



United States
Department of
Agriculture

Forest
Service

Southwestern
Region



Livestock Grazing Management on the Tio Grande Allotment

Tres Piedras Ranger District Carson National Forest



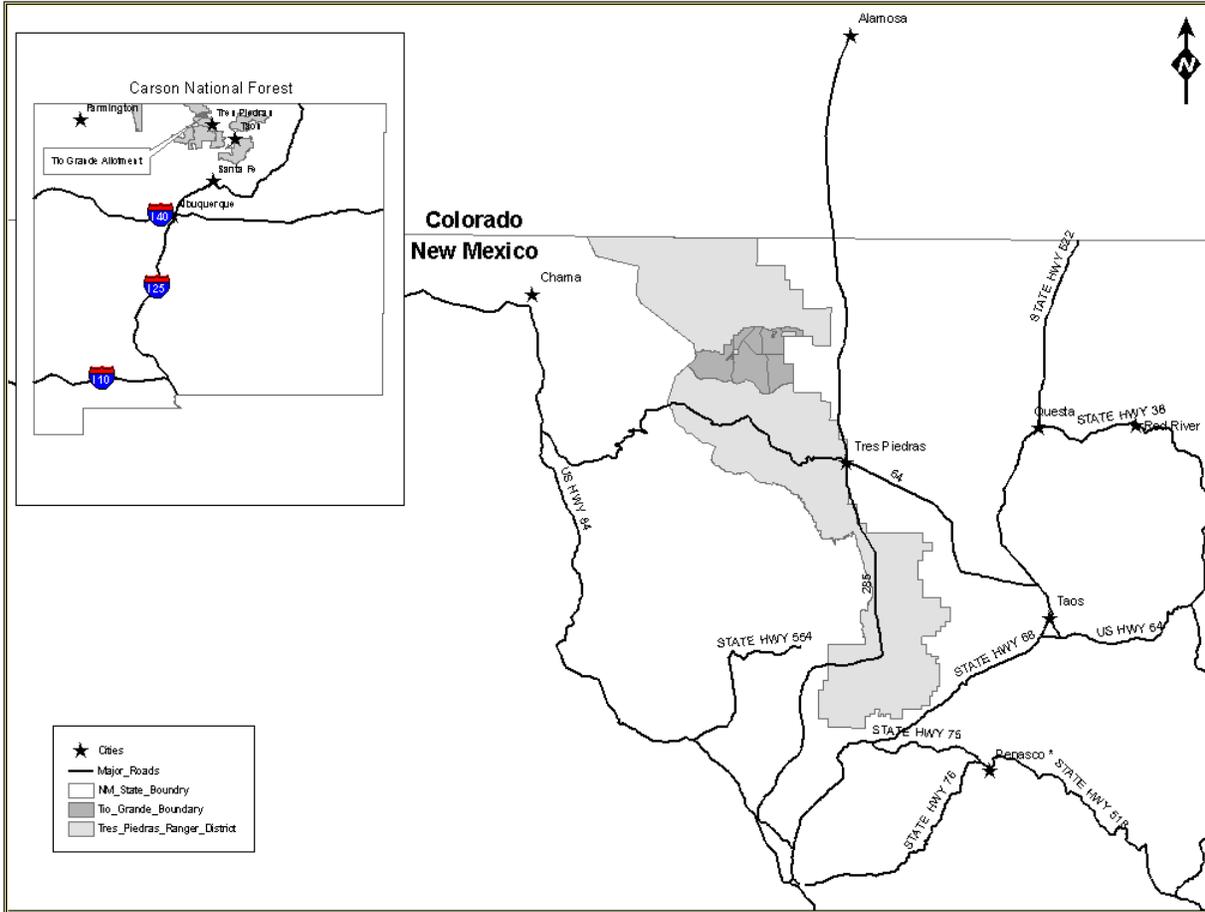


Figure 1. Project Vicinity Map

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Chapter 1 – Purpose and Need

This environmental assessment (EA) is being prepared to analyze the effects of re-authorizing livestock grazing on the Tio Grande Allotment, on the Tres Piedras Ranger District, Carson National Forest. An interdisciplinary analysis on the proposed action is documented in a project record. An index for the project record is presented in appendix A. Source documents from the project record are referenced throughout this environmental assessment by showing the document number in brackets [#]. This analysis is consistent with the Carson National Forest Land and Resource Management Plan (hereby Carson Forest Plan), as amended and was developed in consideration of the best available science. [4]

Background

The Tio Grande Grazing Allotment (31,774 acres) is located approximately 14 miles northwest of the community of Tres Piedras in northern New Mexico. A primary access is from State Highway 285 to Forest Road 87 (see figure 1 and 2). The allotment is within the Rio San Antonio/Rio Los Pinos; Rio Brazos; Rio Tusas/Rio Vallecitos; and Arroyo Aguaje de la Petaca/Rio Grande 5th order watersheds. Key perennial streams within the allotment include the Cañada de Tio Grande and Rio Nutrias (livestock use along the Rio San Antonio is limited to 2 watertrap sites). The allotment has been managed with a six pasture deferred rotation system. Those pastures are: Lucero Lakes, Placitas, Corral, Brokeoff, Tecolote and Tio Grande.

Analysis Area Description

The analysis area for the proposed action is the allotment boundary. The allotment contains both low elevation grasslands and upland meadows (approximately 53 percent is grasslands) that provide key forage for both livestock and wildlife. Less than 1 percent of the allotment is defined as riparian.¹

Allotment grazing capacity was reviewed and updated and indicates that of the total acreage, approximately 82 percent or 26,934 acres has grazable (full and potential²) acres. Currently, the allotment is managed for 988 cows/calves and 33 bulls. The grazing season is approximately 5 months (153 days). Each year, livestock are allowed to use up to 40 percent of the available forage beginning May 15, depending on the soil and forage conditions. All livestock are removed from the allotment on or before October 14, depending on climatic conditions or if utilization guidelines have been reached.

¹ What comprises riparian comes from the forest plan (Forest Plan, MA-14, pp. 1-2). Riparian includes intermittent drainages, perennial streams, wet meadows, bogs, seeps, ponds, rivers and lakes. These areas are located within terrestrial ecosystem units (TEU) 66, 67, 68 and 12 and account for approximately 360 acres of the allotment's total acreage.

² Full capacity grazable acres means the forage is on slopes ranging from 0% to 15% and 15% to 40% (accessible by livestock), there is available water, sufficient ground cover and soil stability. Potential capacity acres means there may be steep slopes (40% to 80%), impaired soil stability, a lack of water, a lack of access, or insufficient ground cover. If the vegetation is treated or managed, it may (in the future) provide full capacity forage (USDA Forest Service, Southwestern Region, 1997, Rangeland Analysis and Mgmt. Training Guide, Chapter 2, pp. 9-10).

Varying amounts of seasonal and annual precipitation (2002 was a drought year) and decreasing vegetation productivity has impacted the allotment's condition and trend and available forage. To respond to resource conditions, authorized use has been reduced from 9 to 55 percent since 1998. Although these reductions have occurred, *overall* allotment condition and trend has not yet improved to a satisfactory condition which is "good condition and a stable to upwards trend" (two pastures, Lucero Lakes and portions of Brokeoff, appear to be in good condition and in a stable to upwards trend).

Purpose and Need for Action

Livestock grazing on National Forest System lands has contributed to the local economy and the stability of southern Colorado and northern New Mexico communities for decades. On the Tio Grande Allotment, there is a need for forage availability to support domestic livestock and contribute to the economic diversity and social well being of surrounding communities that depend on range resources for their livelihood.

The allotment's riparian vegetation, found along perennial streams (e.g., Canada de Tio Grande and Rio Nutritas), lakes (Lucero Lakes), intermittent creeks and drainages provide a key habitat component for wildlife species on the forest. The perennial streams support populations of Rio Grande cutthroat (a USFWS candidate species and Forest Service sensitive species) and other resident trout (a forest management indicator species). To support these species, the desired condition is to have properly functioning stream habitat (e.g., suitable temperature, sediment and streambank conditions). The desired conditions for riparian habitats is to have a mix of native woody and herbaceous plants that provide shade, stabilize the streambanks and limit the amount of sediment that reaches the stream. Regeneration of riparian shrubs, such as willows, is also an important component of these systems.

Healthy plants of various age classes, good to excellent range condition and conservative grazing utilization (20 to 40 percent) provides food and cover for the prey base species of the (federally listed) Mexican spotted owl (MSO) and northern goshawk (Forest Service sensitive species). There is potential habitat along the lower reaches of the Canada de Tio Grande for the federally listed southwest willow flycatcher. Along the upper and lower reaches of Canada de Tio Grande and along portions of the Rio Nutritas, there is need for more vegetation diversity, less soil compaction and better riparian and stream function.

In low elevation grasslands and upland meadows that provide key forage for both livestock and wildlife, the desired condition for these foraging areas is a mix of palatable native cool season grasses (e.g., western wheatgrass, Arizona fescue and junegrass) and forbs, increased plant diversity and increased plant density. There is a need for vegetation that has both diversity and density to maintain soil stability and provides more reliable forage for both livestock and wildlife.

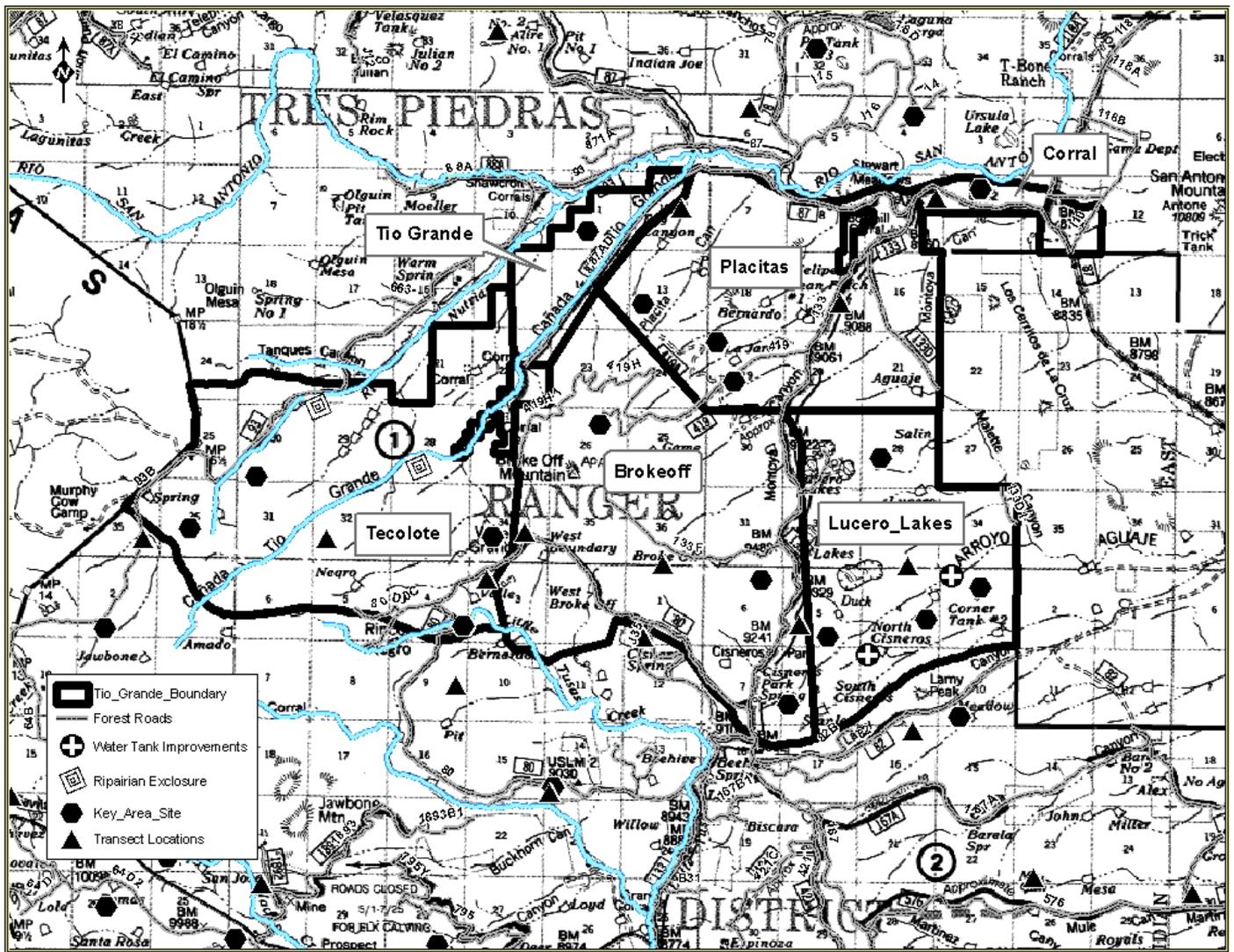


Figure 2. Tio Grande Allotment Proposed Action

Information Corrections

After the request for comments was sent out in May of 2008, some errors were found in the original proposed action. These errors have been corrected. They include: (1) Removing the Rio San Antonio from the riparian section of the purpose and need. Livestock use along the Rio San Antonio is limited to 2 watertrap sites. There are no other areas along the Rio San Antonio that are accessible to livestock. There is no need for change associated with these sites and, (2) The installation of 2 water tanks within 3 to 5 years was part of the proposal. Because there is some information lacking on the location for new water tanks in the Placitas and Lucero Lakes pasture, these 2 tanks have been removed from the proposal. They will be considered in cumulative effects as a reasonably foreseeable action that is analyzed with other watershed improvement projects.

In the scoping letter and the follow-up request for comments (30-day notice and comment period), the term AUM (animal unit month) in addition to numbers of cow/calf units was consistently used to describe livestock allocations. The use of the AUM term was causing confusion; therefore, this term has been removed from the EA (with one exception) and only the numbers of permitted livestock (expressed as cow/calf and bulls) is used. Grazing capacity, existing and proposed livestock numbers remain unchanged from this change in terminology. The AUM term is still used in the “Alternatives Considered but Eliminated from Detailed Study” section.

Proposed Action

The Forest Service proposes to authorize continued livestock grazing on the Tio Grande allotment (31,774 acres), with some modifications. The proposed action is designed to maintain or improve resource conditions in rangeland health, riparian vegetation, soil and water conditions relative to livestock grazing. Some grazing practices would be changed to resolve grazing related resource issues.³ The proposed action also includes adaptive management actions to be taken if resource conditions do not move toward desired conditions in an acceptable timeframe. Table 1 provides details on the Adaptive Management Plan that is part of the proposed action. Components of the proposed action are:

The permit would authorize between 660 cow/calf and 21 bulls and 988 cow/calf and 33 bulls. The lower number represents the stocking rate that has been authorized during past drought periods. The maximum number reflects the number of animals can supported once the desired conditions for vegetation, soils and water resources have been reached. It is likely that current conditions would not support this level of grazing. Through the Annual Operating Instructions (AOI), livestock numbers would be authorized at a lower level until such time as conditions improve.

The grazing period would be up to 153 days. The range of entry dates would be from May 15 to June 1 and the range of exit dates would from September 15 to October 14. The grazing period

³ Grazing management for the Tio Grande allotment is administered through annual operation instructions (AOI). Annual operation instructions are made part of the term grazing permit. The AOI is the instrument for the implementation of specific management actions on an annual basis to achieve resource management objectives.

within each pasture would be based on climate conditions, current growing conditions and the need for plant re-growth following grazing by all ungulates. Entry into Tecolote (upper Canada de Tio Grande) would not occur prior to June 22, to minimize disturbance to Rio Grande cutthroat trout spawning habitat. Grazing management would be a 4 pasture deferred rotation system (Lucero Lakes, Placitas, Brokeoff and Tecolote) and pastures may be rested as needed. At a minimum, the Tecolote pasture would be rested one in four years. In addition, the Tio Grande pasture would be used for trailing only, and the Corral pasture would have a limited number of cattle (150 head) and days (7 to 10 days) of use. A conservative grazing intensity with an allowable utilization range of 20 to 40 percent would be used, depending on the vegetation type and current range conditions.

Once surveys for Forest Service sensitive plant species, *Astragalus ripleyi* (milkvetch) are completed (July of 2008), and the extent of the population is known, the timing of livestock use may be adjusted if needed to maintain plant composition and diversity. For clarification, adaptive management actions for riparian, grasslands and upland meadows with the exception of new exclosures or fence reconstruction are planned to be implemented through the AOI beginning in Year 1.

Intensive Management Requirements to Reduce Livestock Concentration in Riparian:

The following herding requirements would be made part of the AOI:

- In Tio Grande and Tecolote pasture, trailway management and the livestock crossing permits would be modified along the Tio Grande and Rio Nutritas to move livestock through these areas to reduce the time spent in the riparian corridor,
- In Brokeoff pasture, livestock would be herded away from Cisneros Park and,
- In Lucero Lakes pasture, livestock would be herded away from riparian exclosures.

Monitoring

The adaptive management plan (table 1) would be used to move toward achieving both short and long term goals. Short-term monitoring would use grazing intensity and utilization guidelines to assess key area (upland meadow and riparian) use. Long term monitoring would consist of photographs, vegetation sampling, Parker 3-Step Transects and cover frequency. To gauge changes in long term trend (vigor and productivity), cover frequency baseline conditions would be established in year 1. Cover frequency would be read between year 3 and year 5 to gauge changes. When using Parkers transects, existing key areas would be monitored between years 3 and 5 to gauge changes in long term trend (vigor and productivity). To gauge improvement in plant percent composition in Mexican spotted owl (MSO) habitat, the same methods would be used in upland meadow key areas in these pastures: Tecolote and Brokeoff. If monitoring indicates conditions are not being achieved, an adaptive strategy would provide options for adjusting management decisions and actions throughout the life of the permit to meet desired conditions. For aquatics, the Canada de Tio Grande stream habitat inventory and report would be completed in 2010. In addition, the Tecolote pasture exclosure would be monitored annually, with a focus on fence condition. Fence condition would be evaluated prior to livestock going on allotment and when leaving allotment.

Table 1. Adaptive Management Plan

Pasture / Location	Desired Condition	Monitoring Measure	Trigger Indicating Additional Action Is Needed	Possible Grazing Management Actions, If Trigger Indicates Need
<p>Riparian Areas (upper and lower Canada de Tio Grande, Rio Nutritas, Lucero Lakes)</p>	<p>All riparian areas: Diverse riparian plant communities (60% of woody plant composition in 3 or more riparian species) provide overhanging vegetation and effective ground cover (not more than 10% bare ground within the riparian area) to help trap sediment and dissipate energy during peak flows, protect soils from erosion processes, maintain stream bank stability and provide wildlife habitat. Plant species include sedges, rushes, desirable riparian grasses (e.g., timothy, brome), woody shrubs (e.g., willows, elderberry) and trees (e.g., aspen, alder). At least 60% of the woody plant composition includes 3 or more riparian species. [FP MA-14]</p> <p>In upper and low Canada de Tio Grande and Rio Nutritas, new shrubs are establishing and are increasing in size and cover. Woody plants consist of 3 or more age classes. [FP MA-14] Age class structure in woody plant communities are at least 10% plant cover in sprouts, seedlings and saplings. It is likely there would be one size class for 5 years.</p> <p>Stream bank cover is increasing as new shrubs are established and improving desired riparian conditions. Desired riparian conditions provide quality aquatic</p>	<p>1) Diversity of grassland plant community-% of plant composition in cool season grasses within a timeframe</p>	<p>1) Given adequate (near normal) climate conditions, cannot meet at least 75% of plant composition in cool season grasses by year 4-5</p>	<p>*Add riders to control the amount of time livestock spend in riparian areas, while trailing or grazing in the pasture</p> <p>*Move livestock out of riparian areas on a daily basis to control the amount of time spent in these areas</p> <p>*Salt livestock away from riparian areas to improve distribution in less used areas of the pasture</p> <p>*Reduce livestock numbers within riparian areas</p> <p>*In upper Tio Grande, rest the upper section from Canada Tio Grande to Rio Nutritas one year out of every 2 to 3 years to promote riparian and stream channel recovery</p> <p>*Install a 15-acre enclosure fence along upper Tio Grande (Tecolote pasture), approximately 2 miles of fence on the west side of lower Tio Grande (Tio Grande pasture) and a 15 to 80 acre enclosure with a cattle guard along the Rio Nutritas (Tio Grande pasture).</p>
		<p>2) % woody species within a time frame</p>	<p>2) <15% woody species in 5 years.</p>	
		<p>3) % bare ground</p>	<p>3) > 10% to 15% bare ground in year 3</p>	
		<p>4) % utilization at the end of the summer from wildlife and livestock</p>	<p>4) >40% utilization for 2 consecutive years, within a 5-year period (<i>Monitor utilization throughout the grazing period</i>)</p>	
		<p>5) % of fine sediment in riffle habitat</p>	<p>5) % of sediment is moving towards exceeding 20% measured at 2 year intervals (2nd, 4th, 6th and 8th year)</p>	
		<p>6) Stream temperature</p>	<p>6)Temperature increases and does not comply with State of NM standard for cold water fisheries measured in 2 year intervals (2nd, 4th, 6th, 8th year)</p>	
		<p>7) Streambank condition</p>	<p>7) % of unstable banks is moving towards exceeding</p>	

Pasture / Location	Desired Condition	Monitoring Measure	Trigger Indicating Additional Action Is Needed	Possible Grazing Management Actions, If Trigger Indicates Need
	habitat for other resident trout and aquatic macroinvertebrates (forest management indicator species).		10% estimated in 2 year intervals (2 nd , 4 th , 6 th and 8 th)	
Grasslands and upland meadows for key MSO habitat (Tecolote and Brokeoff pastures)	Diverse low elevation grassland communities and upland meadows provide abundant forage for all ungulates, especially in the late-spring and early summer. In the low elevation grasslands, a mix of palatable cool season grasses (e.g., Thurber fescue, Arizona fescue, junegrass) and forbs dominate the plant community, with some evidence of woody species (e.g., willow, elderberry, red osier dogwood). Healthy, reproducing, cool season grasses emerge in the spring and offer nutritious forage for wildlife and livestock early in the growing season. Grasslands and upland meadows provide effective ground cover (5%-20% bare ground depending on soil type) to maintain soil stability and provide quality wildlife habitat, especially for elk, (a forest management indicator species) during the winter and spring. Grasslands and upland meadows also provide foraging habitat for Mexican spotted owl and northern goshawk prey base species.	1) Diversity of grassland plant community-70% plant composition in cool season grasses in Tecolote (TEU 133E) within a timeframe	1) Cannot meet at least 70% of plant composition in cool season grasses by year 3, 4 and 5	<p>*Delay livestock entry, to allow cool season grasses additional time for root growth, formation of basal buds, production of seed and food storage</p> <p>*Remove livestock from the allotment at an earlier exit date, to maintain native food and cover for wildlife species that depend on grasses and forbs for the winter</p> <p>*Reduce livestock numbers in both low and high elevation grasslands and montane meadows, to allow for growth</p> <p>*Install new water sources (additional environmental analysis is require to implement this action) and clean out existing water tanks to improve livestock distribution</p> <p>*Use prescribed fire to reduce woody plant species (Additional environmental analysis is required to implement this action)</p>
		2) % woody species in Tecolote (TEU 133E) within a time frame	2) >15% woody species by year 3, 4 and 5	
		3) % bare ground in Tecolote (TEU 133E) within a timeframe	3) >15% bare ground by year 3, 4 and 5	
		4) Percent (%) utilization at the end of the summer from wildlife and livestock	4) >40% utilization in 2 consecutive years, within a 5-year period (<i>Monitor utilization throughout the grazing period</i>)	

Forest Plan Consistency

The analysis area is within several forest plan management areas (MA) which includes MA 1, 3, 9-11, 13 and 14. The purpose and need for the proposed action focuses on moving towards the desired conditions for 3 key management areas, Riparian (MA 14), High Elevation Grasslands (MA 9) and Low Elevation Grasslands (MA 10). The proposed action is designed to maintain or improve resource conditions in rangeland health, riparian vegetation, soil and water conditions relative to livestock grazing (Scoping Letter, p. 1). [25] For riparian, the purpose and need was developed from forest plan direction (Forest Plan, pp. MA 14, pp. 1-2). The desired condition is to have properly functioning stream habitat (e.g., suitable temperature, sediment and streambank conditions) for terrestrial and aquatic species that include populations of Rio Grande cutthroat (a USFWS candidate species and Forest Service sensitive species) and other resident trout (forest management indicator species). For riparian habitats, the desired condition is to have a mix of native woody and herbaceous plants that provide shade, stabilize the streambanks and limit the amount of sediment that reaches the stream. Regeneration of riparian shrubs, such as willows, is also an important component of these systems.

The proposed action includes measures to move towards desired conditions for low and high elevation grasslands (Scoping Letter, pp. 1-5, 7). [25] For both low elevation grasslands (MA 10) and upland meadows (MA 9), the desired condition for these foraging areas is a mix of palatable native cool season grasses (e.g., western wheatgrass, Arizona fescue and junegrass) and forbs, increased plant diversity and increased plant density. This proposal is consistent with the goals and objectives outlined in the Carson Forest Plan and would help move the analysis area towards desired conditions described in the plan. [4]

Decision Framework

Given the purpose and need, the District Ranger (Responsible Official) for the Tres Piedras Ranger District will: (1) Determine whether livestock grazing will be authorized on all, part or none of the Tio Grande Allotment and, (2) If the decision is to authorize some level of livestock grazing, identify what management criteria will be applied (including standards, guidelines, grazing management system and monitoring) and incorporated in the allotment management plan to ensure desired condition objectives are met or movement occurs toward those objectives in an acceptable timeframe.

Public Involvement

The proposed action has been listed in the quarterly Carson National Forest NEPA Schedule of Proposed Actions since October, 2006. [10] As part of rangeland management consultation requirements (FSH 2209.13, chapter 90, pp. 7, 8, 14, 23, 28), the district and the permittees met on February 29, 2008, to discuss draft proposals. The permittee provided suggestions prior to the scoping period (Tio Grande Association, 2008). [21, 22] On May 21, 2008, the proposal was provided to the public, permit holders and other agencies. One letter responding to the scoping proposal was received. The range of comments (with permittee comments) includes the following concerns and opinions:

- The enclosure proposed for the Tecolote pasture may remove the ability to move cattle from east to west and maintenance of the enclosure proposed for Tecolote would be difficult and expensive.

- Locate potential sites where new tanks could be constructed to keep livestock out of the Canada de Tio Grande in Tecolote pasture.
- The proposal should include building a trail up to 20 feet in width in the Tecolote pasture with the use of heavy machinery to move livestock through the pasture away from the Canada de Tio Grande.
- The size of livestock has increased. This affects the amount of forage utilized. The size/class of livestock is a component in range management and needs to be built into a preferred alternative.
- The department is concerned the function of perennial streams is not being addressed. Cattle grazing can suppress or negatively affect Rio Grande cutthroat trout (RGct) populations by direct habitat degradation.
- The pure (genetic) population of RGct within the Tecolote pasture is of concern. The habitat associated with this area should be emphasized and monitored.
- The proposal should apply the adaptive management actions in the Tecolote pasture (in year 1) to protect RGct habitat.
- The proposal should include comply with the allowable use guide found in the forest plan. Pastures below good condition need to be deferred or rested in accordance with allowable use.
- The loss of critical habitat for sensitive and federally protected species is a concern.
- Over-utilization, the loss of cool season grass diversity, grazing headwater riparian zones and loss of functional watershed components are of concern.
- The proposal should include herding as part of the 10 year reauthorization to improve conditions, mitigate current overuse on some pastures and protect the wildlife projects in Lucero Lakes and Tio Grande Creek.
- The proposal should establish monitoring sites for cover frequency readings within these identified key areas as opposed to using established Parker transects.
- Reauthorize livestock grazing on dates to begin no sooner than June 1st.
- Under current stocking rates, vegetation conditions in montane meadows and riparian areas do not meet standards for utilization.

30-day Notice and Comment Period

On July 9 2008, a request for comments was mailed to 61 individuals, organizations, permit holders and other agencies. Information included the purpose and need for action, public involvement (including issues that resulted from scoping) and alternatives. A legal notice regarding the 30-day notice and comment period was published in *The Taos News* on July 10, 2008. [36] Four letters and 1 response submitted via e-mail were received. Western Watershed requested clarification on how utilization is measured (see chapter 3, pp. 21- 25), how many years of monitoring data is used for this analysis (see chapter 3, page 21) and where are key areas located (see figure 2). The Bureau of Land Management (BLM) noted that major changes in the season of use on any allotment (the 30-day notice and comment period was for 3 allotments, including Tio Grande) could affect management on the adjacent BLM allotments since there are permittees who use both BLM and FS allotments. [34] They were interested in receiving survey information on Ripley's milkvetch when it becomes available. The BLM also noted that the use of fire may be needed to improve vegetation conditions. The New Mexico Environment

Department stated that riparian areas along the Rio San Antonio, which is listed as impaired for temperature, needs protection to ensure cool water fisheries habitat is maintained (see Chapter 3, pp. 34-35). The Navajo Nation stated the project would not impact traditional cultural properties or historical properties. [50] No concern or comment resulted in the development of a new alternative. Most concerns and requests for clarification have been addressed in chapter 1 and in chapter 3. However, all public comments and our responses to these comments can be viewed on the forest website at: www.fs.fed.us/r3/carson/plans/nepa/tiogrande_allotment.

Issues

Comments received during scoping and the 30-day comment period were examined for significant issues. The Forest Service separates the issues into two groups: significant issues and non-significant issues. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council for Environmental Quality (CEQ) NEPA regulations require the following delineation in Sec. 1501.7, "...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)..." A list of issues from scoping comments and reasons regarding their categorization as non-significant may be found in the project record. Among the topics raised during scoping, the Forest Service identified the following significant issues:

Significant Issue #1: Perennial stream function. The function of perennial streams is not being addressed. Cattle grazing can suppress or negatively affect Rio Grande cutthroat trout (RGct) populations by direct habitat degradation. **Response:** Alternative 2 addresses the impact to RGct populations in terms of perennial stream functioning. Impacts to aquatic habitat and the Rio Grande cutthroat trout population in the Canada de Tio Grande and Rio Nutritas will be analyzed in the fisheries report. The indicators for habitat are percent sediment, stream temperature and percent streambank stability. For effects to RGct, the indicator is the effect to individuals and or populations.

Significant Issue #2: Rio Grande cutthroat trout populations in Canada de Tio Grande (Ticolote pasture). The pure (genetic) population of RGct within the Ticolote pasture is of concern. The habitat associated with this area should be emphasized and monitored. Adaptive management actions need to be applied to the Ticolote pasture (in year 1) to protect RGct habitat. **Response:** Alternative 2 addresses this issue. Impacts to aquatic habitat and the Rio Grande cutthroat trout population will be analyzed in the fisheries report. For stream habitat, the indicators are percent sediment, stream temperature and percent streambank stability. For effects to RGct, the indicator is the effect to individuals and or populations. Regarding adaptive management, adaptive management actions in year 1 has been added to the proposal.

Significant Issue #3: Loss of cool season grass diversity and loss of functional watershed components. Some areas are in fair condition with a downward trend. This is likely due to a loss of diversity and productivity of native cool season grasses. This illustrates the seasonal over-utilization by livestock. Reauthorize livestock grazing on dates to begin no sooner than June 1st to improve cool season grass diversity. Grazing in the grazing headwater riparian zones can result in a loss of watershed function. **Response:** Alternative 2 addresses this issue. Impacts to cool season grasses in terms of percent of plant composition in cool season grasses, percent woody species in

Tecolote (TEU 133E), percent bare ground in Tecolote (TEU 133E) and percent utilization will be an indicator of this effect and will be analyzed in the rangeland vegetation report. Alternative 2 addresses this suggestion by including a range of entry dates (from May 17 to June 1). Impacts to riparian habitat (in terms of percent plant community diversity, percent woody species, percent bare ground and percent utilization) and watershed function (indicators of watershed function are soil hydrology, soil stability and nutrient cycling) along the Canada de Tio Grande and Rio Nutritas will be an indicator of this effect and will be analyzed in the soils and water report.

Significant Issue #4: Loss of critical habitat for sensitive and federally protected species (Mexican spotted owl, northern goshawk, Rio Grande cutthroat trout). The proposal may result in a loss of critical habitat. **Response:** Alternative 2 addresses this issue. Impacts to habitat and sensitive and federally protected species will be evaluated in the wildlife and fisheries report. Foraging and nesting habitat affected and effect to individuals and/or populations will be the indicator for terrestrial wildlife. For fisheries, the indicator is the effect to individuals and or populations.

Chapter 2 - Alternatives

This section describes and compares the alternatives that will be considered for livestock grazing management on the Tio Grande Allotment.

Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by the National Environmental Policy Act (NEPA) to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the proposed action provided suggestions for alternative methods for achieving the purpose and need. Some of these alternatives may have been outside the scope of the need for maintaining or improving resource conditions in rangeland health, riparian vegetation, soil and water conditions relative to livestock grazing. Therefore, a number of alternatives were considered, but dismissed from detailed consideration for reasons summarized below.

An Alternative Which Includes Trail Construction in the Tecolote Pasture

This alternative was considered but eliminated because there was not enough time to complete field reconnaissance. Given the steep terrain, a new trail is likely to need tree removal and considerable ground disturbance in order for it to be durable and to be able to accommodate the trailing of 500 to 700 head of livestock. To reduce livestock concentration along the Canada de Tio Grande, the construction of a livestock trail may be considered and evaluated in a future and separate analysis for watershed (319 grants) improvement projects.

An Alternative which uses the Allowable Use Guide (Percent) By Range Condition and Management Strategy in Carson Forest Plan Amendment #11

Due to a court injunction (*Arizona Cattle Growers' Association v. Towns*, CIV No. 97-1868 PHX RCB) the Southwestern Region Regional Forester issued direction on June 5, 2000, terminating any use the "Allowable Use Guide (Percent) by Range Condition and Management Strategy" that is found in the Record of Decision for Amendment of Forest Plans for Arizona and New Mexico (USDA Forest Service, 1996, p. 94). The direction from the Regional Forester concludes, "In sum, the forage utilization table contained in the 1996 ROD may no longer be used to manage livestock grazing under pre-amendment permits. Please note that implementation and enforcement of the Court's injunction must be consistent throughout the Region and that therefore, the only allowable interpretation of the injunction is the interpretation contained in this letter." Although the allowable use guide is no longer in place, we are managing for light (20 percent) to conservative utilization (up to 40 percent) per FSM 2209.13, chapter 90, p. 12. Managing for light to conservative utilization translates into light being between 0 and 30 percent and conservative being between 31 and 40 percent.

An Alternative that Reduces Base Stocking Rates to Reflect Size/Class of Livestock Currently Raised by Permittees

The definition of an AUM that we have used is consistent with rangeland management policy (FSH 2209.15) and is the term used by the Society for Range Management and other rangeland management agencies, universities and professionals. The Forest Service's Washington Office recently addressed the stocking rate issue and concluded that when an allowable use level is reached on a key species or key area, the livestock are to be moved or removed. The response (to

an inquiry) states, “With this type of management, i.e. specifying allowable use on key species or key areas, the size of the livestock is not highly relevant. With larger animals and presumably a corresponding greater consumption rate, the allowable use level might be met sooner and the livestock moved off the pasture sooner than would occur with smaller animals. The stocking rate in this case becomes self regulating because management is based on meeting plant and other resource needs by meeting design criteria. There are other criteria being applied as well including seasonal restrictions, etc., all of which are designed to meet or move toward desired conditions (Forest Service, 2008)”. In order to be consistent with policy and the Carson Forest Plan FEIS (which includes the definition of an AUM (FEIS, p. 100)), we did not further address the stocking rate. [2] However, specific monitoring measures were developed for both riparian and grasslands (e.g. percent of plant composition in cool season grasses, percent woody species, percent bare ground, percent utilization) in addition to thresholds that will indicate when additional management is needed.

Alternatives Considered in Detail

Alternatives are used to evaluate different ways to resolve significant issues brought forth by the public during scoping (see previous section) and to satisfy the purpose and need for action. For this analysis, two alternatives have been considered in detail – the no action and the proposed action. The purpose and need for the proposed action, along with the significant issues serve as the objectives and framework around which alternatives are developed. In this analysis, the four significant issues identified at the end of the purpose and need section can be addressed by including by analyzing the effects in the proposed action and by making some minor additions and clarifications to the proposed action.

Alternative 1- No Action Alternative

This alternative is the “no action” alternative and is required by the Council on Environmental Quality for the implementation of NEPA (40 CFR Part 1502.14d). The no action alternative is the point of reference for evaluating action alternatives. Under the no action alternative, domestic livestock grazing would no longer be authorized on the Tio Grande allotment. The grazing permittee would be required to remove all cattle from the allotment and their permit would be cancelled. All maintenance of range facilities would revert to the Forest Service, where they would be evaluated for wildlife, watershed and soil protection needs. Allotment fences would not be removed, as they would be needed to prevent use by livestock from adjacent active allotments (San Antone, Tusas, Jawbone, Lagunitas, San Antonio Mountain.), BLM, state and private property. Under the no action alternative, the forest plan would continue to guide the management of the area.

Alternative 2- Proposed Action

This alternative is the proposed action as described in the Purpose and Need section with the addition of a riparian exclosure fence in the Tecolote pasture. This alternative would authorize:

- A range of 660 cow/calf and 21 bulls up to 988 cow/calf and 33 bulls for a period up to 153 days would be authorized. The lower number represents the livestock number that has been authorized during past drought periods. The maximum livestock number is the number that can be supported once the desired conditions for vegetation, soils and water resources have been reached.

- The range of entry dates would be from May 15 to June 1 and the range of exit dates would be from September 15 to October 14. Entry into the Tecolote pasture (upper Canada de Tio Grande) would not occur prior to June 22, to minimize disturbance to Rio Grande cutthroat trout spawning habitat.
- Grazing management would be a four pasture deferred rotation system (Lucero Lakes, Placitas, Brokeoff and Tecolote) and pastures may be rested as needed. At a minimum, the Tecolote pasture would be rested one in four years. The Tio Grande pasture would be used for trailing only; and the Corral pasture would have a limited number of cattle (150 head) and days (7 to 10 days) of use.
- A conservative grazing intensity with an allowable utilization range of 20 to 40 percent (depending on the vegetation type and current range conditions) would be used.
- Intensive management would be required and made part of the AOI in the Tio Grande, Tecolote, Brokeoff and Lucero Lakes pasture. Adaptive management actions (see table 1) such as reducing livestock numbers, adding riders and moving livestock out of riparian areas would become part of the annual operating instructions (AOI) and allotment management plan (AMP). Intensive management would begin in year 1.
- In the Tecolote pasture, a 15-acre riparian exclosure fence would be constructed beginning in year three. The fence would be of native material, three strand wire and would be of a lay-down type. The height would be approximately 56 inches to effectively keep cattle out of the riparian area. The fence would be constructed up to 300 feet from the Canada de Tio Grande perennial stream riparian zone.
- Once surveys for Forest Service sensitive plant species, *Astragalus ripleyi* (milkvetch) are completed and the extent of the population is known, the timing of livestock use would be adjusted, if needed, to maintain plant composition and diversity. However, the grazing system and season of use may already meet milkvetch needs.
- The use of adaptive management actions would be taken if resource conditions do not move toward desired conditions in an acceptable timeframe. Table 1 provides details on the adaptive management plan that is part of the proposed action.

Mitigation Measures

No additional mitigation measures were identified by resource specialists. Alternative 2 incorporated specialist recommendations.

Monitoring

The adaptive management plan (table 1) would be used to move toward achieving both short and long term goals. Short-term monitoring would use grazing intensity and utilization guidelines to assess key area (upland meadow and riparian) use. Long term monitoring would consist of photographs, vegetation sampling, Parker 3-Step Transects and cover frequency. To gauge changes in long term trend (vigor and productivity), cover frequency baseline conditions would be established in year 1. Cover frequency would be read between year three and year five to gauge changes. When using Parkers transects, existing key areas would be monitored between years three and five to gauge changes in long term trend (vigor and productivity). To gauge improvement in plant percent composition in Mexican spotted owl (MSO) habitat, the same methods would be used in upland meadow key areas in these pastures: Tecolote and Brokeoff. If monitoring indicates conditions are not being achieved, an adaptive strategy would provide

options for adjusting management decisions and actions throughout the life of the permit to meet desired conditions. For aquatics, the Canada de Tio Grande stream habitat inventory and report will be completed in 2010. In addition, the Tecolote pasture exclosure will be monitored annually, with a focus on fence condition. Fence condition will be evaluated prior to livestock going on the allotment and when leaving the allotment.

Table 2. Comparison of Alternatives

	Alternative 1	Alternative 2
Rangeland condition and trend	Improves to good and stable/upwards	Moves toward good and stable/upwards With poor precipitation, may take twice as long to reach desired conditions
Cool season grass diversity and density	Improves and moves toward desired conditions	Improves with increased opportunities for rest/growth, the rate of improvement dependent on precipitation
Stream habitat condition	Improves but other activities that affect sediment continue	Same as Alternative 1
Riparian habitat condition	Improves in both short and long term because plant density and cover increases	Maintained and slightly improved as impacts to riparian woody and herbaceous plants are better managed
Watershed condition	Improves within analysis area but does not change 5 th code watershed area due to minimal 3.1% affected	Maintained within analysis area but does not change 5 th code watershed area due to minimal 3.1% affected
Forage availability	N/A	Improved - Forage production increases and vigor improves in all pastures
Economic and social benefits	Adverse effect to lifestyle and culture	Overall maintained, but potential gross income likely to be affected in years of poor SPI and in years where resource conditions require shorter season of use
Threatened and Endangered species: Mexican spotted owl (MSO), southwestern willow flycatcher	Increased density of shrubs, forbs, and grasses improves MSO prey base habitat and riparian conditions Suitable southwestern willow flycatcher habitat improves	Improves the diversity and seasonal availability of forage (over time) to support a diversity of prey base species for MSO There would be no change that would result in owls leaving the area. For the flycatcher, existing suitable habitat is maintained. Improved condition of the uplands improves riparian habitat and facilitates restoration of the flycatcher habitat
Forest Service Sensitive terrestrial and aquatic species	Improved terrestrial habitat for riparian, predatory, and upland species Improved stream habitat conditions for aquatic species with no affect to individuals or their populations	Potentially impacts individual aquatic, riparian, predatory, and upland meadow species but no measurable negative effects to populations
Forest Service Sensitive plant species	Any risks related to trampling or grazing would be eliminated	Potential impact to individuals with no measurable negative effect to populations

	Alternative 1	Alternative 2
Forest Management Indicator Species (MIS)	Forestwide habitat or populations trends maintained	Same as Alternative 1
Mule deer and black bear	Increases forage and improves year-round habitat	Improved habitat conditions in the long term (increased cool season grass diversity)

Chapter 3 - Environmental Consequences

Chapter 3 summarizes the physical, biological, social and economic environments of the affected analysis area (analysis area) and the potential changes to these environments if the alternatives were implemented. Chapter 3 also presents the scientific and analytical basis for the comparison of alternatives, as presented in table 2 – Comparison of Alternatives in chapter 2. Chapter 3 complies with the implementing regulations (40 CFR 1500-1508) of the National Environmental Policy Act (NEPA) for analytic and concise environmental documents (40 CFR 1502.2). The project record (see Appendix A for the project record index) contains copies of the full reports for most of the resources analyzed.

Environmental resources could be affected in various ways during implementation of alternatives. The effect or impact is defined as any change or alteration in the environment's existing condition produced by the alternatives, either directly or indirectly. NEPA regulations (40 CFR 1508.27 (a)) refer to effects in terms of short and long term duration. For this analysis, short-term effects may be considered as occurring over a period of up to 5 years, while long-term effects are considered to be up to 10 years. Chapter 3 analyzes the environmental consequences of the proposed action and any alternatives to the proposed action. The analysis of effects for alternative 2 (proposed action) under each resource is described with the assumption that adaptive management will be used as needed.

Cumulative Effects

A cumulative effect is the effect on the environment that results from the incremental effect of the action when added to the effects of other past, present and reasonably foreseeable future actions, regardless of what agency or person undertakes the other actions and regardless of land ownership on which the other actions occur. An individual action when considered alone may not have a significant effect, but when its effects are considered in sum with the effects of other past, present and reasonably foreseeable future actions, the effects may be significant. Cumulative impacts are assessed in terms of how the proposed action would add to the past, present and reasonably foreseeable activities.

Past, present and reasonably foreseeable activities within the Tio Grande allotment boundary are listed in table 3. Other pertinent activities outside the allotment are also included. Completing the cumulative effects analysis required each specialist to choose those activities from the list that overlaps in time and space and location with each alternative. The specialist then analyzed the incremental effect of the alternative when the proposed action was added to these activities.

Table 3. Past, Present and Reasonably Foreseeable Actions

No.	Project or Activity Name	Activity or Project Type	Status	Affected Area (or acres)
Past, Present and Reasonably Foreseeable Activities within Tio Grande Allotment				
1	Water tank improvements	Enlargement of 2 water tanks	Foreseeable – 2009 – 2011	Lucero Lakes and Placitas pasture
2	Rangeland Improvements	Construction of new pit tanks, reconstruction of earth dams	Foreseeable – 2009 -2011	Final locations To Be Determined
3	Forest Road 87AD	Adjacent to the Canada de Tio Grande perennial stream	On-going	3.3 miles
4	Private property	Adjacent to the Canada de Tio Grande perennial stream	On-going	123 acres/1.5 stream miles
5	Forest Road 87	Adjacent to the Rio San Antonio perennial stream	On-going	1.4 stream miles
6	Forest Road 93	Adjacent to Rio Nutritas perennial stream	On-going	Approx.2 miles on the forest
7	Recreation use	Day use hiking and hunting	On-going	Brokeoff and Lucero Lakes pasture
8	Unauthorized motorized trails	ATV and 4WD	On-going	Brokeoff and Lucero Lakes pasture
9	Livestock trailway – lower Tio Grande pasture	Trailing to and from private lands crosses forest	On-going	40 head trail from FR87/FR87AA along FR87AA to private/FS boundary
10	Livestock trailway – Tecolote pasture	Trailing to and from private lands crosses forest and is adjacent to the Rio San Antonio perennial streams	On-going	1,600 head trail adjacent to the Rio Nutritas (along FR 93) in both spring and fall
11	Livestock crossing permit	Modified to limit or exclude trailing use in riparian areas	Foreseeable (2009 permit season)	Canada de Tio Grande, Rio Nutritas
12	Forest Travel Management	Potential changes in open roads	Foreseeable	9 of 47 miles may be closed in 2009
13	Continental Divide National Scenic Trail	Non-motorized trail	On-going	Approx. 2 miles
14	Riparian Enclosures	Lucero Lakes	On-going	4 enclosures/ 75 acres

No.	Project or Activity Name	Activity or Project Type	Status	Affected Area (or acres)
15	Water development improvements and repairs	Allotment-wide	Foreseeable - 2009-2011	Allotment-wide
16	Fish Barrier	The barrier on the Canada de Tio Grande (at Forest Service boundary) minimizes non-native fish access to the upper reaches of the Canada de Tio Grande	Existing – constructed in 1993	Approx. 4 miles of upper Canada de Tio Grande
17	Non native trout removals	Removal of brown trout to reduce competition with native Rio Grande cutthroat trout population	Mid to late 1980's to present	Approx. 4 miles of upper Canada de Tio Grande
Past, Present and Reasonably Foreseeable Activities outside Tio Grande Allotment				
17	Private land	Adjacent to the Rio Nutritas - sediment contribution from adjacent and upstream private land uses to the to the Rio Nutritas	Existing - upstream	1,790 acres
18	Fire Use Forest Plan Amendment	Potentially could allow for fire use district-wide	Foreseeable – 2009 analysis	Potentially district-wide
19	Lagunitas Prescribed Burn	Prescribed burn on adjacent allotment	Foreseeable – 2008-2013	1,200 acres

Rangeland Vegetation [51]

Two methods were used to determine condition and trend. The 2000 Parker 3-Step transects assisted in determining rangeland condition and apparent trend. These transects determined species composition, decreaseers, increaseers and invaders; scored vegetation rangeland condition and apparent rangeland trend; scored soil condition and apparent soil trend; evaluated grass vigor and cool season grass production; measured grass height and recorded cover. Long term trend is obtained by comparing transect apparent trend at the same location over a period of time. RAM data collected in 2006 was also used. RAM measures stubble height, species composition, cool season grass composition, desirable/undesirable grass/forbs/shrub composition (decreaseers, increaseers or invaders), short, mid and tall grass composition and cover, or production (pounds per acre). In 2006, the standard precipitation index (SPI) was near normal. Actual use and utilization data has been collected since 1996 (see rangeland vegetation report and *Principles of Obtaining and Interpreting Utilization Data on Rangelands* for more information). [51]

Within the six pastures, the rangeland vegetation condition is *Fair* and *Fair to Good*. Lucero Lakes pasture is *stable*. Corral and Brokeoff (the majority of) are *stable to upward*. The Placitas

and Tecolote pastures are *stable to downward* and are areas of concern that require more focused management prescriptions. Tio Grande pasture’s apparent trend is not-apparent to downward.

Range condition/apparent trend are affected by variations in annual and seasonal precipitation, use that comes from unauthorized (not permitted) livestock that come from private land or from other grazing allotments (excess use). Condition and trend is affected by high utilization levels, improper livestock distribution practices and the measured or assessed attributes described in the sections below.

The need for change was evaluated by comparing the existing data to the desired conditions found in the forest plan. The condition and trend data was then used to develop criteria in pastures that contain suitable MSO habitat (Brokeoff and Tecolote). Criteria were also developed for the other pastures. Criteria focused on diversity of grassland plant community, percent woody species and percent bare ground. Soil characteristics from the forest Terrestrial Ecosystem Survey (Carson 1987) was also used to classify soils throughout the allotment. Figure 1 displays the locations of the various soils units that are found in the table that compares existing and desired conditions (see table 4. Percent utilization by ungulates measured at the end of the growing season, although not measured by RAM, was summarized. Utilization data was used to evaluate compliance with Forest Service rangeland management policy guideline for conservative use. See the specialist report in the project record for detailed information on methodology. [51]

Table 4. Existing and Desired Conditions in Pastures with MSO Habitat

Pasture	TEU	Criteria Description	Existing Condition %	Desired Condition (DC) in %	Meets DC? Y(Yes)/ N(No)
Brokeoff	545	Diversity of grassland community (% cool season grass composition)	30%	50% or greater within 3, 4, 5 years	N
		Woody species composition	0%	Less than 15% by year 3,4,5	Y
		Bare ground	15%	Less than 15% by year 3, 4, 5	Y
		Utilization – measured at end of the growing season	Not Met	20% - 40% ⁴	N
Tecolote	545	Diversity of grassland community (% cool season grass composition)	28%	50% or greater with 3, 4, 5 years	N
		Woody species composition	0%	Less than 15% by year 3,4,5	Y
		Bare ground	17%	Less than 15% by year 3, 4, 5	N
		Utilization measured at end of the growing season	Not Met	20% – 40%	Y

⁴ 20-40% by ungulates measured at the end of the growing season

Brokeoff pasture summary: The desired conditions are being met with the exception of cool season grass composition (diversity) and utilization. In addition vigor is low.

Tecolote pasture summary: In this pasture the desired conditions are not being met for cool season grass composition (diversity), bare ground and utilization.. In addition, vigor is low.

Table 5. Existing and desired conditions in Corral, Placitas, Tio Grande and Lucero Lakes pastures

Pasture	TEU	Criteria Description	Existing Condition %	Desired Condition (DC) in %	Meets DC? Y(Yes)/ N(No)
Corral	650	Diversity of grassland community (% cool season grass composition)	56%	50% or greater within 3, 4, 5 years	Y
		Woody species composition	3%	Less than 15% by year 3,4,5	Y
		Bare ground	49%	Less than 15% by year 3, 4, 5	N
		Utilization – measured at end of the growing season	Met	20% - 40% ⁵	Y
Placitas	197E	Diversity of grassland community (% cool season grass composition)	31%	50% or greater with 3, 4, 5 years	N
		Woody species composition	6%	Less than 15% by year 3,4,5	Y
		Bare ground	22%	Less than 15% by year 3, 4, 5	N
		Utilization measured at end of the growing season	Met	20% – 40%	Y
Tio Grande	197E	Diversity of grassland community (% cool season grass composition)	76%	50% or greater with 3, 4, 5 years	Y
		Woody species composition	0%	Less than 15% by year 3,4,5	Y
		Bare ground	85%	Less than 15% by year 3, 4, 5	N
		Utilization measured at end of the growing season	Not Met	20% – 40%	N

⁵ 20-40% by ungulates measured at the end of the growing season

Pasture	TEU	Criteria Description	Existing Condition %	Desired Condition (DC) in %	Meets DC? Y(Yes)/ N(No)
Lucero Lakes	545	Diversity of grassland community (% cool season grass composition)	50%	50% or greater with 3, 4, 5 years	Y
		Woody species composition	2%	Less than 15% by year 3,4,5	Y
		Bare ground	14%	Less than 15% by year 3, 4, 5	Y
		Utilization measured at end of the growing season	Met	20% – 40%	Y

Corral pasture summary: The desired conditions for bare ground and utilization are not being met. In addition, vigor is low.

Placitas pasture summary: The data collected indicates that desired conditions are not being met for cool season grass composition (diversity) and bare ground. In addition, vigor is low. This may attributed to how the pasture has been used. Placitas has been the entry pasture in 5 of 11 years (1996 – 2006) because it typically produces annual cool season forage earlier than the other pastures. Consecutive entry affects the vigor by reducing the opportunity for cool season forage (western wheatgrass, Junegrass) to grow and by not providing complete rest during the cool season growth period. Cool season herbaceous plants may not be at high vigor, particularly during future SPI (Standard Precipitation Index) *Near Normal* to *Moderately Dry* years. In the past, the 1996 to 2006 period contained *Near Normal* to *Moderately Dry* years. This resulted in the existing condition when combined with consecutive livestock entry.

Tio Grande pasture summary: The 2006 data indicates that all desired conditions are being met with the exception of bare ground. However, vigor is low.

Lucero Lakes pasture summary: All desired conditions are currently being met.

Environmental Consequences

Significant issues addressed in this analysis:

Significant Issue #3: Loss of cool season grass diversity and loss of functional watershed components. Some areas are in fair condition with a downward trend. This is likely due to a loss of diversity and productivity of native cool season grasses. This illustrates the seasonal over-utilization by livestock. Reauthorize livestock grazing on dates to begin no sooner than June 1st to improve cool season grass diversity. Grazing in the grazing headwater riparian zones can result in a loss of watershed function.

Measures used to evaluate effects: Impacts to cool season grasses in terms of percent of plant composition in cool season grasses, percent woody species in Tecolote (TEU 133E), percent bare ground in Tecolote (TEU 133E) and percent utilization is the indicator used to evaluate effects.

Alternative 1

In alternative 1, there would be positive changes to the vegetative community, vegetative ground cover and desirable herbage. This would assist in establishing fair to good vegetation condition and stable to upward rangeland trend for vegetation and soils. Removing cattle grazing from the allotment would result in a substantial increase of herbage leaf and root volume being retained within the key area sites (in all pastures). This herbage volume would accumulate over time and would be re-incorporated into the surface soil layer as humus or organic matter. This increased organic matter would increase the amount of ground cover, offer protection to the soil surface from erosion by water or wind and improve the soil surface, soil aggregation and structure. In terms meeting desired conditions, the diversity of species, percent of bare ground and percent woody species would move towards desired conditions.

Under alternative 1, there would be a limited short term (up to 5 years) effect on the current diversity of the vegetative resources in comparison to the long term. This is because improvement occurs slowly over time. In the long term (up to 10 years), the frequency of occurrence of the desirable species and herbage cover would improve as reproduction and seedling establishment improves. The seeded areas of crested wheatgrass in the Placitas and Corral pastures were once community types that were converted. The grasses are currently reverting to native species and this would continue. This would change the current diversity from seeded wheatgrass to a more diverse native species composition.

Surface water yields would show a decrease, due to more groundcover accumulation. Surface water-runoff events may decline in severity, as the increase in groundcover occurs. Within drainages, sediment production would decrease because of the greater amounts of ground cover or organic matter in the uplands and adjacent areas. The ground cover assists in reducing wind and water erosion or surface water velocity, as well as, improving the soil's water holding capacity. Increases in vegetation growth, standing vegetative matter and groundcover would improve soil productivity and reduce erosion. Allowing grass and forbs to complete their full life cycle without grazing by livestock would increase seed production, seedling establishment and new herbage production for a period of time. However, "it has been known for sometime that certain degrees of defoliation can increase plant productivity. Some species show an initial increase in plant growth as grazing intensity increased up to an optimum level. Some species are extremely susceptible to grazing and might be injured by light levels of grazing. Other species may not be influenced until grazing has reached a given level and then they are affected detrimentally (Holechek et. al. 2001)."

Alternative 2

Effects Common to all Pastures

Climate: With different climate conditions such as near normal, the ability for moving to good condition and stable/upwards long term trend may fluctuate on an annual basis even with management adjustments such as reducing livestock numbers or days. It may take twice as long for progress toward desired conditions if the average annual SPI is moderately dry. This is

because when plants are stressed they are not producing the volume and mass (vigor is low). This then results in negative progress in terms of moving towards the desired conditions.

Grazing System: There may be years of pasture nonuse or rest. Periodic scheduled annual rest for each pasture (Brokeoff, Tecolote, Lucero Lakes and Placitas) within the proposed deferred/rest-rotation system may be equivalent to 12 to 14.5 months of rest and the opportunity-to-grow, depending on the watershed, vegetation and climate conditions. It would also provide substantial potential to increase the desirable herbaceous ground cover.

Best management practices: BMPs that include supplemental feeding and herding away from intermittent drainages, Cisneros Park in the Brokeoff pasture, water sources and riparian areas would continue. Limiting the number of days grazed each year under a deferred rotation to the allowable use level would provide for conservative utilization or intensity, lower frequency of use and more opportunity to grow for cool season grass species.

Stocking Rates: This alternative would continue to authorize annual livestock numbers below the estimated grazing capacity for livestock that were estimated from the production data, entry/exit dates, forage allocation method, allowable use method (actual use/utilization summary). The AOI livestock numbers may be less than the range permitted to reflect annual resource and climatic conditions. Grazing at lower than permitted numbers would assist in meeting the desired condition

Brokeoff and Tecolote pasture

In the Brokeoff pasture, condition and rangeland long term trend would improve in the short term with normal to above normal climate conditions. The 10-year grazing system (deferred/rest rotation) provides for grazing after approximately June 15 in one of four years; grazing after August 3 in one of four years and grazing after July 14 in two of four years.

Within Brokeoff, the designated crossing permit trail route would continue to be authorized. However, it would minimally affect condition and trend. It is similar to the use that would be expected from wildlife (elk).

In the Tecolote pasture, condition and rangeland long term trend would also improve in the short term with normal to above normal climate conditions. The 10-year grazing system (deferred/rest rotation) provides for grazing Tecolote after June 22 (in 3 of 4 years); but also providing scheduled pasture rest in one of four years (see riparian section for effects of the 15-acre enclosure to be constructed in year three). There is also a designated crossing permit trail route within Tecolote, where 1500 to 1600 c/c, heifers and bulls trail in the spring and then again in the fall. The continuation of this use would minimally affect condition and trend.

Entry Pastures - Placitas, Lucero Lakes

In the Placitas pasture key area, sites with existing *Fair* vegetation condition with stable to downward long term trend would be *Good* within 6 to 10 years at normal to above normal climate conditions (SPI - Moderately Wet). An entry pasture rotation of one in two years would allow increased annual cool season rest and a longer opportunity for cool season herbage to grow within the pastures that are not entered first. A periodic scheduled pasture rest would allow complete annual production rest from cattle grazing when unauthorized and excess use does not occur. In terms of meeting criteria (percent cool season grass diversity, percent woody, percent bare ground), there would be a positive change (2 to 7 percent) from the existing condition in the 6 to

10 year period. The percentage range was based on review of past transect data and the expected annual variation measured over a 5 year period. The production would increase moderately and vigor would be moderate to high. The designated crossing permit trail route would continue to be authorized. The effects are the same as noted above for the Brokeoff and Tecolote pastures. This use would minimally affect condition and trend.

In the Lucero Lakes pasture, key area sites with existing *Fair* vegetation condition with stable long term trend would be *Good* within 6 to 10 years at normal to above normal climate conditions (SPI - Moderately We). An entry pasture rotation of one in two years would allow increased annual cool season rest and a longer opportunity for cool season herbage to grow within the pastures that are not entered first. However, because Lucero Lakes is typically range ready May 20 to June 6, a later entry than May 15 would require the Association to prepare additional plans to feed or pasture or lease pasture during the interim. During the 10-year permit, a periodic pasture rest would allow complete annual production rest from cattle grazing when unauthorized and excess use does not occur in the pasture. The impacts of trailing from the crossing permits is the same as described above.

Corral and Tio Grande pastures

In the Corral pasture, key area sites with existing *Fair* vegetation condition with stable to upward long term trend would be *Good* within 1 to 5 years at normal to above normal climate conditions (SPI - Moderately Wet). In terms of meeting criteria (percent cool season grass diversity, percent woody, percent bare ground), the expected improvement is the same as described for Placitas (see above). This pasture would be managed by limiting the period-of-use to the entry or exit period, limiting the number of days to 7 to 10 days and limiting the number of cattle (to less than 150 cow/calf). These limits would result in the improvement of livestock distribution and the lower level of utilization within the stock tank area. The impacts of trailing from the crossing permits is the same as described above.

In the Tio Grande pasture, key area sites with existing *Fair* vegetation condition with not-apparent to downward apparent trend would be *Good* within 6 to 10 years at normal to above normal climate conditions (SPI - Moderately Wet). In terms of meeting criteria, the expected change is the same as described above for the Placitas and Corral pasture. This pasture would be managed by allowing only cattle trailing use and not Association cattle grazing during the authorized season. The rest from cattle grazing would benefit the riparian area that is potential habitat for the southwestern willow flycatcher. The scheduled annual rest for the pasture (except for the cattle trailing use) would provide for resting the complete cool or warm season growth periods, as well as, providing substantial potential to increase the desirable herbaceous ground cover.

Cumulative Effects

Past, current and future activities within the allotment analysis area considered for cumulative effects includes livestock crossing permits, range improvement projects, forest road maintenance, forest road closures, private agriculture, hunting and recreational pursuits (see table 3).

Under alternative 1, within the allotment boundary, the cumulative impacts to riparian and upland rangeland condition from private agriculture and private grazing (1.17 percent) would be similar to those stated under the effects section. As vegetation succession progresses over time, the forage species composition, frequency, density and cover would change within the allotment analysis

area and watershed boundary. These changes would mostly occur in areas that adjoin spruce, white fir, Douglas fir, ponderosa pine and gambel oak. As described in the above sections, these changes would be also be occurring in addition to the positive benefits from alternative 1 during the short term and long term (and even well beyond the 10 year duration)

Under alternative 2, the listed activities (private land, forest roads, projects, cattle crossing permits, recreational trails) within the affected areas of the allotment analysis area, represents a relatively low amount of acres (376) or is 1.2 percent of the allotment. At this level of scale within the analysis area, the listed activities, proposed action and natural succession changes would result in localized changes in range condition and trend, livestock distribution, utilization levels or pattern of use within the next five years. The cumulative effects from the listed activities would be similar to the effects described in the above alternative 2 effects section. In the long term, because of the relatively limited amount of pasture acreage receiving benefits, improving herbage forage capacity would not increase permitted livestock numbers, number of days or the period-of-use from existing levels as a result of the specific actions/activities. In alternative 2, approximately, 0.1 to 0.3 percent of the full capacity acres openings in some soil units (TEUs) that are adjacent to woody species would be reduced annually. Also, woody species would re-dominate some of the sites and reduce the herbaceous ground cover. Grazing capacity would be lower and authorized annual livestock numbers would be reduced. Future forest health treatments that would increase or positively impact herbage volume are not a listed activity. Presently, these areas of past activities either require maintenance vegetation treatments or require newly prescribed vegetation treatments (due to woody species re-dominance).

Soils and Watershed [41]

Soil Condition and Productivity

Soil condition is an evaluation of soil quality based on an interpretation of factors which affect three primary soil functions. The primary soil functions evaluated are soil hydrology, soil stability and nutrient cycling. Maintaining productive soils and a healthy watershed are recognized as the basic ecosystem indicators. Livestock grazing can affect these soil functions through alteration of the vegetative community, removal of plant material and organic matter inputs, physical compaction of the soil surface by trampling and other effects that are important to maintenance of long term soil productivity.

Data from the Carson National Forest TES survey (Edwards et al, 1987) was used and an initial determination of soil stability (see figure 3 for soils units (TEU) that are within the allotment). [5] Approximately 91 percent (29,003 ac.) of the allotment is in satisfactory soil condition and 9 percent (2,771 ac.) is considered to be impaired. There are no acres that are in satisfactory condition.

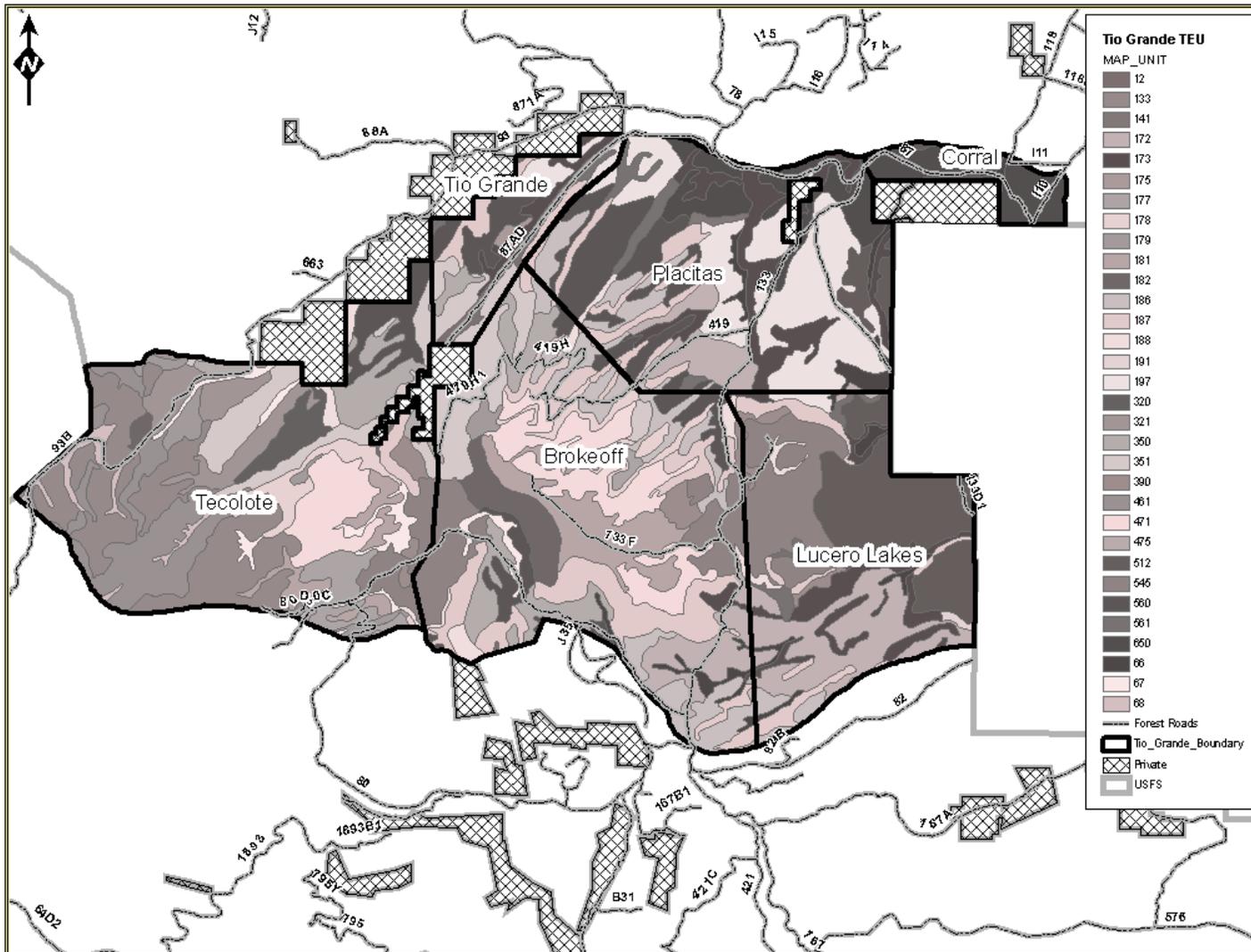


Figure 3. Tio Grande Allotment Soil Units (TEU)

Water Resources

The Tio Grande analysis area is within the Arroyo Aguaje de la Petaca-Rio Grande (equates to 4 percent of the allotment), Rio San Antonio-Rio Los Pinos (equates to 8 percent of the allotment), Rio Tusas-Rio Vallecitos (equates to 1 percent of the allotment) and the Rio Brazos (0.2 percent of the allotment) fifth-order watersheds (HUC 5th 1302010108) (Rio Grande – HUC 13020101). The allotment is 3.1 percent of the total watershed acreage. In terms of watershed condition, the analysis area is in a Class II condition. This means that there is reduced herbage to protect the soil surface and resist soil erosion, reduced surface organic matter, and reduced vegetation cover. This negatively impacts infiltration and surface runoff and results in reduced soil surface stability in plant interspaces and in stabilizing agents. Ground cover, litter and bare ground are not at the levels expected for the ecological sites.

Water Quality

There is one impaired stream segment in the allotment: the Rio San Antonio from Montoya Canyon to its headwaters. This segment is not supporting high quality aquatic life. The probable source of impairment is a loss of riparian habitat, grazing and stream bank modification/destabilization. The impairment is measured with temperature (State of New Mexico 2006-2008).

Riparian

The allotment contains approximately 360 riparian acres; 1.1 percent of the allotment acreage; 360 acres have 0 percent grazable acres (no livestock grazing is authorized on these acres). In addition, there are 856 acres of upland montane meadow.

The perennial streams on the allotment are: Aguaje de la Petaca Arroyo in Lucero Lakes pasture, Canada Tio Grande in Tio Grande/Tecolote pastures, Rio Nutritas/headwaters in Tecolote pasture, Rio Nutritas (Tio Grande pasture water gap only), Rio San Antonio (a majority of the Rio San Antonio is within Stewart Meadows which is excluded from the allotment. There is a watergap in the Placitas pasture along the Rio San Antonio. Ephemeral and intermittent streams are Placitas Canyon in Placitas pasture, Montoya Canyon in Brokeoff pasture and Aguaje de la Petaca Arroyo in Lucero Lakes pasture.

Riparian conditions have been monitored since 1999 in several key areas. Whether the 4 inch stubble height guideline is met in riparian (measured at the end of the growing season) was documented: In summary: (1) Arroyo Aguaje de la Petaca segment in the Lucero Lakes pasture was met in 2006. Riparian stubble height was not measured at this location from 1999 to 2005, (2) The Canada de Tio Grande segment in the Tio Grande pasture met the guideline four out of eight years and, (3) the Rio Nutritas segment in the Tecolote pasture met the guideline one out of four years. The guideline began to be measured in 2003.

Riparian conditions were also determined by evaluating Riparian Area Survey and Evaluation System (RASES) transects conducted between 1988 and 1991. These transects document many stream channel, aquatic ecosystem and riparian community attributes, as well as, evaluate riparian condition against the Desired Future Condition statements outlined in the Management Area Prescriptions (Mgmt. Area 14 – Riparian) of the forest plan. They measure: (1) percent shade over water (desired condition (DC) is 80 percent), (2) percent bank protection (DC is 80 percent), (3) percent Substrate Free of Inorganic Sediment (DC is 85 percent), (4) percent Shade over Land

Surface (DC is 60 percent) and (5) percent Woody Plant Composition in Riparian Species (DC is 60 percent)

Eight RASES transects were located in various reaches for Canada Tio Grande, Rio Nutritas and Arroyo Aguaje de la Petaca (see specialist report for more information on transects). The desired condition for: (1) percent shade over water was not met in the 8 transect locations, (2) percent bank protection was met in four of eight transects, (3) percent substrate free of inorganic sediment was met in three of eight transects, (4) percent shade over land surfaces was met in one of eight transect locations and (5) percent woody plant composition in riparian species was not met in any transect location. In comparing the RASES transects with the 2006 riparian field assessments:

- Percent shade over water has possibly remained the same or changed in a positive direction for four of four locations.
- Percent bank protection has possibly remained the same or changed in a positive direction for two of four locations.
- Percent bank protection has possibly changed in a negative direction for two of four locations.

The riparian field assessments determined that grazing activities and other uses (hunting, dispersed recreation use) are currently impacting riparian areas within the allotment analysis area. Impacts observed include:

- Stream bank trampling and bank shearing which result in channel widening, sediment inputs, decreased streamside cover and increased solar exposure (increased water temperature) ;
- Trailing along and across riparian areas and channels,
- Grazing of woody riparian vegetation, notably remnant willows in small intermittent and interrupted perennial stream segments,
- Development of headcuts along stream channels and
- Compaction of surface soil layers, as determined by the presence of platy soil structure

From the assessments of riparian areas within the analysis area, it is estimated that approximately 4.5 percent (16.18 acres) of the total land area within riparian corridors (360 acres) are being negatively impacted by current grazing management. There was limited field observation or assessments on 39.5 riparian acres or 11 percent of the 360 acres. Approximately 41 percent of the assessed riparian area (39.5 acres) is being negatively impacted by the current grazing management.

Floodplains and Municipal Watersheds

As viewed on the Federal Emergency Management Agency (FEMA) Flood Maps, the analysis area is completely within the forest boundary and is designated as Zone X (Un-mapped) by FEMA on the Flood Maps (FEMA 1989). Only base floodplains occur in the analysis area. Executive Order 11988 requires federal agencies to "...reduce the risk of flood loss, minimize the impacts of floods on human safety, health and welfare and restore and preserve the beneficial values served by floodplains..." The floodplain area has not been reduced due to adjacent development or occupation within the national forest system portion of the analysis area.

There are no management activities in the proposed action that relate to the development or occupation of the floodplains and the 1986 EIS for the forest plan (Carson 1986) did not identify any municipal watersheds on the Forest. Floodplains and municipal watersheds will not be discussed further. [2]

Wetlands

Within the analysis area, wetlands, in the form of intermittent wet meadows, are associated with the drainage network and may be found in areas of TEU map unit 12, 67 and 68, but areas typically do not have the soil and water characteristics necessary to be classified as wetlands. In addition, the low precipitation that the area receives does not make the soils conducive for creating a wetland (see figure 3 for TEU locations).

Soils and Watershed Environmental Consequences

Significant issues addressed in this analysis:

Significant Issue #3: Loss of cool season grass diversity and loss of functional watershed components. Some areas are in fair condition with a downward trend. This is likely due to a loss of diversity and productivity of native cool season grasses. This illustrates the seasonal over-utilization by livestock. Reauthorize livestock grazing on dates to begin no sooner than June 1st to improve cool season grass diversity. Grazing in the grazing headwater riparian zones can result in a loss of watershed function.

Measures used to evaluate effects: Impacts to cool season grasses in terms of percent of plant composition in cool season grasses, percent woody species in Tecolote (TEU 133E), percent bare ground in Tecolote (TEU 133E) and percent utilization was the indicator used in the rangeland vegetation effects analysis. Impacts to riparian habitat (in terms of percent plant community diversity, percent woody species, percent bare ground and percent utilization) and watershed function (indicators of watershed function are soil hydrology, soil stability and nutrient cycling) along the Canada de Tio Grande and Rio Nutritas are indicators used in this section.

Alternative 1

Soil Condition and Productivity

Positive vegetative changes would affect soil and watershed conditions in a positive manner by: 1) retention of existing vegetative biomass on-site; 2) increasing the amount of re-incorporation of this biomass into surface litter and soil organic matter; 3) providing for increased levels of surface soil cover; 4) improving surface soil aggregation and structure from increased organic inputs; 5) increasing protection from water and wind erosion and; 6) increasing levels of fine fuel loads over the allotment areas. The increased biomass would also result in maintaining the amount of nutrients returned to the soil. This would enhance the productivity, fertility and water holding and release functions of the soil resource. The impacts of continued wildlife grazing on seed production and seedling establishment would continue. The effects detailed above would positively improve and enhance the overall productivity of the soil resource and enhance hydrologic function by improving the ability of the soil to accept, store and transmit water to surface water courses.

Water Quality

Water quality would be expected to be maintained or improved slightly over the short and long term during the implementation of this alternative. The current status of water quality and full attainment of State of New Mexico designated uses of surface water would be expected to continue. The assessed areas not in full attainment of the designated uses of surface water would be expected to move towards the objective of full attainment in the next 10 years. The listed probable source of impairment is the loss of riparian habitat, rangeland grazing and streambank modification/destabilization, habitat modification-other than hydromodification or recreational pollution sources. However, private land uses (agriculture, irrigation, livestock grazing) adjacent to the watershed areas would continue to directly impact impairment status.

Riparian

Riparian vegetation condition would be expected to improve, both short and long term, as woody/herbaceous plants increased in density and cover. Within the various intermittent streams that contain segments of herbage vegetation, stream channel shading may not measurably increase or lower surface water temperatures during the summer season. Within the intermittent channel's localized riparian areas of woody species, the limited increase in woody riparian vegetation would also provide deep root mass to adjacent bank areas. The ability of these infrequent riparian areas to mitigate flood flows, filter sediment and store and release stream flow may also be enhanced. This may result in a localized improvement to the watershed condition and water quality as sediment generated by other existing land uses and topographic features may be more effectively processed, filtered and reduced in these limited riparian areas.

Watershed Condition

Watershed condition would be expected to improve in areas of the minimal livestock use, in the long term, as impacts currently occurring (trampling of intermittent stream banks, bank shearing and associated sediment inputs) would be reduced in these areas in the short term and recovery of these impacted areas progressed over the long term. Watershed condition within the entire 5th code watershed area would not be expected to change from the current condition as this alternative would only directly affect approximately 3.1 percent of the total watershed area.

Alternative 2

Soil Condition and Productivity

The grazing of livestock would be expected to affect soil and water resources in a manner similar to the existing conditions described in this report. The level of vegetative biomass accumulation would be maintained at current levels. No additional organic matter contributions would be expected to occur, no increase in vegetative ground cover would occur and the level of nutrients returned to the soil would remain unchanged. Requiring the adjustment of livestock numbers, entry and exit dates, duration, and pasture rotation would maintain current conditions of soils throughout the allotment areas. Annual precipitation levels and vegetative response to that precipitation would be a key factor in this adaptive approach.

Water Quality

Water quality would be expected to be maintained over the short and long term by implementing this alternative. The status of water quality and full attainment of State of NM designated uses of surface water would be expected to continue (refer to specialist report for detailed information on

stream status). Private land uses adjacent to the various reaches within the rivers (Rio San Antonio, Rio Nutritas, and Canada Tio Grande) directly impacts impairment status in addition to FS authorized grazing. Additional measures to decrease impacts to the riparian vegetation and intermittent stream channels within the analysis area include proper stocking levels, adherence to the AOI, on-the-ground oversight and management by the permittees).

Riparian

The riparian vegetation condition would be expected to be maintained or slightly improve over the long term, as grazing continues and measurable impacts to the riparian woody and herbaceous plants are adaptively managed. The ability of these riparian areas to store and release stream flow as well as filter sediment from sediment generating activities and features (roads, OHV use, gathering forest products and recreational use) would continue to slightly improve in the long term.

Watershed Condition

Watershed condition within the allotment analysis area would be expected to remain in its current condition, as the limited impacts currently occurring (trampling of intermittent stream banks, bank shearing and sediment inputs) would continue to affect these areas in the short term. In the long term, similar limited impacts would continue to occur. Watershed condition within the entire 5th code watershed area would not be expected to change from the current condition as this alternative would only directly affect approximately 3.1 percent of the total watershed area.

Cumulative Effects

Past, current and future activities within the four fifth-code watersheds include livestock grazing, earthen stock tank developments, water developments, prescribed burns, fuelwood gathering and sales, timber stand improvement, thinning, pile burning, gravel pits, utility corridors, regional landfill site, forest road maintenance, mechanical vegetation treatments, hunting and recreational pursuits. These activities would result in greater long term positive effects to the watershed condition.

Under alternative 1, permitted grazing outside of the analysis area would still continue. Impacts (direct, indirect and cumulative) associated with this activity are minimal within the State of NM designated uses of surface water that are fully supporting in the watersheds as described in the water quality section.

Within the watersheds that contain the designation of not supporting uses and are impaired, under alternative 2, as a result of adaptive management implementation, the direct and indirect negative impacts to the watersheds from livestock grazing would be minimal. Within the analysis area there are no proposed projects that would directly impact the watersheds and measurably increase the production of sediment and silt. The on-going activities occurring on private land within the watershed areas directly impacts the total maximum daily load. Private activities such as agriculture, irrigation and livestock grazing, directly causes sedimentation and siltation that resulted in the assessment designation of not supporting coldwater and warmwater aquatic life.

Under alternative 2, cumulative effects would be dependant on the success of the adaptive management approach outlined for grazing management activities. The adaptive approach would allow for adjustments to stocking levels, length of grazing, timing of grazing, etc. to account for and respond to annual changes in forage abundance and water availability.

In alternative 2, future range improvement projects would contribute to an improved condition within the watershed. Negative effects to the soil resource from trailing across the allotment or congregation of animals at or near water sources will continue under the grazing alternatives. Although naturally occurring erosion and woody species encroachment would continue, considering the past, present and foreseeable actions, there would be no significant cumulative actions. Cumulative water quality and water yields would show immeasurable change from current levels. Surface water runoff duration would remain at around current levels. Ground cover would be maintained or improved from current levels. There are TES map units with levels of severe sheet and rill erosion-hazard with no vegetative cover.

In both alternatives, OHV and dispersed recreation uses would continue, resulting in a minor level of cumulative effect as this use is typically associated with or in near proximity to surface water flows. District-wide forest product uses would continue within the watersheds, mostly in the form of vigas, latillas, and personal use fire wood gathering. These activities are small in size, located in coniferous forest or aspen cover types and associated with roads that provide access to the products. The effects of this type of activity ranges from none to minor in extent and do provide limited increases in herbaceous vegetation if forest canopy is opened. The Travel Management policy would prescribe the locations for harvested products since the designated roads (map) would limit area accessibility.

Air [41]

Currently, the annual management instructions for the allotment include livestock trailing, livestock herding within pastures, or livestock gathering for movement between pastures and allotment exit (as required by the pasture rotation schedule). These activities (along with the permittee periodically driving along the native and fill surfaced roadways) are activities that could result in effects to air quality, either from vehicular emissions or dust production. These effects are typically short term and localized in their nature.

Comparison of Alternatives

In alternative 1, air quality would remain static, as dust and particulates originating from vehicle/trailer use, herding and other activities generated by grazing permittees would cease within the local area of impact. Other localized impacts to air quality would continue however, as the remaining dust generating activities (road use for recreational and other forest product uses) would continue. In alternative 2, air quality would be expected to remain static from the existing condition, as dust and particulates originating from vehicles/trailers, herding and other activities by permittees would continue, along with the continuation of other dust generating activities (road use for recreational and other forest product uses).

Wildlife (Terrestrial and Aquatic) and Plants [52]

Federally Listed Threatened and Endangered Species

Proposed, threatened and endangered species are managed under the authority of the Federal Endangered Species Act (ESA), (PL 93-205, as amended in 1973) and the National Forest Management Act (PL 94-588). The ESA requires federal agencies to ensure that all actions, which they “authorize, fund or carry out”, are not likely to jeopardize the continued existence of any T&E species. The black-footed ferret, Interior least tern and Rio Grande silvery minnow did not

warrant further analysis because habitat was not present or the forest was not within the range of the species (see fisheries and wildlife reports for additional information). [45, 52]

Significant Issues addressed in this analysis:

Significant Issue #4: Loss of critical habitat for sensitive and federally protected species (Mexican spotted owl, northern goshawk, Rio Grande cutthroat trout). The proposal may result in a loss of critical habitat.

Measure used to evaluate effects: Impacts to habitat and sensitive and federally protected species will be evaluated in the wildlife and fisheries report. Foraging and nesting habitat affected and effect to individuals and/or populations will be the indicator for terrestrial wildlife. For fisheries, the indicator is the effect to individuals and or populations.

Mexican spotted owl – (*Strix occidentalis lucida*) – Threatened

There are no critical habitat units for Mexican spotted owl (MSO) on the Tres Piedras Ranger District. Within the analysis area there is no Protected Activity Centers (PACs) or administratively reserved lands. There are approximately 694 acres of protected habitat and the majority of the most suitable protected habitat is located on the Tecolote and Brokeoff pastures. There are approximately 6,126 acres of restricted habitat with the majority of the most suitable restricted habitat is located on the Tecolote and Brokeoff pastures. The MSO suitable riparian habitat is found in TEU 66, 67 and 68 is found (see figure 3 for TEU locations). Due to the availability, quantity and quality of suitable habitat present within the Brokeoff and Tecolote pastures, these pastures may provide habitat for up one breeding pair of owls.

Formal surveys following Regional protocol methodologies for the presence of this species have occurred on large portions of the forest since 1989. No MSO have been documented on the Tres Piedras Ranger District. The closest and most recent formal surveys were conducted in 2002 and 2003 for the Maquinita Ecosystem Health project. Approximately 7,867 acres of protocol surveys were conducted and yielded negative results for Mexican spotted owls (there is no overlap between the Maquinita project boundary and the Tio Grande allotment boundary). Even though no MSO have not been located within or adjacent to the allotment, the assumption is made that MSO occupy the allotment based on the presence of suitable habitat since this area has not been surveyed within the last 10 years.

Criteria Used to Measure Effects

To accommodate the needs of the owl and its prey, the goal is to maintain the following range/forage criteria on the Tecolote and Brokeoff pastures of the Tio Grande allotment. The purpose of establishing these criteria to ensure allowable use of plant species to maintain or improve plant diversity, density, vigor and regeneration over time to support MSO prey species.

Criterion 1: Upland meadow/grasslands

- 1.1. Diversity of grassland plant community equal to 50 percent plant composition in cool season grasses within 5 years.
- 1.2. Less than 15 percent woody species in upland meadows by year three, four and five.
- 1.3. Less than 15 percent bare ground in upland meadow by year three, four and five.

1.4. Within 20 to 40 percent utilization at the end of the summer from wildlife and livestock.

Criterion 2: Vegetation long term trend of good to excellent range conditions in upland meadows and riparian areas adjacent to restricted and protected habitat

Criterion 3: Promote natural and healthy riparian plant communities

1.1. More than 15 percent woody species where potential exists within 5 years.

1.2. Less than 10 to 15 percent bare ground by year three.

1.3. Within 20 to 40 percent utilization at the end of the summer from wildlife and livestock.

Environmental Consequences:

Alternative 1

In this alternative there would be an increase in density of the vegetative species such as shrubs, forbs and grasses. The increased growth of these various vegetative species would result in plant diversity, cover and a variety of plant heights that equates to good to excellent range conditions, thus improve the habitat for prey base species for the MSO. Criterion 1-3 would be met in 10 years.

Alternative 2

Grazing management would include annual operating instructions (AOI'S). The AOI would include adjustments to livestock numbers, entry and exit dates, number of days and grazing system. These adjustments would reflect annual resource or climatic conditions and assist in making progress towards meeting criterion 1 through 3.

Grazing activities would not directly remove nesting or roosting structural habitat characteristics required. Overall canopy cover and forest structure would not change since livestock would not affect tree composition. Grazing activities are not anticipated to reduce the herbaceous ground cover to the point where there is a decreased potential of a low-intensity ground fire, therefore increasing the potential for a destructive high-intensity vertical fire that would negatively affect MSO nesting and roosting habitat.

The proposed livestock grazing is not anticipated to limit the diversity and seasonal availability of forage to support a diversity of prey species. Grazing is anticipated to assist in increasing forage diversity and season availability over time.

To accommodate the needs of the owl and its prey species, "key grazing areas" are to be maintained in good to excellent range conditions. The implementation of the proposed activities and monitoring plan would assist in meeting adequate range conditions. Ensuring adequate residual cover during the growing season provides cover for MSO prey base. Again, it would be a goal to maintain forage utilization at conservative use levels within the open meadows and riparian habitat found on the pastures. This monitoring would be especially important in pastures that are grazed during the late spring and early summer months when avian species are rearing young and require a higher level of prey species.

Tecolote pasture would be rested one out of four years. This would be implemented in year one. In the long term, the upland meadow/grassland, criterion 1.1 would be met and result in improved vegetation recovery and provide better forage diversity for prey species.

Range readiness to determine the entry dates on the Placitas and Lucero Lakes pasture would translate to later entries of livestock to the MSO pastures (Tecolote and Brokeoff). Later entry dates in these pastures would allow a higher percentage of cool season grasses to seed out. Grasses would respond to additional cool growing season rest by increasing root and leaf volume, annual production, seedling establishment, reproduction and vigor. Criterion 1.1 would be met. Overall, this would allow for greater forage diversity and cool season seed sources in the long and short term for Mexican spotted prey base species.

The proposed grazing system would result in improved livestock utilization and range conditions allotment wide. This would include improving these measures on the Brokeoff and Tecolote pastures, where suitable MSO habitat is found.

In the short and long term, as cool season herbage increases due to entry pasture management and pasture get rest (grazing system), livestock would be grazing slight use areas more often than during previous years, as well as, heavy use areas less often and would generate a more uniform pattern of use that would make progress towards meeting the utilization objectives. Slight to moderate positive impacts to the utilization level within the key areas would occur because of the flexible management grazing system, growing season rest and season of use. In the long term, conservative livestock grazing of 30 to 40 percent allowable utilization on the allotment including the Tecolote and Brokeoff pastures would expedite attaining good to excellent range conditions. Criterion 1.4 would be met for upland meadows.

Long term range condition trends would also be expected to stabilize and begin to showing indicators to moving upward. In riparian areas (Canada Tio Grande and Rio Nutritas), riparian woody and bare ground management requirement are currently being met. With the conservative utilization proposed in riparian, all management requirements for a healthy riparian conditions would be met, maintained and/or improved and this would support prey base species diversity for owls.

The adaptive management actions that would be implemented in the short and long term are expected to improve livestock utilization the upland meadows of the Tecolote and Brokeoff pastures. In the long term, this would contribute to greater diversity of grass species and less percentages of bare ground in these areas. These conditions would be favorable for Mexican spotted owl prey base species. Criterion 1 through 3 would be met.

Southwestern willow flycatcher (*Empidonax traillii extimus*) – Endangered

Riparian habitat includes the Rio Nutritas and the Canada Tio Grande. Suitable habitat for the flycatcher is found within the Stewart Meadows Complex (Rio San Antonio). Potential habitat is found on the Lower Canada Tio Grande. There are no critical habitat units for the flycatcher on the Tres Piedras Ranger District.

No formal protocol surveys for southwestern willow flycatcher have been conducted within or adjacent to the Tio Grande grazing allotment. However, on the adjacent Wheatgrass pasture (San Antone Allotment), the 2006 Stewart Meadows Bird survey redetected one southwestern willow flycatcher (Besser 2006). No breeding pairs have been confirmed within the Stewart Meadows

Complex. Even though no protocol survey have been conducted on or adjacent to the allotment, for this analysis the assumption is made that southwestern willow flycatchers occupy the Stewart Meadows complex based on the present of suitable habitat.

There are approximately 87 acres of suitable habitat within Stewart Meadows Complex (Wheatgrass pasture of the San Antone Allotment) which mostly consists of willow and alder. This habitat is just north and adjacent to the Placitas pasture (see Appendix D in the wildlife report). Over the last 12 years, after the installation of an enclosure and management to exclude livestock from the riparian in Stewart Meadows, there has been an overall improvement of the riparian habitat. Currently, this habitat consists of dense riparian vegetation needed for flycatcher nesting. The percent of woody species and percent of bare ground are currently being met. No permitted livestock grazing occurs within the Stewart Meadows Complex; therefore the utilization of palatable perennial grasses and streambank criteria is being met.

Another notable habitat can be found along lower section of the Canada Tio Grande that is approximately 2.0 mile in length. This area is within the Tio Grande pasture. Approximately 52 acres of potential habitat occurs within this riparian. Although alders and willows are present within this habitat, they are less dense and scattered. Currently this habitat is considered unsuitable to support Southwestern willow flycatchers.

Within the uplands and watersheds or portions of the watersheds of the Placitas, Tio Grande, Brokeoff and Tecolote pastures that are associated with the Stewart Meadows and the Lower Canada Tio Grande, livestock utilization levels have varied throughout the last 10 years. Currently, these four pastures are areas of concern because they have not met the utilization guidelines consistently for the last 10 years.

Criteria to Measure Effects

To accommodate the needs of the southwestern willow flycatcher (SWFF), the goal is to maintain existing southwestern willow flycatcher habitats and attempt to rehabilitate and maintain uplands and watersheds in conditions that will facilitate restoration of southwestern willow flycatcher riparian habitat. The follow criteria were developed to facilitate this management direction. These management criteria are consistent with Table 2, Appendix G of the 2002 USFWS Southwestern Willow Flycatcher Final Recovery Plan (USDI 2002) and the March 15, 2005 guidance criteria for streamlining informal consultation under.

Criterion 1: No grazing in occupied restorable or regenerating habitat during growing season and non-growing season. This criterion applies to the Stewart Meadow complex adjacent to the Corral and Placitas pasture. No livestock grazing during the growing and non growing season to allow plants to recover on their own.

Criterion 2: Within the potential SWWF habitat found along approximately 2.0 of the lower Canada Tio Grande, conservative grazing with average utilization not to exceed 35 percent of palatable, perennial grasses and glasslike plants in uplands and riparian habitats and extent of alterable stream banks showing damage from livestock use not to exceed 10 percent. Woody utilization in this habitat is not to exceed 40 percent on average.

Criterion 3: In uplands (occupied & unoccupied) for any season of use: Average utilization of palatable, perennial grasses and grass-like plants not to exceed 30 to 40 percent. Use stubble height guidelines: 3 inches for short grass, 6 inches for midgrass, and 12 inches for tall grass.

Determine monitoring species prior to grazing. This criterion applies to upland meadows and watersheds associated with the Stewart Meadows Complex suitable habitat.

Environmental Consequences:

Alternative 1

It is anticipated that there would be an increase in density of shrub and herbaceous plant in the uplands to improve riparian condition within suitable southwestern willow flycatcher habitat. All management criteria would be met with the implementation of this alternative.

Alternative 2

The AOI would include adjustments to livestock numbers, entry and exit dates, number of days and grazing system. These adjustments would reflect annual resource or climatic conditions and assist in making progress towards meeting criterion 1 through 3.

In suitable habitat, permitted livestock are currently excluded from the Stewart Meadows Complex via a fence enclosure, therefore direct disturbance is reduced. However, trespass livestock from the allotment could pose a threat to disturbing flycatchers and degrading the riparian habitat. With mitigation, the potential for disturbance and riparian habitat degradation should be minimized. Because grazing would not occur within the complex during the growing and non growing season, plants would be allowed to recover. This area would continue to provide suitable habitat for the southwestern willow flycatcher. Criterion 1 would be met with the continual exclusion of cattle within the Stewart Meadow Complex year round.

Within the Stewart Meadows Complex, the proposed action could result in continued presents of livestock that could facilitate brood parasitism by the brown-headed cowbird (U.S. Fish and Wildlife Service 1995a). However, brown-headed cowbirds have already moved in to both areas already and the removal of cattle would likely not change this current use.

In the short term and long term, the proposed action would allow cool season herbage to increase due to entry pasture management and pasture rest rotation (grazing system), livestock would be grazing slight use areas more often than during previous periods, as well as, heavy use areas less often and would generate a more uniform pattern of use that would make progress towards meeting the utilization objectives. Slight to moderate positive impacts to the utilization level within the key areas would occur because of the flexible management grazing system, growing season rest and season of use. In the long term, conservative livestock grazing of 20 to 40 percent allowable utilization in the Tio Grande, Placitas, Tecolote and Brokeoff pastures. Criteria 3 would be met for upland meadows and watersheds associated at the Lower Canada Tio Grande and Stewart Meadows suitable habitats. Meeting criterion 3 would rehabilitate and maintain uplands and improve watersheds conditions that would facilitate restoration of southwestern willow flycatcher riparian habitat.

In the potential riparian habitat such as the 2.0 mile section Lower Canada Tio Grande, not all attributes of criteria are currently being met. The proposed conservative grazing intensity with an allowable utilization of 20 to 40 percent and the proposal of the Tio Grande pasture used for trailing only would assist in meeting the attributes. Within this section of potential habitat, alterable stream banks showing damage from livestock use would not to exceed 10 percent and woody utilization would not to exceed 40 percent (on average). In the long term, this riparian

habitat would begin improve to result in providing the key riparian habitat attributes needed by the southwestern willow flycatcher. Criterion 2 would be met.

The adaptive management actions that would be implemented in the short and long term (see table 1) are expected to improve livestock utilization within the Upper and Lower Canada Tio Grande and Rio Nutritas riparian areas. In the long term, this would contribute to improve watershed conditions associated with suitable habitats. These conditions would be favorable for maintaining and restoring southwestern willow flycatcher riparian. Criterion 3 would be met. The actions in both the short and long term are expected to improve livestock utilization the upland meadows of the Tio Grande, Tecolote, Placitas and Brokeoff pastures. In the long term, this would contribute to desirable utilization levels to rehabilitate and maintain uplands and watersheds in conditions that will facilitate restoration of southwestern willow flycatcher riparian habitat. Criterion 3 would be met

Forest Service Sensitive Species

There are 47 species on the Regional Forester's Sensitive Species list that potentially occur on the Carson National Forest. Reference was made to the Carson National Forest TEP&S list, dated 3/05/2008 was used to determine which species are located on the Tres Piedras Ranger District. [52]

No further analysis was warranted on these species: American peregrine falcon, New Mexican jumping mouse, small-head golden-weed, Arizona willow, western boreal toad, yellow-billed cuckoo, pika, yellow-bellied marmot and tufted sand verbena. Alternative 2 would not affect the bald eagle, snowshoe hare or southern red-backed vole; therefore they are not discussed further. Please refer to the specialist report in the project record for additional information. [52]

A review of the distribution for other sensitive aquatic species included blue head sucker, flannelmouth sucker, roundtail chub and speckled dace. These species do not warrant further analysis due to a lack of habitat. Habitat ranges for these species include the San Juan (the closest habitat is within the San Juan drainage), Little Colorado River and Gila drainages (Biotic Information System of New Mexico 2007) (Sublette and Hatch 1990). Please refer to the aquatics specialist report for additional information. [45]

The following sensitive species may occur or have habitat present within and adjacent to the Tio Grande grazing allotment. Where appropriate, some forest sensitive species may be grouped with respects to sharing similar habitats and/or being affected in similar ways by the alternatives. Some species may be analyzed in separate sections if the species is associated with multiple habitats.

Aquatic Forest Sensitive Species

Criteria to Measure Effects

To meet the needs of the northern leopard frog, water shrew, Rio Grande cutthroat, Rio Grande chub, Rio Grande sucker and their prey base, the goal is to maintain the following aquatic habitat criteria within suitable aquatic habitat:

Criterion 1: Percentage of fine sediment. Sediment does not exceed 20 percent to support northern leopard frog and water shrew prey base, Rio Grande cutthroat, Rio Grande chub, Rio Grande sucker

In the Canada de Tio Grande, there is a 2001 stream inventory report. Approximately 3.3 miles (of 8.2 miles) within the Tecolote pasture is not properly functioning for the excess amount of sediment in the substrate and is estimated at 28 percent fine sediment (criteria for properly functioning is less than 20 percent). The inventory does note numerous cattle and game trails that run along the stream which indicates some sediment transport into the stream. Field observations (2007) indicate heavy cattle grazing along the stream as well as impacts from trailing. Streamside vegetation was grazed heavily and banks were destabilized in many areas (the entire length was reviewed). Sediment has been increased by the loss of floodplain and riparian roughness which is created by taller grasses, denser riparian vegetation and intact stream banks. With the loss of vegetation, sediments can deliver more readily into the stream during snowmelt run-off and monsoon rain events. Fines or suspended sediments can settle on trout eggs, suffocating that year's progeny. In addition, elevated delivery of sediment can fill in pools and fill in interstitial spaces in the substrate (aquatic macroinvertebrate habitat), leading to limited aquatic biota productivity. Sediment is likely reducing northern leopard frog reproductive success in this segment. Sediment is also likely reducing Rio Grande cutthroat trout reproductive success for the core conservation population found in this segment.

Approximately 3 miles of stream is located in the Tio Grande pasture. In this segment, no stream inventory report is available. However based on 2007 field observation, this lower reach exceeds the criteria for sediment. Likely sources are livestock trailing and grazing, the location of roads, the livestock water gap that concentrates livestock use in a small area (approximately 1/10 of a mile), activities on private lands and sediment contribution from upland grazing. The 2007 riparian assessment noted bank shearing and trampling and minor ungulate trailing impacts in the reach evaluated. Assessments are completed at sites that should be representative of the entire reach (see Tio Grande Allotment soil, water, air report). Excessive sediment reduces the quality of habitat for fish, macroinvertebrate species, the northern leopard frog and the water shrew.

In the Rio Nutritas (Tecolote pasture), no stream inventory report exists. Field observations (2007) indicate the stream is extensively impacted from livestock grazing and trailing. Bank shearing, trampling of banks and ungulate trailing was noted in the 2007 riparian assessment (see soil, water, air report and project record). There is excessive sedimentation (likely above 20 percent). There is extensive past beaver activity. The breaching and degradation of old dams combined with low flows likely contributed to the sediment present. Excessive sediment reduces the quality of habitat for fish, macroinvertebrate species, the northern leopard frog and the water shrew.

Criterion 2: Maintain and/or improve habitat for Prey species for water shrew and northern leopard frog (macroinvertebrates)

Criterion 3: Streambank Condition – There is less than 10 percent unstable banks for both water shrew , northern leopard frog, Rio Grande cutthroat, Rio Grande chub, Rio Grande sucker

The stream inventory report for the portion of the Canada de Tio Grande within the Tecolote pasture indicates stream bank stability is properly functioning (criteria is less than 10 percent

unstable streambanks). The inventory does note numerous cattle and game trails that run along the stream which indicates some sediment transport into the stream. Riparian assessments (2007) indicate approximately 20 percent has bank shearing and trampling in 20 percent of the area evaluated. Ungulate trailing was also noted (mostly) in the riparian zone. In the segment that is within the Tio Grande pasture, no stream inventory was completed. Based on field observations (2007) criterion for streambank stabilization is likely exceeded due to trailing use by livestock which has resulted in bank shearing and trampling. This is also noted in the 2007 riparian assessment and RASES data (1989 to 1992).

In the Rio Nutritas (Tecolote pasture) no stream inventory report exists. Field observations (2007) indicate the stream is extensively impacted from livestock grazing and trailing. Bank shearing, trampling of banks and ungulate trailing was noted in the 2007 riparian assessment. It is likely that the criterion for streambank stability is being exceeded (greater than 10 percent).

In summary, stable streambanks and the generally associated riparian vegetation, reduce the source of sediment to the stream which occurs when banks are trampled, sheared and sloughing. Stable banks, as they undercut, also function to provide valuable hiding cover for fish and reduce stream temperatures by narrowing and deepening the stream channel. Excessive streambank instability degrades fish, northern leopard frog and water shrew habitat quality.

Criterion 4: Trampling – reduce impacts to northern leopard frog egg masses from April to July (Pagels et al 1998) by minimizing trampling

Criterion 5: Stream temperature – Temperature does not exceed 20 degrees C one time or less than 20 degrees Centigrade for 4 consecutive hours over 4 consecutive days (USDA Forest Service, 2003. Level 1 and Level 2 Stream Inventory Version 3.0) for Rio Grande cutthroat, Rio Grande chub, Rio Grande sucker

The portion of the Canada de Tio Grande (based on the Forest Service stream inventory report) in the Tecolote pasture is properly functioning for stream temperature. Stream temperature and daily fluctuations in temperature affect growth and fish health. There is no Forest Service stream temperature data for the segment in the Tio Grande pasture. It is likely exceeding the temperature criteria because of the lack of riparian vegetation that provides stream shading and the lack of under-cut banks (related to bank instability). There is no temperature data for the Rio Nutritas. However, based on professional judgment, it is likely exceeding the temperature criteria because of the lack of riparian vegetation that provides stream shading, lack of under-cut banks (related to bank instability), width to depth ratio and low flows. Excessive temperatures in Tio Grande (Tio Grande pasture) and Rio Nutrias can result in poor growth and diminished fish health.

Northern leopard frog (*Rana pipiens*) and Water shrew (*Sorex palustris navigator*)

Suitable habitat for water shrew and northern leopard frog: 8.2 miles of Canada Tio Grande, 3.0 miles of Rio Nutritas, and the associated ephemeral wetlands and spring-fed stock tanks that holds water year-round and have emergent vegetation. No surveys have been conducted for northern leopard frog and it is not known whether they occur on the allotment. Small mammal surveys were conducted in 2003 on the Carson National Forest (Frey 2003). This survey did not yield any water shrews in the areas surveyed within the allotment and it is not known whether they occur on the allotment.

Environmental Consequences:

Alternative 1

Northern leopard frog and water shrew: In the Canada Tio Grande, there would be some improvement to criterion 1-4 from eliminating grazing in the Canada Tio Grande. Sediment would be reduced in the long term (up to 10 years) as upland range conditions improved and livestock trailing is eliminated from the stream bottom. Streambank trampling would be reduced to wildlife use only. Streambank condition would improve in the majority of this pasture because livestock trailing and crossing was concentrated along the stream due to steep sideslopes and heavy timber. Habitat conditions for the leopard frog and water shrew within this section of stream would improve.

In the segment of the Canada de Tio Grande that is within the Tio Grande pasture, trailing by privately owned livestock would continue to occur via a crossing permit. Even with no authorized grazing, a foreseeable action is that the crossing permits would be modified to limit or exclude trailing use in riparian areas. However, the criteria would likely still be exceeded because of other contributions from sources such as road locations, headcuts and activities on private lands (see cumulative effects for more information). Stream temperature, which is likely exceeding criteria, could be reduced as riparian vegetation increases to provide shading over the stream. However, this improvement is dependent on implementing the foreseeable action of modifying crossing permits and is likely to take up to 10 years before it's evident. Streambank condition should improve with less trailing and trampling along the stream banks. This improvement is also dependent on successfully implementing the crossing permit actions and is likely to take up to 10 years before criteria are met. The time frames are based on professional estimation. There are no representative areas that could be used for comparison purposes. There would still be an impact to individuals in the form of trampling of egg masses from April to July (criterion 4). This would result in displacement (no reproduction, no residing in this area. The number of individuals impacted is unknown. However, this is less than 1 percent of the stream length, and overall, the remainder of the stream appears to be properly functioning based on field observations.

In no action, trailing of private livestock along the Rio Nutritas would continue. With the foreseeable action of modification of the crossing permit (which moves livestock continuously through area, prohibits use along the Rio Nutritas and livestock have to be trailed along Forest Road 93 and along the allotment boundary fence) sediment contributions from trailing would be reduced. The criterion would likely still be exceeded from other sources of contributions such as the location of Forest Road 93, visible headcuts and upstream private lands activities. Streambank condition should improve with less trailing and trampling along the stream banks. There would still be an impact to individuals in the form of trampling of leopard frog egg masses from April to July (criterion 4). This would result in displacement (no reproduction, no residing in this area. The number of individuals impacted is unknown. However, it is expected that that the amount of displacement would be minor due to the amount of other habitat found elsewhere. This improvement is also dependent on successfully implementing the crossing permit action and is likely to take up to 10 years before this criterion is met. The time frames are based on professional estimation. There are no representative areas that could be used for comparison purposes. Overall, there would be an improvement to leopard frog and water shrew in this section of stream with the implementation of the alternative 1. In Lucero Lakes, associated ephemeral wetlands and spring-fed stock tanks there would no effects to criterion 1, 2 and 4 due to livestock grazing as this activity would no longer be permitted.

Alternative 2

In the segment of the Canada de Tio Grande that is within the Tio Grande pasture, the limited number of days allowed for trailing and the use of designated routes along the road or in the upland areas (that routes livestock out of riparian) would reduce sediment contributions. The criterion would likely still be exceeded from other contributions from other sources such as road locations and activities on private lands (see cumulative effects for more information). Stream temperature, which is likely exceeding criterion, would be reduced as riparian vegetation increases to provide shading over the stream. However, this improvement is dependent on both the grazing and crossing permits being modified as proposed and it is likely to take up to 10 years before change is evident.

Streambank condition should improve with less trailing and trampling along the stream banks. This improvement is also dependent on successfully implementing the modifications to the crossing and grazing permits and it is likely to take up to 10 years before these criterion are met. The time frames are based on professional estimation. There are no representative areas that could be used for comparison purposes. In terms of leopard frog and water shrew populations, none of the species have been identified in the area. Habitat is currently of poor quality. With habitat improvement over time (up to 10 years), it might become more suitable for leopard frogs and water shrews to expand upstream from the Rio San Antonio.

In this alternative, adjusting livestock numbers, entry dates, exit dates number of days and grazing system to meet the allotment's objectives would assist in establishing fair to good vegetation condition and stable to upward rangeland trend for vegetation and soils (see Rangeland Vegetation Report). Successful implementation and maintenance of these measures, along with the assumed improvement in range condition and leaving no stray livestock within the pasture would reduce sedimentation and delivery of sediments to Tio Grande as riparian vegetation and streambank stability increases. Various time frames are suggested in different studies for recovery from grazing impacts in riparian areas. It is likely that within 5 to 15 years degraded areas would be improved. This would result in the criterion for sediment being met in the long term. Streambank stability criterion would continue to be met and improve over time. Leopard frog and water shrew habitat within this section of stream would be improved in the long term.

In this alternative, successfully modifying (and implementing the changes) the crossing permit (which moves livestock continuously through area, prohibits use along the Rio Nutritas and confines livestock to being trailed along Forest Road 93 and the allotment boundary fence) would reduce sediment contributions because most visible impacts (trampling and trailing along streambanks) were associated with livestock trailing. The criterion would likely still be exceeded from contributions from other sources such as the location of Forest Road 93, visible headcuts and adjacent private lands activities (see cumulative effects for more information).

Stream temperature, which is likely exceeding the criteria, would be reduced as riparian vegetation increases to provide shading over the stream. However, this improvement is dependent on implementing modifications to crossing permits and is likely to take up to 10 years before it's evident. Streambank condition should improve with less trailing and trampling along the stream banks. This improvement is also dependent on successfully modifying the crossing permit and is likely to take up to 10 years before these criterion are met. The time frames are based on professional estimation. There are no representative areas that could be used for comparison purposes. Various time frames are noted in different studies for recovery from grazing impacts in

riparian areas. Time frames are based on exclusion of grazing and generally recovery is suggested in 5 to 15 years.

In the long term (5 to 10 years), with the construction of an exclosure that protects the Rio Nutritas from livestock grazing and trailing, criterion would likely show an improvement. The Stewart Meadows exclosure (constructed in 1995) is an example of the response that can occur in riparian vegetation when livestock grazing is excluded. The New Mexico Department of Game and Fish has noted some recovery in woody species diversity, increased age classes and density. This is most likely due to exclusion of livestock during the growing season (response to scoping, June, 2008). Various time frames are noted in different studies for recovery from grazing impacts in riparian areas. Time frames are based on exclusion of grazing and generally recovery is suggested in 5 to 15 years. In terms of leopard frogs and water shrews that may be present in the Rio Nutritas. Habitat would improve over time (up to 10 years).

There would continue to be impact to individuals in the form of trampling of leopard frog egg masses from April to July (criterion 4). This would cause the displacement of individuals. The number of individuals impacted is unknown. Sedimentation could also be elevated due to livestock, which could contribute to negatively affect macro-invertebrate prey species. However, it is expected that that the amount of displacement would be minor due to the amount of other habitat found elsewhere. The remainder of the stream appears to be properly functioning based on field observations.

Adaptive management actions are expected to improve livestock utilization the upper and lower Canada Tio Grande and Rio Nutritas riparian areas (see table 1). In the short term (3 to 5 years), a 15 acre exclosure would be constructed and maintained up to 300 feet from the stream. This would minimize or eliminate grazing and trailing by livestock along and through the riparian zone in the Tecolote pasture. This pasture will also be rested in year 1 (with the exclosure planned and implemented in year three through five).

In the long term, this would contribute to improve to less sediment, greater bank stability and less trampling effects. These conditions would be favorable for the northern leopard frog and water shrew, criterion 1-3, 4 would be met. The improvement in sediment would also improve macro-invertebrate prey base, criterion 2 would be met. Within Lucero Lakes, livestock could contribute to increases in sedimentation that could negatively affect macroinvertebrate prey species. Livestock could also negatively affect leopard frog by trampling. However, actively moving livestock away from this area would improve these conditions. This would reduce the negative affects on the leopard frog. Overall, implementation of alternative 2 has potential to impact individual leopard frogs and water shrews. However, would not have a measurable negative effect to their populations.

Rio Grande cutthroat trout, Rio Grande chub and Rio Grande sucker

Suitable habitat for Rio Grande cutthroat trout, Rio Grande chub and Rio Grande sucker within 8.2 miles of Canada de Tio Grande (approximately 3 miles is in the Tecolote pasture, 3 miles in the Tio Grande pasture and 2 miles is within private) and 3 miles of Rio Nutritas. Multiple Pass Depletion Surveys for populations completed in Canada de Tio Grande (2001, 2003, 2004) and Rio Nutritas (2001, 2003). Based on conversations with the district wildlife biologist, no additional information is available. Rio Grande cutthroat are found in the Canada de Tio Grande and Rio Nutritas. Rio Grande chubs and suckers were not identified as being present.

The population estimate of fish (trout species) in the Canada de Tio Grande is based on surveys that document a range of 808 fish per hectare to 3,253 fish per hectare, depending on the site and year and conditions affecting fish populations. One survey was done in the Tio Grande above the confluence with the Rio San Antonio and below the private land. No trout species were found. The population estimate of fish (trout species), in the Rio Nutritas, based on the surveys ranges from 2,237 fish/hectare to 4,725 fish/hectare, depending on the site, year and conditions affecting fish populations.

The Canada de Tio Grande in the Tecolote pasture provides habitat for a core conservation population of Rio Grande cutthroat trout. A core population is defined to have greater than 99 percent genetic purity and represents the subspecies fully in all aspects of physical appearance, life history, characters ecology and behavior. These populations are the highest priority for long range conservation management. They contain the remnants of evolutionary genetic legacy for the subspecies, they represent the foundation upon which future viable populations will develop and contain the genetic resources for reintroducing Rio Grande cutthroat trout to formerly occupied waters and for developing hatchery broodstocks (NMDG&F 2002). A field spawn was conducted in 2008 using the population in Tecolote pasture to produce fish for reintroductions in other stream locations.

In May, 2008, the US Fish and Wildlife Service (USFWS) determined that adding the Rio Grande cutthroat trout to the threatened and endangered species list was warranted. The Candidate listing results from the low number of populations meeting the criteria set by USFWS. The agency will develop a proposed rule to list the subspecies as their priorities allow.

Rio Grande cutthroat, Rio Grande chub and Rio Grande sucker

Environmental Consequences

Significant issues addressed in this analysis:

Significant Issue #1: Perennial stream function – effect to Rio Grande cutthroat trout (RGct). The function of perennial streams is not being addressed. Cattle grazing can suppress or negatively affect RGct populations by direct habitat degradation.

Significant Issue #2: Rio Grande cutthroat trout populations in Canada de Tio Grande (Tecolote pasture). The pure (genetic) population of RGct within the Tecolote pasture is of concern. The habitat associated with this area should be emphasized and monitored. Adaptive management actions need to be applied to the Tecolote pasture (in year 1) to protect RGct habitat.

Measure used to evaluate effects: Impacts to aquatic habitat and the RGct population in the Canada de Tio Grande and Rio Nutritas will be analyzed in the fisheries report. The indicators for habitat are percent sediment, stream temperature and percent streambank stability. For effects to RGCT, the indicator is the effect to individuals and or populations

Significant Issue #4: Loss of critical habitat for sensitive and federally protected species (Mexican spotted owl, Northern Goshawk, Rio Grande cutthroat trout). The proposal may result in a loss of critical habitat.

Measure used to evaluate effects: Impacts to habitat and sensitive and federally protected species will be evaluated in the wildlife and fisheries report. Foraging and nesting habitat affected

and effect to individuals and/or populations will be the indicator for terrestrial wildlife. For fisheries, the indicator is the effect to individuals and or populations.

Alternative 1

The stream habitat condition in the Canada de Tio Grande that is within the Tecolote pasture is likely to improve. Sediment would be reduced in the long term (up to 10 years) as upland range conditions improved and livestock trailing is eliminated from the stream bottom. Stream temperature which is currently properly functioning would continue to be maintained as riparian vegetation shading increases and streambank trampling is reduced to wildlife use only. Streambank condition would improve in the majority of this pasture because livestock trailing and crossing was concentrated along the stream due to steep sideslopes and heavy timber. A decrease in sediment could result in an increase in fish numbers and age class distribution and an expansion of individuals into areas with improved quality habitat. Fish populations fluctuate based on many factors. However, a reduction in sediment would improve habitat and allow for an increase in population based on this criterion alone.

In the segment of the Canada de Tio Grande that is within the Tio Grande pasture trailing by privately owned livestock would continue to occur. Even with no authorized grazing, a foreseeable action is that the crossing permits would be modified to limit or exclude trailing use in riparian areas. However, the criteria would likely still be exceeded because of other contributions from sources such as road locations, headcuts and activities on private lands (see cumulative effects for more information). Stream temperature, which is likely exceeding criteria, could be reduced as riparian vegetation increases to provide shading over the stream. Streambank condition should improve with less trailing and trampling along the stream banks. Both improvements are dependent on successfully implementing the crossing permit actions. Improvement is likely to take up to 10 years before the criterion is met. The time frames are based on professional estimation. There are no representative areas that could be used for comparison purposes. In terms of fish populations, no sensitive species were identified in the population survey. Habitat is currently of poor quality. With habitat improvement over time (up to 10 years), it might become more suitable for RGct and chubs (there are no suckers in this stream) to expand upstream from the Rio San Antonio.

Trailing of private livestock along the Rio Nutritas would continue. With the foreseeable action of modification of the crossing permit (which moves livestock continuously through area, prohibits use along the Rio Nutritas and livestock have to be trailed along Forest Road 93 and along the allotment boundary fence) sediment contributions from trailing would be reduced. The criterion would likely still be exceeded from other sources of contributions such as the location of Forest Road 93, visible headcuts and upstream private lands activities (see cumulative effects for more information). Stream temperature, which is likely exceeding criteria, could be reduced as riparian vegetation increases to provide shading over the stream. Streambank condition should improve with less trailing and trampling along the stream banks. This improvement is also dependent on successfully implementing the crossing permit action and is likely to take up to 10 years before the criteria are met. The time frames are based on professional estimation. There are no representative areas that could be used for comparison purposes.

In terms of fish populations, RGct are present in the Rio Nutritas. Although the habitat would improve over time (up to 10 years), competition from non-native trout species would continue to have the most direct impact on the cutthroat population. The population is not likely to increase

or expand until this competition is eliminated. There would be no effect to Rio Grande suckers and Rio Grande chub. They are not known to be present on the Tio Grande allotment.

Alternative 2

The effects of this alternative for the segment of the Canada de Tio Grande that is within the Tio Grande pasture are the same as described in Alternative 1.

In this alternative, adjusting livestock numbers, entry dates, exit dates number of days and grazing system to meet the allotment's objectives would assist in establishing fair to good vegetation condition and stable to upward rangeland trend for vegetation and soils. (see rangeland vegetation section and report). In the short term (3 to 5 years), in adaptive management for the Tecolote pasture, a 15 acre enclosure would be constructed and maintained up to 300 feet from the stream. This would minimize or eliminate grazing and trailing by livestock along and through the riparian zone. This pasture will also be rested in year one (with the enclosure planned and implemented in year three to five). Successful implementation and maintenance of these measures, along with the assumed improvement in range condition and leaving no stray livestock within the pasture would reduce sedimentation and delivery of sediments to Tio Grande as riparian vegetation and streambank stability increases. Various time frames are suggested in different studies for recovery from grazing impacts in riparian areas. It is likely that within 5 to 15 years degraded areas would be improved. This would result in criteria for sediment being met in the long term. Temperature and streambank stability criterion would continue to be met and improve over time. The core RGct habitat and population reproductive success would be improved in the long term.

As mentioned in Alternative 1, livestock crossing permits and other activities that contribute to sediment would continue (see Rio Nutritas discussion above). Improving the range condition through measures (adjusting livestock numbers, entry/exit dates, the grazing system) would likely result in some improvement in the amount of sediment contributed to the stream. Since the majority of impacts appear to be associated with trailing and other uses, it is not likely that criteria would be improved more than slightly, in the long term.

Stream temperature, which is likely exceeding criteria, would be reduced as riparian vegetation increases to provide shading over the stream. Streambank condition should improve with less trailing and trampling along the stream banks. Both improvements are dependent on successfully modifying the crossing permit. Improvement is likely to take up to 10 years before this criterion is met. The time frames are based on professional estimation. There are no representative areas that could be used for comparison purposes. Various time frames are noted in different studies for recovery from grazing impacts in riparian areas. Time frames are based on exclusion of grazing and generally recovery is suggested in 5 to 15 years.

In the long term (5 to 10 years), with the construction of an enclosure that protects the Rio Nutritas from livestock grazing and trailing, criteria would likely show an improvement. The Stewart Meadows enclosure (constructed in 1995) is an example of the response that can occur in riparian vegetation when livestock grazing is excluded. The New Mexico Department of Game and Fish has noted some recovery in woody species diversity, increased age classes and density. This is most likely due to exclusion of livestock during the growing season (response to scoping, June, 2008). Various time frames are noted in different studies for recovery from grazing impacts in riparian areas. Time frames are based on exclusion of grazing and generally recovery is suggested in 5 to 15 years.

In terms of fish populations, Rio Grande cutthroat trout are present in the Rio Nutritas. Habitat would improve over time (up to 10 years). However, competition from non-native trout species would continue to have the most direct impact on the cutthroat population. The population is not likely to increase until this competition is eliminated. There would be no effect to Rio Grande suckers and Rio Grande chub. They are not known to be present on the Tio Grande allotment.

Riparian Forest Service Sensitive Species

Riparian includes the Canada Tio Grande and Rio Nutritas (see the wildlife report for additional information on soil/TEU locations). From field observation, Upper Canada de Tio Grande and the Lower Rio Nutritas have had some localized impacts by livestock. Based on field observations, the riparian at the Upper Rio Nutritas has not had any impacts related to grazing. At the Lower Canada Tio Grande, recent livestock management to include trailing through this riparian, has improved riparian conditions. Overall, the desired percentage of bare ground and woody species is currently being met.

Cinereus (masked) shrew (*Sorex cinereus cinereus*): Grazing by both livestock and wildlife can alter function and composition of moist areas through trampling and reduction in height and density of vegetation. Excessive grazing can reduce height and density of vegetation limiting the amount of cover for this species against predators and for their prey (insects) (DeLong 2000).

Spotted bat (*Euderma maculatum*): Livestock grazing has been responsible for large-scale conversion of mesic riparian habitats to xeric uplands throughout the West. Conversion of wetlands, wet meadows or spring overflow areas to xeric sites by draining these sites, lowering the water table or overgrazing by livestock, all of which reduce the amount of clean, open water, has the potential to adversely impact spotted bats (Luce and Keinath 2007).

Pale Townsend's big-eared bat (*Corynorhinus townsendii pallascens*): Activities that reduce the productivity of wetlands likely impact local populations of the Townsend's big-eared bat by reducing the quality of important foraging and drinking sites. The alteration of surface and subsurface hydrology of wetlands and removal of shrub and overstory vegetation ultimately reduce the value of wetlands to this species (Gruver et al 2006).

Long-tailed vole (*Microtus longicaudus*): The long-tailed vole is most widespread and likely has the greatest overall abundance of any vole species on Carson National Forest. Grazing activities affect long-tailed voles by reducing herbaceous cover such as grasses, sedges and forbs within riparian and upland meadow/grasslands and at the edge of conifer stands.

Mink (*Mustela vison energumenos*): Fire, modification to water ways, logging and livestock/wildlife grazing are the major threats to mink (Bison-M 2006). These activities (fire, logging and grazing) result in the reduction of cover near water ways (Sullivan 1996). The reduction of cover may also indirectly affect the availability of prey as well through loss of pools for aquatic prey and loss of vegetation cover for rodents.

Nokomis fritillary (*Speyeria nokomis nokomis*): Short-term negative impacts from grazing include reduced nectar availability and vegetation cover and long-term impacts include soil compaction and reduced water infiltration, which can lead to a loss of larval host plants and invasion of by non-native grasses. While excessive grazing can be a serious threat to the butterfly, light or moderate grazing may in fact offer the violet a competitive advantage (Selby 2007).

Dwarf shrew (*Sorex nanus*): The preferred habitat is talus and other rocky areas primarily in sub-alpine coniferous forest (Findley 1975). On the Carson National Forest, other habitat affinities include riparian (Frey 2003). Management practices (BISONM 2006) note that dwarf shrews are tolerant to clearcutting and grazing.

Western heather vole (*Phenacomys intermedius intermedius*): According to Frey (2003), heather voles on the Carson Nation Forest may be found in the upper mixed conifer and riparian boreal habitat. Grazing activities affect western heather voles by reducing herbaceous cover such as grasses, sedges and forbs within riparian and upland meadow/grasslands and at the edge of conifer stands.

Ermine (*Mustela erminea murices*): See detailed description below in the “Predatory Forest Sensitive Species” section

Northern Goshawk (*Accipiter gentiles*): Nesting and foraging habitat for the goshawk within the Tio Grande allotment consists of approximately 31,773 acres. Formal surveys for the goshawks have been conducted throughout the Tres Piedras Ranger District for vegetation management projects and timber stand improvement projects. The surveys have yielded two nesting pairs outside the allotment. No recent surveys have been conducted with the allotment. Livestock grazing may affect northern goshawk by reducing herbaceous cover for prey species within riparian zones adjacent to forested habitat that is use for nesting.

Survey Status: Small mammal surveys were conducted forestwide within the Carson National Forest in 2003. The mammal survey included a survey of Stewart Meadows that is adjacent to the allotment. No New Mexico meadow jumping mice, masked shrews, minks and dwarf shrews were documented in this area (Frey 2003). Long tailed voles were recorded at this location. Ermine are likely to occur in the area. No surveys for Nokomis fritillary have been conducted within the allotment. It is not known whether they occur within the allotment. In addition, no surveys for both bat species have been conducted.

Criteria to Measure Effects:

To meet the needs of the riparian Forest Service Sensitive species, the goal is to maintain the following riparian condition criteria on the allotment: The purpose of establishing these criteria to ensure allowable use of plant species to maintain or improve plant diversity, density, vigor and regeneration over time to support the riparian Forest Service Sensitive Species.

Criterion 1: Vegetation long term trend of good to excellent range conditions in riparian areas.

Criterion 2: Promote natural and healthy riparian plant communities: (1) More than 15 percent woody species where potential exists within 5 years , (2) Less than 10 to 15 percent bare ground by year 3, (3) Within 20 to 40 percent utilization at the end of the summer from wildlife and livestock

Environmental Consequences:

Alternative 1

It is anticipated that there would be an increase in density of the vegetative species such as shrubs, forbs and grasses. The increased growth of these various vegetative species would result in plant diversity, cover and a variety of plant heights that equates to favorable riparian habitat conditions for the riparian Forest Service sensitive species. More cover and foraging

opportunities would exist for these species under this alternative. Criterion 1 and 2 would be met within 10 years.

Alternative 2

The AOI would include adjustments to livestock numbers, entry and exit dates, number of days and grazing system. These adjustments would reflect annual resource or climatic conditions and assist in making progress towards meeting the desired conditions for the riparian Forest Service sensitive species. Desired conditions include maintaining or improving plant diversity, density, vigor and regeneration over time to support the riparian Forest Service sensitive species. The proposed livestock grazing is not anticipated to limit the diversity and seasonal availability of forage to support a diversity of riparian forest sensitive species. The proposed grazing is anticipated to assist in increasing forage diversity and seasonal availability of forage and cover over time. This includes, providing nectar producing plants for the Nokomis fritillary.

In riparian areas (Upper and Lower Canada Tio Grande and Rio Nutritas), currently criterion 2 is mostly being met. A greater percentage of woody specie would be desired. With the conservative utilization be proposed, the riparian desired conditions would be maintained and/or improved and this would support habitat for the riparian forest sensitive species.

The adaptive management actions that would be implemented (see table 1) in the short and long term are expected to improve livestock utilization the riparian areas. In the long term, this would contribute to greater diversity of grass species and less percentages of bare ground, higher percentage of woody species in these areas. These conditions would be favorable for riparian Forest sensitive species. For the small mammals, this would translate into better forage and cover. For the bats this would translate into better conditions to support insect (moth) prey base. For the ermine, northern goshawk and mink this would translate into more prey base (small mammals) diversity. For the Nokomis fritillary, this would translate into more nectar producing plants. Criterion 1 and 2 would be met. Overall, the implementation of alternative 2 has potential to impact individual Forest Service sensitive riparian species. However, would not have a measurable negative effect to their populations.

Predatory Forest Service Sensitive Species

Allotment-wide habitat concerns: Currently, three pastures (Tio Grande, Tecolote and Brokeoff are areas of concern because during two of the five years, utilization guidelines have not been met (see pp. 21-24 of the EA for additional information).

American marten (*Martes americana origenes*): On the Tio Grande grazing allotment there is approximately 2,225 acres of blue spruce and Engelmann spruce with upland meadows intermixed. The forested habitat is the primary habitat for the pine marten that provides den sites as well as primary foraging habitat. The edge habitat (forested edge/upland meadow interface) may provide secondary foraging habitat for the pine marten where it preys on a variety of prey species (see Appendix A of the wildlife report). American marten surveys conducted on the CNF from 1997 to 2001 in close proximity to the Tio Grande allotment include the San Antonio Mountain survey (Long 2001). These surveys yielded negative findings for marten. No surveys have been conducted within the allotment. Livestock grazing may affect the marten by reducing herbaceous cover for prey species within upland meadows and at the edge of conifer stands.

Ermine: Small mammal surveys were conducted forestwide within the Carson National Forest in 2003. The mammal survey included a survey of Stewart Meadows adjacent to the allotment. No ermine were documented in this area (Frey 2003). However, ermine are likely to occur in the area.

Northern goshawk (*Accipiter gentiles*): See details in “Riparian Forest Service Sensitive Species” section (above).

Boreal owl (*Aegolius funereus*): Nesting and foraging areas are present within the Tio Grande allotment and limited to approximately 2,225 acres of potential habitat that is of combined habitats such as blue spruce and Engelmann spruce. Where upland meadows/grasslands are adjacent to mature or old spruce fir habitat for the boreal owl, these areas could be used for foraging during the spring and summer (see appendix A). Surveys were conducted approximately 15 miles northwest of the Tio Grande allotment. Boreal owls were found (Stahlecker 1987). Their status is not known on the allotment. Livestock grazing may affect the boreal by reducing herbaceous cover for prey species within upland meadows that are adjacent to mature or old spruce fir habitat.

Criteria to Measure Effects

To meet the needs of the predatory Forest Service sensitive species, the goal is to maintain the following range/forage criteria on the upland meadows in the allotment:

Criterion 1: Upland meadow/grasslands

- 1.1. Diversity of grassland plant community equal to 70 percent plant composition in cool season grasses within 5 years
- 1.2. Less than 15 percent woody species in upland meadows by year three, four and five.
- 1.3. Less than 15 percent bare ground in upland meadow by year three, four and five.
- 1.4. Within 20 to 40 percent utilization at the end of the summer from wildlife and livestock.

Criterion 2: Vegetation long term trend of good to excellent range conditions in upland meadows

Environmental Consequences:

Alternative 1

It is anticipated that there would be an increase in density of the vegetative species such as shrubs, forbs and grasses. The increased growth of these various vegetative species would result in plant diversity, cover and a variety of plant heights that equates to good to excellent range conditions, thus improve the habitat for prey base species for the predatory forest sensitive species. Criterion 1 and 2 would be met in 10 years.

Alternative 2

The AOI would include adjustments to livestock numbers, entry and exit dates, number of days and grazing system. These adjustments would reflect annual resource or climatic conditions and assist in making progress towards meeting the desired conditions for the predatory forest sensitive species to include the American marten, ermine, northern goshawk and boreal owl.

Implementation of this alternative could impact predator prey species diversity and abundance (for the same reasons as described under alternative 2 for Mexican spotted owl (MSO)). Although the prey species are different than MSO prey species; the prey species will utilize the same upland meadows that are described for the MSO.

Grazing activities would not directly remove the structural habitat characteristics (overall canopy cover and forest structure) required for the predatory forest sensitive species. The marten, boreal owl and northern goshawk denning/nesting habitat would not be affected. Indirectly livestock grazing may reduce the herbaceous ground cover and increases shrubs and small trees. However, the grazing activities are not anticipated to reduce the herbaceous ground cover to the point where there is a decreased potential of a low-intensity ground fire, therefore decreasing the potential for a destructive high-intensity vertical fire that would negatively affect the structural habitat such trees, logs and snags that are use by these predator species.

The proposed livestock grazing is not anticipated to limit the diversity and seasonal availability of forage to support a diversity of prey species. There would be no change that would result in predatory species leaving the area. The proposed grazing is anticipated to assist in increasing the current forage diversity and season availability over time. Under the proposed action the Tecolote pasture would be rested one out of four years. This would be implemented in year one. In the long term, the upland meadow/grassland, criterion 1.1 would be met and result in improved vegetation recovery and provide better forage diversity for prey species.

Range readiness to determine the entry dates on the Placitas and Lucero Lakes pasture would translate to later entries of livestock to the upper elevation pastures (Tecolote and Brokeoff). This would allow a higher percentage of cool season grasses to seed out. Grasses would respond to additional cool growing season rest by increasing root and leaf volume, annual production, seedling establishment, reproduction, and vigor. Criterion 1.1 would be met. Overall, this would allow for greater forage diversity and cool season seed sources in the long and short term for prey base species for ermine, northern goshawk, boreal owl and American marten.

The proposed grazing system would result in improved livestock utilization and range conditions allotment wide. In the short and long term, as cool season herbage increases due to entry pasture management and pasture get rest (grazing system), livestock would be grazing slight use areas more often than during previous years, as well as, heavy use areas less often and would generate a more uniform pattern of use that would make progress towards meeting the utilization objectives. Slight to moderate positive impacts to the utilization level within the key areas would occur because of the flexible management grazing system, growing season rest and season of use. In the long term, conservative livestock grazing of 20 to 40 percent allowable utilization on the allotment would expedite attaining good to excellent range conditions. Criterion 1.4 would be met for upland meadows.

The adaptive management actions that would be implemented in the short and long term are expected to improve livestock utilization within the upland meadows. In the long term, this would contribute to greater diversity of grass species and less percentages of bare ground in these areas. These conditions would be favorable for ermine, northern goshawk, boreal owl and American marten prey species. Criterion 1 and 2 would be met.

Overall, the implementation of alternative 2 has potential to impact individual Forest Service sensitive predatory species. However, would not have a measurable negative effect to their populations.

Upland Meadow Forest Service Sensitive Species

On the allotment there are approximately 16,901 acres of upland meadow or grassland that may provide habitat the upland meadow forest sensitive species (see Appendix A of the wildlife report for additional information). [52] Currently three pastures (Tio Grande, Tecolote and Brokeoff) are areas of concern because during 2 of the 5 years, utilization guidelines have not been met.

White-tailed jackrabbit *Lepus townsendii campanius*: Livestock grazing may affect the white-tailed jackrabbit by competing for succulent plants.

Gunnison's prairie dog (GPD) *Cynomys gunnisoni*: Despite the extensive grasslands on Carson National Forest, prairie dogs were found to be very uncommon in the Small Mammal Survey conducted in 2003 (Frey, 2003). All observations of prairie dogs were on the west side of the forest which includes this allotment.

Burrowing owl *Athene cucicularia hypugaea*: In New Mexico, burrowing owls are associated with Gunnison's prairie dogs (*Cynomys gunnisoni*). Moderate livestock grazing can benefit burrowing owls by keeping vegetation around burrows short (Gould 1985).

Ermine – see description in the *Riparian Forest Sensitive Species* section

Dwarf shrew – see description in the *Riparian Forest Sensitive Species* section:

Survey Status: Small mammal surveys were conducted forestwide within the Carson National Forest in 2003. The mammal survey included a survey of Stewart Meadows that is adjacent to the allotment. No white-tailed jackrabbits or dwarf shrews were documented in this area (Frey 2003). Gunnison's prairie dogs were recorded on the Westside Carson National Forest Districts and are believed to found in small scattered colonies. Ermine are likely to occur in the area. Burrowing owls are known to occur in Taos County during the spring and summer (Stahlecker 1989).

Criteria to Measure Effects

To meet the needs of the upland meadow Forest Service sensitive species, the goal is to maintain the following range/forage criteria on the upland meadows within the allotment:

Criterion 1: See description above in “Predatory Forest Service Sensitive Species” section

Criterion 2: Vegetation long term trend of good to excellent range conditions in upland meadows

Currently all the pastures are in fair condition (not meeting criterion 2). The table below displays how criterion 1.1 through 1.4 are being met by pasture.

Table 6. Upland meadow habitat condition

Pasture	Criteria Met	Criteria Not Met
Brokeoff	1.4, 1.3,	1.1, 1.3
Tecolote	1.2,1.4	1.1, 1.3
Corral	1.1, 1.2,1.4	1.3
Placitas	1.2, 1.4	1.1, 1.3
Tio Grande	1.1, 1.2,	1.3, 1.4
Lucero Lakes	1.1, 1.2, 1.3, 1.4	N/A

Environmental Consequences:

Alternative 1

It is anticipated that there would be an increase in density of the vegetative species such as shrubs, forbs and grasses. The increased growth of these various vegetative species would result in plant diversity, cover and a variety of plant heights that equates to good to excellent range conditions, thus improve the foraging habitat for the Gunnison prairie dog and white-tailed jackrabbit. The increase growth in herbaceous cover would benefit the dwarf shrew and ermine prey species. Conditions for the burrowing owl would remain the same. Under this alternative, criterion 1 and 2 would be met in 10 years.

Alternative 2

AOI adjustments would reflect annual resource or climatic conditions and assist in making progress towards meeting the desired conditions on the upland meadow within the allotment to support the white-tailed jackrabbit, Gunnison’s prairie dog, burrowing owl, ermine, and dwarf shrew. The Tecolote pasture would be rested one out of four years. This would be implemented in year one. In the long term, the upland meadow/grassland, criterion 1.1 would be met and result in improved vegetation recovery and provide better forage diversity for upland meadow dependent species.

Range readiness to determine the entry dates on the Placitas and Lucero Lakes pasture would translate to later entries of livestock to the Mexican spotted owl pastures (Tecolote and Brokeoff). Later entry dates in these pastures would allow a higher percentage of cool season grasses to seed out. Grasses would respond to additional cool growing season rest by increasing root and leaf volume, annual production, seedling establishment, reproduction and vigor. Criterion 1.1 would be met. Overall, this would allow for greater forage diversity in the long and short term for white-tailed jackrabbit and Gunnison’s prairie dog. Greater forage diversity would benefit ermine prey species.

Slight to moderate positive impacts to the utilization level within the key areas would occur because of the flexible management grazing system, growing season rest and season of use. In the long term, conservative livestock grazing of 30 to 40 percent allowable utilization on the allotment including the Tecolote and Brokeoff pastures would expedite attaining good to excellent range conditions to improve habitat for the upland meadow dependent species. Criterion 1.4 would be met for upland meadows.

The adaptive management actions that would be implemented in the short and long term are expected to improve livestock utilization the upland meadow. In the long term, this would contribute to greater diversity of grass species and less percentages of bare ground in these areas. These conditions would be favorable for white-tailed jackrabbit and Gunnison's prairie dog. A greater diversity of grass species would be beneficial to the ermine prey species. Criterion 1 and 2 would be met. The adaptive management actions would not affect the burrowing owl or the dwarf shrew.

Overall, the implementation of alternative 2 has potential to impact individual Forest Service sensitive upland meadow species. However, would not have a measurable negative effect to their populations.

Forest Service Sensitive Plant Species

Ripley's Milkvetch (*Astragalus ripleyi*): Surveys were initiated within suitable habitat forest wide to include areas within this allotment. The results of this survey are not available at this time. Once the extent of the population is known, the timing of livestock use may be adjusted if needed to maintain plant composition and diversity.

Within the allotment, all six pastures have potential to contain Ripley's milkvetch based on the association with the TEUs (see figure 3). In the summer of 2007-2008, Ripley's milkvetch was recorded on several sites on the forest during a vegetation mapping project. This included sites within the allotment (Cortez 2008). An assumption has been made that this plant has potential to occur in these soil types. Recent field observations on the Placitas and Corral pastures in early July (2008) indicate that 25 percent of the Ripley's milkvetch plants were at the flowing stage and the other 50 percent of the plants were at fruit stage and remaining 25 percent plants were at seed set. The plants observed did not indicate any grazing pressure by livestock or wildlife. Livestock had trailed through the Corral pasture earlier in the season. Livestock was not present on the pastures on the day of field observation (wildlife was present).

Robust larkspur (*Delphinium robustum*): On the allotment, suitable habitat for robust larkspur is found in mesic riparian valley bottoms, open aspen stands, upland meadow/grasslands and open conifer forested stands. Approximately 16,901 acres Approximately 16,901 acres pf upland meadow/grassland qualifies as suitable habitat for robust larkspur. It is found in all of the pastures. The 2008 vegetation mapping project did not record any robust larkspur plants and no surveys specific for robust larkspur have been conducted within the allotment. It is not known whether robust larkspur occurs within the allotment.

Criteria to Measure Effects

To avoid detrimental effects to Ripley's milkvetch and robust larkspur plants, the goal is to manage for the long-term persistence of the plant by following these criteria. The purpose of establishing these criteria is to ensure allowable use of Forest Sensitive plant species while maintaining or improving the long term persistence of these plants:

Criterion 1 (Ripley's milkvetch): A rotation-grazing system in which spring grazing occurs only one in three years appears to be compatible with the long-term persistence of *A. scaphoides* populations (Ladyman 2003.) Deferring grazing until after seed has set (typically May through June) or even later in the year is also another option. In response to prolonged drought a rest rotation of more than one in three years may be necessary. Individual plants die back to the

ground each year; therefore, care should be taken to avoid disturbing the soil too deeply to prevent damage to dormant root stock. To avoid detrimental effects to Ripley's milkvetch and reduce trampling of robust larkspur plants, the goal is to manage for the long-term persistence of the plant by following these criteria:

Criterion 2: Within suitable robust larkspur habitat maintain 20 to 40 percent utilization at the end of the summer from wildlife and livestock.

Criterion 3: To reduce trampling effects to the robust larkspur, use a grazing system that provides partial or complete season rest during the growing season.

Environmental Consequences:

Alternative 1

Under alternative 1, the existing grazing permits would be cancelled and additional permits would not be issued. This alternative would eliminate any related risks to the Ripley's milkvetch caused by grazing or trampling by livestock. Trampling effects to the robust larkspur would be eliminated with this alternative

Alternative 2

The implementation of the proposed activities would increase the probability that Ripley's milkvetch plants be grazed by livestock and selected over other forage species. However, the ability to adjust permitted numbers and duration based on production/utilization studies and maintaining 40 percent utilization guidelines throughout the allotments at the end of the growing season would assure that the species would not be over utilized. Under alternative 2, grazing by livestock would be managed to allow use and maintain the plant's ability to continue to grow and reproduce. Criterion 2 would be met for Ripley's milkvetch.

The implementation of alternative 2 would increase the probability that robust larkspur plants be trampled by livestock. However, as a result of the proposed deferred/rest-rotation grazing system, plant vigor would be improved by: providing partial to complete rest would reduce trampling during the growing season. Partial or complete rest would benefit robust larkspur: reproduction; seedling establishment, herbage volume; leaf development; seed production; root growth; and food storage. Criterion 3 for the robust larkspur would be met. Since the robust larkspur may be poisonous to cattle, it is possible that this plant would not be selected over other forage species. Therefore, livestock grazing effects would be minimal to nil under alternative 2. Criterion 2 would be met.

Out of the six pastures, two pastures (Placitas and Lucero Lakes) would be part of an alternating entry rotation system. Under this alternating entry rotation system, one of the two entry pastures would be entered after Ripley's milkvetch seed set each year. In the two higher elevation pastures (Brokeoff and Tecolote), livestock entry would be after seed set. Entry on the Tecolote pasture would never be before June 22nd. The Corral and Tio Grande pastures would only be used for a short period of time to trail through. This would allow Ripley's milkvetch seeds to germinate to seedlings that would eventually grow to fruit and seed producing plants. Ripley's milkvetch plants would perpetuate and lead to the long term persistence of this plant within the allotment. Criterion 1 would be met.

Four pastures (Corral, Placitas, Lucero Lakes and Brokeoff) would receive rest 1 out of 6 to 8 years and the Tecolote pasture would be rested one of four years during a typical 6 year rest rotation grazing system. The Placitas, Corral, Tio Grande and Lucero lakes pastures would be grazed periodically before seed development. When including the 1 year of rest, Placitas and Lucero Lakes would not be grazed 1 out of 2 years before seed development. The Corral pasture would be lightly grazed before seed development by trailing use. The Tio Grande pasture would lightly be grazed before seed development 1 in 2 years by trailing use. The Ripley's milkvetch population may be reduced when cattle graze and prefer the plant over other forage in these areas. This selective grazing before seed development may lower the localized population frequency of occurrence but populations in the Tecolote and Brokeoff pastures would be maintained or improved under the proposed action. The AOI flexibility may also adjust the rotation system where pastures may be grazed more frequently during the latter period of use. Also, the AOI would prescribe a conservative stocking rate for the allotment to prevent management practices that would lower the vigor, growth and survival of the individual plants. Based on proposed rest rotation system, Criterion 1 would be met for Ripley's milkvetch. Overall, the implementation of alternative 2 has potential to impact individual Forest Service sensitive plant species. However, would not have a measurable negative effect to their populations.

Management Indicator Species

The Carson National Forest Plan (USDA 1986) identified 11 wildlife species as MIS to monitor the conditions of the forest's ecosystems. All 11 MIS were considered in the Tio Grande Grazing Allotment analysis; however because of limited habitat (vegetation) types found within the analysis area, only three species or groups of species were found to have the potential of being affected by implementation of continued grazing on the allotments and were evaluated in detail. The three species include elk, resident trout and aquatic macro-invertebrates. Refer to the specialist reports in the project record for rationale on why other species were not included in the analysis. [45, 52]

For a more details on the forest MIS assessment see document #14 in the project record or on the forest web site (www.fs.fed.us/r3/carson/plans)

Rocky Mountain Elk *Cervus canadensis nelsoni*: There are approximately 31,773 acres of suitable habitat for this species within the allotment. During the spring, summer and fall months, elk use the upland meadow/grasslands or forest openings near water sources. See Appendix A of the wildlife report for additional information. [52]

On the Carson, the majority of elk habitat is in a mid-seral condition with a lack of widely distributed understory forage in the forested types. This results in increased competition between numerous species of wildlife and livestock in key pastures. Most livestock allocations were made during the period of heavy timber harvest, which created transient range and provided for much higher levels of forage production for all ungulates. Increasing elk populations have contributed to higher utilization levels on important foraging areas such as upland meadows and riparian areas. The same sites are also key livestock grazing areas. With the decline in timber practices on the forest and continued fire suppression, canopy closure and duff layers are increasing, thus reducing understory forage production in the forested types (Carson 2007).

Forestwide habitat trend for this species is based on acres of available quality or "occupied" habitat identified in the Carson Forest Plan EIS [2] compared to an estimate of existing acres of

similar habitat. Rocky Mountain elk habitat from 1986 to 2005 is estimated to have increased from 1,362,760 acres to 1,424,074 acres or an upward trend of about 4 percent (Carson 2007).

Throughout its range, the elk is listed as globally secure and common, widespread and abundant. Game Management Unit 52 (which includes Tio Grande allotment)) have shown in increase from 1999 to 2003 from 2799 elk to 4882 elk using sight-ability surveys (Carson 2007). The population of for the Rocky Mountain elk on the Carson National Forest is up from 1986 and is considered currently stable (Carson 2007) (Kohlmann 2006).

Criteria to Measure Effects

To meet the needs of elk for their life necessities, the goal is to maintain the following range/forage criteria on the allotment:

Criterion 1: Upland meadow/grasslands

1.1. Diversity of grassland plant community equal to 50 percent plant composition in cool season grasses within 5 years

1.2. Within 20 to 40 percent utilization at the end of the summer from wildlife and livestock.

Criterion 2: Vegetation long term trend of good to excellent range conditions in upland meadows and riparian areas. The purpose of establishing these criteria is to ensure allowable use of plant forage species to maintain or improve plant diversity, density, vigor and regeneration over time to support elk to maintain forestwide population and habitat trends.

Environmental Consequences:

Alternative 1

It is anticipated that there would be an increase in density of the vegetative species such as shrubs, forbs and grasses. Over time this alternative would increase forage for elk and improve year round habitat. Based on the probability of improving habitat, alternative 1 would maintain the forest trends. In the long term, the existing levels of foraging and grazing by elk would remain static or decrease in accordance with the current long term elk management goals of the New Mexico Department of Game and Fish. However, the long term objectives for elk management may change, as elk/livestock grazing conflicts would diminish under this alternative .Based on the above factors, alternative 1 would continue forestwide population and habitat trends.

Alternative 2

Under alternative 2, elk and livestock would compete for the available forage which may lead to elk/livestock grazing conflicts within the Tio Grande grazing allotment. This alternative could especially affect the elk during years of drought, since there would be more competition with livestock for the available forage during these periods. Livestock and elk competition for forage would also continue to occur, since the distribution of forage is wildy limited in forested types. Under alternative 2, livestock and elk forage competition would occur in upland meadow/grassland while livestock are present on the allotment. The greatest competition would be in the early spring, when cool season grasses are limited.

Range readiness to determine the entry dates on the Placitas and Lucero Lakes pasture would translate to later entries of livestock to the Mexican spotted owl pastures (Tecolote and Brokeoff).

Later entry dates in these pastures would allow a higher percentage of cool season grasses to seed out. Grasses would respond to additional cool growing season rest by increasing root and leaf volume, annual production, seedling establishment, reproduction and vigor. Criterion 1.1 would be met. Overall, this would allow for greater forage diversity and cool season grass in the long and short term to be used as elk forage.

In the short and long term, as cool season herbage increases due to entry pasture management and pasture get rest (grazing system), livestock would be grazing slight use areas more often than during previous periods, as well as, heavy use areas less often and would generate a more uniform pattern of use that would make progress towards meeting the utilization objectives. Slight to moderate positive impacts to the utilization level within the key areas would occur because of the flexible management grazing system, growing season rest and season of use. In the long term, conservative livestock grazing of 20 to 40 percent allowable utilization on the pastures of the allotment would expedite attaining good to excellent range conditions to improve foraging habitat for the upland meadow for elk. Criterion 1.4 and Criteria 2 would be met for upland meadows.

The adaptive management actions (see table 1) that would be implemented in the short and long term are expected to improve livestock utilization within riparian areas. In the long term, this would contribute to improved habitat conditions for elk. This would include calving habitat. Criteria 2 would be met. Actions are expected to improve livestock utilization and improve the diversity of cool season grassed on the upland meadows on the allotment. In the long term, this would contribute to desirable utilization levels and improve diversity of cool season forage to continue to provide favorable foraging conditions for elk. Criterion 1 and Criterion 2 would be met. Based on the above information, alternative 2 would not affect forestwide population and habitat trends for elk.

Other Species of Interest

Mule deer (*Odocoileus hemionus hemionus*)

Black bear (*Ursus americanus*)

Of the species listed previously, important year long habitat features for other big game such as mule deer and black bear occurs within and adjacent to the allotment. Spring and summer use ranges are typically found in the small open meadows and aspen stands that are scattered throughout the ponderosa pine and mixed conifer vegetation types. These vegetation types occur within the allotment. Several small upland meadows/grasslands can be found within the analysis area. Within the allotment, there are approximately 16,901 acres of upland meadow/grasslands that may be used for foraging. While mule deer may use the upland meadow grasslands they desire to forage on browse over grass species. Browse is found in the more open forested areas, open ridges, as well as meadows and riparian areas. Black bear make extensive use of riparian zones and small meadow complexes (Hoover and Willis, 1987). Cool season grasses are important to black bear as forage during the early spring.

Criteria to Measure Effects:

To meet the needs of mule deer and black bear for their life necessities, the same range/forage criteria listed for elk are used. See the Criteria to Measure Effects section for elk.

Environmental Consequences

Alternatives 1 and alternative 2 would have similar effects on mule deer and black bear that are described in the environmental consequence section for elk.

Migratory Birds

Migratory birds have often been referred to as neotropical migratory birds (NTMB). As a result any bird that is listed in 50 CFR 10.13 is considered a migratory species. On January 10, 2001 President Clinton issued Executive Order 13186 “Responsibilities of Federal Agencies to Protect Migratory Birds” directing Federal agencies to comply with MBTA.

The information derived for this analysis is an assessment in progress. As the assessment stands now, it is largely information from Partners in Flight (PIF) and the US Dept. of Interior Fish and Wildlife Service (FWS). This will serve as a guide in project and landscape assessments on the Carson National Forest. The focus of the assessment is on habitat and ecosystem processes, not species management. The New Mexico PIF highest priority list of species of concern by vegetation type and the BCR #16 species list will be used to determine which species will be analyzed in this analysis. The following describe habitats found on the Tio Grande allotment and the migratory birds that are typically found in these habitats. All species described have not been located within the project area, but have the potential of occurring.

Ponderosa Pine Forest

Ponderosa pine forest habitat type is found in mountainous areas throughout the state at elevations of 6,000 to 9,000 feet. There are approximately 3,000 acres of ponderosa pine within the Tio Grande grazing allotment. Highest priority species include northern goshawk, Mexican spotted owl, flammulated owl, greater pewee, olive warbler, Virginia's warbler and Grace's warbler. Mexican spotted owls are not found in ponderosa pine habitat on the forest. The greater pewee and the olive warbler are not found on the Carson National Forest (Carson 2001). Neither alternative would affect the flammulated owl or Grace's warbler. These species are not discussed further.

Northern goshawk: See sensitive species section

Virginia's warbler: Alternative 1 benefits this species by providing more grass for concealing nest sites. It would be more beneficial for the species. Alternative 2 would have a negative effect on nesting habitat by providing less grass for ground nesting sites. This would not have a measurable negative effect to Virginia's warbler populations.

Mixed Conifer Forest

Mixed conifer forest habitat type is found in all higher mountain ranges in New Mexico, including the Sacramento and Animas Mountains, generally between 7,500 to 10,000 feet. There are approximately 6,126 acres of mixed-conifer within the Tio Grande grazing allotment. Highest priority species include northern goshawk, Mexican spotted owl, Williamson's sapsucker, olive-sided flycatcher, dusky flycatcher and red-faced warbler. The red-faced warbler is not found on Carson National Forest (Carson 2001).

Please the sensitive species section for effects to northern goshawk and boreal owl and to the threatened species section for effects to Mexican spotted owl. Neither alternative would affect Williamson's Sapsucker, olive-sided flycatcher or the dusky flycatcher. They are not discussed further.

Spruce-Fir (Subalpine)

There are approximately 1,055 acres of spruce-fir within the Tio Grande grazing allotment. Highest priority species include blue grouse and boreal owl (Carson 2001).

Blue grouse: Alternative 1 benefits this species by providing more grass for concealing ground nest sites and would not affect grouse by trampling. It would be more beneficial for the species. Alternative 2 would have a negative affect upon nesting habitat. There is the potential of livestock trampling nest and killing young. This would not have a measurable negative effect to the grouse population.

Wet Meadow (High Elevation Grassland)

There are approximately 16,901 acres of high-elevation grasslands within the allotment. Highest priority species include the Wilson's phalarope and bobolink (Carson 2001). To date no breeding bird surveys have been conducted in the wet meadow habitat within the west zone districts (including the Canjilon, Tres Piedras and El Rito Ranger Districts).

Wilson's Phalarope: Alternative 1 benefits species by decreasing the risk of livestock trampling ground nests in wet meadows. Alternative 2 would affect the species during nesting season when livestock is utilizing the wet meadow habitat. This would not have a measurable negative effect to Wilson's phalarope populations.

High Elevation Riparian Woodland

Approximately 360 acres of riparian habitat is found on the allotment. Highest priority species include the black swift, red-naped sapsucker, Hammond's flycatcher, American dipper, veery, painted redstart and MacGillivrays's warbler. The painted redstart and black swift does not occur on the Carson National Forest (Carson 2001). To date no Breeding Bird Surveys have been conducted in the high elevation woodland riparian habitat within the west zone districts (including the Canjilon, Tres Piedras and El Rito Ranger Districts). There is no habitat in the area for the black swift, red-naped sapsucker and Hammond's flycatcher. They are not discussed further.

American Dipper: Alternative 1 benefits the species by decreasing the risk of livestock grazing attributing to stream erosion. Alternative 2 may attribute to erosion in Canada Tio Grande and Rio Nutritas that would contribute to siltation that affects aquatic invertebrate prey. However, it would be anticipated that this alternative would not have a measurable negative effect to American dipper populations.

Veery: Alternative 1 benefits the veery by decreasing the risk of livestock impacting alder, willow and shrub cover along streams. Alternative 2 could impact this species by reducing the amount of willows and shrubs along the riparian. However, it would be anticipated that this alternative would not have a measurable negative effects to veery populations.

MacGilliv-ray's Warbler: Alternative 1 benefits this species by providing grassier component for concealing nest sites along creeks. Alternative 2 could impact species by reducing the grass component near creeks that is used for nesting. However, it would be anticipated that this alternative would not have a measurable negative effect to MacGilliv-ray's warbler populations.

Summary of Effects

Management activities associated with livestock grazing may affect wildlife species by affecting prey base habitat, cover, nesting habitat and/or competing with other wildlife species for available forage and water. The implementation of the alternatives would not cause population changes of TE&P, Forest Sensitive Species, management indicator species, migratory birds and other wildlife.

Cumulative Effects (all species except fisheries and macro-invertebrates)

Some animals are much more mobile than others. Therefore, it is important to recognize the entire range of an animal's habitat as its affected environment, instead of just the pastures of the allotment. For example, the Gunnison's prairie dog does not move around much—staying in the upland meadows and hibernating, instead of migrating for the winter. Therefore, its affected environment is the upland meadows habitat type within the allotment. On the other hand, elk use much larger areas to mate, calve, graze and winter. Therefore, its affected environment also includes habitat outside of the allotment. This analysis discusses the past, present and reasonably foreseeable future activities combined with the effects of the alternatives of this grazing analysis. These activities were analyzed when determining cumulative effects for each species

The past, present and reasonably foreseeable future activities were analyzed when determining cumulative effects on species discussed in this analysis. These activities include livestock grazing, livestock trailing, roads and recreation, prescribed burns, fire use, Stewart Meadows wetland improvement, 319 grants, range improvement projects, and range improvement maintenance. These projects have incrementally contributed, are contributing or will contribute to the current condition of the area.

The upland meadows and riparian habitats have been affected by historical and on-going grazing activities on federal lands and private lands. This area has historically been grazed for several hundred years. Heavy grazing in the past before grazing management by the Forest Service has caused a change in plant species composition and reduce amount of riparian habitat available. Historical grazing had had a negative effect on the Mexican spotted owl, boreal owl, northern goshawk, American marten, ermine, mink and some migratory bird species due to the loss of prey species, by changing timber stand structures and removing fine fuels for natural wildfires.

These affects have been improving since the Forest Service began the administration of this grazing allotment. Current on-going grazing on the allotment has shown that the grazing activities overall are maintaining range conditions in the upland meadows and riparian areas. These improvements are beneficial to prey species for the Mexican spotted owl, northern goshawk, boreal owl, American marten, ermine, mink and some migratory birds due to more grass and shrub species are now available and more forage is available for the white-tailed jackrabbit, Gunnison's prairie dog, western heather vole, elk and other big game species. Habitat condition would also beneficial to the burrowing owl. However, due to changes in plant species composition there is still a negative affect to these species. Changes in the riparian habitat

affected the northern leopard frog, Nokomis fritillary, cinereus shrew, water shrew, spotted bat, pale Townsend's big-eared bat, long-tailed vole, ermine, mink and riparian dependent migratory bird species. As the habitat has recovered it has improved the habitat for these species. The cinereus shrew, dwarf shrew, water shrew, western heather vole, long-tailed vole are negatively affected due to changes in plant composition especially those required for dense and diverse cover. Plant species such as Ripley's milkvetch and robust larkspur are negatively affected due to on-going grazing by these plants being grazed, trampled or by changing their habitat.

Historical grazing and on-going grazing as well as roads and recreation activities have potentially increased sediments and have affected water quality on the Canada Tio Grande and Rio Nutritas. The increase in sediments could have negatively affected the northern leopard frog, water shrew, spotted bat, pale Townsend's big-eared bat and mink. Excessive sediments, if not flushed through the stream system will degrade these species habitat and their prey base species (macro invertebrate, insects, fish) habitat. These impacts if not managed may magnify minor impacts to riparian areas that may be caused by livestock grazing.

Past activities and future activities such as fire use and the Lagunitas Prescribed burn project have and will reduce fuel loading in the area. However there is still a chance that the area could experience a stand replacing wildfire. Prescribed burning and fire use would provide benefits to elk, white-tailed jackrabbit, Gunnison's prairie dog, burrowing owl, western heather vole and other big game such as mule deer and black bear by providing foraging habitat for them.

Alternative 1:

Alternative 1 would incrementally reduce the cumulative impacts on the Mexican spotted owl, northern goshawk, boreal owl, ermine, American marten, mink and some high priority migratory bird species by providing for more cover for prey species in grass and shrub species in the upland meadow/grasslands, riparian areas and in timbered stands that are treated by past, present and foreseeable activities that would result in greater diversity of herbaceous cover. Incrementally, riparian habitat would likely to improve at a quicker rate without livestock grazing within the wet meadows and riparian vegetation due to increase in plant diversity and density and also by a reducing the amount of sediments introduced into the drainages. This would benefit the northern leopard frog, nokomis fritillary, cinereus shrew, dwarf shrew, water shrew, spotted bat, pale Townsend's big-eared bat, long-tailed vole, ermine, mink and riparian dependent migratory bird species. By removing livestock, this alternative would eliminate competition between white-tailed jackrabbit, Gunnison's prairie dog, elk, mule deer and black bear. Without livestock in the allotment, more forage for elk, mule deer and black bear would be available. Alternative 1 would also reduce cumulative direct impacts to Gunnison's prairie dogs and plants such as the Ripley's milkvetch and robust larkspur. With this alternative there would be less trampling impacts to these species and less of a chance livestock foraging these plants or altering the plants habitat. This alternative cumulative with past, present and foreseeable activities would not have any affect the burrowing owl.

Alternative 2

The livestock grazing in alternative 2, when cumulatively added to past, present and foreseeable activities, would not incrementally reduce the availability of structural habitat for such as trees and snags that are used by Mexican spotted owls, northern goshawks, boreal owls, martens, spotted bats and pale Townsend's big-eared bats for roosting/denning and nesting/denning sites.

However, the proposed livestock grazing, when added to the past, present and foreseeable livestock grazing on other allotments or private lands and livestock trailing could incrementally affect the woody vegetation structure in suitable riparian habitats for the southwestern willow flycatcher when livestock utilize the herbaceous vegetation and begin to utilize the woody species. Permitted livestock from the allotment combined with private on 1,790 acres and up to 2,000 head of trailing livestock cumulatively could result in southwestern willow flycatcher brood parasitism by brown-headed cowbird which can negatively affect the flycatcher.

These same activities could incrementally affect the southwestern willow flycatcher directly through disturbance and indirectly through degrading the riparian habitat at Stewart Meadows Complex and the Lower Canada Tio Grande. The riparian species to include the New Mexico jumping mouse, northern leopard frog, Nokomis fritillary, cinereus (masked) shrew, dwarf shrew, water shrew, spotted bat, pale Townsend's big-eared bat, long-tailed vole, ermine, mink and riparian dependent migratory bird species would also be affected.

Livestock grazing on adjacent allotments to include trailing through the allotment combined with the proposed grazing could incrementally impact Ripley's milkvetch by utilizing the plant early in the spring-summer before seed set. Trampling impacts to the robust larkspur could also be increased.

Also in riparian areas that have lost suitable riparian characteristics or have been converted to less woody systems that would not support Southwestern willow flycatchers, again this is likely to continue to affect the amount of suitable habitat for the flycatcher within the allotment. The proposed grazing system instructed through the AOI, to allow alternative entry pastures, pasture rest and later entry dates to the upper elevation pastures would allow Ripley's milvetch seed and reduce trampling effect to the robust larkspur to allow the persistence of these plants.

The proposed livestock grazing in alternative 2 along with the present existence of Forest Roads 87AD along the Canada Tio Grande, Forest Road 87 along the Rio San Antonio, Forest Road 93 along Rio Nutritas and the recreation that occur adjacent to these roads, would incrementally contribute to poor riparian and watershed conditions. Poor riparian and watershed conditions can result from these activities by increasing runoff to contribute to increased silt loads, increased turbidity, decrease water quality, increased scouring during high flows and altered pH levels. All of these impacts can have an indirect adverse effect to riparian species such as the southwestern willow flycatcher, New Mexico jumping mouse, northern leopard frog, nokomis fritillary, cinereus (masked) shrew, dwarf shrew, water shrew, spotted bat, pale Townsend's big-eared bat, long-tailed vole, ermine, mink and riparian dependent migratory bird species.

Present and foreseeable range improvements would improve livestock distribution within the allotment. This would improve prey base habitat on the allotment for the Mexican spotted owl, northern goshawk, boreal owl, ermine, American marten and mink and some migratory birds by improving/decreasing the utilization of forage. The improvement in livestock distribution (to improve utilization) would also improved watershed conditions to facilitate the restoration of Southwestern willow flycatcher riparian habitat within the Stewart Meadows Complex and the Lower Canada Tio Grande. Combined with the 319 grant range improvement projects, projects include the enlargement of 2 water tanks, the construction of pit tanks and the reconstruction of earthen tanks with all pastures, would aid in lessening use within current key areas. This would improve livestock distribution and help maintain conservative forage utilization by all ungulates within these pastures on the allotment. This would assist in rehabilitating the uplands and

watersheds associated with suitable southwestern willow flycatcher habitats that would facilitate the restoration of riparian habitat for the northern leopard frog, nokomis fritillary, cinereous shrew, dwarf shrew, water shrew, spotted bat, pale Townsend's big-eared bat, long-tailed vole, ermine, mink and riparian dependent migratory bird species. Likewise, the on-going and foreseeable 325 acres of wetland improvement projects proposed within the 556 acres Stewart Meadows Complex, combined with these range improvement projects would cumulatively improve riparian habitat for riparian species.

Foreseeable actions on or adjacent to the allotment include fire use program within the allotment and the 1,200 prescribed burn near Lagunitas, when combined with the proposed conservative forage use by livestock would improve range conditions by provide more forage in the upland meadow and riparian. The increase in forage would improve habitat for Mexican spotted owl, northern goshawk, boreal owl, ermine, American marten and mink and some migratory birds prey base in the short term and long term. An improvement of forage would also benefit elk, white-tailed jackrabbit, western heather vole, Gunnison's prairie dog and other big game such as mule deer and black bear. Improving range conditions in the upland meadows and riparian areas would contribute to improving the watershed conditions associated with southwestern willow flycatcher, northern leopard frog, Nokomis fritillary, cinereus (masked) shrew, dwarf shrew, water shrew, spotted bat, pale Townsend's big-eared bat, long-tailed vole, ermine, mink and riparian dependent migratory bird species riparian habitat. Alternative 2 combined with fire use and prescribed burning would not affect burrowing owls. The proposed conservative grazing when combined with a fire use program and prescribed burning would improve condition for Forest Sensitive plants such as Ripley's milkvetch and robust larkspur. The past, present and foreseeable actions, when combined with the proposed adaptive management actions to be implemented as part of alternative 2, would incrementally improve range conditions in riparian areas and upland meadows. Therefore, those species dependent on these habitats would benefit from these actions.

Fisheries and Macroinvertebrates Cumulative Effects

Effects of Past and Present Activities

Based on a stream habitat inventory report (2001), the Canada Tio Grande (Tecolote pasture) is exceeding the criteria for sediment and meeting the criteria for both streambank stability and temperature. The Canada Tio Grande (Tio Grande pasture) is likely exceeding the criteria for sediment, streambank stability and temperature based on field observations. Several beaver dams have retained sediment and insured sustained flows in the stream during the times they have been in place. This has reduced sediment in the stream.

The Tio Grande (Tecolote pasture) provides habitat for a core conservation population of Rio Grande cutthroat trout. Non native trout were present throughout the Tio Grande and numbers have been greatly reduced by removals from the mid 1980s to the present. The threat of competition from non native trout downstream is being minimized by a fish passage barrier. The barrier was constructed in 1993 and is in imminent need of reconstruction to continue to provide protection to the Rio Grande cutthroat trout (RGct) population.

Concentrated livestock use and trailing (40 head trailed Tio Grande/1600 head Rio Nutritas) along the Tio Grande and Rio Nutritas has increased sediment and trampled streambanks. Private lands, 123 acres, are adjacent to the Tio Grande. The associated activities (grazing and other uses within riparian zones) contribute sediment to the stream. Adjacent roads (3.3 miles) and road

crossings, both on private and FS land, also contribute sediment. Grazing and trailing of livestock from livestock crossing permits has increased sediment, destabilized banks and reduced riparian vegetation.

The Rio Nutrias is likely exceeding the criteria for sediment, streambank stability and temperature based on field observations. Private lands (1790 acres) and their associated activities (grazing and other uses within riparian zones) along with adjacent roads (2.5 miles) contribute sediment to the stream. Grazing and trailing of livestock from livestock crossing permits has increased sediment, destabilized banks and reduced riparian vegetation.

Alternative 1

Since there would be no direct or indirect effects to fisheries as a result of no grazing, there would be no cumulative impacts along the Tio Grande and Rio Nutritas. Other factors noted above would continue to impact stream habitat condition.

A foreseeable action would be the reconstruction of the fish passage barrier protecting the RGct trout population in the Canada Tio Grande (Tecolote pasture). The improvement of the barrier would minimize or eliminate upstream movement of non native trout which is considered a major threat to RGct trout populations.

Alternative 2

A foreseeable action would be the reconstruction of the fish passage barrier protecting the RGct trout population in the Canada Tio Grande (Tecolote pasture). The improvement of the barrier would minimize or eliminate upstream movement of non native trout which is considered a major threat to RGct trout populations.

Authorized grazing would continue and trailing crossing permits would be in place. Range condition would be improved through adaptive measures and likely result in some reduction in the amount of sediment contributed to the stream. Crossing permits would be modified and adaptive measures taken to locate trailing outside of riparian areas resulting in less sediment and streambank damage.

The effects of alternative 2, along with the effects of past, present and reasonably foreseeable activities would have minimal improvements to stream habitat condition in the long term on the Rio Nutritas and the Canada de Tio Grande (Tio Grande pasture) because of the other factors not related to grazing on the allotment or national forest (see above). The Canada de Tio Grande (Tecolote pasture) would show improvement to stream habitat condition with the successful completion, maintenance and monitoring of an exclosure to eliminate streamside trailing. There are no other identified effects (such as roads, private lands, etc) in the Tecolote pasture.

Heritage Resources [38]

This effects analysis identifies the known heritage resources within the allotment and analyzes effects of the alternatives on heritage resources in accordance with the USFS Region 3 “Standard Consultation Protocol for Rangeland Management: First Amended Programmatic Agreement Regarding Historic Property Protection and Responsibilities” (USFS 2005). Concurrence from New Mexico State Historic Preservation Office (NM SHPO) was received on August 13, 2008. [43]

Heritage inventories at this time (which include 3 other allotments in addition to Tio Grande) have examined from 3 to 8.3 percent of potential inventory acres in Tio Grande, San Antone, and Jawbone allotments and 20 percent of acres examined in the Tusas Allotment. See the heritage report for details of heritage inventory coverage and results by allotment. [38]

In the Tio Grande allotment, 96 percent (2,453 ac.) of the survey acres have been inventoried for large-scale timber sales / vegetation treatments, meaning that inventoried acres are disproportionately in mixed conifer or aspen. The Forest Terrestrial Ecosystem (TES) GIS layers provide a framework for quantifying the relationship between archaeological components and vegetation. Despite a more than nine to one ratio of inventoried forested acres versus grassland acres, 59 percent of known prehistoric components are in grasslands, while 41 percent are recorded in timber.

Potential Effects to Historic Properties

Settings where cattle congregate consist of corrals, around earth tanks and drinkers, in stream bottoms and sometimes along fences, particularly in corners and at gates (see Appendix D, Maps 3d, 4d, 5d and 6d in the heritage report for the locations of earth tanks, streams and fences within the allotments). Many of the corral locations in the allotments were inventoried prior to construction or prior to expansion and as a result heritage sites were identified, where present and avoided.

A number of stock drinking water sources were visited by the author as a part of this analysis or for projects occurring in the allotments over the past 6 years, including earth tanks at the Cisneros Lakes, Valle Grande and Lamy Peak and drinkers at Lucero Lakes and Posito Springs. The features have been in place for varying lengths of time, some for nearly a century. Generally speaking, there appear to be one or two earth dams constructed within an allotment every decade or so. Most of these locations have well-worn cattle trails that fan out from the drinking features into the surrounding pastures. None of the trails have been identified as cutting through significant buried deposits

Tribal Consultation

A consultation letter was sent in January of 2007 listing all the proposed projects for each Ranger District with an enclosed project location map. The project was added to the SOPA calendar in 2006 and has remained on the calendar through the present. [10] The SOPA calendar and a consultation letter are sent to the tribes on a quarterly basis. The tribes receiving the letter and SOPA calendar include: The Comanche Tribe of Oklahoma, The Jicarilla Apache Nation, The Navajo Nation, The Southern Ute Indian Tribe, The Ute Mountain Ute Tribe, The Hopi Tribe and the Pueblos of Jemez, Nambe, Ohkay Owingeh, Picuris, Pojoaque, San Ildefonso, Santa Clara, Taos, Tesuque and Zuni. An additional mailing providing the tribal governments with opportunity for comment was sent out July 9, 2008. [35] The tribal governments have not identified any specific traditional or sacred places within the project area or other concerns regarding this project.

Environmental Consequences

Under alternative 1, grazing would not be allowed on the allotment. As erosion or other natural deterioration (not related to livestock grazing) of the landscape is not occurring or is very limited

and localized, there would have no effect (direct, indirect, cumulative) on heritage resources. Heritage resources would remain in their current condition.

Livestock grazing has been taking place on the allotments for over a century. Large-scale projects of any kind in the project area, other than timber harvest, were no longer being proposed by the 1970s (following passage of the National Environmental Policy Act and the National Historic Preservation Act). Since that time, the effects of grazing in the project area, such as erosion, trampling / compaction and overgrazing of palatable plant species are believed to have moderated and are expected to continue to do so under the proposed action. No adverse effect is expected from implementation of alternative 2 (proposed action). There would be no effect to Traditional Cultural Properties (TCPs) and sites listed on the National Register of Historic Places. Neither of these site types are present within the project area.

The most recent version of the National Register of Historic Places (NRHP) was reviewed; no sites listed on the NRHP are situated within the project area. There would be no effect to NRHP. Congregation of livestock in areas such as corrals and watering places are not impacting known archaeological sites. Grazing disturbance is not noted in previously recorded site documentation. A review of extant site information and visits to numerous locations on the allotment indicates no known historic structures, ruins with standing walls, rock art sites or rock shelters are being impacted by current grazing. Likewise, no known non-sensitive site types, such as artifact scatters, are being damaged by current grazing.

One other heritage site type considered for effects are Traditional Cultural Properties (TCP). There are no TCPs present within the project area. There would be no effect. Overall, no adverse effect is expected from implementation of the proposed action.

Cumulative Effects

Livestock grazing has been taking place on the allotment for over a century. Large-scale projects of any kind in the project area, other than timber harvest, were no longer being proposed by the 1970s (following passage of the National Environmental Policy Act and the National Historic Preservation Act). Since that time the effects of grazing in the project area, such as erosion, trampling / compaction and overgrazing of palatable plant species are believed to have moderated and are expected to continue to do so under the proposed action.

Under the proposed action, enlargement of existing earth tanks in the Placitas and Lucero Lakes pasture would occur. The proposed improvements would be analyzed and implemented in 3 to 5 years after the decision is signed. Separate Section 106 consultation would address each of these projects in the future and so these are not considered in depth.

Wilderness, Wild and Scenic Rivers and Special Designations [47, 48]

Tio Grande allotment livestock do not graze within the wilderness. The allotment is approximately 5 miles from the Cruces Basin Wilderness. There are no wilderness study areas within the allotment. In addition, there are no inventoried roadless areas or research natural areas within the allotment. Therefore, there would be no effect (direct, indirect or cumulative) in either alternative to these designations.

There are no designated Wild and Scenic Rivers within or adjacent to the allotment. The closest designation (Rio Grande River) is approximately 20 miles away. Segment 8 of the Rio San Antonio that is located within a very small portion of the Placitas pasture is eligible for designation. The outstanding remarkable values (ORVs) for this segment is wild (has potential southwestern willow flycatcher habitat) and historic (old houses on private lands) in the vicinity of the Stewart Meadows Complex (Carson 2001). See the specialist report for additional information. In alternative 1 even with no grazing, other trailing activities would continue. However, there would be no effect (direct, indirect or cumulative) to the wild and historic ORVs (see wildlife and heritage resources section). These activities were in place at the time that the segment was determined to be eligible. In alternative 2, there would be no effect to ORV's as grazing is excluded within Stewart Meadows.

Social and Economics [46]

This analysis focused on the location of the allotment in relation to the community of Tres Piedras, New Mexico (Taos County), to the 3 southern Colorado communities and to Santa Fe, New Mexico.

The current domestic livestock grazing operations for the Tio Grande allotment are managed by the Tio Grande Association which is comprised of several individuals who primarily live in the southern Colorado communities of Antonio, La Jara and Alamosa. One permittee is from Santa Fe, New Mexico. When not on the forest allotment, the permittees base their operations on their private lands and lease other lands. One permittee also has a permit on adjacent Bureau of Land Management allotments. In northern New Mexico, contemporary ranching operations that have access to private grant lands use a combination of privately owned or leased lands, grand lands and public lands as their range. As private land sales occur, grazing areas become limited to many ranchers. More reliance is placed on forest grazing permits (Raish and McSweeney 2003).

Permittees have had to adjust to several years of livestock number reductions in response to weather (poor precipitation) in the past 10 years. A rangeland management objective of providing reliable forage has, in some years, not been attainable. From 1996 to 2006, annual livestock reductions ranged from 9 percent (2000, 2001) to as high as 55 percent in 2002, a drought year (see rangeland vegetation report). The interconnection between operations on private lands and the national forest becomes clear when considering post-drought effects. On the Tres Piedras Ranger District after the 2002 drought a total of four permittees went out of business between 2003 and 2004. Two permittees were on the Tio Grande allotment and two permittees were from the adjacent allotment, San Antone. Given that the existing association is made up of nine permittees (families), the loss equated to over a 20 percent reduction in members.

On both allotments, the permittees sold their herds because they lacked the private land on which to keep the herd when forest forage was unavailable. Remaining permittees sold approximately 20 to 40 percent of their head. In terms of the viability of the Tio Grande Association, it has recovered those losses through new livestock purchases. However, it is estimated that it took the Association 5 years to recover from the 2002 event. The Association's ability to recover was based on having operational flexibility. When forest conditions are less than favorable the options that allow a permittee to continue operating is often: the ability to sell hay, the ability (funds) to purchase hay and the ability to keep livestock on their private lands or leases for extended periods of time (personal communication between Cote and Yonemoto 2008).

Environmental Consequences (Social and Economic)

Alternative 1

This alternative would not support the purpose and need which includes: (1) contributing to the local economy and the stability of southern Colorado and northern New Mexico communities and (2) providing forage for livestock in order to contribute to the economic diversity and social well being of surrounding communities that depend on range resources for their livelihood.

While the ranching lifestyle for nine families may be continued through private land or BLM operations, there would be an adverse effect to these families in terms of losing the connection to the national forest that had been place for several generations. Life-style changes could include decreasing their spending, diversifying operations to make them less dependent upon ranching and family members seeking more "outside" work to bring in more income (Aragon 2007).

Losses in estimated income would be greatest in this alternative. Based on a stocking rate up to 988 cow/calf⁶ and 33 bulls on the allotment for an entire season (153) days, the Association would lose approximately \$165,000 in estimated gross income. Indirect effects (and income losses) that may occur but are not quantified are the effects to BLM permittees and other forest allotment permittees who use a system that includes several allotments and private lands in order to have sustainable operations. There would be no impacts to those permittees who use the Tio Grande allotment as a critical travelway to private lands. The crossing permits would be issued even if the allotment use was discontinued

Whether permittees could continue livestock operations without the use of national forest would depend on how well they could adjust their operations. The permittees would need to find other sources of grazing land, reduce herd size or provide for supplemental feeding. Available lands may be more readily available in southern Colorado than around Santa Fe, New Mexico, for alternative grazing lands. However, supplemental feeding and/or the acquisition of other grazing lands may be impractical and exceed any profit margin. For example, in the small community of Antonito, Colorado, real estate value has appreciated over 100 percent in the last 10 years. However, in comparison to the community of Santa Fe, NM, it may still be attainable for some. In Antonito, CO, the median cost of a house is \$112,525. This is considered very low relative to most of Colorado. In Santa Fe, NM the median price is over \$435,000 (<http://www.neighborhoodscout.com>).

Alternative 2

In alternative 2, there would be no change in terms of lifestyle choice and the continuance of tradition. Because the grazing authorization would respond annually to resource conditions and weather, there may be years when permittees can maximize revenue generation. This assumes that through adaptive management and the AOI the quality and quantify of forage is at least maintained during years of poor precipitation and improved and increased during “good” years. The estimated income for the Association with full numbers and a full season of use would be approximately \$165,000. Likewise, there may be years when revenue generation is reduced by as much as \$88,000 (worse case scenario) if both the livestock numbers and the grazing season is

⁶ There are also 33 permitted bulls but the assumption is that bulls are not part of the annual sales like cow/calves are.

reduced (660 cow/calf for 3.5 months) in response to weather or resource conditions (see cow/calf income sheet in the specialist report for additional information on calculations). [46]

Whether individual members of the Association could stay viable could depend on their operational flexibility (see definition above). However based on how the Association has responded to poor forage conditions in the past, it has demonstrated it can modify management and recover from poor revenue periods. Since 1996, the majority of the members have been able to keep operating even though annual stocking rates have varied from 9 to 55 percent.

Please note, costs that are not included in this analysis are the other costs that permittees have in order to sustain livestock operations. Costs would include maintenance of fences, cattleguards, gates and stock tanks; hauling water where it is inadequate, hiring a herder if needed and grazing fees. Time and monies spent commuting would also be part of the costs. In addition, the recent but significant rise in fuel and transportation-related costs adds additional burden. These costs would be offset by the income generated from the grazing operations. In general, many permittees do not maintain their grazing operations as commercial ventures so much as for a lifestyle choice and to maintain cultural traditions.

Cumulative Effects

Because the total number of permitted livestock (cattle and sheep) on National Forests in the Southwestern Region (Arizona and New Mexico) has dropped dramatically during the past century (from over 1,400,000 permitted head in 1909 to approximately 200,000 by 1997) (Aragon 2007) eliminating grazing on the allotment may contribute to the overall trend of fewer small livestock operations. Particularly for the small communities in southern Colorado (Antonito and La Jara), the mid-sized community of Alamosa and the growing city of Santa Fe, the reduced number of livestock operations combined with the emerging growth in population (such as Santa Fe, NM) could contribute to a loss of traditional land uses and values. Based on observing how growth has affected other communities throughout the southwest (Taos and Santa Fe), the assumption is that lands that were once considered agricultural lands are sold and converted to residential development. Over time as more permittees get out of the livestock business, those people who had connections to the national forest may be reduced.

In alternative 2, there would be no cumulative effects in terms of maintaining lifestyle choices and tradition through use of the national forest. Should there be extended periods of poor forage conditions, permittees may go out of business. The cumulative effect would be the same as described in Alternative 1.

Environmental Justice [46]

As required by law and Executive Order 12898 (1994), all Federal actions should consider potentially disproportionate effects on minority or low-income communities. Potential impact or change to low-income or minority communities within the study area due to the proposed action should be considered. Where possible, measures should be taken to avoid negative impacts to these communities or mitigate the adverse effects.

The rural community of Tres Piedras lies is located to the south of the Tio Grande allotment and numerous small, predominantly Spanish communities are located within the study area (see specialist report in project record). Native Americans have been present in the area for over 1,000 years and Spanish settlers arrived in the area around 1540 (Kyte 2008). Please see the heritage

resources report for detailed information on the cultural history that is associated with the allotment. [38]

Most permittees are from southern Colorado communities of La Jara, Antonito and Alamosa. One permittee is from Santa Fe, NM. While Tres Piedras is the nearest community to the allotment, impacts to this community would be extremely limited given that small businesses that offered fuel and restaurant services are no longer open (as of June, 2008). The disposable income of most permittees is used in their local communities (Antonito, CO and La Jara, CO). Economic impacts are more likely to be realized in the vicinity of the permittee homes (particularly Alamosa, Colorado), which is a full service community, rather than in Tres Piedras. Any economic impacts to the city of Santa Fe would be immeasurable.

All the communities in the study area would fall under the minority and/or low-income populations identified in the Environmental Justice Executive Order 12898. Generally, environmental justice is concerned with identifying these communities and ensuring that they are involved in and understand the potential effects of the proposed action. The people in the study area communities are interested in maintaining their historic and subsistence lifestyle, using the surrounding area to gather resources needed.

Environmental Consequences

Alternative 1

This alternative would negatively affect the lifestyle of the communities in the study area. This alternative could impact minority and low-income populations. Eliminating the opportunity to graze cattle would adversely affect the permittees and their families by changing traditional use of the land and causing an economic hardship to those individuals who rely in part on the income generated from their long-term cattle operations. The cumulative impacts are the same as discussed in social and economics for alternative 1.

Alternative 2

Overall, this alternative should result in no change on low income or minority populations. There may be years when permittee revenues may be lower because of weather and resource conditions. However, forage availability (which translates into potential revenue) should be maintained or improved in the long term. There would be no change to the traditional use of the land and no change in economics related to the grazing authorization. There would be no displacement of minorities, changes of land use or increases in taxes that would constitute an economic hardship. During consultation, the tribal governments have not identified any specific traditional or sacred places within the project area or other concerns regarding this project. There would be no cumulative impacts.

Chapter 4 - 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:

Federal and State Agencies

New Mexico State Historical Preservation Office (NM SHPO)
State of New Mexico Department of Game and Fish
State of New Mexico Environment Department
US Department of the Interior, Fish and Wildlife Service
US Department of the Interior, Bureau of Land Management

Local Government

Rio Arriba County

Tribes

Pueblo of Jemez	Pueblo of Taos
Jicarilla Apache Nation	Pueblo of Tesuque
Pueblo of Nambe	Pueblo of Zuni
Pueblo of Picuris	The Hopi Tribe
Pueblo of Pojoaque	The Navajo Nation
Pueblo of San Ildefonso	Southern Ute Tribe
Pueblo of Okay Owingeh	Ute Mountain Ute Tribe
Pueblo of Santa Clara	Comanche Tribe of Oklahoma

Organizations

WildEarth Guardians	Northern NM Stockman's Association
Western Watershed	Carson Forest Watch
Wild Watershed	New Mexico Trout
Sierra Club Rio Grande Chapter	NMSU Cooperative Extension Service
Forest Trust	Tio Grande Association
John B. Shawcroft Ranches	Reverse S Slash Cattle Company
Center for Biological Diversity	

Individuals

Donald and Anna Shawcroft	Johnny A. Garcia
Donald Sandoval	Ernesto S. Garcia
Ruben Sandoval	Joseph L. Romero
Pedro A. and Sarah F. Marquez	Wade Sandoval
Jackie Bush	Chris Garcia
Maclovio Garcia	Willie Garcia

Chapter 5 - References

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Chapter 6 – List of Preparers

USDA Forest Service, Carson National Forest, Supervisor’s Office and Tres Piedras Ranger District

Wayne Yonemoto	Tres Piedras District Rangeland Staff (Vegetation, Soils, Water, Air)
Greg Miller	Forest Watershed Program Manager (Soils, Water, Air)
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Ray Martinez	West Zone Recreation Staff District (Recreation, Wilderness)
Michael Kyte	Tres Piedras Archeologist (Heritage)
Paul Otero	Forest GIS Specialist (GIS)
Paula Coté	Forest Planner (IDT Leader)
Audrey Kuykendall	Forest NEPA Coordinator (NEPA)

Appendix A – Project Record Index

DOC #	DATE	DOCUMENT	AUTHOR	RECIPIENT
1	03.06.72	Region 3 Policy on Managing National Forest Land in Northern New Mexico	USDA Forest Service, Southwestern Region, Regional Forester	Project Record
2	09.86	Environmental Impact Statement, Carson National Forest Plan	Carson National Forest	Project Record
3	10.31.86	Record of Decision Carson National Forest Land and Resource Management Plan	Carson National Forest	Project Record
4	10.31.86	Carson National Forest Plan, as amended	Carson National Forest	Project Record
5	08.00.87	Terrestrial Ecosystems Survey of the Carson National Forest	USDA Forest Service, Southwest Region	Project Record
6	12.03.90	FSH 2509.22 Soil and Water Conservation Practices Handbook	USDA Forest Service, Southwest Region	Project Record
7	07.27.95	Rescission Act of 1995, PL 104-19, Section 504		Project Record
8	1999	Utilization Studies and Residual Measurements	USDI Bureau of Land Management, et. al.	Project Record
9	03.13.03	Tio Grande Livestock Association Term Grazing Permit	Tres Piedras Ranger District	Project Record
10	01.14.05 to 07.01.08	Schedule of Proposed Actions	Carson National Forest	Project Record
11	09.09.05	FSM 2238 Grazing Fees	USDA Forest Service	Project Record
12	03.19.07	Project Initiation Letter	Benjamin Romero, Tres Piedras District Ranger	IDT
13	05.30.07	Allotment analysis timeline	IDT	Project Record
14	06.07	Management Indicator Assessment	Carson National Forest	Project Record
15	06.06.08	IDT Field Trip	IDT	Project Record
16	09.08.07	FSH 2209.13 Grazing Permit Administration Handbook, Chapter 90	USDA Forest Service, Southwestern Region	Project Record
17	10.15.07 to	IDT Meeting Notes	Cote, IDT Lead	Project Record

DOC #	DATE	DOCUMENT	AUTHOR	RECIPIENT
	10.18.07			
18	10.30.07	IDT Meeting Notes with GIS maps	Cote, IDT Lead	Project Record
19	12.30.07	IDT Notes	Cote, IDT Lead	Project Record
20	2008	Tio Grande allotment GIS	Paul Otero, GIS analyst	Project Record
21	03.16.08	Recommendations for allotment management	Jacqueline Bush	Tres Piedras District Ranger
22	03.18.08	E-Mail re: Recommendations for allotment management	Wayne Yonemoto	District Ranger
23	04.24.08	District Review of permittee proposals	Tres Piedras District Ranger	Project Record
24	05.16.08	Adaptive management recommendations	Greg Miller, Forest Soils and Watershed program manager	IDT
25	05.21.08	Scoping letter with mailing list	District Ranger	Interested parties
26	05.23.08	Returned scoping letters – undeliverable	Various	Project Record
27	06.16.08	IDT notes re: assumptions, corrections, proposed mitigation	IDT	Project Record
28	06.18.08	USFS (Washington Office) response to Western Watershed Project re: AUMs and stocking rates(with 03.24.08 letter to USFS from WWP attached)	Janette S. Kaiser, Director of Rangeland Management	Jon Marvel, Western Watershed Project
29	06.19.08	IDT Notes – adaptive management and cumulative effects information	Cote, IDT Lead	Project Record
30	06.19.08	Response to scoping - New Mexico Department of Game and Fish (NMDGF)	Matthew Wunder, NMDGF Conservation Services Division	District Ranger
31	06.30.08	Public comment content analysis	IDT	Project Record
32	07.02.08	E-mail re: Tecolote pasture mitigation	District Ranger	Paula Cote, IDT Lead
33	07.02.08	Response to scoping	Erik Ryberg for Western Watershed Project	District Ranger
34	07.03.08	Response to scoping	USDI, Bureau of Land Management	District Ranger
35	07.09.08	30 day notice and comment request for comments and mailing list	IDT	Interested parties

DOC #	DATE	DOCUMENT	AUTHOR	RECIPIENT
36	07.10.08	Legal notice in <i>The Taos News</i>	<i>The Taos News</i>	Project Record
37	07.14.08	Response to scoping – New Mexico Environment Department	Georgia Cleverly, Environmental Impact Review Coordinator	District Ranger
38	07.17.08	Heritage Resources Specialist Report	Michael Kyte, District Archaeologist	Project Record
39	07.31.08	E-mail re: cumulative effects for fisheries	Donna Storch, Forest Fisheries Biologist	Cote'/IDT Lead
40	08.05.08	Issues and Alternatives, <i>amended on 08.12.08 in response to 08.11.08 comment letter from Western Watershed Project</i>	District Ranger	Project Record
41	08.08.08	Soils, Watershed and Air Specialist Report	Wayne Yonemoto, District Rangeland Staff	Project Record
42	08.11.08	Response to 30-day notice and comment request	Erik Ryberg for Western Watershed Project	Project Record
43	08.13.08	Inventory Standards and Accounting Form – heritage concurrence	NM State Historic Preservation Office	Forest Supervisor
44	08.06.08	Biological Assessment to USFWS	Kendall Clark, Forest Supervisor	Wally Murphy, United States Fish and Wildlife Service
45	08.26.08	Fisheries Specialist Report	Donna Storch, Forest Fisheries Biologist	Project Record
46	09.12.08	Social and Economics Specialist Report	Paula Cote, Forest Planner	Project Record
47	09.12.08	Special Designations Specialist Report	Ray Martinez, West Zone Recreation Staff	Project Record
48	09.12.08	Wilderness and WSA Specialist Report	Ray Martinez, West Zone Recreation Staff	Project Record
49	09.15.08	E-mail: cow/calf numbers and BLM permits	Wayne Yonemoto	IDT Lead
50	09.18.08	Response to 30-day notice and comment	The Navajo Nation	District Ranger
51	09.19.08	Rangeland Vegetation Specialist Report	Wayne Yonemoto, District Rangeland Staff	Project Record
52	09.19.08	Wildlife Specialist Report with Biological Assessment and Biological Evaluation and 09.30.08 USFWS Concurrence	Francisco Cortez, District Wildlife Biologist	Project Record