a 771-acre mechanical thinning project planned for implementation in 2006. This project is designed to protect the community of Vallecitos from the risk of high-intensity crown fire that could come from the south or southwest. The project will include 158 acres of ladder fuel reduction, 356 acres of thinning small-diameter trees, and 257 acres of land treated to act as a fuelbreak.

Timber Management. Timber management effects the environment by changing the successional stage of the forest ecosystem to a more open and younger stage. Effects usually include increased forage production, modification of wildlife habitat to favor more disturbance-dependent species, improved vigor and health of non-harvested trees, and fuels reduction. Water quality is also often affected by an increase in runoff from storm events, which can contribute to sedimentation of nearby waterways.

The project area has regularly been managed for timber production over the past 30 years. Most of the harvests on record from this area were concentrated in the late 1970s through the mid-1980s. They are located throughout the project area, with actual harvest occurring primarily on the mesa tops. The most recently recorded timber sale from the project area was the Dome timber sale, which included both fuels thinning and timber harvest in approximately 2,000 acres of ponderosa pine forest. This sale ended in 1994. Project information retrieved from available records is listed below:

Table 10. Timber Sales in the Proposed Project Area*

Timber Sale Name	Year	Location	Size*	Harvest Information
Silva	1975 – 1977	T18N, R5E	570 acres	2,990 MBF 58% - PP 36% - DF 6% - TF
Graduation	1977 – 1979	T.18N R.5E Sec. 5,6,7,8,17,18	700 acres	3,060 MBF 42% - DF 36% PP 20% - TF 2% - Blue Spruce (BS)
Rabbit	1977 – 1980	T18N, R5E Sec. 6,7,18 T18N, R4E Sec. 1	505 acres	Data not available
Borrego[†]	1977-1978	T16N R3E T16N R4E T17N R3E T17N R4E	Approximately 4,000 acres	Data not available
Cochiti	1979	T18N, R5E Sec. 6,7 T18N, R4E Sec.	800 acres	Data not available

		1,12,13		
Mesa (includes fuelbreak from pines to Cerro Balitas)	1981 – 1984	T18N, R5E Sec. 19,20,29,30,32,33 T18N, R4E Sec. 13, 24 T17N, R5E 4,5 (along Cochiti Mesa)	2,470 acres	4,930 MBF 65% - PP 24% - DF 11% - TF
Sawyer	1982 – 1985	T18N, R5E Sec. 4,5,9 (On Sawyer Mesa, bordered by Bandelier National Monument on east and Alamo Canyon on west)	470 acres	2,150 MBF 49% - PP 33% - DF 18% - TF
Alamo	1984 – 1987	T.18N R.5E, Sec. 5,6,8,9,15,16	500 acres	3,200 MBF 56% – PP 28% – DF 16% - TF
Los Utes	1988 – 1991	T18N, R5E Sec. 15-17,21,22	869 acres	4,205 MBF 65% - PP (14.6-inch average DBH) 22% - TF 13% - DF
Dome	1991 – 1994	T18N, R5E	2,000 acres	Included thinning and timber harvest 650 MBF 100% - PP 16-inch average DBH

* Acreages are based on timber sale boundaries, not acreages that received timber harvest. All sizes are approximations

† Pers. Comm., Ron Herrera, October 5, 2005

MBF = Thousand Board Feet (4 MBF approximately equals 1 cord)

PP = Ponderosa Pine

DF = Douglas Fir

TF = True Fir (also called white fir)

BS = Blue Spruce

DBH = Diameter at Breast Height

Wildfire and Prescribed Burns – Fire plays many roles in the ecology of southwest forestlands. It affects the environment by changing the forest structure through killing both large and small trees and incinerating downed woody debris and litter. Fire is also a key part of nutrient cycling in the forest by returning nitrogen to the soil and carbon to the atmosphere. It also affects water flow and can have significant short-term and identifiable long-term consequences on water quality.

The proposed project area includes primarily ponderosa pine and mixed conifer forests, which before the 20th century are thought to have experienced low-intensity fire in return intervals ranging from approximately 2 to 25 years across the Jemez Mountains. These fires often occurred over extensive areas (e.g. watershed-wide) and in some years may have included most of the Jemez Mountains (Allen, 2002).

With the onset of fire suppression activities and intense grazing beginning in the late 19th century, the number and type of wildfires have changed. Prevention of wildfires throughout the early and mid 20th century has driven large-scale vegetation change in the Jemez Mountains, including increased density of woody species and fuel loadings, changes in species composition and

structure in mixed conifer forests, and invasion of grasslands and meadows by trees and shrubs (Allen, 2002). Due to these changes, fire behavior is now more commonly expressed through unnatural stand-replacing conflagrations instead of large-scale, long-burning, and low-intensity wildfires.

About 5,200 historic fires have been mapped in the Jemez Mountains between 1909 – 1996 according to available records (Allen 2002). The proposed project area, within the Jemez Mountains, has experienced several fires throughout the past few decades. For purposes of analysis these fire events have been divided into the following categories: Prescribed burns, large fires (above 500 acres), medium fires (50 to 500 acres), and small fires (1 to 50 acres). The following table includes data on recent wildfires taken from available Santa Fe National Forest Geographic Information System (GIS) information:

Table 11. Recent Wildfires and Prescribed Burns Recorded within the Project Area

Incident	Date	Area	Size (acres)
Prescribed burns			
Oaks and West Mesa Wildlife Habitat Enhancement Project	Planned for implementation in spring or fall of 2006	Mesa tops of Oaks and West mesas – Includes the southwest portion of Bland allotment (Colle Canyon pasture)	1,800 acres
San Juan Burn	There have been no recent prescribed burns in the project area. The nearest prescribed fire was the 7,200-acre San Juan burn. It was located approximately five miles west of the project area on San Juan Mesa.		
Large Wildfires			
La Mesa	1977	Dome wilderness and mostly on Bandelier National Monument	17,000 acres
Dome	1996	Dome wilderness	10,000 acres
Medium Wildfires			
Unknown name	1970	Bland allotment	<100 acres
Unknown name	1974	Del Norte allotment	<100 acres
Unknown name	1974	Bear Springs	400 acres
Unknown name	1987	Bland allotment	<100 acres
Unknown name	1991	Alamo allotment	<100 acres
Unknown name	1992	Bear Springs	<100 acres
Unknown name	1996	Bland allotment	<100 acres
Unknown name	1998	Alamo allotment	<100 acres
Unknown name	2000	Bland allotment	<100 acres
Cochiti Fire	2003	Bland Canyon	150 acres
Small Wildfires			
Various	Annually	Project-area	There are approximately 6 to 10 small fires a year that are between 1/10 to 50 acres in size. Most are lightning caused, but some are human caused. For example, in 2005 there were 3 arson fires along FR 289.

Recreation. Recreational activities in the project area include hiking, camping, rock climbing, hunting, bird watching, and vehicle use on unsurfaced roads. Impacts from these activities are short-term and primarily consist of minor ground disturbance in popular camping areas and from Off-Highway Vehicle (OHV) use.

The project area encompasses a portion of the Jemez Ranger District which receives relatively light recreational use compared to other portions of the district. There are no developed campgrounds or day use areas in the area; only occasional dispersed camping. There are a few Forest Service hiking trails (described below). There is also what appears to be a fairly extensive network of motorcycle trails; however, these are not sanctioned or maintained by the Forest Service. Special use activity is light, characterized by some outfitter-guide camps and recreation based group camping. There have been two requests for special use permits to authorize road use and road improvements in the last two years; however, neither of these was granted.

Recreational activities in the project area can be categorized into three distinct activities: OHV use, hiking and climbing, and group activities that require special use permits. Table 12 below discusses past, present, and reasonably foreseeable recreation activities that have been identified in the proposed project area.

Table 12. Recreational Activities in the Project Area

Action(s)	Date of Action	Area	Comments
Motorcycle Use	1989 - present	Throughout project area	A map provided by the Black Feather Motorcycle group (dated 1989, but received in 2002 as current information), shows user created trails in parts of Silva, Spruce, Bland, Alamo and Sanchez Canyons. Motorcycle tracks were observed during the 2005 field season in Medio Dia, Pines, Spruce and Silva canyons. These trails tend to be one track, show moderate use with a few areas of deeper ruts in wet areas
Hiking	Ongoing	Throughout project area	Four Forest Service hiking trails are within the project boundaries. These include trail 113 in Alamo, trails 118 (St. Peters Dome) and 116 (Turkey Springs) which both traverse the Dome Wilderness, and trail 424 (Medio Dia) through the lower 4 miles of Medio Dia Canyon. Hiking trails in this area receive very light recreational use compared to other areas on the district.
Hiking	Foreseeable future	Northwest portion of Bandelier National Monument	It is expected that the Bandelier National Monument will open up new hiking trails in the northwest portion of the Monument. This area includes the upper portions of the watersheds which encompass the proposed project area.
Rock Climbing	Ongoing	Cochiti	The vertical cliffs that occur in the north

Action(s)	Date of Action	Area	Comments
		Canyon	edge of Cochiti Canyon provide a popular rock climbing area that attracts small weekend groups. There is no information on how regularly climbing activities take place in this area.
Special Uses	Ongoing	Graduation Flats – Northwest portion of Alamo allotment	Special use permits authorizing camping for large groups or outfitter guides for periods of up to one week are issued on an annual basis in this area.

There have been no recent substantial past actions such as trail construction or campground development within the project area. There are no ground-disturbing, recreation-based projects planned for this area in the foreseeable future. A discussion of existing recreation use of the proposed project area is included in the Affected Environment discussion in section 3.8 Recreation and Scenery of this Environmental Assessment.

Minerals Management. Portions of the proposed project area included intensive hard rock and ore mining in the late 19th century. Most mining in the project area was historically conducted in the Cochiti Mining District, which is located in private and Forest Service lands centered in the northern portion of the Bland allotment. Between 1889 and 1902, gold and silver mining was common in this area. Much of the ore was milled using early cyanide processes. Most of the mills, and their associated waste rock, are located on patented claims, not Forest System lands.

The historical literature notes extensive mineral activity has taken place between the Peralta Canyon and Medio Dia Canyon drainages. In addition to several patented mine parcels, turn-of-the-century maps note more than 100 mining claims, "mines" and prospects within this area. It is thought the majority of these historical mine sites are minor in extent and contain minimal waste dumps and associated shafts, adits and other mine features.

In addition to the precious metals mines, there are several sites where pumice, sand and gravel, and rock have been removed from within these allotments. For example, a reclaimed pumice mine has been identified on the southeastern portion of the Alamo allotment. There are no active rock mines at the current time.

The Forest is currently undergoing an assessment process to determine which mines need to be closed and under which authorities they can be closed and reclaimed. A mine shaft in Bland Canyon was sealed in the fall of 2004 to prevent physical hazard and trash dumping. A separate survey is currently being completed to confirm land ownership boundaries in areas such as the Cochiti Mining District, which has intermingled public and private lands.

Development of Inholdings. There are three areas of concentrated private inholdings that include several structures. They occur in the Bland, Del Norte, and the southwest portion of Alamo allotments. These areas include small communities whose growth is limited by surrounding public ownership. For example, the Community of Cochiti, located in the northern portion of the Del Norte Allotment, includes approximately 50 privately owned homes completely surrounded by Forest Service Lands.

These areas primarily include vacation homes, though there are some areas such as the Bland Allotment that have one or two year round residences. They have experienced occasional

development of new structures within the last several decades; however, this development has been sparse and limited by the surrounding public ownership and lack of accessibility.

Change of Ownership. The eastern portion of the Bear Springs allotment is currently in the process of being transferred out of public ownership to tribal ownership. This process is expected to be finalized in 2006. There is no information to suggest that the land transfer would result in changes to land management activities.

Roads. Roads in the forest can enhance recreational access and access for grazing permittees and private property landowners. Creation of new roads, however, can add to fragmentation of the landscape, and can result in runoff and eventual sedimentation of nearby waterways.

According to table 13 there is currently 335.2 miles of existing road in the proposed project area, resulting in approximately 5.0 miles of road per every square mile of area in the forest. Existing road length and road density information is included in the table below.

Table 13. Roads within the Project Area

Allotment	Area (sq. miles)	Miles of Road (miles)	Road Density (miles/sq. mi)
Alamo	35.1	132.6	3.8
Bear Springs	11.9	94.3	7.9
Bland	13.8	26.8	1.9
Del Norte	12.3	81.5	6.6
Total	73.1	335.2	5.0 (average)

No new roads have been built in the past decade in the proposed project area. However, there has been some recent road maintenance and repair, ongoing road use, and expected changes to road access.

Approximately seven miles of FR 289 (Dome Road), on the west side of the Alamo Allotment, has experienced occasional 'wash-outs' from storm events and increased sedimentation and water flow resulting from the Dome Fire. Minor road repairs occurred in 2000 after storm events and some erosion from the road may continue from ongoing minor maintenance and/or use that occurs under special use permit

Request for road easements and road maintenance permits are occasionally approved for private parcels in Del Norte Canyon and the upper end of the Community of Pines. The Forest Service is required to permit access to private lands provided there is not an alternate route available. Presently the road easements are minimal in this area and not a large part of the special use program.

FR 268D will be gated and closed for administrative use pending the completion of Oaks and West Mesa Wildlife Habitat Enhancement project. This road currently receives little use for access purposes, and may be occasionally used for OHV riding.

There are no new roads or major road maintenance projects planned for in the foreseeable future (pers. comm., Leyba 2005).

3.2 SOIL

3.2.1 Affected Environment

The four allotments are located south of the southern edge of the Valles Caldera. The predominant geologic landform in the area is Bandelier Tuff which consists of poorly welded tuff and pumice beds formed by aerial deposition during the volcanic activity of the Valles Caldera about 1.2 million years ago. Over many thousands of years this landscape has been dissected by water flowing south and east into the Rio Grande floodplain, resulting in a series of flat mesa tops separated by steep canyon walls. Some of the soils have a high erosion risk due to the nature of the parent material, the slope position and the depth and structure of the organic layer. Landforms within the area are not typical of those where mass movement is a dominant geomorphic process. Data from the Terrestrial Ecosystem Survey of the Santa Fe National Forest (USDA-FS, 1993) was used to determine soil condition. Soil condition is normally evaluated by examining properties that reflect past and present soil function. The physical condition of surface soil, a zone of maximum biological activity, has an essential role in nutrient recycling, vegetative productivity and diversity, water storage and movement, and geomorphic stability.

A *satisfactory* soil condition rating indicates past and current management have allowed soil to function properly and retain its inherent productivity. An *impaired* soil condition rating indicates past and/or current conditions or management activities have reduced the soil’s ability to function properly to support all biological processes. Impaired soils have an annual soil loss in excess of tolerance (equivalent to the depth of soil generated on an annual basis) but less than potential (the loss predicted to occur following a high-intensity wildfire). Causes of accelerated erosion can include disturbance of vegetative cover or surface soil by humans (such as with road use and maintenance), disturbance by livestock or wildlife, and low to moderate severity wildfires. An impaired rating can also be based on geologic conditions, such as steep slopes that naturally result in poor soil formation and conditions conducive to erosion.

An *unsatisfactory* soil condition rating can indicate that management activities have resulted in a loss of soil function. Generally, these areas have degraded so far that they are not likely to recover in a timely manner, even if rested from use without substantial restoration measures. An unsatisfactory rating can also be based on geologic conditions, such as steep slopes that naturally result in poor soil formation and conditions conducive to erosion. Soil condition ratings for the four allotments are presented in table 14.

Table 14. Soil Condition Ratings (all numbers in acres)

	Alamo	Bear Springs	Bland	Del Norte
Satisfactory	10,339	5,592	4,430	6,292
Impaired	12,137	2,044	4,378	1,612
Unsatisfactory	0	0	0	0

About 57 percent of the soils are designated in satisfactory condition; 43 percent are considered impaired, and none are considered unsatisfactory. There are twenty-seven Terrestrial Ecosystem Survey (TES) map units within the project area. Based on these TES map units, soil loss rates in the project area indicate fairly stable soils, with acceptable movement rates that are well below tolerance levels for these soil types. TES map units 187, 506, 623, and 649; however, are listed as impaired, indicating soil loss is exceeding tolerance levels. A review of the location of units 623 and 649 indicate this rating can be primarily attributed to geologic conditions, the main factor being steep slopes that naturally result in poor soil formation and conditions conducive to erosion.

These TES units are generally not accessible to livestock for grazing, although some trailing does occur in these areas. Although minimal, some of the trails have some erosion that is occurring, but these areas are usually less than $\frac{1}{4}$ acre in size, and only three of these sites have been identified within the analysis area (Personal observation, Derek Padilla and Sean Ferrell, 2005). There is a small percentage (four percent of total for all allotments) of impaired soils within TES units 187 and 506 that are accessible to livestock on the Bear Springs allotment in which the landform is not the cause of impairment. Management activities over the past 100 years in this area (fire suppression and historic grazing) have altered the tree species make-up, density, and distribution. Past records indicate that continual trespass from other allotments as well as from livestock owned by the permittee at the time exacerbated these conditions. These conditions led to an increase in piñon pine and various species of juniper trees (P/J). This increase in P/J densities has led to a reduction in herbaceous ground cover that has contributed to impairment of soil properties.

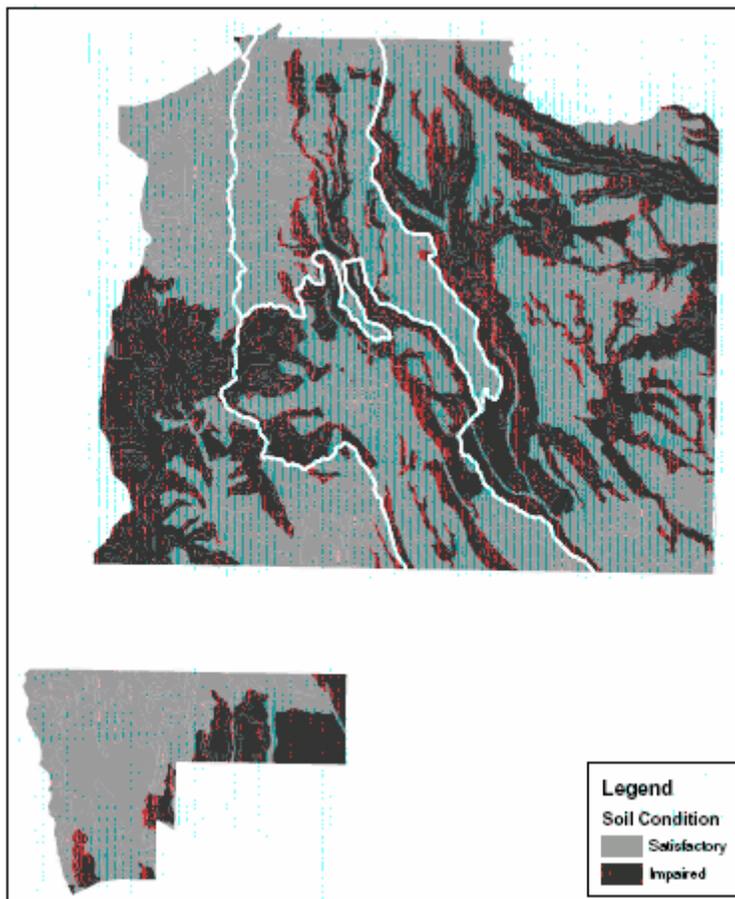


Figure 6. Soil condition ratings in the project area

In the mid 1970's fencing was put in place, additional water sources were developed, and a new permittee began managing the allotment in coordination with the Forest Service. This led to improved management which continued until 1999 at which time the permit was transferred to the Santo Domingo Pueblo. Since 1999 the permit has been in non-use.

Current grazing practices do not appear to be exacerbating the soils conditions within this allotment. As with all areas, road development (past and present) have also contributed to soil impairment within the analysis area. Many roads have been closed to the general public, but with the increase in all terrain vehicle use, previously closed roads have been re-opened and new, user

created roads have been established. An analysis of road density is located in section 3.1 of this report. Additional analysis including use patterns, access need, etc. is planned to be completed in the near future and will be used as a basis to address issues related to the road system.

3.2.2 Environmental Consequences

No Grazing (Alternative 1) – this alternative would have the least effect on soil within the four allotments because eventually (as permits expire) no cattle would be permitted in the area. Overall, however, there would be little change in soil condition because water developments would likely be retained and used by wildlife so there would continue to be limited localized disturbance to soil in the vicinity of the water sources. Additionally, the corrals would likely be retained for limited hunting use and as such, there would continue to be similar localized soil disturbance in these areas as well.

Cumulative Effects. There would still be effects to soil condition due to the 1996 Dome Fire. Although the area is re-vegetating, there are areas where vegetation has been slow to re-grow in which some soil loss is still occurring. As time goes on, it can be expected that these areas will eventually re-vegetate leading to improved soil conditions.

Other wildfire activity of the past is estimated to have less of an effect. The effects from the La Mesa Fire are no longer affecting the area due to the amount of time that has passed since this event. There have been several small wildfires that in the short term affected soil conditions but have since healed and are no longer significantly affecting soil conditions.

Many livestock trails would still be used by trail motorcycles that would cause erosion in localized areas, many near steep slopes. Until an OHV management plan is developed, the current situation can be expected to continue.

Timber management in the area does not appear to be adding to effects to soil condition at this time. Many years have passed since the last timber sale in the area (Dome Timber Sale in 2000) and the effects associated with them are mostly negligible.

Vegetative treatments proposed for the future may negatively impact soil resources in the short term, but the increased herbaceous vegetation that can be expected will improve overall soil conditions since dense overstory is one of the reasons for the impairment of soil conditions. Cessation of livestock grazing would allow this improvement to occur at a faster rate due to no vegetation being removed.

The road system would also continue to add to soil impairment until a road management plan is developed which could lead to the closure of some roads which would lead to improvement in soil condition.

Currently, mining does not appear to be having a significant impact on soil resources and since no future mines are anticipated, effects would not be expected to change from the current condition.

Impacts associated with trail motorcycles, hikers, and other recreation would continue to remain at current levels. It is not expected that changes in land ownership would affect soil conditions because it is not anticipated that land use will change.

Current Management (Alternative 2) – under this alternative, impacts to soils would continue to remain the same. Under current management, livestock are having a minimal impact on soil

condition. Past monitoring indicates that there are areas that are utilized at rates higher than desired that could eventually lead to loss of vegetative ground cover if allowed to continue, but at present time this is not occurring to the extent that it is significant.

Soil compaction resulting from cattle grazing can occur in localized areas surrounding spring developments, within corrals, and where cattle tend to trail. Under the Current Management alternative, these localized effects would occur at existing developments. Three spring developments are located on the Alamo, two on Bear Springs, three on Del Norte and no spring developments are located on the Bland Allotment. On those allotments with spring developments, some soil compaction would be expected to occur in a small area (less than 1/10 acre) surrounding the drinker/trough and around the springs that are not fenced.

Similar effects would be expected in the vicinity (less than an acre) of earth water tanks. There are seven existing earth tanks on the Alamo, four on the Bear Springs, two on the Del Norte and no earthen tanks on Bland Allotment. Water is available on the Bland Allotment through the perennial streams and undeveloped springs that occur throughout the allotment. There are isolated areas of compaction along various reaches along the streams.

Compaction also occurs in the vicinity of and within the corrals (encompassing about ¼ acre around a corral). One corral is located on the Alamo Allotment, four are located on Bear Springs, one is located on Bland, and none are present on the Del Norte Allotment. Compaction in these areas is limited because cattle are only in the vicinity of the corrals for a couple of days in June and a couple of days in October as well as incidental use in cases where a sick or injured cow may be treated. Generally, between the use in June and October, vegetation (consisting of perennial forbs and grasses) grows back in the area surrounding the corrals. On occasion, hunters will use the corrals during hunting season.

Overall, considering the existing corrals and water sources, soil compaction caused by cattle grazing would affect less than 0.1 percent of the soils in these allotments. Jones (2000) states in her quantitative review of effects of cattle grazing on North American arid ecosystems that in all cases livestock seemed to have detrimental impacts to soil conditions, but goes on to say that the analysis did not take into account details of individual studies, such as stocking rates, intensity, etc. This is problematic because some range management textbooks give sound evidence of systems that are applicable in areas similar to the analysis area. Holechek et al. (1989) is given as an example and is the being used to establish guidelines for grazing within this analysis area. Holechek states grazing standards should be set at the conservative use level, 30 to 40 percent use of the current year's growth (Holechek et al. 2000, pp. 11-14.). Holechek et al. state "a stocking rate at 90% of the carrying capacity, with some adjustment in drought periods, will provide relatively high sustained ranch income and maintain or improve range condition (Holechek et al. 1989, pg. 203).

One of the components of range condition is soil condition, so adherence to his recommendations should maintain or improve soil conditions. Based on the estimated forage production, we are within the recommendations of Holechek et al.

Cumulative Effects. As discussed in the affected environment, with the exception a few localized areas on the four allotments, soil resources are not being negatively impacted by livestock grazing.

Vegetative treatments would be expected to improve soil conditions by removing dense overstory promoting the growth of herbaceous vegetation which is key in retaining soil. Vegetative treatments would also lead to greater distribution of livestock due to opening up previously dense areas that may have been inaccessible to livestock either because of being physically unavailable,

or due to not having a herbaceous component. This would further add to the improvement of soil conditions.

Recreation use, hiking, trail motorcycles etc. are cumulatively impacting soils resources in localized areas. Many of the trails currently used by recreationists were created by livestock, but as discussed in the affected environment section there are only a few areas of concern, mostly associated with the use of the same trails by livestock and trail motorcycles. Until an analysis of OHV use and our transportation system is completed this issue will continue to impact soil resources, but to reiterate, currently this issue isn't impacting soil resources to the extent that it is considered of concern. Livestock do utilize old logging roads, closed roads, existing roads, etc., and add to the impacts to soil resources. Analysis of the transportation system is scheduled to be completed in the near future that should address this issue and alleviate impacts to soil resources by identifying roads and trails to be closed and rehabilitated.

Mining impacts are not currently impacting soils resources, so there are no cumulative impacts in regards to livestock grazing.

Proposed Action (Alternative 3) – As described in Alternative 2 the same recommendations from Holechek et al. would apply to this alternative as well. The effects of this alternative would be the same as Alternative 2 for Bear Springs and Bland Canyon allotments, as no improvement or changes in management are being proposed (except for the re-building of a burned corral in the Bland Allotment).

Slight improvement in soil conditions would be expected on the Alamo and Del Norte in those key areas that are not consistently meeting established guidelines. This predicted improvement is due to the installation of the proposed improvements. Two spring developments and one cattleguard are proposed for the Alamo Allotment. One earthen tank is proposed for the Del Norte Allotment. Installation of these proposed improvements will provide for better distribution of livestock which would lead to all key areas meeting established guidelines. The improved distribution gained by the installation of these improvements will exceed the impacts to soil condition created by their development.

Impacts to soil conditions surrounding the proposed improvements would be similar to those describe under Alternative 2.

Cumulative Effects. Cumulative effects for Proposed Action (Alternative 3) are largely the same as in Alternative 2.

3.3 WATERSHED AND RIPARIAN AREAS

3.3.1 Affected Environment

The four allotments are within two 4th code watersheds: Jemez (HUC 13020202) and Rio Grande – Santa Fe (HUC 13020201). These then separate out into four different 5th code watersheds: Borrego Canyon – Rio Grande (HUC 1302020107), Frijoles Canyon – Rio Grande (HUC 1302020101), Rio Grande – Cochiti Reservoir (HUC 1302020102), and Upper Jemez River (HUC 1302020202).

Table 15. Watersheds within the Project Area

Allotment	4 th Code Watershed	5 th Code Watershed	Acreage within 5 th Code Watershed
Alamo	Rio Grande – Santa Fe	Frijoles Canyon – Rio Grande	3,523
		Rio Grande – Cochiti Reservoir	18,953
Bear Springs	Rio Grande – Santa Fe	Borrego Canyon – Rio Grande	7,636
Del Norte	Rio Grande – Santa Fe Jemez	Borrego Canyon – Rio Grande	30
		Rio Grande – Cochiti Reservoir	7,663
		Upper Jemez River	210
Bland	Rio Grande – Santa Fe	Rio Grande – Cochiti Reservoir	4,340
		Borrego Canyon – Rio Grande	4,467

Numerous ephemeral and intermittent drainages run throughout the allotments. Many of these are important collection sources for groundwater sources and the perennial streams present in all four allotments. Many of the intermittent drainages become the perennial streams downstream and the exact start point of the perennial reaches will vary from season to season.

Table 16. Perennial Stream Miles per Allotment

Allotment	Perennial stream miles*
Alamo	36
Bear Springs	3
Del Norte	5
Bland	17

*According to the SFNF GIS database.

Riparian Vegetation. Riparian vegetation stabilizes stream banks and reduces erosion. Stream bank vegetation can improve water quality by filtering sediment and capturing excess nutrients in runoff from upland regions. Stream bank vegetation provides shelter for birds and small animals. Overhanging vegetation cools streams for fish and provides debris and organic matter for insects to feed. The maintenance of streambank structure and function is a key item in riparian-stream habitats from both fisheries and hydrologic standpoints (Bohn 1986, Platts 1983). Vegetation plays a principal role not only in the erosional stability of streambanks, but also in the rebuilding of degraded streambanks. These sediments form the physical basis for new bank structure (Elmore and Beschta 1987).

According to the Santa Fe National Forest’s GIS database, three of the four allotments support riparian vegetation. Riparian areas identified by using the Santa Fe National Forest’s Terrestrial Ecosystem Survey to locate complexes of community types and/or subseries communities that

meet the definition of riparian area, specifically an area with a perennial or intermittent stream, hydrophytic plants, and hydric soil.

Table 17. Acreage of Riparian Vegetation per Allotment

Allotment	Acres of riparian vegetation*
Alamo	270
Bear Springs	0
Del Norte	170
Bland	150

*According to the SFNF GIS database.

In the Alamo Allotment there is a concentration of riparian vegetation at the north-western edge in Pine and Spruce canyons. Down at the south-western boundary there’s another large grouping of riparian vegetation in Medio Dia and Cochiti canyons.

Most of the riparian vegetation in the Bland Allotment is located in two main concentrations within Bland Canyon – one at the north end of the canyon and another that starts at the center and extends all the way to the southern end.

The majority of the Del Norte Allotment’s riparian vegetation is dispersed in the north-to-south trending intermittent drainages that ultimately drain into Medio Dia Canyon. Medio Dia Canyon starts in the Del Norte allotment, but winds its way through the Bland and Alamo allotments.

The Bear Springs Allotment is the allotment that does not map out with riparian vegetation. It is likely that dispersed pockets of riparian plants do occur within this allotment, especially within Bear Springs Canyon, but they are probably very isolated and are very limited by their surrounding soils.

Water Quality. Little water quality data exists for the natural water sources in this allotment. Four of the streams, Alamo Canyon, Capulin Creek, Medio Creek, and Sanchez Canyon, within the Alamo Allotment are listed on the 2004 State of New Mexico Integrated Clean Water Act §303(d)/§305(b) Report, which defines designated uses and prescribes water quality levels according to those designated uses. None of the designated uses for Alamo Canyon and Sanchez Canyon have been assessed. For Medio Creek the domestic water supply, high quality coldwater fishery, industrial water supply, irrigation, municipal water supply and wildlife habitat designated uses were all found to be fully supported. Livestock watering, primary contact and secondary contact were not assessed for Medio Creek.

In Capulin Canyon livestock watering, primary contact and secondary contact were not assessed. The designated uses of domestic water supply, industrial water supply, irrigation, municipal water supply, and wildlife habitat were all found to be fully supported. The designated use of high quality coldwater fishery was found to be not supported. The probable causes of impairment for the designated use of high quality coldwater fishery are listed as “benthic-macroinvertebrate bioassessments and sedimentation/siltation” with the probable source of impairment being “watershed runoff following forest fire.” The forest fire in question would be the 1996 Dome Fire.

Bacterial contamination of drinking and surface water by domestic livestock can be a significant non-point source of water pollution (George 1996). Although usually not considered pathogenic,

fecal coliform such as *Escherichia coli* (E. coli), and enterococci bacteria are regularly monitored in surface waters because they are indicators of fecal contamination that may include pathogenic organisms such as *Cryptosporidium*, *Giardia*, *Salmonella*, *Shigella* and enteric viruses (Bohn and Buckhouse 1985, George 1996).

A fecal coliform sample taken on July 5, 2005 from Capulin Creek at the Santa Fe National Forest and Bandelier National Monument boundary came back non-detectable. At the time of sample, the New Mexico Water Quality Standards (New Mexico Environment Department, 2005) for the area (“Rio Grande Basin – Perennial tributaries to the Rio Grande in Bandelier National Monument and their headwaters in Sandoval county, all perennial reaches of tributaries to the Rio Grande in Santa Fe county unless included in other segments.”) was, “The monthly geometric mean of fecal coliform bacteria shall not exceed 100/100 mL; no single sample shall exceed 200/100 mL.” Since this time, the standards for the project area (as amended through July 17, 2005) have changed to read, “The monthly geometric mean of E. coli bacteria 126 cfu/100 mL or less; single sample 235 cfu/100 mL or less.”

A follow-up E. coli sample was taken on October 27, 2005 from the same location in Capulin Creek. The sample was analyzed by the Department of Health of the State of New Mexico to show an E. coli count of 6.3/100 mL. This is well below the state threshold of 100/100 mL.

The New Mexico Environment Department, Department of Energy Oversight Bureau, in conjunction with Los Alamos National Laboratory’s Earth and Environmental Sciences Division has data collected on May 26, 2004 from springs in Alamo and Spruce Canyons (Yanicak 2005). These data were collected as part of a project to determine background-level perchlorate in local groundwater, which is of little help when understanding the effects of cattle grazing on local water sources.

However, a few of the variables tested in this data set can be indirectly applied to the current management cattle grazing in the project area. The pH value measured for the spring in Alamo Canyon was 7.44. The spring in Spruce Canyon had a pH value of 6.95. Both values are well within the range allowed in New Mexico’s water quality standards.

Another surface water quality concern is that nutrients found in animal wastes stimulate algal and aquatic plant growth when they are deposited directly or washed into streams. If resulting plant growth is moderate, it may provide a food base for the aquatic community. If excessive, these nutrients stimulate algal blooms. Subsequent decomposition of the algae leads to low dissolved oxygen concentrations and changes in pH levels (U.S. EPA 1995), which endangers aquatic organisms and fish. Normal levels of stream pH also vary depending on the mineral inputs into the system. Water with an acidic pH can be detrimental to many aquatic organisms, especially affecting invertebrates and embryonic development in fish. Most aquatic organisms require a pH range between 5.6 and 8.5. A range of 6.6 to 8.8 is allowed for pH in the New Mexico Water Quality Standards for the project area.

The state standards for plant nutrients fall under their “General Standards” category. They read as such, “Plant nutrients from other than natural causes shall not be present in concentrations which will produce undesirable aquatic life or result in a dominance of nuisance species in surface waters of the state.” The state is currently working on developing reference reaches in order to develop quantitative plant nutrient standards (Schiffmiller 2005).

Nitrate concentrations were found to be 0.20 and 0.00 mg/L in the springs of Alamo Canyon and Spruce Canyon, respectively. Phosphate concentrations were 0.08 and <0.01 mg/L in the springs

of Alamo Canyon and Spruce Canyon, respectively. All of these nutrient values are extremely low and would likely meet the state's qualitative standards for plant nutrients.

The state standards for temperature in the project area is 20°C (68°F) or below. Water temperature is closely tied in to many biological and chemical processes in an aquatic system. It affects dissolved oxygen levels, rates of plant photosynthesis, the metabolic rates of aquatic organisms, and reproduction and migration of species. Poorly managed cattle grazing can affect stream temperature by removing riparian vegetation and by trampling undercut banks both of which provide shade and cover. The temperatures measured for the springs in Alamo and Spruce canyons were 6.8°C and 6.5°C, respectively. Though one-time measurements are not used to assess standard compliance, these values are well below the standard of 20°C or below called for the area in New Mexico's Water Quality Standards.

3.3.2 Environmental Consequences

Environmental consequences of each action (no grazing, current management, and the proposed action) will be discussed to disclose expected impacts to streambanks, streamside vegetation, and the expected runoff and sedimentation that may result.

No Grazing (Alternative 1)

This alternative would result in the most beneficial effects to riparian areas and stream morphology because there would be no cattle grazing in any of the streams or riparian areas at any time. As a result, grazing would not contribute to effects in riparian areas and a slow upward trend in riparian area recovery would be expected.

Cumulative Effects. With the No Grazing alternative there would still be effects on the water resources within the four allotments; however, cattle grazing would not contribute to these ongoing effects since there would be no grazing once existing permits expired.

Current Management (Alternative 2)

Alamo Allotment – If the current action was maintained there would still be limited watering opportunities for cattle, thus keeping them concentrated in certain areas and limiting distribution. The limited watering opportunities concentrate the cattle on the parts of the perennial streams that they have ready access to. Alamo, Capulin, Spruce, Silva, Pines and Cochiti canyons' riparian areas are all in good shape due to inaccessibility to livestock. The conditions in Capulin Canyon are indicative of how the majority of the canyons on the east side of this allotment are handling the current management. "It is possible nutrients and sediments caused by grazing are delivered to the downstream perennial reaches during snowmelt and monsoon events. Influence is likely minimal primarily due to dynamic stream habitat and excellent riparian conditions which currently indicate an even distribution of fines while maintaining deep pools. In essence, Capulin Canyon is able to handle the current load of sediments it is receiving under the current management (Ferrell 2005b)." From the limited water quality data from the springs in Alamo and Spruce canyons, one can draw the conclusion that the current management is not degrading water quality in these areas. The pH and temperature values are within the quantitative standards outlined by the state and the nutrient values represent the qualitative standards also detailed by the state.

Bland Allotment – If the current action was maintained there would be minimal effect to water resources due to cattle. The low numbers of cattle in this allotment and the ability to move them to and/or alternate them between the two canyons, Bland and Colle, helps reduce impact on the streams and riparian areas.

Bear Springs Allotment - Low numbers of cattle on a rotational basis and the existing water developments help encourage even distribution and reduce the impact on the intermittent streams.

Del Norte Allotment – There would be a continued downward trend in water and riparian resources in this allotment due to the trespass cattle issues currently experienced. The cattle would also be limited to existing water developments which have not been enough to encourage even distribution.

Cumulative Effects. Bland Canyon would still see some effects from the dispersed camping that takes place there. It is expected that dispersed camping in this area will continue to have minor effects to water quality.

The canyons on the east side of the Alamo Allotment would still be recovering from the effects of the 1996 Dome Fire. “Impacts to Sanchez Canyon appear to be related to its slow recovery in severely burned areas related to the Dome Fire. In these areas, vegetation is slow to recolonize, allowing sediments to naturally deliver into Sanchez Canyon. In addition, stream temperatures may be elevated due to the lack of riparian vegetation; again, associated with effects from the Dome Fire (Ferrell 2005b).” Sanchez, Alamo, Capulin, and Medio canyons are still susceptible to large storm events that can move large substrate and large woody debris due to the unstable conditions created by the Dome Fire. These conditions are improving with time as the riparian vegetation continues to mature toward fully functioning condition.

There have been multiple small to medium fires and timber sales in the project area over the past few decades. Some of these have likely contributed to sediment to the streams affecting water quality. The vast majority of these; however, were over a decade ago and have likely stopped contributing sediment to the streams above natural conditions.

Proposed Action (Alternative 3)

Alamo Allotment – Alamo, Capulin, Spruce, Silva, Pines and Cochiti canyons’ riparian areas are all in good shape and allow for little accessibility to livestock. The conditions in Capulin Canyon are indicative of how the majority of the canyons on the east side of this allotment are handling the current management. “It is possible nutrients and sediments caused by grazing are delivered to the downstream perennial reaches during snowmelt and monsoon events. Influence is likely minimal primarily due to dynamic stream habitat and excellent riparian conditions which currently indicate an even distribution of fines while maintaining deep pools. In essence, Capulin Canyon is able to handle the current load of sediments it is receiving under the current management (Ferrell 2005b).”

The water developments planned for this allotment will help ease the concentration of cattle around the existing developments and perennial streams. Providing water sources away from the stream reduces animal time in the stream and lessens impact on water quality (Miner et al. 1992). These new water sources will only help to improve water quality by decreasing the nutrient and bacterial input into the streams that be occurring from the current management. Also, less time cattle spend on the streams for watering purposes will decrease the chances that riparian vegetation is removed and undercut banks are trampled.

Bland Allotment – The low numbers of cattle in this allotment and the ability to move them to and/or alternate them between the two canyons, Bland and Colle, helps reduce impact on the streams and riparian areas.

Bear Springs Allotment – Low numbers of cattle on a rotational basis and the existing water developments help encourage even distribution and reduce the impact on the intermittent streams.

Del Norte Allotment – Medio Dia Canyon is showing some signs of current impact, but the reconstruction of three miles of boundary fence would eliminate the pressure from trespass cattle. The construction of the dirt water tank would help better distribute cattle in the Del Norte Allotment. Providing water sources away from the stream reduces animal time in the stream and lessens impact on water quality (Miner et al. 1992). These new water sources will only help to improve water quality by decreasing the nutrient and bacterial input into the streams that might be occurring from the current management. Also, less time cattle spend on the streams for watering purposes will decrease the chances that riparian vegetation is removed and undercut banks are trampled.

Cumulative Effects. The cumulative effects from cattle grazing in this alternative would be the same as in the Current Management (Alternative 2) alternative.

The infrastructure improvements associated with this alternative would likely result in short-term localized sedimentation events associated with soil disturbance resulting from construction of the proposed springs, trick tanks, earthen tanks, cattle guard, corral, and boundary fence. Sedimentation from construction of these facilities, however, is expected to be negligible.

Soil disturbance would also result from cattle concentrations around new improvements such as the developed springs, trick tanks, and earthen tanks. These impacts would be localized adjacent to water sources, and are not expected to result in cumulative effects from other impacts caused by activities in the project area. These indirect impacts adjacent to new water sources could result in slight sedimentation to nearby streams; however, they are expected to result in a decrease of overall sedimentation because their purpose is to disperse cattle away from streamside areas, which are the largest contributors of sedimentation.

3.4 AIR

3.4.1 Affected Environment

Ambient air quality is regulated according to the Clean Air Act, Section 163; which requires Prevention of Significant Deterioration (PSD) according to the class of the air quality management area. The Alamo, Bear Springs, Bland, and Del Norte allotments are within a Class II air quality management area that is in attainment of all air quality requirements.

3.4.2 Environmental Consequences

None of the alternatives being considered would have any measurable direct or indirect effect on air quality in this area. Because this project would have no direct or indirect effect, there would be no associated cumulative effects.

3.5 VEGETATION

3.5.1 Affected Environment

Within the four allotments approximate elevation ranges are: Alamo 6,100 to 8,800 feet; Bear Springs 6,800 to 8,200 feet; Bland 6,100 – 8500 feet; and Del Norte 7,700 to 9,300 feet. They are generally similar in habitat and vegetation is largely defined by elevation. Higher elevations exhibit a spruce dominant, mixed conifer forest that trends toward a ponderosa pine dominant forest as elevation decreases. Aspen stands are found along north facing slopes and in cool drainages. Piñon and juniper woodlands are present at lower elevations. Kentucky bluegrass meadows, along with scattered patches of Arizona fescue, mountain muhly and various other herbaceous species are the major sources of forage for livestock in the higher elevations. Blue grama, little bluestem, and western wheatgrass are major sources of forage in the lower elevations. After the Dome Wildfire in 1996, approximately 4,000 acres of the Alamo Allotment was seeded and previously inaccessible (due to tree density), low forage producing areas were reverted to high forage producing, accessible areas. Table 18 displays the general vegetation types that occur on the four allotments.

Table 18. Vegetation Type (percent of allotment)

	Alamo	Bear Springs	Bland	Del Norte
Riparian	<1	0	<2	2
Piñon / juniper	<1	37	0	0
Grassland	0	0	<1	0
Juniper Woodland	10	11	6	0
Ponderosa Pine	40	52	45	4
Mixed Conifer	49	0	47	94

The current production of forage vegetation ranges between 50 to 1,200 lbs per acre (Padilla 2005). Much of the range capability in the allotments is located along canyon bottoms and in flat to moderate sloped mixed conifer, ponderosa pine, or piñon/juniper woodlands depending on elevation. In general, recent monitoring data shows use in key areas consistently falls within 31 to 40 percent utilization.

Key species utilization standards are defined as 30 to 40 percent utilization. Jones (2000) states in her quantitative review of effects of cattle grazing on North American arid ecosystems that livestock had varied impacts to vegetation resources, but that the analysis did not take into account details of individual studies, such as stocking rates, intensity, etc., which was problematic because some range management text books give sound evidence of systems that are applicable in areas similar to the analysis area.

Holechek et al. (1989) is given as an example and is the being used to establish guidelines for grazing within this analysis area. Holechek states grazing standards should be set at the conservative use level, 30 to 40 percent use of the current year's growth (Holechek et al., pp. 11-14. 2000.). In another publication, Holechek et al. state "a stocking rate at 90 percent of the carrying capacity, with some adjustment in drought periods, will provide relatively high sustained ranch income and maintain or improve range condition (Holechek et al. pg. 203, 1989). Based on the estimated carrying capacity of each allotment, the allotments are within the recommendations of Holechek et al.

Key areas are identified in the allotment management plan and annual operating instructions. Key species for the higher elevations of Alamo, Bear Springs, Bland, and Del Norte allotments are mountain muhly (*Muhlenbergia montanus*), Kentucky bluegrass (*Poa pratensis*), and Arizona fescue (*Festuca arizonica*). In the lower elevations of the Alamo, Bear Springs, and Bland allotments, key species are western wheatgrass (*Elymus smithii*) and blue grama (*Bouteloua*

gracilis). Stubble height guidelines developed by the Forest Service for lands in New Mexico are the measures that will be used to determine compliance with the standards. Table 19 outlines the guidelines that will be used for these allotments.

Table 19. Grazing Intensity Guide for Rangelands in New Mexico (Holocheck & Galt, June 2000)

Qualitative Grazing Intensity Category	Use of Forage by Weight	Stubble Height Indicators of Grazing Intensity				
		Arizona Fescue	Mountain Muhly	Bluegrass	Blue Grama	Western Wheatgrass
	---(%)--	-----Inches-----				
Conservative	31-40	6-7	4-5	4-5	2-2.5	4-5

Grazing capability is a qualitative expression of the inherent ability of an ecosystem to support grazing use by various classes of livestock on a sustained yield basis; that is, maintaining the stability and productivity of the site. Soil stability determinations and site productivity evaluations are used in combination to determine and assign one of three capability classes:

Full capability - are those areas that can be used by grazing animals under proper management without long-term damage to the soil resource or plant communities. Full capability areas exhibiting fair, good, or excellent range condition, are considered stable or improving (upward trend), and are designated as satisfactory. Full capability areas exhibiting poor range condition are considered to be on a downward trend and are designated as unsatisfactory.

Potential capability – are those areas that could be used by grazing animals under proper management but where soil stability is impaired, or range facilities are not adequate under existing conditions to obtain necessary grazing animal distribution. These areas are not included when calculating the amount of forage available for cattle.

No capability – are those areas that cannot be used by grazing animals without long-term damage to the soil resource or plant community, or are barren or unproductive naturally. These areas are not included when calculating the amount of forage available for cattle and a designation of satisfactory or unsatisfactory is not applicable.

Table 20 displays acres of full, potential, and no capability on each allotment. Of the full capability areas, 12,632 acres (82 percent) are considered in satisfactory range management status and 2,924 acres (18 percent) are in unsatisfactory range management status. Elements of the proposed action were developed to address the unsatisfactory range. They include constructing improvements to improve distribution, implementing adaptive management to allow for changes in season of use, and duration of use in a given area.

Table 20. Range Capability (Acres)

	Satisfactory	Unsatisfactory	Total (acres)
Alamo (including Dome Burro Territory)			
Full Capability	7,887	823	8,710
Potential Capability	779	0	779
No Capability	N/A	N/A	12,989
Bear Springs			

	Satisfactory	Unsatisfactory	Total (acres)
Full Capability	1,586	1,754	3,340
Potential Capability	1,049	0	1,049
No Capability	N/A	N/A	3,247
Bland Canyon			
Full Capability	837	0	837
Potential Capability	1068	0	1,068
No Capability	N/A	N/A	6,903
Del Norte			
Full Capability	2,322	350	2,672
Potential Capability	0	0	0
No Capability	N/A	N/A	5,232

Invasive Species. The Santa Fe and Carson National Forests jointly completed a NEPA analysis and signed a Record of Decision for the treatment and control of invasive plants, which was distributed in September 2005. This decision was recently successfully appealed, and subsequently remanded to the Forest for additional environmental analysis. Once this analysis is completed and a new decision is made, site specific invasive species treatments can be planned and implemented under the terms of the decision.

According to the EIS, “Domestic livestock grazing on the forests (Carson and Santa Fe) has not been found to be a major contributor to the spread of weeds within affected range allotments. The overall trends indicate that the human activity along roads, trails, and recreation areas, along with disturbance at oil and gas well pads and the movement of seed or other vegetative propagules by water along riparian corridors, are the main transportation vectors at this time. However, this human activity can include the hauling of livestock on trailers which could contribute to the spread of invasive weeds if the vehicle comes from an infested area or drives through an infested area. Livestock permittees are not allowed to feed hay to their livestock on National Forest System lands, which could be a potential source of new infestations if it was allowed (USDA FS 2004).” These include but are not limited to chemical control, mechanical control, and biological control.

The following invasive plants occur within the allotments.

Bull Thistle – This is the only known invasive plant occur within the analysis area. One population is on the Alamo Allotment and is associated with the Dome Fire. At the time the survey was done, the population was 42 acres in size. To date, no treatment has been conducted. Additionally, a response to the Draft EA made available for this analysis pointed out that there is a population of thistle between FR 289 and Sanchez Canyon. This population has yet to be recorded and there are currently no plans for treatment.

In addition to bull thistle, populations of **cheat grass** and **downy brome** were identified in comments as existing along the lower elevations of FR 289. These populations have been confirmed by observances of Jemez Ranger District staff, but there are currently no plans for treatment.

3.5.2 Environmental Consequences

No Grazing (Alternative 1) – as permits expire, cattle would be removed from the allotments. Eventually, understory vegetation would no longer be grazed by cattle but would continue to be

grazed by deer and elk. In those areas where plant diversity still exists, little improvement over the current condition would be expected. This is anticipated because studies have indicated that there is little difference in areas of light use (0 to 30 percent utilization, which would be result with only wildlife use) and conservative use (30 to 40 percent) (Dietz, 1989 and Holechek et al, 2000).

In the Kentucky bluegrass dominated meadows classified as unsatisfactory for range management status purposes, status would not change. This is because cessation of livestock grazing alone will not improve range management status. The lack of diversity within these Kentucky bluegrass dominated meadows is the cause of the unsatisfactory rating. Only through mechanical treatment (or some other type on intervention) would these areas be able improve in range condition. Similarly, the unsatisfactory areas of the Bear Springs Allotment would also require mechanical treatment to improve range management status because it is the density of trees that is the determining factor in the unsatisfactory rating.

Since much of the spread of invasive species within the allotments occurs adjacent to roads and dispersed recreation sites, eliminating cattle grazing would not likely reduce the spread or rate of spread of these plants. Removing cattle as permits expire would not affect overstory vegetation.

Current Management (Alternative 2) – under this alternative, impacts to vegetative resources on the Bear Springs and Bland allotments would remain the same. Under current management these allotments are meeting established standards and guidelines and vegetative resources are not being negatively impacted by livestock use. On the Alamo and Del Norte allotments, those key areas that have not consistently met established standards would continue to be over-utilized on occasion, which could lead to negative impacts to vegetative resources.

With respect to the Del Norte and Peralta allotments the boundary fence would not be reconstructed which would allow unauthorized use of livestock from one allotment to the other possibly resulting in overuse on the impacted allotment, which could vary depending on which allotment the unauthorized use is occurring.

One possible negative impact is the expansion of Kentucky bluegrass meadows as the less grazing resistant vegetation is replaced with the grazing resistant Kentucky bluegrass. This would lead to less diversity, negatively impacting range condition. More intensive management by the livestock operator would be required to improve distribution without the construction of improvements.

In those area already dominated by Kentucky bluegrass vigor would be lost leading to less production, poor plant health, and eventually plant mortality. In a publication by Dietz 1989, he references a study in which root growth was monitored relative to defoliation. Zero to 40 percent utilization had no affect on root growth, while utilization exceeding 40 percent negatively impacted root growth, with the impact increasing as use increased. Table 21 is reproduced from this publication:

Table 21. How Grazing Affects Root Growth (Deitz 1989)

Percent leaf volume removed	Percent root growth stoppage
10%	0%
20%	0%
30%	0%

40%	0%
50%	2-4%
60%	50%
70%	78%
80%	100%
90%	100%

Root growth is important because it is necessary for plants to remain healthy and vigorous.

Since livestock grazing has not been identified as a major vector for the spread of invasive species, no effects are anticipated as a result of this alternative. There are no impacts to overstory vegetation resulting from this alternative.

Proposed Action (Alternative 3) – under this alternative all allotments would be within the estimated carrying capacity of the allotment and improved distribution would be realized on those allotments where it is an issue. The result would be maintenance or improvement of current range conditions (where possible), healthy plant communities, maximum production, diversity, etc. The impacts to vegetation through the installation of the proposed improvements would be minimal as little ground disturbance is associated with the proposed improvements. The areas surrounding the proposed spring developments on the Alamo allotment are already utilized by livestock in the undeveloped status. Development of these spring sources will lead to less vegetative disturbance as the wet areas will be protected from access by livestock and the use will be concentrated to a single point. Since livestock grazing has not been identified as a major vector for the spread of invasive species, no effects are anticipated as a result of this alternative. There are no impacts to overstory vegetation resulting from this alternative.

Cumulative Effects. Since there would be no change to overstory vegetation under any of the alternatives, there would be no cumulative effects to overstory vegetation. No significant changes to general understory vegetation are expected. However, there may be minimal improvement to understory vegetation resulting from better distribution of cattle (through construction of water developments on the Alamo and Del Norte allotments) and this combined with other proposed management activities (such as Cochiti Wildland Urban Interface treatment project on the Del Norte allotment) and past activities (including several timber sales in the analysis area, refer to Table 10 – Cumulative Effects for specific past timber sales) will result in continued preservation of understory vegetation. Road system planning could lead to improvement in understory vegetation as roads were closed and rehabilitated.

3.6 WILDLIFE

3.6.1 Affected Environment

The Alamo, Bear Springs, Bland Canyon, and Del Norte allotments are generally similar in habitat. Approximate elevation ranges are: Alamo 6,100 feet to 8,800 feet; Bear Springs 6,800 feet to 8,200 feet; Bland Canyon 6,100 feet to 8,500 feet; and Del Norte 7,700 feet to 9,300 feet. Vegetation transitions from a low percentage of piñon/juniper through ponderosa pine to mixed conifer in the higher elevations, with a low percentage of riparian in all allotments. These vegetation and elevation variations combined with flat mesa tops, deep canyons, wooded moderate slopes and steep cliffs provide a wide diversity of wildlife habitat. Because of past wildfires (Dome and La Mesa), there is a greater component of Gambel’s oak, New Mexico

locust and other shrubs within the Alamo Allotment. Downed wood is also abundant in the post-fire areas.

One wildlife element lacking within the area is permanent water sources. Water is available year-round in Medio Dia, Cochiti, Pines, Spruce, Sanchez, and Capulin Canyons, and in sections of Colle and Bland Canyons (pers. comm. Ferrell 2005d). On the mesa tops, however, water is available only seasonally, during snow melt and storm runoff. Several springs, man-made earthen dams, and cattle water tanks provide other water sources. One trick tank on the Del Norte Allotment is only available from June 1 through October 31; all other water sources are potentially available year-round, although the earthen dams may go dry between spring rains and summer monsoons.

There are approximately 43,400 acres in the project area; of these, about 16,926 acres (39 percent) are fully or potentially capable of sustaining grazing; about 26,474 acres (61 percent) have no capability for grazing because of private ownership, steep slopes limiting cattle access, no water available, thick tree density with low forage, or low forage-producing soils.

I. PROPOSED, ENDANGERED, THREATENED AND SENSITIVE (PETS) SPECIES

The Santa Fe National Forest Threatened and Endangered species list (USDA FS 2004b), Region 3 Sensitive Species List (USDA FS 1999), and district maps and files were reviewed. The likelihood of occurrence for PETS species or their potential habitat within the allotment or in an adjacent area which could potentially be affected by the proposed project alternatives in the analysis area is noted below.

Table 22. Potential for Occurrence of PETS Species in the Project Area

Species	Status*	Potential for occurrence in Jemez 4 allotments
Rio Grande silvery minnow <i>Hypognathus amarus</i>	E	No occurrence within allotments; canyons within these allotments drain into the Rio Grande which contains occupied habitat, and designated Critical Habitat for the silvery minnow
Bald eagle <i>Haliaeetus leucocephalus</i>	T	Possible transient roosting during migration
Mexican spotted owl <i>Strix occidentalis lucida</i>	T	Confirmed occurrence within allotments
Western Yellow-billed cuckoo <i>Coccyzus americanus occidentalis</i>	C	Potential habitat present along lower elevation stream corridors such as in Bland Canyon
New Mexican jumping mouse <i>Zapus hudsonicus luteus</i>	S	Potential habitat present in small percentage of riparian meadows
Northern goshawk <i>Accipiter gentilis</i>	S	No known nest sites within the allotments; potential nesting/roosting/foraging habitat present in all allotments
Peregrine falcon <i>Falco peregrinus anatum</i>	S	Designated suitable breeding habitat within the allotments
Jemez Mt.		Suitable habitat present in northern sections of all

Salamander <i>Plethodon neomexicanus</i>	S	allotments
Northern leopard frog <i>Rana pipiens</i>	S	Potential habitat in springs, wet areas, and lower elevation side-pools of intermittent and perennial streams.
Rio Grande chub <i>Gila pandora</i>	S	Habitat present; no confirmed occurrence.
Rio Grande Cutthroat Trout <i>Onchorhynchus clarki virginalis</i>	S	Occur within Medio Dia Canyon; proposed for future reintroduction in Cochiti and Capulin Canyon
Chiricahua dock <i>Rumex orthoneurus</i>	S	Potential habitat in riparian corridors; however, no records of occurrence in the Jemez Mountains.

* E = Endangered (federal); T = Threatened (federal); P = Proposed for federal listing
 C = Candidate for federal listing; S = Forest Service, Region 3, sensitive species

Allotments are outside of the range or contain no potential habitat for the following PETS species: Holy Ghost ipomopsis, swift fox, Goat Peak pika, white-tailed ptarmigan, boreal owl, Pecos bluntnose shiner, blue-black silverspot butterfly, hairless fleabane, and Arizona willow.

Rio Grande Silvery Minnow (*Hypognathus amarus*)

This species now occurs in New Mexico in a 163 mile reach of the Rio Grande from around Cochiti Dam downstream to Elephant Butte Reservoir. The distance from lands managed by the national forests from that occupied by the silvery minnow are disjunct, and separated by many miles of dry or intermittent streams.

Rio Grande silvery minnow critical habitat: There is no designated Critical Habitat in the project area.

Affected habitat: The silvery minnow does not occur within streams within these allotments; however, Cochiti Creek and other drainages within these allotments flow into the Rio Grande which has confirmed populations of the silvery minnow and has designated Critical Habitat for the silvery minnow. All drainages in the project area drain into the Rio Grande above Cochiti Dam. The exception is Colle Canyon, which joins together with lower Peralta Creek and flows into the Rio Grande below Cochiti Dam. For these other streams originating in the proposed project area, distances from the boundary of the allotment to the junction with the Rio Grande above Cochiti Dam range from three to eight miles.

Bald Eagle (*Haliaeetus leucocephalus*)

The occurrence of breeding bald eagles in New Mexico is very limited. As of 2001, there were four bald eagle nests in New Mexico, all on private land. Small numbers of eagles can be found wintering on all national forests in New Mexico. The location and abundance of wintering eagles is dependent on food and availability of appropriate roosting and foraging habitat and can change from year to year. In winter, the greatest number of birds can be found along rivers and lakes; however, they can frequently be found in uplands where they use a variety of prey species, including prairie dogs (USDA FS 2004b, pp. 152-156).

Affected habitat: There are no records of occurrence in the proposed project area. There are no large water bodies to provide breeding/foraging habitat within or near these allotments. Past records note that bald eagle occurrence is uncommon on the Jemez Ranger District. The Jemez Mountains do not contain known breeding habitat. Migrating/ wintering eagles could pass

through and roost, but it would be on a transient basis. The allotment does not occur in any area that drains into identified bald eagle nesting habitat.

Mexican Spotted Owl (*Strix occidentalis lucida*)

The MSO Recovery Plan divides the MSO range into six Recovery Units (RU). The Santa Fe National Forest occurs in the Southern Rocky Mountains – New Mexico RU, which has a fairly small portion of the known owl sites throughout its range (USDA FS, 2004b). MSOs use a variety of habitats but are typically associated with multi-canopied stands of mature mixed-conifer and ponderosa pine-Gambel oak forests. In the Jemez Mountains, most nests are on cliff ledges or cavities in steep-walled canyons.

Affected habitat: There are ten occupied Protected Activity Centers (PACs) within the proposed project area included in this analysis. There are about 25,469 acres of mixed conifer habitat within these allotments that could provide foraging habitat for MSO. None of the proposed range improvements (earthen tanks, trick-tanks, fencing, etc.) are located within PACs.

Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*)

This species breeds in riparian woodlands and similar habitats at low and mid-elevations (2,800 to 7,500 feet), with the greatest densities below 5,000 feet. Surveys in New Mexico show that this bird is uncommon and scattered in the northern half of the state and still relatively abundant in areas containing substantial stands of prime habitat (Travis and Salazar 2003).

Affected habitat: The lower elevations of these allotments which contain some deciduous riparian vegetation, particularly the lower elevations of Bland Canyon, contain some suitable habitat for the western yellow-billed cuckoo. The upper elevations which are still in the conifer zones would not provide suitable habitat. Use in lower riparian areas would again be limited because of access.

New Mexican Meadow Jumping Mouse (*Zapus hudsonicus luteus*)

This subspecies of the meadow jumping mouse is found in mesic habitats in lowland valleys and the riparian zone along mountain streams. Preferred habitat characteristics include dense riparian vegetation and permanently running water. Preferred habitat in the Jemez Mountains contains permanent streams, moderate to high soil moisture, and dense, diverse streamside vegetation of grasses, sedges, and forbs (Morrison 1985, 1988 in BISON).

Affected habitat: Grassy riparian meadows within the lower canyons could provide some suitable habitat for the jumping mouse; however, because of the limited amount of riparian acres in these allotments, population numbers would not be expected to be high or widespread.

Northern Goshawk (*Accipiter gentilis*)

The small New Mexico population occurs locally in mature coniferous forests of mountains and high mesas. They primarily occur at lower elevations (2800 to 5500 feet). The goshawk is a predator of small birds and mammals. Snags, downed logs, woody debris, openings, large trees, herbaceous and shrubby understory vegetation, and interspersed vegetation structure are important features contributing to the presence of prey populations (NMGF BISON).

Affected habitat: There are no known goshawk territories in the proposed project area. No surveys have been done specifically for this grazing allotment analysis. Breeding, roosting and foraging habitat is available within all four allotments within the mixed conifer and ponderosa pine forests.

Peregrine Falcon (*Falco peregrinus anatum*)

The peregrine falcon was removed from the Federal Endangered species list in August 1999. In New Mexico, breeding habitat is provided locally by cliffs in forested habitats in mountain and river canyons statewide. They prefer elevations from 6,500 to 8,599 feet but may be found from 3,500 to 9,000 feet.

Affected habitat: There are three designated suitable nesting areas within the boundaries of the allotments and two which lie on the border with about half of their territory acres within the allotments. Falcons could forage throughout all four allotments.

Jemez Mountains Salamander (*Plethodon neomexicanus*)

The Jemez Mountains salamander (JMS) is found primarily in habitats between 7,200 feet to 9,600 feet in relatively high humidity microhabitats and soils that contain deep igneous, subsurface rock that is fractured to allow retreat underground to below the frost line. Much of the life cycle occurs underground with surface activity inside rotted coniferous logs or under rocks during a brief period of the summer when conditions are warm and wet. Habitat is typically Douglas fir, blue spruce, Engelmann spruce, ponderosa pine, or white fir.

Affected habitat: Some sections of the Del Norte, Alamo and Bland Canyon allotments are within the Essential or Regular Survey Zone as designated by the Cooperative Management Plan (Cooperative Management Plan for the Jemez Mountains salamander (2000)). There are confirmed occupied stands for Jemez Mountain salamanders within all four allotments. There are approximately 5,585 acres of essential habitat within the project area. Approximately 49 percent (2755 acres) are open for grazing. A large portion of these pastures is on steeper slopes where livestock would not tend to graze. Much of the suitable grazing areas on moderate slopes are in ponderosa pine stands which are not considered suitable Jemez Mountain salamander habitat. Facilities such as corrals or water developments that concentrate animals could result in soil compaction with some impacts to individual salamanders.

Northern Leopard Frog (*Rana pipiens*)

The northern leopard frog is typically associated with streams and rivers, although lakes, marshes and irrigation ditches are also occupied. In New Mexico, they occur at elevations of about 3,500 feet to 11,000 feet. Their habitats include cattail marshes, beaver ponds and other water sources with aquatic vegetation.

Affected habitat: Potential habitat could occur within these allotments in all perennial streams within the allotments, intermittent streams which could retain sufficient pools for seasonal breeding, and in springs.

Rio Grande Chub (*Gila pandora*)

The historic distribution of Rio Grande chub was mainly in the cool water reaches of the Rio Grande and Pecos River (and tributaries) in northern New Mexico. They occupy impoundments and pools of small to moderate streams, and are frequently associated with aquatic vegetation. There are known populations in the Jemez River and all of its fish-bearing tributaries (Ferrell, personal communication, 2004). Threats to this species include bank degradation, water diversion and lowering of water quality.

Affected habitat: Analysis done by the forest fisheries biologist notes that no Rio Grande chub occur in within the allotments in Medio Dia, Pines, Spruce, Cochiti, Sanchez, and Capulin canyons nor within downstream influence range of these allotments (Ferrell 2005). No surveys were done in Colle and Bland Canyon, but historical records indicate that these waters are not occupied due to limited water. Rio Grande chub are being considered as part of a re-introduction into Capulin Canyon.

Rio Grande Cutthroat Trout (*Onchorhynchus clarki virginalis*)

Rio Grande Cutthroat Trout (RGCT) Population. In New Mexico, the RGCT exist only in mountain streams in the Sangre de Cristo and Jemez Mountain ranges from the headwaters of the Rio Grande to tributaries in northern New Mexico. The Santa Fe National Forest (SFNF) hosts a stronghold of RGCT in the Jemez and Sangre de Cristo mountains.

Today, total known occupied stream miles are over 130 miles. The overall decline in RGCT numbers in New Mexico is attributed to many factors which include but are not limited to: 1) Introduction of non-native trout species who either prey upon or hybridize with RGCT; 2) Dewatering of streams for irrigation; and 3) Altered stream habitat.

Rio Grande Cutthroat Trout Occurrence in Project Area. Rio Grande cutthroat trout occupy one stream (Medio Dia Canyon) within the Project Area and are proposed for re-introduction into another (Capulin Canyon). Two other canyons (Cochiti, Sanchez) have potential for re-introduction and/or population expansion into historically occupied habitat. Most canyons are intermittent or have short sections of perennial waters associated with seeps and springs, limiting the mileage of viable fish-bearing waters to 6.7 stream miles combined in Medio Dia, Cochiti, Pines, Spruce, Sanchez, and Capulin canyons.

Table 23. Santa Fe National Forest and NMED Water Quality Temperature Standards

Water Temperature Standards	Properly Functioning	At Risk	Not Properly Functioning
SFNF 7-day Average Maximum	≤ 64°F	64 to 70°F	> 70°F
	Fully Support		Not Fully Support
NMED High Quality Coldwater Fishery	<73.4°F at one time; or ≤ 68°F for 4 consecutive hours over 4 consecutive days		≥ 73.4°F at one time; or > 68°F for 4 consecutive hours over 4 consecutive days

Del Norte Allotment. Del Norte Allotment has one primary fish-bearing stream located inside its boundaries – Medio Dia Canyon. Medio Dia is occupied solely by an isolated and relict Rio Grande cutthroat trout population for approximately 0.5 miles of stream. Genetic studies are planned by the New Mexico Game and Fish to determine the genetic viability of this population (pers. comm., Patten 2005).

The Medio Dia population is considered at risk due to its small size and range and unknown genetic viability.

Cattle grazing primarily takes place upstream from the RGCT occupied corridor. Cattle trail through Medio Dia Canyon in early June, following a user-maintained trail, which crosses the stream numerous times. There are no trail crossings in the short section where RGCT persist, minimizing the potential for cattle trampling redds.

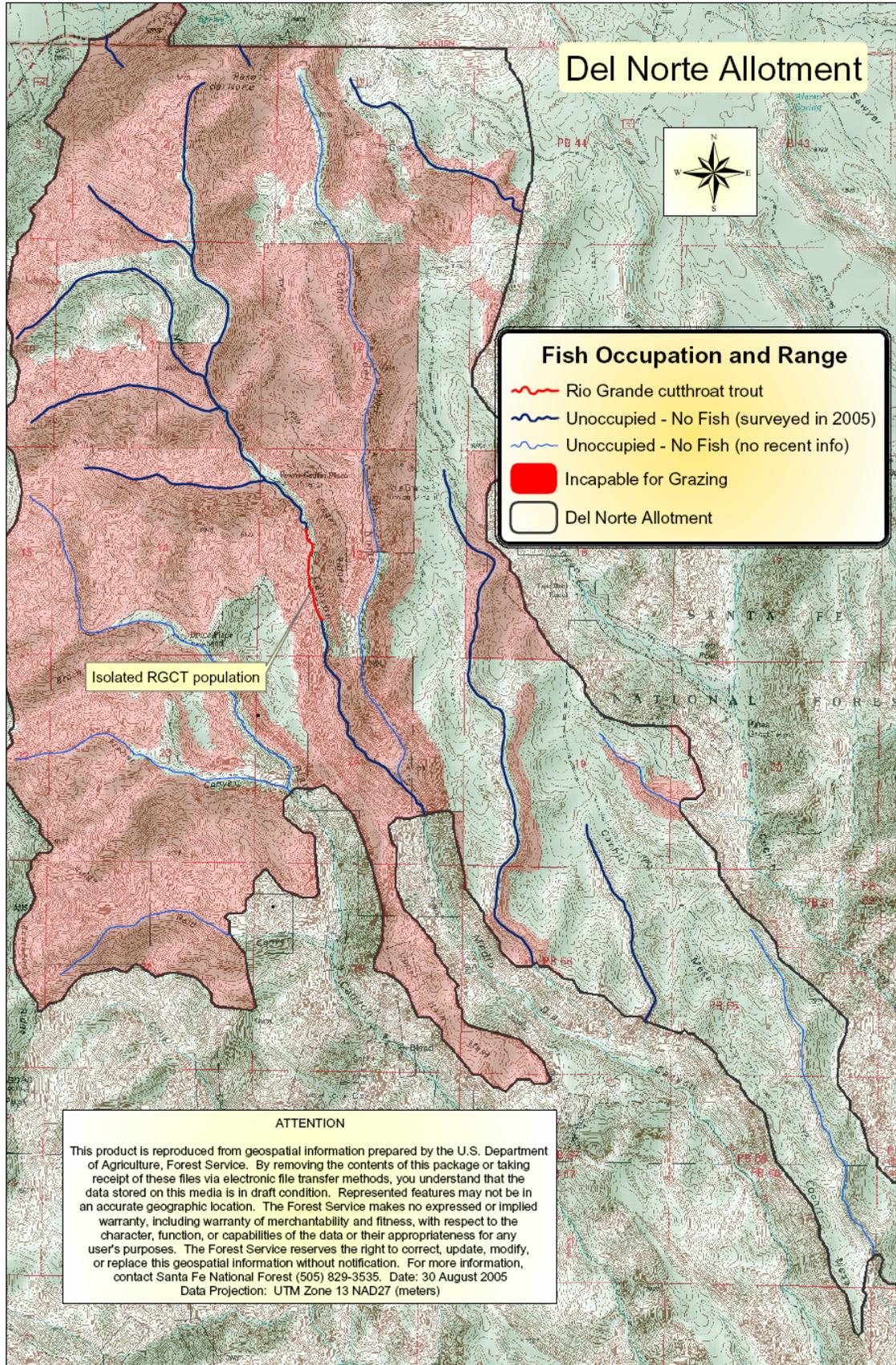


Figure 7. Rio Grande cutthroat trout occupation in the Del Norte Allotment

Alamo Allotment. Alamo Allotment has six primary fish-bearing streams located inside its boundaries: Pines, Spruce, Cochiti, Medio Dia, Sanchez and Capulin canyons. Sanchez and Capulin are currently unoccupied due to rain-on-ash delivery events post Dome Fire (1996). The remaining four are occupied by non-native eastern brook and/or rainbow trout. All six streams were historically occupied by Rio Grande cutthroat trout.

Noted in field visits conducted in 2004 and 2005, grazing is widespread, mostly on mesa tops and the extreme headwaters of the streams. Riparian conditions downstream from grazing are in pristine condition, creating optimum floodplain roughness and dynamic fish habitat, minus Cochiti Canyon. Cochiti is excluded from grazing but witnesses the largest impacts of all fish-bearing streams due to dispersed recreation associated with FR 89.

Cochiti Watershed has the potential for re-introducing Rio Grande cutthroat trout but currently is not being pursued by NMGF. A re-introduction would include Pines, Spruce, Cochiti and Medio Dia canyons in areas that are currently administratively withdrawn or geologically improbable to graze. All effects in these areas appear to be from developed and dispersed recreation along with private inholdings.

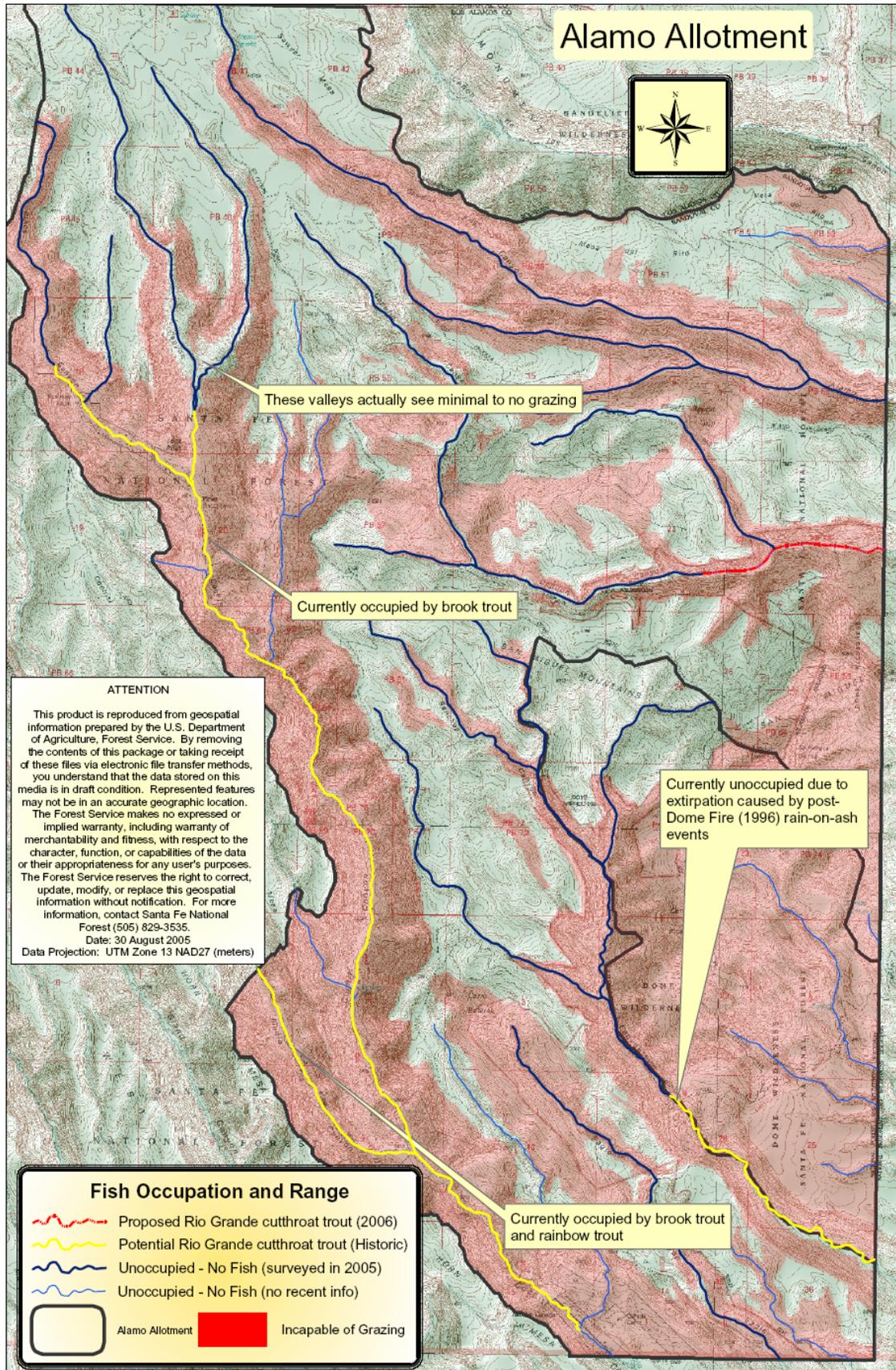


Figure 8. Rio Grande cutthroat trout occupation in the Alamo allotment

Capulin Canyon is slated for re-introduction of Rio Grande cutthroat trout as early as 2006. The canyon would support fish in its perennial section which its terminus is approximately one mile downstream from the last evidence of cattle grazing. Dense riparian vegetation, downed wood and limited water all but eliminate grazing down to the perennial source of Capulin. Of the 7.6 stream miles of Capulin proposed to be occupied by RGCT, SFNF manages 1.2 miles, all within the Dome Wilderness.

To monitor possible effects of livestock grazing on the perennial section of Capulin, water quality samples were taken at the Park Service/Forest Service boundary. Thermographs were placed in two locations for retrieval in the fall of 2005, but were lost as a result of atypical flood events in July. Water quality samples did not detect any fecal coliform. It is possible that nutrients and sediments caused by grazing are delivered to the downstream perennial reaches during snowmelt and monsoon events. Influence is likely minimal primarily due to dynamic stream habitat and excellent riparian conditions which currently indicate an even distribution of fines while maintaining deep pools. In essence, Capulin Canyon is able to handle the current load of sediments it is receiving under the current management.

Sanchez Canyon is being considered for re-introduction of Rio Grande cutthroat trout. The likely uppermost terminus of the fish population is approximately two miles downstream from the last evidence of cattle grazing. Any impacts to Sanchez Canyon appear to be related to its slow recovery in severely burned areas related to the Dome Fire. In these areas, vegetation is slow to recolonize, allowing sediments to naturally deliver into Sanchez Canyon. In addition, stream temperatures may be elevated due to the lack of riparian vegetation; again, associated with effects from the Dome Fire.

Surveys were also conducted in Alamo Canyon and confirmed historical records that the canyon does not support fish. Riparian conditions were noted as pristine in this isolated canyon with no signs of cattle grazing downstream from Alamo Spring.

Bland Allotment. Bland allotment has one primary fish-bearing stream located inside its boundaries – Medio Dia Canyon. Medio Dia is currently occupied by non-native eastern brook and rainbow trout and was once historically occupied by RGCT.

Noted in field visits conducted in 2004 and 2005, evidence of grazing was minimal to none along the shores of Medio Dia within the Bland Allotment. Riparian conditions were excellent with dense vegetation, tall forbs, and an assortment of downed wood. The only grazing noted was when Paso del Norte Road approached Medio Dia Canyon, but more significant impacts seemed to be associated with the road condition, off-road vehicle use, and dispersed camping.

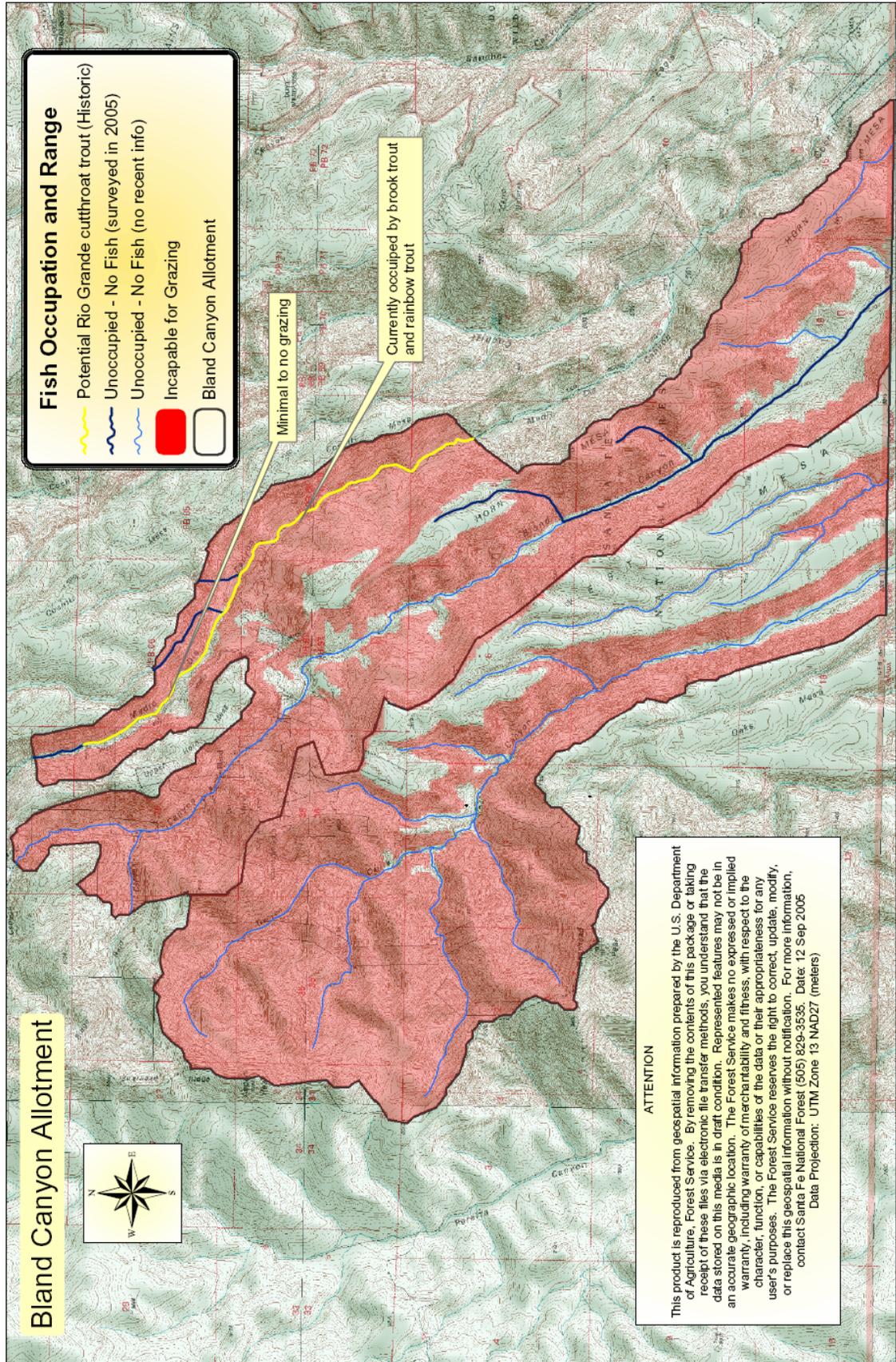


Figure 9. Rio Grande cutthroat trout occurrence in the Bland allotment

Colle Canyon and Bland Canyon are also located within the allotment. Surveys were not done in these canyons, but historical records indicate that there are no fish populations present due to limited water.

Future surveys need to be conducted in Bland Canyon and Colle Canyon to determine current habitat conditions as well as confirm the absence of fish.

All other creeks within the allotment are ephemeral or intermittent and are non-fish bearing.

Bear Springs Allotment. All creeks within the allotment are ephemeral or intermittent and are non-fish bearing. The dry drainages flow during snow melt and monsoon events and typically flows become subterranean before reaching the Rio Grande.

Chiricahua Dock (*Rumex orthoneurus*)

This species is a long-lived herbaceous perennial plant which grows in mid to high elevation (4,480 to 9,660 feet) wetlands with moist, organic soil adjacent to perennial springs or streams in canyons or meadows with associated coniferous or southwestern riparian deciduous forest. Associated species include sedges and rushes. Consultation with C. McDonald, Regional Botanist, notes that it is likely that Chiricahua dock is in the Jemez Mountains but has been identified as another *Rumex* species; recent genetic work shows that Chiricahua dock has a much broader distribution than previously supposed.

Affected habitat: Riparian meadows would have potential for occurrence of this plant species. No occurrences of this plant have been reported on this district, but there is potential for occurrence (pers. comm., Savinsky 2002).

II. MANAGEMENT INDICATOR SPECIES

A review of Management Indicator Species (MIS) for the Santa Fe National Forest (USDA 1995, page 96) shows the following MIS species have potential to be in the project area: **Merriam's turkey, pinyon jay, hairy woodpecker, mourning dove, Mexican spotted owl, elk, and Rio Grande cutthroat trout.** The allotment contains no habitat for Rocky Mountain bighorn sheep. **Mexican spotted owl and Rio Grande cutthroat trout** are discussed in more detail in the PETS section, wildlife or fisheries biologist report and therefore are not discussed further in this section. The MIS Assessment (<http://www.fs.fed.us/r3/sfe/wildlife/index.html>) for the Santa Fe National Forest (USFS 2003) contains more detailed habitat information and population trends for each species.

Merriam's Turkey (*Meleagris gallopavo*)

Merriam's turkey is the most common subspecies of turkey. It is found in many mountainous areas of northern New Mexico. Surface water is a range requirement. Ponderosa pine is an essential component of its permanent habitat, and is utilized as a source of mast and as a favorite roosting tree. Turkeys forage in grasslands, brush communities, deciduous tree-brush and in ponderosa pine.

Approximately 25,395 acres in the project area contain suitable vegetation cover for the turkey in riparian, juniper, piñon/juniper and ponderosa pine cover types (see table 18). This makes up approximately two percent of identified suitable turkey habitat on the Santa Fe National Forest. Water may limit populations as water sources are limited to the lower riparian boundaries, and several springs, with little water available on the mesa tops. No specific surveys for turkey have

been done in this project area. There have been occasional observations by Forest Service personnel in this area. The population trend for the Merriam's turkey is rated as stable to slightly increasing on the Santa Fe National Forest.

Pinyon Jay (*Gymnorhinus cyanocephalus*)

The pinyon jay nests mainly in stands of piñon-juniper or pine woodlands. Pinyon jay nesting populations are stable or decreasing based on Breeding Bird Surveys in NM. Pinyon jays were not observed in bird surveys done on Virgin Mesa (Dickson 2002), and Dome Wilderness (USFS 2002) or in breeding bird surveys done along FR 376 (Fair 2002, 2004).

The project area contain potential habitat for his jay on a total of approximately 6,750 acres of piñon/juniper and juniper woodlands (Alamo 3,230 ac.; Bear Springs 2,905 ac.; Bland Canyon 615 ac.; Del Norte 0), which makes up 1.5 percent of potential habitat on the Santa Fe National Forest. The trend for pinyon jay population across the SFNF is ranked as stable to downward based on the state trend and the breeding survey routes located near the forest.

Hairy Woodpecker (*Picoides villosus*)

The hairy woodpecker is a forest generalist which keys in on snags, down logs, and live aspen. About 46,380 acres of the project area in mixed conifer, ponderosa pine and piñon/juniper woodlands would provide breeding and foraging habitat. The population of hairy woodpeckers is considered stable to increasing on the SFNF.

Based on the habitat available, hairy woodpeckers would be expected to be common in this area. Breeding Bird Survey (BBS) data for New Mexico indicates a trend of about 5 percent increase in hairy woodpecker populations from 1980 to 2000 (Sauer and Hines 2001). Various surveys done on the Jemez District have recorded hairy woodpeckers: Virgin Mesa (Dickson 2002); breeding bird survey route (Vallecitos route on FR 376 and FR 144 (Fair 2002, 2004). Other bird surveys done in the Cerro Grande and Viveash burn areas showed that hairy woodpeckers were one of the ten most common species seen (Kotliar 2002). They were also common on surveys done in the Dome area (USFS 2002), and on Lake Fork Mesa and Sandoval Ridge (USFS 2003). It would be expected that woodpecker numbers have increased in this area because of the past Dome and La Mesa wildfires have resulted in increased habitat preferred by this species.

Mourning Dove (*Zenaida macroura*)

Mourning doves are common to abundant in most counties in New Mexico; nesting populations are stable or decreasing based on Breeding Bird Surveys in New Mexico. The population trend for the mourning dove on the SFNF is ranked as stable based on the statewide trend and breeding bird surveys in and adjacent to the Forest.

This species is primarily found in lower elevations of the Forest, however, they can occur in Douglas-fir, ponderosa pine, spruce-fir, aspen, and piñon/juniper forest types. In all situations, abundant food and water must be available within 20-30 km. Nests are either in small trees or on the ground. Water developments and underburning in ponderosa create favorable feeding areas.

Potential forage for mourning doves is predominantly in the lower elevations of the proposed project area in ponderosa pine, piñon/juniper and riparian forest types - a total of about 25,395 acres or approximately 3 percent of suitable habitat on the Santa Fe National Forest. Breeding habitat would be limited to sites where water is available during the breeding season. Mourning doves have been recorded on various bird surveys on the Jemez District: Breeding Bird Survey Route (FR 376 and FR 144); (Fair 2002, 2004), and in bird surveys done on Virgin Mesa (Dickson 2002) and Sandoval Ridge (USFS 2003).

Rocky Mountain Elk (*Cervis elaphus nelsoni*)

Rocky Mountain Elk inhabit most forest types with good forage and cover. They utilize a variety of habitat types during the course of their lives. They appear to be extremely adaptable to both secondary successional and specific successional vegetation types.

The project area provide approximately 25,395 acres foraging habitat in ponderosa pine, piñon/juniper, juniper and riparian; however, some of these areas include steep cliff habitat which would be inaccessible.

In the northern higher elevations of the allotment, use would be mainly in summer because of usual snow cover in winter. Elk use in the lower elevations of the allotment would be mostly winter foraging, although some elk will remain through the summer (NMGF 2002c).

Since 1995, the New Mexico Department of Game and Fish (NMGF 1996-97) has conducted aerial elk counts over the Jemez Mountains. The most recent estimate population estimate in the Jemez Mountains, which includes Hunt Units 6A, 6B and 6C, is 4,434 +/- 529 (NMGF 2002). The proposed project area makes up a majority of the southern portion of Hunt Unit 6C. Many of these elk move through Hunt Unit 6C, in which these allotments are located, migrating to and from winter/summer habitat.

III. MIGRATORY BIRDS

Migratory birds and their habitats are protected under the federal Migratory Bird Treaty Act of 1918.

NM Partners in Flight considers eight risk factors in identifying conservation priority species: Global Abundance, NM Breeding Abundance, Global Breeding Distribution, NM Breeding Abundance, Threats to Breeding in NM, Importance of NM to Breeding, Global Winter Distribution, and Threats on Wintering Grounds. Species with the highest risk factors are classified as “highest priority” for conservation action. This evaluation addresses general effects to migratory birds. Specific effects to highest priority species for the main habitat types found in the four grazing allotments are in the wildlife specialist report in the project file.

IV. GENERAL WILDLIFE

Based on the varying elevations, forest types, and topography, the general wildlife species expected to occur within the allotments include (among many others) mule deer, elk, coyotes, mountain lion, bear, bobcats, ring-tailed cats, squirrels, bats, and other small rodents; a variety of birds including turkey, hawks, owls, and songbirds; and reptiles and a few amphibians.

3.6.2 Environmental Consequences

Environmental consequences of each action (No grazing, current management, and the proposed action) will be discussed for Proposed Threatened or Endangered Species, Management Indicator Species, migratory birds, and general wildlife effects. Cumulative effects in this document will be discussed separately for each of the categories mentioned above. Cumulative effects analysis for wildlife is based on the area within the boundary of the four allotments, unless otherwise noted.

No Grazing – Alternative 1

I. PROPOSED, ENDANGERED, THREATENED AND SENSITIVE (PETS) SPECIES

Rio Grande Silvery Minnow. This alternative would have no effect on the Rio Grande silvery minnow and no effect on Critical Habitat. Eliminating grazing in these four allotments would remove the potential for any sediment input from cattle grazing.

Bald Eagle. All alternatives would have no effect on the bald eagle. No grazing (Alternative 1) would remove any disturbance factors associated with livestock and permittee management from the allotments.

Mexican Spotted Owl. This alternative would have no effect on MSO. There would be no potential for disturbance from livestock or permittee activity, and no potential impacts from livestock grazing on understory vegetation. It is expected that with no grazing, there would be an increase in vegetation such as willow and alder in some riparian areas, which could improve prey opportunities for the MSO.

Critical Habitat for the Mexican Spotted Owl. There would be no effect on Critical Habitat for the MSO. Removing grazing from these allotments would eliminate any potential for localized vegetation impacts from livestock grazing.

Western Yellow-billed Cuckoo. All alternatives are likely to have no impact on the western yellow-billed cuckoo. The primary areas grazed in these allotments are on the mesas and moderate side slopes. Because the potential habitat for cuckoos occurs in the lower elevation sites, where steep slopes block cattle access, there would be little potential for impacts. The lowest elevations in the project area occur around 6,100 feet, which probably limits the occurrence of large numbers of these birds in the allotments included in this project analysis.

New Mexico Meadow Jumping Mouse. This alternative would eliminate any potential for impacts to jumping mice or their habitat.

Northern Goshawk. There would be no impacts on goshawk or goshawk habitat. Eliminating grazing would remove any potential for impacts of noise and disturbance from grazing and permittee activity.

Peregrine Falcon. Eliminating grazing would remove any potential for impacts of noise and disturbance of grazing.

Jemez Mountain Salamander. In this alternative, eliminating grazing would remove all potential for impacts of ground disturbance, soil compaction from range facilities or grazing/permittee activities.

Northern Leopard Frog. There would be no effect on the leopard frog. Elimination of grazing would remove potential for above-noted impacts. There would be no water developments created to potentially create additional habitat.

Rio Grande Chub. There would be no impacts on the Rio Grande chub or potential habitat. The elimination of grazing in these four allotments would improve riparian conditions, with increases in vegetative diversity and structure, stabilization of streambanks, and reduction of sediment input.

Rio Grande Cutthroat Trout. The elimination of grazing across the four allotments would improve stream habitat and watershed conditions in areas where RGCT historically, currently and are proposed to occupy; overall, this would likely lead to more productive aquatic habitat. There would be no reduction in available stream habitat for RGCT.

Chiricahua Dock. This alternative would have no impact on Chiricahua dock or potential habitat. There would be no potential for grazing impacts on riparian vegetation.

II. MANAGEMENT INDICATOR SPECIES

There would be no potential for impacts to population trends; there would be no reduction in acres of available habitat for: Merriam's Turkey, Pinyon Jay, Hairy Woodpecker, Mexican spotted owl, Mourning Dove, Rocky Mountain Elk, and Rio Grande cutthroat trout.

III. MIGRATORY BIRDS

There would be no impacts on migratory birds. Because tall grass habitat would be increased, songbirds requiring these vegetation characteristics would increase. Riparian vegetation would increase providing better streamside corridor habitat throughout the project area.

IV. GENERAL WILDLIFE EFFECTS

There would be no grazing effects on wildlife. There would be no disturbances from cattle grazing or permittee management use; all forage would be available with no competition. Both upland and riparian vegetation would be expected to become more abundant and become more diverse overtime, increasing forage and cover for wildlife. There would be no benefit from creation of additional water sources on the mesa tops.

Current Management – Alternative 2

I. PROPOSED, ENDANGERED, THREATENED AND SENSITIVE (PETS) SPECIES

Rio Grande Silvery Minnow. Livestock grazing in the proposed project area may affect, not likely to adversely affect, the Rio Grande silvery minnow or critical habitat for the Rio Grande silvery minnow. Any effects are likely to be insignificant or discountable due to the distance from the managed lands to the occupied or critical habitat. Minimal sediment into allotment streams is expected from livestock grazing in the proposed project area. Because of the distance between allotment boundaries and junction with silvery minnow habitat, sediment would be expected to drop out of the system. In addition, any sediment introduced above Cochiti Dam (all allotments except Colle Canyon in the Bland Allotment) would be caught in the dam and not flow into Critical Habitat.

Bald Eagle. Livestock grazing within the four allotments would have no effect on the bald eagle. This determination meets the criteria designated within the USDA Guidance Criteria (USDA 2005) for no effect determination:

- Livestock grazing will not occur in areas that drain into identified bald eagle nesting habitat or roost sites.
- Livestock management activities in the action area will not occur within .25 miles of a bald eagle roost or nest site during any time of occupation by bald eagles.

Eagle presence in the allotment would be infrequent. Roosting or perch sites would usually be high in trees or on cliff ledges. Permittee or cow movement through the area would not be expected to cause a major disturbance. If alarmed, eagles would fly from the site. Because

eagles' diets consist primarily of fish from large streams and lakes, and carrion, any riparian or vegetation changes in the allotment would have no effect on the bald eagle.

Mexican Spotted Owl (MSO). Effects would be similar to those in the Proposed Action; however, no range improvements would be constructed in this alternative. Without construction of these range facilities, there will not be an improvement in cattle range distribution throughout the area. Livestock will continue to concentrate near riparian areas and not extend range to use other available forage. Springs would not be fenced off and vegetation in immediate spring area would continue to be impaired by cattle use. There would be no potential for increased prey in immediate spring sites.

Critical Habitat for the Mexican Spotted Owl. With implementation of monitoring mitigations, grazing within the proposed project area may affect, but would not be likely to adversely affect Critical Habitat for the MSO. Effects would be the same as those in the Proposed Action, with the exception that cattle range distribution would be expected to stay the same.

Western Yellow-billed Cuckoo. All alternatives are likely to have no impact on the western yellow-billed cuckoo. The primary areas grazed in these allotments are on the mesas and moderate side slopes. Because the potential habitat for cuckoos occurs in the lower elevation sites, where steep slopes block cattle access, there would be little potential for impacts. The lowest elevations in the proposed project area occur around 6,100 feet, which probably limits the occurrence of large numbers of these birds in the allotments included in this project analysis.

New Mexico Meadow Jumping Mouse. Grazing effects would be similar to those in the Proposed Action. Fences would not be constructed at springs. Therefore, these sites would continue to be disturbed by cattle use, with no potential for improving/increasing meadow mouse habitat.

Northern Goshawk. With implementation of grazing monitoring measures in key areas, and implementation of goshawk mitigation, grazing within this allotment may impact individuals but would not cause a trend to federal listing or cause a decrease in overall species populations. Impacts would be similar to the Proposed Action except that because no range improvements would be constructed, there would be no potential for disturbance from these activities.

Peregrine Falcon. Impacts would be similar to the Proposed Action except that because no range improvements would be constructed, there would be no potential for disturbance from these activities. There would be no potential for better distribution of grazing because no range improvements will be constructed.

Jemez Mountain Salamander. Grazing within the proposed project area would not be likely to cause a trend to federal listing or cause a decrease in overall species populations. If salamanders were present, there could be some localized impacts to individuals with movement of cattle through an area. Any localized concentrations of cattle could cause soil compaction that could deter salamander movement under ground. The Cooperative Management Plan (2000) notes that only a small percentage of individuals that occur at a site are surface active; therefore, only a small number of the population would have potential to be impacted at any one time. According to the Cooperative Management Plan, current levels of livestock grazing are not believed to be a direct threat to the viability of JMS populations because the majority of salamander habitat is too rocky or steep to support livestock grazing.

Impacts would be similar to the Proposed Action except that because no range improvements would be constructed, there would be no potential for ground disturbance, soil compaction from these activities.

Northern Leopard Frog. There could be some localized impacts to individuals; these impacts would not be expected to cause a decline in populations or a trend to federal listing. There could be some direct impacts to individuals, young or eggs with cattle moving through wet areas, streams or other water sources. Alamo Spring is fenced, so that cattle do not move through the immediate spring area. Silva Spring is not currently fenced, and would remain as such.

Other impacts from grazing could include effects on water quality from waste products, and sedimentation from streambank trampling (Smith 2003). The majority of leopard frog habitat in these allotments would be in the lower elevation canyons which would not receive much impact from grazing because of steep access.

Effects would be the same as in the Proposed Action - Alternative 3, except that there would be no water developments created to potentially create additional habitat for the northern leopard frog. Silva Spring would not be protected by fencing; cattle would continue to trail through spring area, trampling vegetation, and pools, with potential impacts to young and eggs if present.

Rio Grande Chub. There would be no impacts on the Rio Grande chub. Canyons in the proposed project area seem to be little affected by current management and potential habitat would be maintained.

Rio Grande Cutthroat Trout. Effects from continued cattle grazing may impact Rio Grande Cutthroat Trout populations in Medio Dia canyon.

Noted in Del Norte Allotment field visits conducted in 2005, grazing is widespread in the Medio Dia headwaters in valley bottoms and on mesa tops. Where grazing has occurred upstream from RGCT, conditions include unstable stream banks, stream widening, a decrease in woody riparian vegetation, and decreased root mass from forbs.

The delivery of fines and nutrients from these affected areas is mostly ameliorated by a small reservoir on private property over ½-mile upstream from the occupied corridor. There is some grazing between the reservoir and the RGCT population along the shores of Medio Dia indicated by trampled banks and small wetlands, decreased forbs height, and some widened channel sections. The occupied area appears to be protected from localized grazing due to dense riparian, downed wood, bedrock formations, and beaver activity.

More significant impacts to the fish population and its associated habitat is likely contributed by a non-sanctioned and user-maintained motorbike trail, which appears to be the greater contributor of non-point source pollutants into Medio Dia.

Overall, current grazing practices appear to have minimal effects on the Rio Grande cutthroat trout population and its associated habitat

Operating under the current management would maintain and/or degrade current riparian, stream and floodplain conditions; however, would not result in any reduction of available stream habitat for the RGCT. Without implementation of range facilities, distribution would remain similar in the allotment.

Chiricahua Dock. Grazing on this allotment could cause impacts to individual plants (if present) in riparian areas. Because major occurrences of this plant do not occur on this district, any impacts would not be expected to cause a trend to federal listing or a decrease in the overall population. Many of the riparian acres in these allotments are not accessible because of steep slopes; therefore, there would be no potential for impacts to these areas.

II. MANAGEMENT INDICATOR SPECIES

Merriam's Turkey. Grazing effects would be similar to the proposed action; however, there would be no benefit of development of additional water sources, or resulting improvement in distribution of grazing.

Pinyon Jay. Grazing in piñon/juniper habitat in the proposed project area would have no negative impacts on the overall species population trend; there will be no reduction in acres of piñon/juniper habitat available. The majority of pinyon jay habitat in the proposed project area is not grazed. These areas include West Mesa, and the non-grazed area of the Alamo Allotment. The majority of the Bear Springs allotment is piñon/juniper. This allotment has been inactive for grazing since 1999, but could become active at any time. Cattle grazing would cause no reduction of piñon/juniper trees, therefore, no change in availability of piñon nuts. Cattle moving through piñon/juniper stands during the breeding season could impact some low elevation nests.

Hairy Woodpecker. Grazing within the proposed project area would not have an impact on the overall population trends for hairy woodpecker in the project area; there would be no reduction in number of acres of habitat available. These woodpeckers nest and forage for the most part high in larger diameter trees/snags that would be minimally affected by grazing and permittee activity. The hairy woodpecker's diet is mainly insects within decaying trees. Grazing would have no impact on availability of snags or downed wood within these allotments.

Mourning Dove. Grazing within the proposed project area would not have an impact on the overall population trends for mourning dove; there would be no reduction in number of acres of habitat available. Effects would be the same as in Alternative 3 except that there would be no development of water reservoirs, therefore, no additional water sources.

Rocky Mountain Elk. Grazing in the proposed project area will have no negative impacts on the overall population trends for elk; there will be no reduction in acres of available habitat. Grazing effects would be similar to the proposed action; there will be no reduction in acres of available habitat. No additional water sources would be developed. There would be no improvement in cattle/elk distribution across the allotments to provide more even foraging.

III. MIGRATORY BIRDS

On January 10, 2001, President Clinton signed Executive Order 13186 placing emphasis on conservation of migratory birds.

The Forest Service, Southwestern Region, currently analyzes effects (impacts) in the following manner:

- effects to Species of Concern listed by Partners in Flight;
- effects to Important Bird Areas (IBAs);
- effects to important overwintering areas.

Grazing impacts will decrease habitat for some species, while increasing habitat for others. As referenced by Belsky et al. (1999), Saab found that livestock grazing in the west has decreased habitat for ground nesters or birds that forage in riparian areas or heavy shrub, while other species that prefer open habitats have increased.

In general, impacts to migratory birds from grazing include noise and disturbance from cattle movement and permittee activity. Effects are greater if they occur during the breeding season when nests and young can be impacted, depending on intensity and duration of disturbances. Adults can fly from major disturbances, and if early enough in the breeding season, can re-nest. If done outside the breeding season, most birds can escape or avoid any areas of disturbance. Grazing and browsing grasses and small shrubs can change vegetation structure and composition, especially in riparian corridors. This could affect breeding/foraging habitat and possibly create changes or reductions in insect/prey availability for some species. Grazing in riparian corridors can cause reduction or removal of riparian corridor vegetation, streambank instability with sediment erosion into stream, impacting water quality and aquatic habitat. These effects could reduce breeding/foraging habitat and aquatic prey availability for some birds. Because much of the riparian area within the proposed project area is not accessible for grazing because of steep slopes, undisturbed riparian habitat will be available for breeding.

Reduction of tall grasses would impact species, such as sparrows, which need tall grasses in which to forage and nest. Their numbers could be reduced in areas that are grazed; however, breeding habitat would be still available in those areas closed to grazing, or inaccessible to cattle.

Important Bird Areas: There is no designated Important Bird Area (IBA) affected by the project. No IBA is affected by this project.

Overwintering Areas: The four allotments in the project area could provide migration/winter roost sites for the bald eagle; however, it is not recognized as an important overwintering area because significant concentrations of birds do not occur here nor do unique or a high density of birds winter here.

IV. GENERAL WILDLIFE EFFECTS

Potential for grazing effects to wildlife will occur on less than ½ of the acreage in the proposed project area. Potential effects to wildlife from grazing include those caused by cattle foraging and moving through areas, and those from permittee activities for livestock operations. Movement of cattle could impact ground nesting birds; litter and burrowing species such as small rodents, amphibians, and reptiles; and birds which nest in shrubs or low tree branches. There could be competition for forage with other ungulates, such as elk and mule deer, and other forb/shrub users, such as rabbits and other small rodents. In localized areas of heavier cattle concentration, such as near water sources, soil could become compacted deterring movement of salamanders, voles, insects, and other subsoil species. Permittee activities for care and maintenance of livestock and livestock facilities, depending on frequency and noise intensity, would create noise and movement disturbance. Any potential impacts would be greater during the breeding season. Disturbances associated with livestock activity and grazing would generally not extend beyond ¼ mile of the activity because topography/vegetation would buffer sounds and visual disturbances.

Construction of fences could block travel paths or cause injuries from barbed wire snags. Mitigation to construct all fences to wildlife specifications will minimize these impacts.

Grazing can cause localized changes in vegetation structure and composition. Depending on duration and intensity of grazing, short-term loss of cover/food can occur and could lead to more

long-term shifts in vegetation cover, changing animal species occurrence (i.e., could change prey base and have localized impacts on predator populations, necessitating increased hunting range distances).

Pasture rotation and monitoring will minimize the potential for the above effects, although it is possible that some localized areas could receive concentrated grazing.

Concentrated grazing could impact streambank vegetation resulting in limited willow/other shrub growth with resultant decreased cover/forage/nesting sites for riparian corridor wildlife species. Streambanks can become physically modified by trampling and removal of vegetation. Sedimentation and lack of streambank vegetation can cause streams to become shallower and lack adequate woody debris cover. Resulting decrease in water quality and aquatic habitat can impact habitat diversity.

Following guidelines in Riparian Area Management TR 1737-14 1997 Grazing Management for Riparian Wetland Areas, USDI BLM, USDA Forest Service, as noted below, will minimize potential for the above impacts:

Utilization guidelines where used for riparian areas and riparian pastures, should:

- Maintain both herbaceous and woody species (where present) in a healthy and vigorous condition and facilitate their ability to reproduce and maintain different age classes in the desired riparian plant community.
- Leave sufficient plant residue to protect banks, filter sediment, and dissipate flood energy during runoff events.
- Maintain consistency with other resource values and objectives; e.g., esthetics, water quality, etc.
- Limit streambank shearing and trampling to acceptable levels.

Consultation with our district rangeland management specialist (Padilla 2003) notes that since 1999, in general, monitoring standards have been adhered to indicating that there is little or no competition at this time between ungulate species in sites monitored.

Approximately 35 percent of the total acreage in the project area is grazed which leaves 65 percent of the area available for wildlife use with no competition or disturbance from livestock grazing or grazing management activities. A percentage of this ungrazed area is steep cliffs which would not be used by most wildlife other than birds, small mammals, reptiles and amphibians. There are other areas, however, such the riparian corridor of the non-grazed section of Alamo allotment, where good quality habitat is available for wildlife with no competition from livestock.

Impacts would be the same as in the Proposed Action, except that there would be no range improvements to provide benefits of better distributed and increased water availability. Without construction of these range facilities, there will not be an improvement in cattle range distribution throughout the area. Livestock will continue to concentrate near riparian areas and not extend range to use other available forage.

Proposed Action – Alternative 3

I. PROPOSED, ENDANGERED, THREATENED AND SENSITIVE (PETS) SPECIES

Rio Grande Silvery Minnow. Same as for Current Management (Alternative 2) above.

Bald Eagle. Same as for Current Management (Alternative 2) above.

Mexican Spotted Owl (MSO). With implementation of mitigations (Discussed in Section 2.3), grazing within the project area may affect, but would not be likely to adversely affect the MSO. This determination is based on the criteria designated within the USDA Guidance Criteria (USDA 2005) for this determination:

- In the action area, livestock grazing or livestock management activities will occur within PACs, but no human disturbance or construction actions associated with the livestock grazing will occur in PACs during the breeding season.
- Livestock grazing and livestock management activities within PACs, in the action area, will be managed for levels that provide the woody and herbaceous vegetation necessary for cover for rodent prey species, the residual biomass that will support prescribed natural and ignited fires that would reduce the risk of catastrophic wildfire in the Forest, and regeneration of riparian trees.
- In owl foraging areas, forage utilization will be maintained at conservative levels.

Because MSO in the Jemez Mountains have been found to nest in cliff cavities, there would be no potential for impacts to nest sites from livestock grazing. The nest sites observed on the Jemez District are in narrow side canyons with thicker mixed conifer overstory with little grassy understory; therefore, cattle would typically not be attracted to these sites for foraging.

None of the proposed rangeland improvements will be located in PACs. Therefore, there would be no potential from disturbance from construction activities. One cattle guard is proposed for placement on the border of one PAC. If done during the non-breeding season, there would be no potential for any noise impacts to nesting owls.

There could be some temporary and localized vegetation impacts where cattle tend to concentrate. By following monitoring requirements, cattle would be moved before any impacts would be widely distributed. Because these impacts would be localized and temporary and because in all but one of the PACs in this area less than 1/2 of the PAC is grazed, there would not be expected to be any wide-scale reductions in available habitat for MSO prey species. Construction of additional water sources would be expected to distribute cattle better throughout allotments, resulting in more even forage use and reduced impacts to riparian areas.

Critical Habitat for the Mexican Spotted Owl. With implementation of monitoring mitigations, grazing within the proposed project area may affect, but would not be likely to adversely affect Critical Habitat for the MSO. Impacts of grazing on primary constituent elements of critical habitat are described in table 24 below.

Table 24. Environmental Effects of the Proposed Action on MSO Critical Habitat

Constituent element of MSO Critical Habitat	Effects
Mixed conifer; high basal area of large diameter trees; moderate to high canopy closure; wide range of trees sizes suggestive of uneven-aged stands; multi-layered canopy with large overstory trees of various species	No effect. Grazing will not impact tree species or number of trees within the allotments.
High snag basal area	No effect. Grazing will not impact large snags.
High plant species richness	There could be reduction in species richness of low ground cover (grass and shrub) vegetation in some grazed areas. Grazing has the potential to

	<p>modify the normal availability and diversity of food for the MSO. By adhering to utilization standards and moving cows when monitoring shows standards are close to being met, prey populations would be maintained throughout the allotment. There could be some increased localized impacts to vegetation surrounding water developments where cattle use would be more concentrated to access water. This impact would be less than an acre at each water site and would not have wide-scale impacts on vegetation diversity. The proposed construction of additional water sources to better distribute grazing would minimize the potential for effects on plant species richness.</p>
<p>Adequate levels of residual plant cover to provide for needs of MSO prey species</p>	<p>It is expected that with implementation of monitoring requirements, plant cover would be maintained to retain habitat for MSO prey species.</p>

Western Yellow-billed Cuckoo. All alternatives are likely to have no impact on the western yellow-billed cuckoo. The primary areas grazed in these allotments are on the mesas and moderate side slopes. Because the potential habitat for cuckoos occurs in the lower elevation sites, where steep slopes block cattle access, there would be little potential for impacts. The lowest elevations in the project area occur around 6,100 feet, which probably limits the occurrence of large numbers of these birds in the allotments included in this project analysis.

New Mexico Meadow Jumping Mouse. Grazing within these allotments would not be expected to cause a trend to federal listing or cause an overall decline in population numbers of this species. Suitable habitat is not abundant in these allotments. Potential grazing impacts caused by cattle trampling streambanks (impacting nest burrows), loss of cover, soil compaction and loss of vegetation communities could be detrimental to individual jumping mice. In past studies in the Jemez Mountains, jumping mice were found in areas of moderate grazing. Mitigations for maintaining four inch stubble height in grazed areas would be expected to minimize any grazing impacts and maintain populations of jumping mice, if present. No range improvements are proposed in riparian meadows, so there would be no potential for disturbance from any range improvement construction. There could be some limited potential habitat in some of the spring development sites. The design of these will capture some of the water and funnel it to a drinker. The spring area itself will be fenced to keep cattle out. This will remove impacts of cattle around immediate spring site, and potentially provide increased habitat for the meadow mouse. Water will still be available at these sites to maintain wet natural area around the spring sites; therefore, if meadow mice would be present, there could be some impacts near drinker site where cattle would congregate, but area around the spring site would be available with no disturbance.

Northern Goshawk. With implementation of grazing monitoring measures in key areas, and implementation of goshawk mitigation, grazing within this allotment may impact individuals but would not cause a trend to federal listing or cause a decrease in overall species populations. Goshawks typically nest high in larger trees. Cattle grazing through an area would be unlikely to create disturbance to nest sites. Permittee activity (movement and noise), depending on distance from nest site, duration and intensity of disturbance, could disturb nesting behavior. This disturbance would have a greater impact earlier in the breeding season. Once goshawks are incubating eggs and feeding young (usually after May 1), it is more likely that they will retain

nest. Because grazing season in the project area normally will not begin until June 1, disturbance during the early vulnerable breeding period is usually eliminated. The season of use could vary up to two weeks earlier; however, this would be after May 15 and still beyond the more vulnerable period. Grazing effects on vegetation structure and composition could reduce abundance or variety of prey species in localized areas, but would not have impacts over large areas. Because less than 40 percent of the total area of the project area is grazed and because of the goshawk's ability to forage over a wide range (typical foraging range is approximately 6,000 acres), prey opportunities would not be limited. Grazing would have no effect on canopy cover levels, and thus, there would be no change in existing vegetation structural stages. There are no grazing improvements proposed in a known goshawk territory. Construction of proposed improvements (earthen tanks, corrals, trick tanks, fences) would create noise and activity disturbance. Mitigation to do goshawk surveys for any projects done during the breeding season (March 1 to September 30) would eliminate potential for impacts to nest sites.

Peregrine Falcon. With implementation of grazing monitoring measures in key areas and mitigation, grazing within this allotment would not be likely to cause a trend to federal listing or cause a decrease in overall species populations. Falcons nest in cavities high on cliffs where cattle would have no access; therefore, there is no potential for direct impacts to nests. Visual or noise stimuli during the early breeding season (March 1 to May 15) would have the greatest potential for short-term and localized effects to breeding birds. Grazing will not normally begin in the project area until June 1 (depending on monitoring); therefore, there would usually be no disturbance during the early breeding season. The season of use could vary up to two weeks earlier; however, this would still be after May 15 and still beyond the more vulnerable period. Construction of new water sources and cattle guard could create noise and activity disturbance.

Construction of one proposed water development has potential to cause disturbance in a designated suitable habitat. If a pair of nesting falcons is present and if construction activity occurs during the breeding season, disturbance could be sufficient to disrupt nesting. Avoiding construction between March 1 and August 15 would avoid impacts during nesting season. Permittee access to this tank, when necessary, if done by foot or horse access should not create undue disturbance, or lead to any creation of vehicle tracks that OHVs would be attracted to follow. Any other motorized access for tank repair, etc., needing heavier equipment, could create noise disturbance.

Another proposed water development and the proposed cattle guard are located within sensitive habitat. Because of the temporary nature of the disturbance (approximately one to two days) and topography buffer, avoiding construction activities between March 1 and May 16 should be a sufficient restriction to avoid any disturbance during the vulnerable period of the nesting season.

Indirect effects to falcons would include impacts on prey species caused by temporary and localized impacts on grassy vegetation. Because of monitoring restrictions, cattle would be moved before these impacts become widespread. Because the falcon prey includes songbirds which are wide-ranging, any temporary impacts on vegetation would not be expected to cause a decline in any songbird populations. Falcons also range over a several mile territory; therefore, it is not anticipated that there would be any impacts to the falcons ability to find food.

Construction of additional water sources would be expected to distribute cattle better throughout allotments, resulting in more even forage use and reduced impacts to riparian areas.

Jemez Mountain Salamander. With mitigations, grazing within the East Jemez 5 would not be likely to cause a trend to federal listing or cause a decrease in overall species populations. If salamanders were present, there could be some localized impacts to individuals with movement

of cattle through an area. Any localized concentrations of cattle could cause soil compaction that could deter salamander movement under ground. The Cooperative Management Plan (2000) notes that only a small percentage of individuals that occur at a site are surface active; therefore, only a small number of the population would have potential to be impacted at any one time. According to the Cooperative Management Plan, current levels of livestock grazing are not believed to be a direct threat to the viability of JMS populations because the majority of salamander habitat is too rocky or steep to support livestock grazing.

Construction of range improvements, such as water developments or corrals, in essential or occupied habitat could cause some impacts, either directly from project activities or indirectly from soil compaction from cattle use. The primary period in which salamanders are on the surface is during the seasonal rains (typically July 1 through October 15). Avoiding constructing of range improvements during this period would eliminate potential for direct impact to salamanders on the soil surface. Typically, construction of fences creates trailing of cattle along those fences with resultant soil compaction along fences. These trails are usually less than about two feet wide so soil compaction would not limit surface access for the salamander over a wide area. Those range improvements which are located in Essential or Regular survey zones as designated by the Cooperative Management Plan were surveyed in 2004 or 2005 with negative findings.

Both the Alamo Springs site and Silva Springs site are currently (and have been in the past) used by cattle for water. The proposed improvements will fence off the immediate spring area to prevent cattle from walking through site. Therefore, there will be no increased cattle use of this area, merely continuance of current use, and limiting cattle traffic to desired location (outside of natural spring area). Field visits to these sites showed evidence of cattle walking through the natural spring areas. Cattle trails on side slopes accessing spring site, and exiting spring site down canyon are very narrow (less than two feet), already compacted. Therefore, there would not be expected to be new soil compaction impacts, and fencing would reduce cattle impacts to sensitive wet areas.

Northern Leopard Frog. There could be some localized impacts to individuals; these impacts would not be expected to cause a decline in populations or a trend to federal listing. There could be some direct impacts to individuals, young or eggs with cattle moving through wet areas and entering streams or other water sources. Alamo Spring is fenced, so that cattle do not move through the immediate spring area. Silva Spring is not currently fenced; fencing as proposed in this alternative will fence cattle out surrounding the spring area, and remove the potential for any impacts at this spring. Because leopard frogs have been found in water developments (Britton 2005, Painter 2005), proposed construction of water sources in the proposed project area would provide some additional habitat. With a mitigation to provide escape ramps from these water tanks, there would be no potential for frogs to get trapped in these tanks. Other impacts from grazing could include effects on water quality from waste products, and sedimentation from streambank trampling (Smith 2003). The majority of leopard frog habitat in these allotments would be in the lower elevation canyons which would not receive much impact from livestock because of steep access.

Rio Grande Chub. Because there are no known occurrences of the Rio Grande chub in these allotments, there would be no direct/indirect impacts; potential habitat would be maintained or nominally improved. Because some streams in this allotment contain potential habitat, effects on that potential habitat are considered. Effects analysis has been done by Forest Fisheries Biologist on aquatic habitat for the Rio Grande cutthroat trout. Those findings would also pertain to potential habitat for the chub. His findings show that overall, grazing as proposed in this alternative with construction or re-construction of range improvements, would likely maintain or nominally improve aquatic habitat (Ferrell 2005).

Rio Grande Cutthroat Trout: See discussion of environmental effects discussed in Current Management – Alternative 2 for general impacts of grazing in Medio Dia canyons. Grazing in the proposed project area will have no negative impacts on the overall population trends for the RGCT; there will be no reduction in miles of available stream habitat available. With the proposed construction/reconstruction of range facilities, range conditions will improve. The Medio Dia population seems to be little affected by grazing and the proposed improvements would have no effect on the existing condition. The proposed improvements would provide better distribution in the uplands, which will decrease non-point source pollutant delivery in general in the associated watersheds.

Chiricahua Dock. Grazing on this allotment could cause impacts to individual plants (if present) in riparian areas. Because major occurrences of this plant do not occur on this district, any impacts would not be expected to cause a trend to federal listing or a decrease in the overall population. Many of the riparian acres in these allotments are not accessible because of steep slopes; therefore, there would be no potential for impacts to these areas.

II. MANAGEMENT INDICATOR SPECIES

Merriam's Turkey. Grazing as proposed in this alternative would have no negative impacts on the overall species population; there will be no reduction in acres of turkey habitat available. Individuals or groups of turkeys could be impacted by localized grazing, especially during the breeding period, when ground nests and/or family groups could be disrupted; riparian and upland vegetation diversity and structure could be decreased in localized sites. Although grazing may temporarily decrease vegetation in localized areas, these areas will still provide habitat for travel corridors, bugging, etc. Grazing could impact riparian vegetation that could affect nesting cover, and vegetation structure and composition changes that could affect insect ability in localized areas. Mitigation and monitoring measures which maintain minimum utilization standards, and deferred rotation grazing would minimize impacts.

Development of reservoirs will also provide water for wildlife, which could expand turkey use into areas that wouldn't have been used before due to lack of water. Addition of water sources will also better distribute cattle grazing, spreading out foraging and reducing riparian impacts. \

Pinyon Jay. Effects of the alternative are the same as those discussed in the Current Management – Alternative 2.

Hairy Woodpecker. Effects of the alternative are the same as those discussed in the Current Management – Alternative 2.

Mourning Dove. Grazing within the proposed project area would not have an impact on the overall population trends for mourning dove; there would be no reduction in number of acres of habitat available. Development of water reservoirs would provide water sources during dry periods of the year. Mourning doves nest on average 10 to 25-foot high in trees, rarely on the ground. Grazing and permittee activity would have little potential for direct impacts to nests; however, visual and noise stimuli could have some localized disturbance effects. Grazing would not impact presence of ponderosa pine, spruce-fir, aspen and piñon-juniper forest.

Rocky Mountain Elk. Grazing in the proposed project area will have no negative impacts on the overall population trends for elk; there will be no reduction in acres of available habitat. Cattle grazing can cause competition for grass and browse forage. Mitigations which restrict utilization to 40 percent would assure adequate forage availability. Elk range farther from water sources than

cattle which expands their range and ability to find food. Earthen dam and water tank construction would provide water availability during dry periods and could improve both elk and cattle distribution in the allotment, expanding forage use over more acres. Construction of fences could create travel barriers; however, use of mitigations to construct fences to wildlife standards will allow migration and passage.

III. MIGRATORY BIRDS

See discussion of grazing effects above in Current Management (Alternative 2). In addition to the effects discussed from grazing, there will be the following effects from proposed improvements under this alternative.

Development of more water sources would provide both positive and negative impacts. Birds would benefit from more distributed water sources for drinking, bathing, and emerging insect sources. Livestock and other ungulate use around the water could reduce vegetation, impacting individual nests and reducing forage and cover. Water sources could attract more predators to the site, increasing avian predation (Finch et al. 1997).

Providing a drinker system and constructing/reconstructing fence around the Alamo Springs and Silva Springs natural spring sites will restrict cattle use to desired site and remove cattle impacts to the soil, vegetation, and wetland sites in the immediate spring area. This would improve these sites for bird habitat.

Overall the deferred rotation grazing system should provide minimal impacts to birds and their habitat as long as appropriate allowable use standards for grazing are followed. In localized areas, individual birds could be negatively impacted by grazing and permittee activity, however, these losses would not be expected to cause declines in overall species population. Approximately 65 percent of the project area is not grazed; this ungrazed area will provide migratory bird habitat with no disturbance from grazing.

IV. GENERAL WILDLIFE EFFECTS

Potential impacts expected from the Proposed Action alternative would include those discussed under the Current Management discussion of general wildlife effects above. The proposed earthen dams, spring developments, and fence and corral construction; however, would have additional beneficial and negative effects.

Construction of earthen dams and water tanks will create additional water sources and provide better distribution of water availability in the allotment for all species of wildlife. By providing more upland sources for water, cattle may become better distributed throughout the allotment decreasing potential for breaking fences and trespassing into riparian areas outside of the grazing period. All livestock water developments are made available year-round, except for one trick-tank in Del Norte Allotment which is available from June 1 to October 31. There will be short-term disturbance from equipment use and human activity during construction of earthen dams; however, disturbance will be minimal as it usually takes ½ day or less for construction of each dam. Metal trick-tanks could trap small rodents, bats, amphibians; mitigation to include escape ramps in all tanks will eliminate this possibility.

These earthen dams would provide both positive and negative effects to wildlife species. Many species would benefit from an additional water source during dry periods of the year. Predators, such as snakes, hawks, predatory mammals, could benefit from the concentration of prey near the water source – to the detriment of the prey species. Livestock could reduce the vegetation around

the water source possibly reducing cover and forage sites. Expanding livestock distribution would result in additional grazing in upland areas that formerly were grazed less or not grazed. It would be expected that broader livestock distribution and additional grazing in upland areas would have minor impacts to wildlife as long the appropriate allowable use standards for grazing and required stubble heights are maintained. Expanding distribution would be beneficial in that foraging will be more evenly spread over the allotments, and reduce impacts on riparian areas. Rotational grazing would also help maintain adequate forage/cover for wildlife.

Providing a drinker system and constructing/reconstructing fence around the Alamo Springs and Silva Springs natural spring sites will restrict cattle use to desired site and remove cattle impacts to the soil, vegetation, and wetland sites in the immediate spring area. This would improve these wet areas for wildlife use – rodents, birds, and amphibians.

Construction of fence line, cattle guard, corral, and water sources will create temporary disturbance during the time of construction. Cattle guards, if not designed properly, can be traps for small mammals, amphibians, and reptiles. Using cattle guards designed with escape ramps would eliminate any potential for entrapment.

Cumulative Effects

Rio Grande Silvery Minnow. Because of 1) the distance of the managed land from silvery minnow habitat, and 2) streams in the proposed project area (with the exception of Colle Canyon) flow into the Rio Grande above Cochiti Dam; there would not be any expected contribution to any cumulative effects on the Rio Grande silvery minnow or its critical habitat from continued grazing in the project area.

Bald Eagle. Because there are no direct or indirect effects to the bald eagle anticipated from continued grazing in the project area there would be no contribution to cumulative effects on the bald eagle in any alternative.

Mexican Spotted Owl and Critical Habitat.

No Grazing (Alternative 1): Because there would be no grazing, there would be no potential contribution to cumulative effects.

Current Management (Alternative 2) and Proposed Action (Alternative 3): Effects considered would be those that would contribute to direct effects of disturbance to nesting sites, and indirect effects from impacts to vegetation which could contribute to impacts on MSO prey. As noted above, because of the location of MSO nests, there is little potential for direct effects to MSO nesting; therefore, there would be no contribution to cumulative effects from grazing disturbance.

Indirect effects to MSO noted above would include temporary and localized impacts on grass/shrub vegetation. Because of monitoring restrictions, cattle would be moved before these impacts become widespread. Other cumulative use includes wildlife use of grassy vegetation, i.e., elk, mule deer, rabbits, other small rodents, and insects such as grasshoppers. Therefore, even if livestock is moved before 40 percent utilization standards are met, other wildlife use could continue to reduce vegetation below standards needed for MSO prey habitat. This could temporarily reduce habitat in localized areas for species such as voles, and mice. MSO pellet studies in the Jemez Mountains from 1982 through 2000 show that voles were about 7 percent of prey items overall; woodrats and insects were in the highest percentages (>30 percent and >20 percent respectively) of the prey items. Terry Johnson (2004) collected the pellets for this study

and feels that with the number of pellets collected in each PAC, a fair sample of year-round prey items was obtained. Recent pellets from the Fenton Lake PAC (Johnson 2004) showed wood rats and insects to be the major prey items. Because approximately 65 percent of the total project area is not grazed, and because studies show that the diet of MSO in Jemez PACs is diversified with voles being a smaller percentage of diet, any temporary reduction in vole or mice populations would not be expected to limit the availability of prey opportunities for MSO.

The Dome Fire, La Mesa fire and other small wildfires have added to forage availability in the Alamo Allotment; past timber harvest in allotments has also added to availability of forage. This increase in forage would result in more forage being available to livestock and wildlife, and better distribution of wildlife and livestock forage use, with decreased potential for concentrated grazing in localized areas; therefore, lower potential for localized impacts on owl prey species. The proposed prescribed burns adjacent to the proposed project area on West Mesa/Oaks Mesa, San Juan Mesa will add to diversity of prey by increasing shrubs/grasses, enhancing food supply for small rodents.

Because of the availability of forage in the area, it is expected that grazing (both cattle and ungulate) will be well distributed. Any localized impacts on vegetation and prey species would not be expected to cause negative cumulative effects to availability of prey species for MSO.

Western Yellow-billed Cuckoo. Because there are no anticipated impacts to the western yellow-billed cuckoo from this grazing proposal, there will be no contribution to cumulative effects in any alternative.

New Mexico Meadow Jumping Mouse.

No Grazing (Alternative 1): Because there would be no grazing, there would be no potential contribution to cumulative effects.

Current Management (Alternative 2) and Proposed Action (Alternative 3): Other cumulative use includes wildlife use of grassy vegetation; i.e., elk, rabbits, other small rodents, and insects such as grasshoppers. This cumulative use could reduce vegetation below standards needed for cover habitat in localized areas. Also, elk could also contribute to trampling effects of streambanks, and reduction of riparian vegetation. Because jumping mice have been found in the Jemez Mountains in areas of moderate grazing (Morrison), it is not expected that these cumulative effects would lead to declines in overall populations. Off-highway vehicles and motorbikes traveling through wet areas and crossing streams would be a major contribution to cumulative effects for streambank disturbance.

Northern Goshawk.

No Grazing (Alternative 1): Because there would be no grazing, there would be no potential contribution to cumulative effects.

Current Management (Alternative 2) and Proposed Action (Alternative 3): Effects considered would be those that would contribute to direct effects of disturbance to nesting sites, and indirect effects from impacts to vegetation which could contribute to impacts on prey species. Motorbikes and OHV use would cause noise disturbance, which could combine with intermittent permittee disturbance, to cause cumulative effects, dependent on frequency and distance from nest sites, with the OHVs and motorbikes contributing the major part of the disturbance. Past wildfires, timber sales, and WUI areas, as well as proposed prescribed burns on West Mesa/Oaks Mesa and San Juan Mesa will result in more widespread grass and shrub growth, resulting in

better distributed livestock forage. This will decrease localized concentrations of livestock, and enhance habitat for goshawk prey species over a widespread area. Because less than ½ of the project area is grazed and the forage range of the goshawk is approximately 6,000 acres, any cumulative effects of localized impacts to vegetation and prey species, would not be expected to impact the ability of goshawks to find prey in the project area.

Peregrine Falcon.

No Grazing (Alternative 1): Because there would be no grazing, there would be no potential contribution to cumulative effects.

Current Management (Alternative 2) and Proposed Action (Alternative 3): Effects considered would be those that would contribute to direct effects of disturbance to nesting sites, and indirect effects from impacts to vegetation which could contribute to impacts on prey species. As noted above, because of the location of falcon nests high on cliff sites, there is little potential for direct effects to nesting from cattle grazing; therefore, there would be no contribution to cumulative effects from grazing disturbance. With mitigations for seasonal restriction of range improvement construction, there would be no contribution to disturbance cumulative effects.

The Dome Fire, La Mesa fire and other small wildfires, as well as past timber harvests, have added to forage availability in the Alamo Allotment. This increase in forage availability would result in better distribution of wildlife and livestock forage use, with decreased potential for concentrated grazing in localized areas; therefore, lower potential for localized impacts on prey species. The proposed prescribed burns on West Mesa/Oaks Mesa, San Juan Mesa are proposed to enhance diversity of prey by increasing shrub/grasses, and adding to songbird habitat.

Because of the availability of forage in the area, it is expected that grazing (both cattle and ungulate) will be well distributed. Any localized impacts on vegetation and prey species would not be expected to cause negative cumulative effects to availability of prey species for the falcon.

Other disturbance factors are moderate to high in these allotments from recreationists: hunting, OHV use, and motorbikes. These uses are difficult to control; however, we do have control of grazing permittee use and have placed restrictions on seasons for construction and use of range improvements in suitable breeding habitat zones, which will minimize contribution of grazing disturbance to cumulative effects.

Jemez Mountain Salamander.

No Grazing (Alternative 1): Because there would be no grazing, there would be no potential contribution to cumulative effects.

Current Management (Alternative 2) and Proposed Action (Alternative 3): Those projects which would contribute to direct effects of disturbance to on-surface salamanders, or indirect effects of soil compaction are considered for cumulative effects. As noted, off-road vehicle use (motorbikes, ATVs) is high in this area. Bikers have been noted to seek areas that are “challenging” – rocky, steep slopes. These uses could impact salamander habitat. The Cooperative Management Plan for the Jemez Mountain Salamander (2000) notes that cattle grazing does not usually occur on the steep rocky areas necessary for salamander habitat; therefore, grazing would be a minor contribution to these cumulative effects. The increased availability of forage in the area from La Mesa, Dome and other wildfires, will attract cattle to these areas, decreasing need to graze in more sparsely vegetated sites on slopes which contain salamander habitat.

Northern Leopard Frog.

No Grazing (Alternative 1): Because there would be no grazing, there would be no potential contribution to cumulative effects.

Current Management (Alternative 2) and Proposed Action (Alternative 3): Other uses that would be considered for cumulative effects when combined with grazing would be those that would impact springs, streams and wet areas. There would be no potential impacts from timber cutting for WUIs which would avoid cutting in or near streams. Hiking trails cross streams but have point of impact in constant area; therefore potential for impacts would be limited. Anglers walking through side pools, and OHVs and motorbikes running through wet areas and streams would contribute impacts to eggs and young.

Rio Grande Chub. Rio Grande chub, a Forest Service Sensitive Species, is not located within or within an influential range downstream from the Project Area. This action would not lead to the decline of the species and/or listing of species under the protection of the Endangered Species Act.

Rio Grande Cutthroat Trout.

No Grazing (Alternative 1): Delivery of sediments and quality of thermal regulation appear to be the greatest concern for maintaining quality stream habitat within the Project Area. These conditions are readily limiting the productivity of current and historically occupied Rio Grande cutthroat trout waters. In addition to grazing, influences from the Dome Fire (1996), increased off road vehicle activity and road density have contributed to the delivery of sediments and lack of thermal regulation. Areas affected by the Dome Fire continue to improve and will stabilize over time. Unmanaged off road vehicle activity, such as the motorcycle trails, will continue to increase until the Forest fully implements and enforces an OHV Management Plan (project initiation expected in 2006). Road densities in most Management Areas within the project area exceed Forest Standards. At the time of the analysis, the Jemez Ranger District has not set a timeline for implementing a Roads Analysis which is the tool set aside for meeting these Forest Standards.

If the No Grazing alternative were selected, sediment delivery and thermal regulation would improve in site specific locations.

This action would not lead to the decline of Rio Grande cutthroat trout and/or listing of the species under the protection of the Endangered Species Act.

Current Management (Alternative 2): Delivery of sediments and quality of thermal regulation appear to be the greatest concern for maintaining quality stream habitat within the Project Area. These conditions are limiting the productivity of current and historically occupied Rio Grande cutthroat trout waters. In addition to grazing, influences from the Dome Fire (1996), increased off road vehicle activity and road density have contributed to the delivery of sediments and lack of thermal regulation. Areas affected by the Dome Fire continue to improve and will stabilize over time. Unmanaged off road vehicle activity, such as the motorcycle trails, will continue to increase until the Forest fully implements and enforces an OHV Management Plan (project initiation expected in 2006). Road densities in most Management Areas within the project area exceed Forest Standards. At the time of the analysis, the Jemez Ranger District has not set a timeline for implementing a Roads Analysis which is the tool set aside for meeting these Forest Standards.

Under current management, grazing would continue to incrementally add to sediment delivery and negate thermal regulation in site specific locations.

This alternative would limit site productivity in the small, isolated population in Medio Dia Canyon, but would not lead to the decline of Rio Grande cutthroat trout and/or listing of the species under the protection of the Endangered Species Act. This would be further mitigated by the introduction of a biologically significant population in Capulin Canyon.

Proposed Action (Alternative 3):

If the Proposed Action were selected, grazing would continue to incrementally add to sediment delivery and occasionally negate thermal regulation in site specific locations. Overall, incremental effects from livestock grazing under the Proposed Action will be less than the current management. It is expected that range improvements included in this alternative would result in greater distribution of cattle reducing areas that contribute to sediment delivery.

Chiricahua Dock. Because direct and indirect impacts are expected to be minimal because major occurrences of this plant are not known on this district, there would be no anticipated contribution to cumulative effects from this grazing proposal.

II. MANAGEMENT INDICATOR SPECIES

Because there is no reduction in habitat or impacts on population trends from implementation of this grazing proposal, there would be no contribution to cumulative effects for **Merriam's Turkey, Pinyon Jay, Hairy Woodpecker, Mourning Dove, and Mexican spotted owl.**

Rocky Mountain Elk.

No Grazing (Alternative 1): Because there would be no grazing, there would be no potential contribution to cumulative effects.

Current Management (Alternative 2) and Proposed Action (Alternative 3): Competition can occur between elk and livestock for forage. Wildfires in the Dome and La Mesa area, past timber sales, and creation of WUI areas have created large expanses of grassy areas producing increased forage. Proposed prescribed fires on West Mesa/Oaks Mesa and San Juan mesa will also increase forage distribution adjacent to the project area. Also, the trend over the last approximately 40 years is for decreasing AUMs in these allotments. Because there is no reduction in elk habitat or impacts to population trends from this grazing proposal, there will be no contribution to cumulative effects.

III. MIGRATORY BIRDS

No Grazing (Alternative 1): Because there would be no grazing, there would be no potential contribution to cumulative effects.

Current Management (Alternative 2): Effects considered would be those that would contribute to disturbance to ground and understory nesting species, and indirect impacts to habitat.

Motorbikes and OHV use would cause noise and ground disturbance, which could combine with cattle movement and intermittent permittee disturbance to cause cumulative effects, dependent on

frequency and distance from nest sites, with the OHVs and motorbikes contributing the major part of the disturbance. Some riparian habitat, has impacts from grazing as well as motorbikes and OHV use. Other riparian areas are inaccessible to cows because of steep access, and are likewise not frequently used for recreation, such as hiking or camping; therefore, this riparian habitat would remain relatively undisturbed for nesting habitat.

Indirect effects noted above would include minimal temporary and localized impacts on grass/shrub vegetation. Because of monitoring restrictions, cattle would be moved before impacts become widespread. Other cumulative use includes wildlife use of grassy vegetation; i.e., elk, mule deer, rabbits, other small rodents, and insects such as grasshoppers. Understory habitat for nesting/cover/food sources (insect and seed) have been increased by the Dome Fire, La Mesa fire, other small wildfires, and past timber harvest which have added to tall grass/shrub availability in the Alamo allotment. This increase in vegetation would also result in more forage being available, with resultant better distribution of wildlife/livestock forage use, and decreased potential for concentrated grazing in localized areas; therefore, lower potential for localized impacts on grass/shrub vegetation. The proposed prescribed burns on West Mesa/Oaks Mesa, and San Juan Mesa (adjacent to the project area) will also enhance understory bird habitat by increasing shrubs/grasses.

Any potential impacts to migratory birds will be minimal and localized. Over one-half of the project area is not grazed and will provide habitat for migratory birds with no grazing disturbance or localized habitat impacts. Therefore, any potential cumulative effects would be expected to be minimal and would not cause an overall decline in any migratory bird species populations.

Proposed Action (Alternative 3): Same as in Current Management (Alternative 2) above.

IV. GENERAL WILDLIFE EFFECTS

No Grazing (Alternative 1): Because grazing would be eliminated in all allotments, there would be no contribution to cumulative effects.

Current Management (Alternative 2): Cumulative effects would be similar to those noted under the Proposed Action (Alternative 3); however, there would be no range improvements, so there would be no temporary disturbance from construction, and there would be no cumulative improvement in livestock/wildlife foraging distribution over the allotments.

Proposed Action (Alternative 3): Past, current and proposed projects/events that could contribute to cumulative effects of disturbance and forage impacts are discussed in section 3.1 above. Disturbance effects from construction of proposed range improvements will be temporary for the period of project activity. Cattle and livestock will be restricted from or will avoid these areas during project activity, as will most wildlife, so there would be no combined impacts. Any disturbance from permittee activity to drop off or move cattle from pasture to pasture would also be temporary - approximately ½ to one day.

Recreation use in the allotments in some aspects is relatively light compared to other portions of the district. There are no developed campgrounds or day use areas. There are a few hiking trails. Other recreation in this area includes mountain bike-riding, and hunting. Graduation Flats is a popular location for Special Use group activities, including anywhere from 30 to 500 people, with frequent use from Memorial Day to Labor Day. It is probable that wildlife have adjusted to avoid sites of heavy recreation use such as this; therefore, there would be little opportunity for combined effects on wildlife of grazing and recreation at this site. There appears to be a fairly extensive network of motorcycle trails which are not sanctioned or maintained by the Forest

Service. This use occurs in all seasons (except when snow precludes motorcycle/ATV use) and throughout the allotment, and it is probable that this use creates disturbance to wildlife. This disturbance would be the major contributor to a cumulative effect of noise and movement disturbance when combined with grazing management effects.

The majority of public vehicle traffic in the allotments occurs on FR 268, 284, 286, 289. Because of deep canyons and cliffs, no roads are accessible across the allotments. Traffic use is associated with residences on private landownership, and other forest uses, such as fuelwood gathering, hunting, pleasure driving. Those uses which maintain vehicles on established roads would not tend to present a major disturbance to wildlife, as it is probable wildlife have become acclimated to this established use. Vehicles that drive off-road can disturb wildlife; this use would be more problematic in the spring during breeding season.

Cumulatively, the past timber projects and wildfires, along with current WUI development, proposed prescribed burns on West Mesa/Oaks Mesa and San Juan Mesa, and thinning occurring on Bandelier National Monument, will create a mosaic of wildlife habitats throughout the area with more open stands, more grass, forbs and shrub re-growth, providing more diverse forage opportunities. Past development of earthen dams in combination with those proposed in this project will better distribute water sources throughout the allotment. Because forage and water will be better distributed, cattle and wildlife will be more widespread through the area decreasing forage competition, chance encounters and disturbance potential to wildlife. Because grazing will be done under restrictions of grazing monitoring and rotation, there should not be a lack of availability of forage for wildlife in any areas of the grazing allotment. Although there could be some localized sites where wildlife and livestock would compete for food, forage opportunities would be well distributed.

Contribution of grazing impacts to cumulative effects for disturbance and forage impacts would be localized and minimal over the project area and would not be expected to contribute to any negative widespread impacts on wildlife.

3.7 HERITAGE RESOURCES

3.7.1 Affected Environment

Heritage resources include both archeological (e.g. pueblo ruins) and historical sites (e.g. turn-of-the-century railroad ties), and also elements important to maintaining the traditional beliefs and lifeways of local social groups.

The four allotments analyzed in this report are located in a high site-density area within the Jemez culture area. Approximately 41% of the approximately 43,400-acre area encompassed by the four allotments has been surveyed and 362 sites have been recorded within the allotments.

The four allotments are located within the Northern Rio Grande culture area on the eastern flank of the Jemez Mountains. The majority of the 362 recorded sites are associated with the Eastern Ancestral Puebloan cultural occupation of the area, which occurred between A.D. 600 and A.D. 1600. While the vast majority of sites within the allotments date to prior to A.D. 1600, there are 29 historic sites, which are mainly associated with the historic Cochiti Mining District.

Of the 362 recorded sites, only one site (AR-03-10-03-1440/LA 295) is currently listed on the National Register of Historic Places. For management purposes, all of the sites within the four

allotments will be treated as eligible to the National Register of Historic places even though some of the previously recorded sites have never been evaluated for National Register eligibility.

One site (AR-03-10-03-1171/LA 23920) is discussed as part of the proposed action in Chapter 2, because there is currently a dirt tank located within the boundaries of the site. The dirt tank is next to an existing road and collects water from runoff of the road. This dirt tank is to be 'decommissioned' under the proposed action, but will remain part of the grazing management infrastructure under the current management alternative.

3.7.2 Environmental Consequences

Grazing activities have the potential to adversely impact heritage resources in a number of ways. Impacts include 1) damage to archeological features and artifacts from trampling or concentration of livestock, 2) damage to standing walls or rock art from livestock rubbing against them, and 3) damage to features and artifacts by the construction and use of range facilities (developed springs, trick tanks, earthen tanks, corrals, and fences). Livestock concentration is greatest around water facilities, in corrals, adjacent to fences, at salt feeding locations, and in shady locations with good wind flow.

No Grazing (Alternative 1) – This alternative would result in the least impact to heritage resources since all potential grazing impacts would be removed once existing grazing permits expired.

Cumulative Effects. Since no impacts are expected to result from this alternative, approval of this alternative would not result in cumulative effects to heritage resources.

Current Management (Alternative 2) – Current management would result in potential impacts as stated above under section 3.7.2 Environmental Consequences. To determine the impacts of current management and provide a body of baseline data for the monitoring program, 12 sites on the Alamo allotment were inspected for the aforementioned potential impacts. This survey in addition to ongoing site monitoring revealed no known, measurable impacts occurring on sites within the four allotments.

This alternative would maintain the dirt tank located within the boundaries of an identified heritage site as grazing management infrastructure. Though the tank currently holds little water and does not result in impacts from cattle to the surrounding area, maintenance of the tank could result in increased impacts from high cattle concentrations.

Since no known, measurable impacts have been recorded within the four allotments from cattle grazing at current levels, no other sites would be at risk should cattle grazing continue to be permitted at current levels.

Cumulative Effects. Since no impacts are expected to result from this alternative, approval of this alternative would not result in cumulative effects to heritage resources.

Proposed Action (Alternative 3) – Since the proposed action includes cattle grazing at current impacts from cattle grazing under this alternative would be the same as discussed in Current Management (Alternative 2). No sites would be at risk should cattle grazing continue to be permitted at current or reduced levels.

In addition to direct impacts from cattle grazing, the construction of new improvements under this alternative was also analyzed for direct (impacts from construction) and indirect effects (impacts

resulting from cattle concentrating around new improvements). Archeological survey was conducted in and around areas where proposed range improvements would entail ground disturbing activities. A total of 51 acres were surveyed for all of the proposed improvements.

Surveys of proposed improvement locations identified no new or previously recorded heritage sites. Therefore, no effects to archeological sites are anticipated related to these improvements.

Additionally, decommissioning of the dirt tank on top of a heritage site in the Alamo allotment would mean its removal from the grazing management infrastructure database. As a result of this decommissioning, this tank would be left to deteriorate and would no longer function to provide cattle or wildlife with water. Thus, there would be no impacts from concentrated cattle to the heritage site.

Cumulative Effects. Since no impacts are expected to result from this alternative, approval of this alternative would not result in cumulative effects to heritage resources.

3.8 RECREATION

3.8.1 Affected Environment

The project area encompasses a portion of the Jemez Ranger District which receives relatively light recreational use compared to other portions of the district. There are no developed campgrounds or day use areas in the proposed project area. There are a few Forest Service hiking trails (described below). There is also what appears to be a fairly extensive network of motorcycle trails; however, these are not sanctioned or maintained by the Forest Service. Special use activity is light, characterized by three to four outfitter-guide camps, recreation based group camping concentrated in Graduation Flats, and one to two requests for road easements every couple years.

OHV Use. A map provided by the Black Feather Motorcycle group (dated 1989, but received in 2002 as current information), shows user created trails in parts of Silva, Spruce, Bland, Alamo and Sanchez Canyons. Motorcycle tracks were observed during the 2005 field season in Medio Dia, Pines, Spruce and Silva canyons. These trails tend to be one-track and show moderate use with a few areas of deeper ruts in wet areas. There is a loosely organized motorcycle trail riding group out of Los Alamos sending e-mails to its members suggesting that some trail maintenance in the form of cutting out deadfall, does seem to be occurring throughout this trail system.

In addition to motorcycle use, other OHV use (4-track vehicles) is a regular occurrence on existing forest system roads in the project area.

Hiking Trails. Four Forest Service hiking trails (appearing in the INFRA database) are within the project area. These include trail 113 in Alamo, trails 118 (St. Peters Dome) and 116 (Turkey Springs), which both traverse the Dome Wilderness. Trail 424 (Medio Dia) through the lower 4 miles of Medio Dia Canyon also occurs in the project area. Trails 118 and 116 are prohibited to motorized and mechanized use as per the Wilderness Act.

Trail 424 is open for pedestrian, equestrian and mechanized (i.e. mountain bikes) use as per a Special Order restricting the use of motorized vehicles. There has been some recent interest by the motorcycle community to open the trail to motorized use. Presently, the upper and lower trail heads each have a metal, locked gate to prevent motorized use. Trail 113 is available to all user groups, and some portions do exhibit some deep rutting caused by motorcycle use.

Special Uses. Graduation Flats, located in T18N, R5E section 6, is a very popular location for Recreation Special Use activities. These generally include groups anywhere from 30 people to upwards of 500 people. Groups in the past have included Boy Scouts, church campouts, weddings, Solstice Celebrations, Society for Creative Anachronism, and family reunions. All groups of 75 people or more are required to obtain a Recreation Special Use permit and are closely monitored during their stay. Between Memorial Day and Labor Day, Graduation Flats is generally under permit every other weekend, and sometimes back to back weekends or an entire week at a time.

One to two outfitter guide hunting camps are permitted annually in the Graduation Flats area. These camps are required to meet strict sanitation and use guidelines outlined in their Special Use Permit on file at the Jemez Ranger Station. These camps generally do not stay in one location for more than a week.

Request for one to two road easements and road maintenance permits arise every couple years associated with private parcels in Del Norte Canyon and the upper end of the community of Pines. The Forest Service is required to permit access to private lands provided there is not an alternate route available. Presently the road easements are minimal in this area and not a large part of the special use program.

FR 89 leading to the private lands in the upper end of Pines Canyon has been a point of contention in past years. The land owners have been adamant about the Forest Service maintaining and upgrading the road in light of recent washouts; however, the Forest Service has decided not to maintain the road beyond moving a few rocks now and then. The residents have been informed on the possibility of forming a road maintenance agreement whereby the land owners maintain the road, however to date they have chosen not to organize such a group.

3.8.2 Environmental Consequences

No Grazing (Alternative 1) – Under this alternative there will be little direct or indirect effect to recreation use or the issuance of special use permits. Regardless of cattle grazing, the public would continue to use the area for the above outlined activities. This use is expected to continue at its current rate.

Cumulative Effects. Eliminating grazing in the project area would result in relatively little cumulative effect to recreation use and special use permits. Recreation use overall is relatively light in this area and there have been no reported public concern by the public concerning cattle/human conflicts.

Current Management (Alternative 2) – If the current management remains the same, there can be very little change in the direct and indirect effects of cattle grazing.

Cumulative Effects. Since current management is expected to result in very little direct or indirect effects to recreational use of the proposed project area, there are no cumulative effects from this alternative.

Proposed Action (Alternative 3) – The proposed action includes developing a variety of infrastructure improvement devices for cattle use and reconstruction of some fences. Additional watering source may divert cows to other watering areas reducing impacts to existing trails, but possibly creating new ones. There have been no known reports of people attaining special use

permits in the area having any conflicts with cattle grazing in the area, so this proposal would have no direct or indirect effect to that aspect of district activities.

Cumulative Effects. Since the proposed action is expected to result in no direct or indirect effects to recreational use of the proposed project area, there are no cumulative effects from this alternative.

3.9 ENVIRONMENTAL JUSTICE

3.9.1 Affected Environment

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations, provides for agencies to determine if a proposed action will result in disproportionately high and adverse effects to minority or low-income populations. Those effects are to encompass both human health and environmental effects, and are to include the cumulative and indirect effects on a community.

Livestock grazing has occurred in northern New Mexico, and portions of the Jemez Mountains, since shortly after Spanish colonization in 1598. A permittee's ability to use National Forest System Lands for livestock grazing plays an important role in their economic well-being and in their cultural tradition.

In a recently published report entitled, "Economic, Social, and Cultural Aspects of Livestock Ranching on the Española and Canjilon Ranger Districts of the Santa Fe and Carson National Forests: A Pilot Study," the authors explain that 94 percent of the permittees in the study reported livestock ownership and ranching had been in their family for several generations (Raish and McSweeney 2003). Over 70 percent reported that they (or their families) have held their Forest Service grazing permits for over 50 years. Considering Forest Service lands are often a key component of contemporary grazing operations, it is likely that changes to Forest Service grazing authorizations will have serious implications to these grazing operations.

Economic Analysis. Financial efficiency is defined in Forest Service Handbook (FSH) 1909.17. Financial efficiency is determined by Present Net Value for the Forest Service. This analysis is based on the standard 10-year period covered by a term grazing permit beginning in 2006 with the following assumptions:

- The analysis is based only on those values that can have a cash value readily assigned;
- Range inspections, permit administration and range maintenance will only continue so long as there is grazing.

The Forest Service has mandates and management objectives that are not easily quantified for financial analysis; some of our partners operate under similar circumstances. Therefore, fiscal analysis results are not a primary determining factor in land management decisions. The no grazing alternative is the baseline for this analysis.

3.9.2 Environmental Consequences

No Grazing (Alternative 1) – This alternative would have the largest effect on surrounding communities and low-income populations. Grazing permits would expire and grazing in the

proposed project area would be required to stop. Those who had relied on public lands as part of their ranching operations would have to quit ranching or find other affordable forage sources.

An economic analysis of this alternative based on prices from cow/calf pairs from a livestock auction on November 9, 2005 in Roswell, NM showed that removal of 178 cow/calf pairs from the project area would result in an annual economic loss of approximately \$169,000 per year. This cost of permit expiration would be spread among the five permittees that currently graze the four allotments in the project area.

Though the majority of small ranching operations in northern New Mexico are not full-time operations, in many cases the de-authorization of grazing permits would cause those permittees to be unable to continue with their ranching operations. This would impact the income of those permittees, their families, and communities. In addition, for many of the permittees it would interrupt a cultural tradition that has existed for centuries.

Costs to the Forest Service under this alternative would total approximately \$13,203. These costs would result from trespass enforcement, removal of pasture fences, and assessment and modification of current range infrastructure for wildlife and other purposes. Estimated cost per allotment is listed in table 25 below.

Table 25. Forest Service Management Costs Under the No Grazing Alternative by Allotment

Allotment	Alternative 1, No Grazing
Alamo	-\$5,400.00
Bear Springs	-\$2,546.10
Bland	-\$2,598.75
Del Norte	-\$2,658.06

Cumulative Effects. Grazing permit reductions and consolidation has been the trend in Forest Service grazing management since the early 1900s. This is also true for grazing management in the project area. Expiration of all of the grazing permits in the project area (without reauthorization) combined with past permit reductions, would mean the removal of grazing as a source of income for those permittees. Cumulatively, this alternative would have an incremental contribution to the removal of grazing from income for local communities, whereas it was once one of the main sources of income in these communities.

Current Management (Alternative 2) – Under this alternative, income from livestock grazing would stay the same. Livestock grazing as proposed in this alternative would have no anticipated effects to disadvantaged communities with minority or low-income populations.

Costs to the Forest Service under this alternative would total approximately \$111,958 over the ten year term of the permit. These costs would result from trespass enforcement, monitoring, maintenance of current range improvements, and general range management. Estimated cost per allotment is listed in table 26 below.

Table 26. Forest Service Management Costs Under the Current Management Alternative by Allotment

Allotment	Cost
Alamo	-\$47,156.82
Bear Springs	-\$22,280.21
Bland	-\$22,724.33
Del Norte	-\$19,763.53

Cumulative Effects. Since no impacts on low-income or minority populations are expected to result from this alternative, approval of this alternative would not result in cumulative effects.

Proposed Action (Alternative 3) – Livestock grazing as proposed in this alternative would be similar to those in Current Management (Alternative 2).

Costs to the Forest Service under this alternative would total approximately \$135,282 over the ten year term of the permit. These costs would result from planning and construction of new permits, trespass enforcement, monitoring, materials for construction of new improvements, maintenance of current range improvements, and general range management. Estimated cost per allotment is listed in table 27 below.

Table 27. Forest Service Management Costs Under the Proposed Management Alternative by Allotment

Allotment	Cost
Alamo	-\$52,879.90
Bear Springs	-\$22,280.21
Bland	-\$22,724.33
Del Norte	-\$37,871.22

Cumulative Effects. Since no impacts on low-income or minority populations are expected to result from this alternative, approval of this alternative would not result in cumulative effects.

CONSULTATION AND COORDINATION

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

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Team Member	Position	Contribution/Role
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Derek Padilla	Jemez Ranger District Range Program Manager	Chapters 1 and 2, Soil analysis, and Vegetation analysis, Economic analysis
Mike Dechter	Jemez and Cuba Ranger District National Environmental Policy Act (NEPA) Coordinator	Writer/editor, project manager
Jo Wargo	Jemez Ranger District Wildlife Biologist	Wildlife analysis
Erica Nevins	Jemez and Cuba Ranger District Hydrology Specialist	Water resources analysis
Jennifer Boyd	Jemez, Cuba, and Coyote Ranger District Heritage Resource Specialist	Heritage Resources analysis
Sean Ferrell	Santa Fe National Forest Fisheries Biologist	Rio Grande cutthroat trout and Rio Grande chub analysis
Anne Karsian-Ferrell	Jemez Ranger District Recreation Program Manager	Recreation analysis

FEDERAL, STATE, AND LOCAL AGENCIES:

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 USDI Fish and Wildlife Service
 New Mexico State Historic Preservation Office
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TRIBES:

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 Pueblo of Santo Domingo

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REFERENCES

- Allen, C.D., R. Touchan, and T.W. Swetnam. 1995. Landscape-scale fire history studies support fire management action at Bandelier. *Park Science*, Summer 1995.
- Allen, C.D. 2002. Fire and Vegetation History of the Jemez Mountains. USGS Fort Collins Science Center, Jemez Mountains Fields Station, Los Alamos, NM.
- Allison, Christopher. 2005. Letter to Antonio Montoya regarding field visit and assessment of Peralta allotment conducted on October 13, 2005. New Mexico Range Improvement Task Force.
- Arno, S.F., M.G. Harrington, C.E. Fiedler, and C.E. Carlson. 1994. Using silviculture and prescribed fire to reduce fire hazard and improve health in Ponderosa pine forests. In: Close, K. and Bartlette, R. eds. *Fire management under fire (adapting to change)*; Proceedings of the 1994 Interior West Fire Council meeting and program, November 1994; Coeur d'Alene, ID.
- Belsky, A.J., A. Matzke, S. Uselman. 1999. Survey of livestock influences on stream and riparian ecosystems in the western United States. Published by *Journal of Soil and Water Conservation*, 1999, Vol. 54, pp. 419-431).
- Bohn, C., and J. Buckhouse. 1985. Coliforms as an indicator of water quality in wildland streams. *J. Soil and Water Cons.* 40:95-97.
- Bohn, Carolyn. 1986. Biological importance of streambank stability. *Rangelands*. 8(2): 55-56.
- Dickson, L. 2002. Northern Arizona University. Bird surveys, Virgin mesa and Lake Fork mesa. Jemez District files.
- Dietz, Harland E. 1989. Special Report: Grass: The stockman's crop, How to harvest more of it. Sunshine Unlimited, Inc. Lindsborg, KS.
- Elmore, W. and R. Beschta. 1987. Riparian areas: perceptions in management. *Rangelands* 9(6): 260-265.
- Fair, J. 2002, 2004. Breeding bird survey data for 1999, 2000, 2002, 2004, Vallecitos. Jemez District files.
- Ferrell, S. 2003. Personal communication re: fish and aquatic habitat. USFS Forest Fisheries Biologist, Jemez Springs.
- Ferrell, Sean and Derek Padilla. 2005a. Personal communication re: Peralta Allotment field trip. Jemez Ranger District: Jemez Springs, NM
- Ferrell, S. 2005b. Personal communication (email) re Rio Grande chub. January 13, 2005, Jemez Ranger District files, Jemez Springs, NM.
- Ferrell, S. 2005c. Rio Grande cutthroat trout (*Onchorhynchus clarki virginalis*). Specialist report for East Jemez 5 Allotments EA. Sean Ferrell, Santa Fe National Forest Fisheries Biologist. Santa Fe, NM.

Ferrell, Sean. 2005d. personal communication and Jemez 5 Effects Analysis. Forest Fisheries Biologist, Santa Fe National Forest.

Finch, D.M. 1992. Threatened, endangered, and vulnerable species of terrestrial vertebrates in the Rocky Mountain region. General Technical Report RM-215. Fort Collins, CO: US Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station.

Finch, D.M., J.L. Ganey, W. Yong, R.T. Kimball, and R. Sallabanks. 1997. Effects and interactions of fire, logging and grazing. *In*: Songbird Ecology in Southwestern Ponderosa Pine Forests: A Literature Review. USDA Forest Service. Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO GTR RM-GTR-292.

George, M. 1996. Creating awareness of clean water issues among private landowners. p. 96-100. *In*: W.D. Edge, S.L. Olson-Edge (eds.), Sustaining rangeland ecosystems. Oregon State Univ. Extension Service, Special Rep. 953: Corvallis, OR.

Holechek, Jerry L., Rex D. Piper, and Carlton H. Herbal. 1989. Range Management Principles and Practices. Prentice-Hall, Inc. Englewood Cliffs, NJ.

Holechek, Jerry L. and Dee Galt. 2000. Grazing Intensity Guidelines *in* Rangelands 22 (3). June 2000. pp 11-14.

Irving, R.B. 1954. Ecology of the cutthroat trout in Henry's Lake, Idaho. Transactions of the American Fisheries Society 84:275-296.

Johnson, J.A.; T.H. Johnson. 1985. The status of the spotted owl in northern New Mexico. Contract No. 516.6-73-03. Santa Fe, NM: New Mexico Department of Game and Fish. 39p.

Johnson, Lee. 2001. Personal communication with Santa Fe National Forest Biologist (former).

Johnson, M.A. 1996. Changed Southwest forests: Resource effects and management remedies. Presented at the Forest Ecology Working Group session at the SAF National Convention held in Albuquerque, NM, November 9-13, 1996.

Johnson, Terry. 1994. Peregrine falcon habitat management in National Forests in New Mexico. Jemez Ranger District files, Jemez Springs, NM.

Jones, Allison. 2000. Effects of Cattle Grazing on North American Arid Ecosystems: A Quantitative Review. Western North American Naturalist 60(2). pp. 155-164

Kotliar, T. 2002. USGS bird surveys in Viveash and Cerro Grande burn areas. Jemez District files.

Leyba, Patrick. 2005. Personal communication. Santa Fe National Forest Road and Infrastructure Manager. Santa Fe National Forest: Santa Fe, NM.

McDonald, C. B. 2002. Email re: Chiricahua dock. Jemez District files. Jemez Springs, NM

Miner, J., J. Buckhouse, and J.A. Moore, 1992. Evaluation of Off-Stream Water Source to Reduce Impact of Winter Fed Range Cattle on Stream Water Quality. Oregon State University, Corvallis, OR.

Morrison J.L. 1985. The distribution of the meadow jumping mouse, *Zapus hudsonius luteus*, in the Jemez Mountains, New Mexico. A report submitted to the New Mexico Department of Game and Fish.

Morrison, J.L. 1989. Status of the meadow jumping mouse in selected areas, Jemez Mountains. Jemez Ranger District files, Jemez Springs, NM.

Morrison, Joan L. Undated. The meadow jumping mouse in New Mexico: Habitat preferences and management recommendations. Managing wildlife in the Southwest Symposium. Jemez Ranger District files, Jemez Springs, NM

New Mexico Department of Game and Fish. 1995 and 1997. BISON-M (Biota Information System of New Mexico): Biological database for New Mexico. NMDGF in cooperation with USDI BLM, USDI FWS, USDI Bureau of Reclamation, US Army Corps of Engineers, USDA Forest Service and University of New Mexico.

New Mexico Department of Game and Fish. 1996-97. Jemez Mountain Elk Herd. Game Management Unit 6. Unpublished paper by R. J. Kirkpatrick. NMDG&F, Albuquerque, NM

New Mexico Department of Game and Fish. 1998. Handbook of threatened and endangered species of New Mexico. Santa Fe, NM.

New Mexico Department of Game and Fish. 2002. Elk Regional Management Information. Santa Fe, NM

New Mexico Game and Fish. 2002. Long-Range Management Plan for the Conservation of Rio Grande Cutthroat Trout. Santa Fe, NM.

New Mexico Department of Game and Fish. Jan. 2002b. Personal communication with R.J. Kirkpatrick, Game Biologist, Albuquerque, NM.

New Mexico Department of Game and Fish. June 2002c. Personal communication with R.J. Kirkpatrick, Game Biologist, Albuquerque, NM.

New Mexico Department of Game and Fish. 2004. Biota information system of New Mexico (BISON). Web site: <http://nmnhp.unm.edu/bisonm/bisonquery.php>

New Mexico Endemic Salamander Team. 2000. Cooperative management plan for the Jemez Mountains salamander (*Plethodon neomexicanus*) on lands administered by the Forest Service.

New Mexico Endemic Salamander Team. 2002. Consultation with team on Jemez Mountain Salamander Management.

New Mexico Environment Department, Surface Water Quality Bureau. 2004. 2004 State of New Mexico Integrated Clean Water Act §303(d)/§305(b) Report.

New Mexico Environment Department, Surface Water Quality Bureau. 2005. State of New Mexico Standards for Interstate and Intrastate Surface Waters 20.6.4 NMAC (as amended through July 17, 2005).

- Padilla, Derek. 2003. Personal communication. Jemez Ranger District Range Conservation Manager, Jemez Springs, NM
- Padilla, Derek. 2005. East Jemez 5 Range Capacity analysis Methodology. Unpublished. Santa Fe National Forest: Jemez Springs, NM.
- Painter, C. 2005. Personal communication. Chairperson, New Mexico Endemic Salamander Team, New Mexico Game & Fish Department: Santa Fe, NM.
- Patten, Kirk. 2005. Personal Communication with the Rio Grande cutthroat trout Biologist, New Mexico Game and Fish.
- Platts, William S. 1983. Those vital streambanks. *Western Wildlands*. 3(9): 7-10.
- Raish, Carol; McSweeney, Alice M. 2003. Economic, Social, and Cultural Aspects of Livestock Ranching on the Española and Canjilon Ranger Districts of the Santa Fe and Carson National Forests: A Pilot Study. Gen. Tech. Rep. RMRS-GTR-113. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 89 p.
- Sauer, J.R.; J.E. Hines; G. Gough; I. Thomas; and B.G. Peterjohn. 1997. The North American Breeding Bird Survey Results and Analysis. Version 96.4. Patuxent Wildlife Research Center, Laurel, MD.
- Sauer, J.R., J.E. Hines, and J. Fallon. 2001. The North American Breeding Bird Survey Results and Analysis. Patuxent Wildlife Center: Laurel, MD. Online: <http://www.mpr-pwrc.usgs.gov/bbs>
- Savinsky, R. 2002. Personal communication. New Mexico State Botanist, Santa Fe, NM.
- Schiffmiller, Gary. 2005. personal communication. Environmental Scientist/Fisheries Biologist, New Mexico Environment Department, Surface Water Quality Bureau.
- Simino, J. and S. Ferrell. 2001. East Fork Jemez River, Stream Inventory Report. Unpublished: Santa Fe National Forest, Jemez Ranger District.
- Smith, B.E. 2003. Conservation assessment for the northern leopard frog in the Black Hills National Forest, South Dakota and Wyoming. Department of Biology, Black Hills State University: Spearfish, SD.
- Travis, J. 2003. Yellow-billed cuckoo surveys – History, Distribution, Status. Share with Wildlife Newsletter. Issue 11, Fall 2003.
- Temple, L. and D. Weybright. 1995. Big game surveys: Valle Vidal Merriam's Turkey Studies. Final Report, 1 April 1989: NM W-093-R-36/Job 14/Segments 32-36. Santa Fe, NM: 28 p.
- USDA Forest Service. 1983. Departmental Regulation, 9500-4, Fish and Wildlife Policy. August 22, 1983. Washington, DC.
- USDA Forest Service. 1987. Environmental Impact Statement, Santa Fe National Forest Plan. Santa Fe National Forest: Santa Fe, NM.
- USDA Forest Service. 1990. National Forest Management Act, 36 CFR, Ch. 2 (7-1-90 edition, §219.27)

USDA Forest Service. 1992. Management recommendations for the northern goshawk in the southwestern United States. GTR RM-217. Rocky Mountain Research Station: Fort Collins, CO.

USDA Forest Service. 1993. Terrestrial Ecosystem Survey of the Santa Fe National Forest. Southwestern Region: Albuquerque, NM.

USDA Forest Service. 1996. Santa Fe National Forest Plan, as amended. Santa Fe National Forest: Santa Fe, NM.

USDA Forest Service. 1997. Birds of the Santa Fe National Forest. U.S. Government Printing Office: 1997-573-252/24077. Santa Fe National Forest: Santa Fe, NM.

USDA Forest Service. 1999. Regional Forester's sensitive species list. Southwestern Region: Albuquerque, NM.

USDA Forest Service. 2000. Forest Service Roadless Area Conservation Final Environmental Impact Statement Volume 2. p.113.

USDA Forest Service. 2001. Biological Assessment for the Wildland Urban Interface Fuel Treatment. Southwestern Region: Albuquerque, NM.

USDA Forest Service. 2002. Conservation Agreement for the Rio Grande cutthroat trout between and among New Mexico Department of Game and Fish, USDA Forest Service, and USDI Fish and Wildlife Service. Southwest Region, Albuquerque, NM.

USDA Forest Service. 2002a. Dome Wilderness bird surveys. Jemez District files, Jemez Springs, NM.

USDA Forest Service. 2002. Jemez Mountains Geographic Management Unit: populations of Rio Grande cutthroat trout. Unpublished: prepared by Sean Ferrell, Forest Fisheries Biologist, Santa Fe National Forest.

USDA Forest Service. 2002. Viveash Project, Management Indicator Assessment and Evaluation. Santa Fe National Forest: Santa Fe, NM.

USDA Forest Service. 2003. Santa Fe National Forest, Management Indicator Species Assessment, with Dec. 2004 update for the Rio Grande cutthroat trout. Santa Fe National Forest: Santa Fe, NM.

USDA Forest Service. 2003. Breeding bird surveys, Lake Fork Mesa and Sandoval Ridge. Unpublished. Jemez Ranger District files: Jemez Springs, NM

USDA Forest Service. 2004. Draft Environmental Impact Statement for the Invasive Plant Control on the Santa Fe National Forest. Santa Fe National Forest: Santa Fe, NM.

USDA Forest Service. 2004b. Federally Listed Threatened, Endangered, and Proposed Species (including designated and proposed critical habitat) found within National Forests in the USDA Forest Service Southwestern Region. January 6, 2004. Southwestern Region: Albuquerque, NM.

USDA Forest Service. 2005. Jemez Ranger District Threatened, Endangered and Sensitive Species maps and files. Jemez Springs, NM

USDA Forest Service. 2005. Framework for Streamlining Informal Consultation for Livestock Grazing Activities. USDA Forest Service Southwestern Region. March 15, 2005. U.S. Region 3 Office, Albuquerque, NM

USDA Forest Service. 2005. Santa Fe National Forest Fisheries Program Files. Jemez Springs, NM.

USDI, Fish and Wildlife Service. 1993. Rule to list the Mexican spotted owl as a threatened species. Federal Register, Volume 58, Number 49. March 16, 1993. Rules and Regulations: 50 CFR Part 17. RIN 1018-AB 56. Washington DC: US Department of Interior, Fish and Wildlife Service: 14248-14271.

USDI, Fish and Wildlife Service. 1995. Recovery Plan for the Mexican Spotted Owl (*Strix occidentalis lucida*): Volumes I and II. Albuquerque, NM: US Department of Interior, Fish and Wildlife Service. Volume I, 172 p. and Volume II 145 p.

USDI, Fish and Wildlife Service. 2001. Biological Opinion for the Wildland Urban Interface Fuel Treatment. USDI Region 2.

U.S. Environmental Protection Agency. 1995. National Water Quality Inventory, 1994 Report to Congress Executive Summary. Office of Water, Washington DC 20460.

Vavra, Martin, William A. Laycock and Rex D. Pieper. 1994. Ecological Implications of Livestock Herbivory in the West. Society for Range Management.

Williams, S. December 2002, personal communication. New Mexico Department of Game and Fish.

Yanicak, Steve. 2005. personal letter. Program Manager, New Mexico Environment Department, White Rock DOE Oversight Bureau.

APPENDIX 1: ABBREVIATIONS AND ACRONYMS

Abbreviation	Description or Definition
°C	Degrees Celsius
°F	Degrees Fahrenheit
ATV	All-terrain Vehicle
AUM	Animal Unit Month
BBS	Breeding bird survey
BISON	Biota Information of New Mexico
BLM	Bureau of Land Management
bs	Blue spruce
CFR	Code of Federal Regulations
cfu	Culture forming units
dbh	Diameter at breast height
df	Douglas fir
E. coli	Escherichia coli
EPA	Environmental Protection Agency
FR	Forest Road (or Forest System Road)
FSH	Forest Service Handbook
FSM	Forest Service Manual
GIS	Geographical Information System
HUC	Hydrologic Unit Code
INFRA	Infrastructure database
JMS	Jemez Mountain Salamander
Km	kilometer
MBF	Thousand board feet
MIS	Management Indicator Species
mL	Milliliter
MSO	Mexican spotted owl
NEPA	National Environmental Policy Act
NMGF	New Mexico Game and Fish Department
OHV	Off-highway Vehicle
P/J	Piñon-juniper
PAC	Protected activity center
PETS	Proposed, endangered, threatened, and sensitive species
pH	pH scale – expression of concentration of hydrogen ions
pp	Ponderosa pine
PSD	Prevention of significant deterioration
RGCT	Rio Grande cutthroat trout
RU	Recovery Units
SFNF	Santa Fe National Forest
tf	True fir (white fir)
TES	Terrestrial Ecosystem Survey
TR	Technical report
WUI	Wildland urban interface
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
USFS	United States Forest Service

