



United States  
Department of  
Agriculture

Forest  
Service

**Southwestern  
Region**



# Environmental Assessment for Livestock Grazing Management on the Deer Creek Allotment

Questa Ranger District  
Carson National Forest



The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because of all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means of communication of program information (Braille, large print, audiotape, etc.) should contact USDAs TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410, or call (800) 79503272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Printed on recycled paper

# Content

<b>Chapter 1 – Purpose and Need</b> .....	<b>1</b>
<b>Purpose and Need for Action</b> .....	<b>1</b>
<b>Background</b> .....	<b>1</b>
Existing and Desired Conditions .....	2
<b>Management Direction</b> .....	<b>4</b>
<b>Proposed Action</b> .....	<b>4</b>
<b>Decision Framework</b> .....	<b>6</b>
<b>Public Involvement</b> .....	<b>6</b>
<b>Issues</b> .....	<b>7</b>
<b>Chapter 2 - Alternatives</b> .....	<b>9</b>
<b>Alternatives Considered, but Eliminated from Detailed Analysis</b> .....	<b>9</b>
<b>Alternatives Considered in Detail</b> .....	<b>9</b>
Alternative A - No Action.....	9
Alternative B – Current Management .....	9
Alternative C - Proposed Action .....	10
<b>Mitigation</b> .....	<b>13</b>
<b>Monitoring</b> .....	<b>17</b>
<b>Comparison of Effects by Alternative</b> .....	<b>18</b>
<b>Chapter 3 - Environmental Consequences</b> .....	<b>21</b>
<b>Cumulative Effects</b> .....	<b>21</b>
<b>Rangeland Vegetation</b> .....	<b>23</b>
Environmental Consequences .....	23
Cumulative Effects .....	25
<b>Soil, Water, and Air Resources</b> .....	<b>26</b>
Soil Condition, Stability and Nutrient Cycling .....	26
Streams and Riparian Areas.....	26
Soils - Environmental Consequences .....	29
Riparian – Environmental Consequences.....	30
Water Quality and Aquatic Habitat – Environmental Consequences .....	32
Cumulative Effects .....	32
Cumulative Effects- All Alternatives.....	33
Air – Environmental Consequences .....	33
All Alternatives.....	33

<b>Wildlife, Fish and Rare Plants .....</b>	<b>34</b>
Federally Listed Species .....	34
Forest Sensitive Species.....	34
Northern Goshawk ( <i>Accipiter gentilis</i> ).....	34
White-tailed ptarmigan ( <i>Lagopus leucurus</i> ) .....	36
Sangre de Cristo pea clam.....	38
Management Indicator Species .....	40
Rocky Mountain Elk .....	40
Cumulative Effects.....	41
Rocky Mountain Bighorn Sheep.....	41
White-tailed Ptarmigan .....	42
Resident Trout.....	44
Aquatic macro-invertebrates .....	44
Avian Species.....	45
Cumulative Effects – All Species.....	48
<b>Heritage Resources.....</b>	<b>50</b>
<b>Social and Economic Environment.....</b>	<b>51</b>
<b>Environmental Justice/Civil Rights.....</b>	<b>54</b>
Environmental Consequences .....	54
<b>Wilderness, Wild and Scenic Rivers, and Recreation .....</b>	<b>55</b>
Wilderness.....	55
Wild and Scenic Rivers.....	55
Recreation Opportunity Spectrum (ROS) and Visual Quality .....	55
Recreational Opportunities .....	56
<b>Chapter 4 - Consultation and Coordination.....</b>	<b>59</b>
<b>Chapter 5 - References.....</b>	<b>61</b>
<b>Chapter 6 – List of Preparers.....</b>	<b>69</b>
<b>ID Team Members:.....</b>	<b>69</b>

# Chapter 1 – Purpose and Need

The Forest Service has prepared this environmental assessment (EA) in compliance with the National Environmental Policy Act (NEPA) of 1969 and other relevant Federal and State laws and regulations. This EA discloses the direct, indirect, and cumulative environmental impacts that would result from implementation of the proposed action and alternatives and considers the best available science. An interdisciplinary analysis on the proposed action is documented in a project record. Source documents from the project record are incorporated by reference throughout this EA by showing the document number in brackets [#]. This EA summarizes the project record to make the analysis results as clear as possible. Additionally, comments received during a 30-day comment period (as required by the Forest Service's 36 CFR 215 notice, comment, and appeal regulations) were considered by the specialists in finalizing the proposed action and their effects analyses.

## Purpose and Need for Action

The Deer Creek Allotment contains land that is considered suitable for grazing in the Carson Forest Plan. When continued use is consistent with the goals, objectives, standards, and guidelines of the forest plan, it is Forest Service policy to make forage available to qualified livestock operators from lands suitable for grazing (Forest Service Manual (FSM) 2203.1.6). The purpose of the proposed action is to authorize livestock grazing in a manner that maintains and/or moves the allotment toward Forest Plan objectives and desired conditions for rangeland vegetation, soil, watershed, and wildlife habitat relative to livestock grazing. Action is needed:

- For maintaining and/or improving vegetation and habitat that is in good condition and for promoting vegetation recovery and native species re-establishment in several riparian areas. There is a need to continue meeting and moving toward high elevation grassland and riparian desired conditions in an acceptable timeframe.
- For additional flexibility in the management of the allotment to allow the Forest Service and permittees the ability to respond to changing resource conditions and management objectives.

## Background

The Deer Creek Grazing Allotment<sup>1</sup> is located southeast of Questa, in northern New Mexico (see Map 1). The legal description is T28N, R13E Section 13, and all/or portions of T28N, R14E, Sections 2, 3, 4, 17, 18, 28, and 33. It can be accessed from the Taos Ski Valley area by hiking Wheeler Peak Forest Trail #90 and Forest Trail #64 towards the Gold Hill area. Of the allotment's 5,370 acres, only 470 acres are considered grazable (approximately 243 acres have full grazing capacity and 227 acres have potential grazing capacity<sup>2</sup>). Currently, the Deer Creek Allotment is

---

<sup>1</sup> In the past, this analysis has also been known as the Deer Creek Complex Grazing Allotment.

<sup>2</sup> 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, and sufficient ground cover and soil stability. Full capacity acreage (243 acres) was the only factor used to determine the overall capacity of this allotment (the maximum number of livestock that would be permitted). 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. Although these (227 acres) potential acres are part of the total 470 grazable acres within the allotment, they were not used to determine capacity (the maximum number of livestock that would be permitted) because they are small isolated units dispersed across the allotment, are limited because they are too far away from

managed for a total of 50 head of cow/calves (167 AUM) and the season of use is from July 1 through September 15. The allotment is made up of three pastures – Deer Creek, Main Fork, and Long Canyon (see Map 1) and grazing management is a three-pasture, deferred rotation system. On an annual basis, livestock are either put on a specific pasture later in the summer or are taken off a pasture earlier in the fall. Deferred rotation does not allow a pasture to completely rest for one year.

Depending on soil and forage conditions, livestock are allowed to use up to 40 percent (USDA 1986) of the available forage each year, beginning July 1. Livestock may be removed from the allotment before September 15<sup>th</sup> in response to climatic conditions or if utilization guidelines have been reached. In-depth vegetation studies were conducted in 2003 and 2004 to determine condition and trend and ocular (visual) inspections occurred in 2005 and 2006. The majority of the allotment is in good condition and in a stable trend with annual forage utilization ranging from 11% to 30% from 2002 to 2005.

## Existing and Desired Conditions

### High Elevation Grasslands

Grassland accounts for 26 percent (120 acres) of the acres with full or potential capacity for grazing and all three pastures have high elevation grassland meadows. This vegetation type is a mix of riparian and mountain meadows near or above timberline. The dominant species in these areas are Thurber's fescue (*Festuca thurberi*), alpine timothy (*Phleum alpinum*), and a species of high elevation sedge known as Bellardi bog sedge (*Kobresia bellardi*).

The high elevation grasslands in all pastures are in good (to excellent) condition based on past and present comparison of forage production and professional judgment (see rangeland vegetation report for monitoring information). However, poor livestock distribution in the Long Canyon pasture is affecting riparian resources in the Main Fork pasture (see riparian discussion). Quality ptarmigan nesting habitat is found in the alpine grasslands of Long Canyon and around Middle Fork Lake in the Main Fork pasture. There is a need to maintain high quality ptarmigan nesting habitat and a need to improve livestock distribution in the upper Long Canyon grasslands (Forest Plan, D-9, High Grass, pp. 1-3).

### Riparian

Riparian vegetation accounts for approximately 3 percent or 182 acres of the entire allotment and these areas are favored by livestock. Riparian meadows are interspersed throughout the high elevation grasslands. Riparian species include narrowleaf cottonwood (*Populus angustifolia*), mountain alder (*Alnus tenuifolia*), blue spruce (*Picea pungens*), thin leaf alder (*Alnus tenuifolia*), Drummond willow (*Salix drummondiana*), and Bebb willow (*Salix bebbiana*). The riparian areas are considered key monitoring areas. Most "key" riparian areas are in good condition with the exception of 2-1/4 acre and 3-1/10 acre key areas in the Main Fork and Long Canyon pasture. These areas are in fair to good condition due to an increase in upland grass species. A decrease in rushes and sedges along these riparian areas is likely due to grazing pressure combined with wildlife and domestic livestock use.

---

water, are not preferred by livestock, are located on steep slopes, or are inaccessible by livestock. [116]

One riparian meadow/wetland in Main Fork pasture (Bull of the Woods meadow) is at risk for exceeding utilization guidelines because there is poor livestock distribution in the adjacent Long Canyon pasture where a small (partially developed) spring (locally known as the Long Canyon/Gold Hill spring) serves as the water source. Due to this being an inadequate water source<sup>3</sup>, livestock tend to drift back and concentrate in the Bull of the Woods area even though the permittees continuously push the cattle out of the wetland. Past over utilization occurred in 2003 due to a combination of factors including commercial (outfitter and guide) livestock use, grazing (permittee) livestock use, and general public recreational stock use. While changing the use patterns of commercial stock in 2004 use resolved the over-utilization problem, it did not improve livestock distribution. In order to move closer to the forest plan desired conditions for riparian (MA 14) that includes maintaining natural shade on water surfaces, natural bank protection, and healthy, native vegetation along most of the stream and lakes (Forest Plan, pp. D-14, Riparian, pp. 1-3) there is a need to maintain and promote the establishment of native grasses in those key areas that are in fair to good condition and to improve livestock distribution in Long Canyon pasture to reduce livestock concentration in the Bull of the Woods wetland (Main Fork pasture).

### **Other Vegetation**

Aspen accounts for approximately 19 percent (87 acres) of the acres with full or potential capacity for grazing. Aspen stands are favored for deer, elk, and livestock, especially in stands with forb-grass understories. Engelmann spruce, subalpine fir, Douglas-fir, bristlecone pine, white fir, ponderosa pine, and blue spruce account for the remaining predominant vegetation.<sup>4</sup> Monitoring has not indicated a need for changing how livestock are managed in aspen, spruce/fir, mixed conifer, and ponderosa pine.

### **Stocking Levels (Capacity) and Season of Use**

Utilization and monitoring records indicate the current permitted number of 50 cow/calves is the stocking rate at which utilization and riparian stubble height objectives can be met given the allotment's high elevation and short (30 to 45 day) growing season. Since 2000, the stocking numbers have been reduced and livestock entry has been delayed up to 10 days in response to range readiness and drought conditions.

Based on past monitoring information and desired vegetation conditions, there is a need for additional management flexibility on entry and exit dates that more accurately reflect range readiness and utilization thresholds on the allotment. In the late spring and early summer, forage plants need additional time for root growth, formation of basal buds, development and production

---

<sup>3</sup> In the fall of 2007, permittees attempted to improve the spring. However, resource damage such as loss of vegetation and soil compaction occurred. Because the improvements were not installed to FS standards, the area is not currently usable by livestock. For livestock to continue using the Long Canyon pasture, the area would have to be protected from further use from 2 to 5 years (estimated time for complete restoration). During this time, livestock would have to use alternative water sources.

<sup>4</sup> Other management areas such as oak and unsuitable timber are not predominant vegetation types within the allotment. However, they are considered in the wildlife analysis.

of seed and food storage. The objective is to reduce the chance of over-utilization and allow for maintaining native food and cover for wildlife species that are dependent on a grass/forbs habitat.

## Management Direction

Under the National Forest Management Act (NFMA) of 1976 (16 U.S.C. 1600 et seq.), project-level decisions, which authorize the use of specific National Forest System lands for a particular purpose (like livestock grazing) must be consistent with the broad programmatic direction established in the forest's land and resource management plan. Consistency was determined by examining whether the project-level decision implements the goals, objectives, desired conditions, standards and guidelines, and monitoring requirements from the Carson Forest Plan.

The forest plan includes both forest-wide prescriptions and standards and guidelines for the 12 management areas (MA) within the allotment. They include MA 1-7, 9, 13, 14, 16, and 17.

Portions of the Deer Creek Allotment are within the Columbine-Hondo Wilderness Study Area and the Wheeler Peak Wilderness, MA 17. The desired condition for wilderness is to have: the natural quality of the landscape preserved, opportunities for high quality wilderness recreation, a high quality trail system, and watersheds that are in good condition. Even though the allotment is within several forest plan management areas, this analysis focuses on the dominant vegetation types because they make up the acres with full grazing capacity and have desired conditions that complement the desired conditions described for MA 17, Wilderness. These are:

- Management Area 9                      High Elevation Grassland
- Management Area 6                      Aspen
- Management Area 14                      Riparian
- Management Areas 1-5, 7                Spruce, fir, pine

## Proposed Action

The proposed action would permit 25 to 50 cow/calves with a maximum of 167 AUMs and the allotment would be managed under a rest rotation grazing system. Two and ½ months of grazing within a three month grazing season would be permitted with a range of entry dates from July 1 to July 15. September 15 to September 30 would be the range of exit dates. A conservative grazing management guideline of 20 to 40 percent forage utilization would be used to maintain or improve rangeland vegetation condition and a minimum of 4-inch stubble height of forage species in key riparian areas would be applied with the exception of Middle Fork Lake. A 6" stubble residual stubble height would apply to the area surrounding Middle Fork Lake. A 0.1 acre spring development would be constructed at the Long Canyon/Gold Hill spring. Short term and long term monitoring would occur using a variety of methods. Additional details on the proposed action can be found in Chapter 2.

**Table 1. Summary of proposed action and purpose and need**

<b>Action</b>	<b>Need</b>	<b>Purpose (Objective)</b>
<b>A range of 25 to 50 cow/calves (167 Animal Unit Months)</b>	Apply a stocking rate that better reflects grazing capacity and provide additional management flexibility to determine the (annual) maximum number of livestock.	Improve response to site-specific resource conditions or management objectives.
<b>July 1 to July 15 as the range of entry dates</b>	Additional flexibility is needed in allotment entry dates.	<ol style="list-style-type: none"> <li>1. Have entry dates that more accurately reflect range readiness and utilization thresholds (due to high elevation and short growing season).</li> <li>2. Provide forage plants additional time for root growth, formation of basal buds, development and production of seed and food storage.</li> </ol>
<b>September 15 to September 30 as the range of exit dates</b>	Additional flexibility in allotment exit date as needed.	<ol style="list-style-type: none"> <li>1. Reduce the chance of over-utilization.</li> <li>2. Maintain residual native food and cover for wildlife species that are dependent on a grass/forbs habitat.</li> </ol>
<b>Rest-rotation grazing system</b>	Maintain the good to excellent allotment conditions.	Allow a pasture to be completely rested for one year and improve vegetation recovery (vigor and productivity).
<b>Apply a conservative grazing management guideline of 20 to 40% forage utilization and 4” residual stubble height (except Middle Fork Lake)</b>	Maintain and/or improve vegetation condition.	Protect upland grassland meadows and riparian area from over-utilization
<b>Apply 6” residual forage stubble height (lighter utilization) around Middle Fork Lake</b>	Critical use area for Sangre de Cristo pea clam and white-tailed ptarmigan nesting habitat	Provide additional vegetation cover to reduce or eliminate potential impacts to critical habitat and nesting habitat
<b>Apply a light (20%) utilization guideline in Long Canyon pasture until</b>	Protect nesting white-tailed ptarmigan.	Reduce or eliminate potential impacts to nesting habitat

Action	Need	Purpose (Objective)
July 23.		
Construct a water development at Long Canyon/Gold Hill spring	Improve livestock distribution in Long Canyon and Main Fork pasture.	Reduce or eliminate concentration of livestock in Bull of the Woods riparian meadow/wetland.

## Decision Framework

Given the purpose and need, the deciding official reviews the proposed action and the other alternatives. The Questa District Ranger is the Responsible Official for this proposal. For authorizing livestock grazing on the Deer Creek Allotment, there is a two-part decision at the project level to be made:

- Determine whether livestock grazing will be authorized on all, part, or none of the Deer Creek Allotment.
- If the decision is to authorize some level of livestock grazing, then 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

Because there have been several attempts to complete the environmental analysis, the proposal has been listed in the Carson National Forest Schedule of Proposed Actions since July of 1994. Previous public involvement and analysis efforts are located in the project record. [13, 30, 32, 34-37, 39-46, 51-59, 63-75, 80-82, 84, 86-92, 98]

Public involvement efforts resumed in September of 2005, when the proposed action was mailed to 20 interested and affected people and to 16 Tribes. A legal notice of availability was also published in *The Taos News* in accordance with 36 CFR 215.5(b). [35] A total of five letters were received in response to the 2005 solicitation for comments.

In 2007, the proposed action was mailed to 25 interested and affected people or groups on December 11, 2007. The most recent legal notice of availability was published in *The Taos News* on December 13, 2007, announcing the availability of the proposed action for the Deer Creek Grazing Allotment for public comment, in accordance with 36 CFR 215.5(b). [112] A 30-day comment period followed the date of the legal notice, ending on January 15, 2008. In addition, a letter soliciting comments was sent to 16 Tribes who regularly consult with the Carson National Forest on December 17, 2007. [113] Two letters were received in response to the December, 2007, solicitation for comments and no issues were raised. [115, 117] Permittees participated in the planning process via meetings with the district.

## Issues

Scoping and public involvement are used to identify issues for the proposed action. An issue is a point of disagreement, debate, or dispute about the specific environmental effects of the proposed action. Using the comments from the public, other agencies, and tribes, the interdisciplinary team developed a list of issues to address. The Forest Service separates issues into two groups: significant and non-significant issues. Significant issues are defined as those directly or indirectly caused by implementing the proposed action. An issue is non-significant if it is:

- Outside the scope of the proposed action;
- Already decided by law, regulation, the forest plan, or a higher level of decision;
- Irrelevant to the decision to be made; or
- Conjectural and not supported by scientific evidence.

The Council for Environmental Quality (CEQ) NEPA regulations require this delineation in 40 CFR § 1501.7, "...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (§ 1506.3)..." No significant issues were identified during scoping or the 30-day comment period. Although there were no significant issues identified that could not be addressed through mitigation or project design modifications, New Mexico Game and Fish Department provided these comments (summarized):

### **(1) Monitoring is key to maintaining good to excellent range conditions**

**Comment:** New Mexico Game and Fish Department commented in both 2005 and 2007 (in summary) that monitoring is the key to maintaining the good to excellent range conditions within the allotment. Monitoring is needed for good livestock distribution, to prevent forage over-utilization and to provide for residual forage for wildlife.

**Response:** The agencies comments are included in the design of both Alternative B (Current Management) and Alternative C (Proposed Action).

### **(2) Developments needs to be compatible with wilderness character**

**Comment:** New Mexico Game and Fish Department commented that any planned developments should take into account wilderness qualities in the Columbine-Hondo Wilderness Study Area and Wheeler Peak Wilderness.

**Response:** The upper Long Canyon spring would be located within the Columbine-Hondo Wilderness Study Area and would be designed to minimize the evidence of man (an indicator of wilderness character) and be in harmony with the character of the area (Forest Plan, MA 17, p. 2).

The complete comment content analysis can be found in the project record at #35 #87, and #122.



# Chapter 2 - Alternatives

This chapter describes and compares the alternatives considered for the Deer Creek Allotment analysis. As discussed at the end of Chapter 1, no significant issues were identified for the Deer Creek Allotment during public scoping or the Forest Service's 30-day comment periods, thus no other action alternatives were developed for this analysis. The no action alternative of not taking any action or no grazing must be addressed in the analysis. The CEQ regulations implementing NEPA require the inclusion of the no action alternative in the analysis (40 CFR 1502.14).

## Alternatives Considered, but Eliminated from Detailed Analysis

Federal agencies are required by the 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). Although there have been numerous public involvement efforts since 2000, there were no comments or concerns submitted (in response to scoping and the 30-day notice and comment period conducted in September of 2005 or the December, 2007, 30-day notice and comment period) that suggested alternative methods for achieving the purpose and need. Therefore, no alternatives were considered but dismissed from detailed consideration.

## Alternatives Considered in Detail

### Alternative A - No Action

Under the no action alternative, domestic livestock grazing would no longer be authorized on the Deer Creek 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. Structures associated with the spring in the Long Canyon/Gold Hill area would be removed. Allotment fences would not be removed, as they would be needed to prevent use by livestock from adjacent active allotments (Columbine and Arroyo Hondo). Under the no action alternative, the forest plan would continue to guide management of the area.

### Alternative B – Current Management

This alternative represents a continuation of current grazing management on the Deer Creek Allotment. Fifty cow/calves, which equates to 167 AUMs would be permitted and three pastures would be managed under a deferred-rotation grazing system. The grazing season would be a two and ½ month grazing season with July 1 as the entry date and September 15 as the exit date. Range readiness guidelines would have to be met prior to allowing livestock to enter the allotment. A conservative grazing management guideline of 20 to 40 percent forage utilization (includes use from livestock and wildlife) would be applied to maintain or improve rangeland vegetation condition. Utilization would be monitored throughout the grazing period. In key riparian areas, a minimum of 4-inch stubble height of forage species would apply. Residual stubble height would be monitored at the end of the growing season. The Long Canyon/Gold Hill spring would not be developed and mitigation (reduced livestock numbers) would be required in the Long Canyon pasture for a period up to 5 years. Short-term monitoring would consist of ocular inspection, photographs, vegetation sampling, Rapid Assessment Methodology, and use of the established grazing intensity and utilization guidelines. Long-term monitoring would include reviews of established (and permanent) Parker 3-Step transects, production/utilization studies

(that are conducted on an average of 10 years). Additional monitoring methodology may be included as new technology becomes available.

### **Alternative C - Proposed Action**

The proposed action would authorize continued grazing use on the Deer Creek Allotment using updated grazing management direction in order to move and/or maintain existing rangeland resource conditions within the allotment toward desired conditions. The updated direction incorporates resource use recommendations, best management practices (BMP's), conservation practices, and mitigation measures that will be part of the allotment management plan (AMP). This will guide grazing management within the allotment during the coming decade, or until amendments are warranted based on changed condition.

In order to meet the purpose and need, the Forest Service is proposing to reauthorize domestic livestock grazing on the Deer Creek Allotment of the Questa Ranger District, Carson National Forest, (via a 10-year term permit) as follows:

The proposed action (see Figure 1) would permit 25 to 50 cow/calves with a maximum of 167 AUMs and the allotment would be managed under a rest rotation grazing system. Each pasture would be rested for the entire season one out of three years, to allow the vegetation in each pasture to have a full season of recovery. Long Canyon pasture would be the first pasture rested in 2008. Two and ½ months of grazing within a three month grazing season would be permitted with a range of entry dates from July 1 to July 15. This would provide the appropriate stocking number (allotment livestock capacity) and the additional management flexibility needed to determine the number of livestock that may be allowed onto the allotment, based on site-specific resource conditions. September 15 to September 30 would be the range of exit dates. To protect high quality White-tailed ptarmigan nesting habitat, a 20% (light) utilization threshold in the Long Canyon pasture until July 23rd would be implemented. Additional flexibility with exit dates should reduce the chance of over-utilization and allow for maintaining native food and cover for wildlife species that are dependent on a grasses and forbs. A conservative grazing management guideline of 20 to 40 percent forage utilization would be used to maintain or improve rangeland vegetation condition and a minimum of 4-inch stubble height of forage species in key riparian areas would be applied with the exception of Middle Fork Lake. A 6" stubble residual stubble height would apply to the area surrounding Middle Fork Lake. A 0.1 acre spring development would be constructed at the Long Canyon/Gold Hill spring. Actions include: (1) A declaration of ownership of livestock water (or dam) would be submitted to the State of New Mexico, (2) The existing livestock watering area would be relocated to an area that would eliminate spring degradation, (3) A native material buck and pole fence that is approximately 80 ft x 135 ft would be constructed around the spring site to protect it from further soil compaction, (4) The existing collection pipe would be re-set to hide from view, (5) Approximately 230 feet of small diameter water line would be installed within the 0.1 acre site in a location that is not visible and does not impact the spring site, (6) A trough, a float valve, and a wildlife escape ramp would be installed to FS standards, and, (7) The area surrounding the trough would be hardened to protect soils. All work associated with spring development would occur in the summer and fall of 2008 and the Long Canyon pasture would be rested during this time. The spring would be functional in 2009.

Short-term monitoring would consist of ocular (visual) inspection, photographs, vegetation sampling, Rapid Assessment Methodology, and use of the established grazing intensity and utilization guidelines. Long-term monitoring would include the review of established (and

permanent) Parker 3-Step transects, production/utilization studies (that are conducted on an average of 10 years). Additional monitoring methodology may be included as new technology becomes available. The proposed action is consistent with the 1986 Carson Forest Plan goals, standards, and guidelines and does not require a forest plan amendment.

Mitigation measures are an integral part of Alternatives B and C. The environmental effects are analyzed assuming mitigation measures are in place and are successful. To mitigate is to offset or lessen real or potential impacts of an activity through the application of additional controls or actions. To minimize resource impacts, the mitigation measures in Table 2 will be applied to both action alternatives (B and C). Implementation of the required mitigation measures identified in Table 2 will be considered and documented at the time of project implementation by the appropriate responsible official, based on current condition, technologies, and the success of prior measures.



## Mitigation

In the mitigation measures table, the Effectiveness column is included to give the reader an idea of how well these mitigation measures work from past experiences and/or research. The environmental effects described in Chapter 3 are based on these effectiveness levels. Determination of effectiveness is a specialist's professional opinion on what he or she has experienced with certain mitigation measures. The number in the effectiveness column corresponds to the following statements:

- Almost always reduces impacts significantly. Almost always done in this situation.
- Usually reduces significant impacts. Often done in this situation.
- Effectiveness monitoring<sup>5</sup> will be conducted during project implementation and other appropriate times (see monitoring section).

**Table 2. Mitigation measures applied to the action alternatives**

No.	Mitigation	Why	Effectiveness
<b>Heritage</b>			
H1	If any unrecorded sites are discovered during the course of project implementation, all project activities in the vicinity of the site(s) will cease and the District or Forest Archeologist will be notified.	To protect heritage resources and comply with NHPA.	1
<b>Noxious Weeds (Non-native invasive plants)</b>			
IP1	Communication and coordination with the permittees on the allotment will occur to encourage preventative practices, especially if any noxious weeds become established on their private pastures. This will also keep them informed of any established populations on the allotment so they can avoid unintentionally transporting them back home.	To establish preventative practices.	2, 3
IP2	New occurrences of musk thistle and Canada thistle which is currently found on private property will be monitored for the next 3 years (as suggested by Rangeland Analysis and Management Training Guide (6/97), Appendix A) and will be controlled by appropriate means as needed.	To establish preventative practices.	3
<b>Recreation and Wilderness</b>			
WR1	Non-motorized and non-mechanized methods will be the only means of transporting fence and/or spring materials within the Columbine-Hondo Wilderness Study Area (WSA).	To promote actions that are consistent with wilderness character.	1
WR2	Grazing permittees will be required to participate in trail maintenance on the trails used to drive livestock onto the allotment.	To reduce impacts (visual, soils) to the Columbine	1

<sup>5</sup> Completing effectiveness monitoring is the responsibility of the District Ranger.

No.	Mitigation	Why	Effectiveness
		Twining National Recreation Trail from livestock use. This is a common practice used to minimize the effects of repetitive trail use.	
WR3	Permittees and their wranglers will use weed-free feed or pellets when bringing horse feed into the WSA	To minimize the introduction of weed seeds	3
<b>Soil, Water, Air</b>			
S1	See Chapter 3, soil and water section, and Appendix B, Best Management Practices		
S2	<b>Alternative B only:</b> Remove all spring improvements and install a 80 ft. by 135 ft. native material buck and pole fence. The fence will remain in place until the areas has been returned to its original condition. It is estimated this will take 2 to 5 years. During this time, reduced livestock numbers of 25 cow/calf will be required. Livestock will have watering sources in lower Long Canyon and in the Main Fork (Bull of the Woods) pasture.	To restore spring area.	2

In addition to the project specific mitigation measures listed in Table 2, any activities proposed for implementation are required to following the forest plan standards and guidelines, the Southwestern Region’s Soil and Water Conservation Practices Handbook of best management practices (BMP’s) for rangeland and watershed management, evaluation and opinions from the U.S. Fish and Wildlife Service, and any other Forest Service policies that apply, such as the protection of heritage resources.

Range management BMP’s are published in the Forest Service Manual, FSM 2509.22.20.22 (USDA Forest Service, Southwestern Region, 1990). BMP’s pertinent to the Deer Creek Allotment include:

**22.1 - Range Analysis, Allotment Management Plan, Grazing Permit System, and Permittee Operating Plan.**

1. Objective. To manage rangelands through IRM and ensure they are meeting Forest Land Management Plan objectives.
2. Explanation. An analysis of a potential and/or existing grazing area is conducted by an interdisciplinary team to evaluate its productive capabilities, inherent hazards, resource values, and uses for the purpose of meeting Forest Land Management Plan objectives. Following this analysis the Forest Service, in cooperation with the permittee, prepares a written allotment management plan and authorizes livestock grazing as per stipulations in the management plan. These documents include measures to protect other resource values, such as water quality,

riparian area resource management, and to coordinate livestock grazing with other resource uses. Specific methods for controlling when, where, amount of utilization, and numbers of livestock to be grazed are covered in the plan. Also included are needed rangeland improvements, monitoring methods, and an implementation schedule. A permittee operating plan is prepared, reviewed, and revised annually to reflect direction in the allotment management plan. The amount of livestock use is determined primarily through measurement of vegetative utilization. Allowable use is set to meet the objectives of the Forest Land Management Plan. The maintenance of soil productivity and stability is considered in determining allowable use.

3. Implementation. The District Ranger is responsible for analysis of range allotments, completion of environmental assessment reports, preparation of management plans, and processing of grazing applications. The Forest Supervisor or District Ranger approves management plans and issues grazing permits with stipulations and conditions. Most permits are issued for 10 year terms. Revise allotment management plans as needed to meet the Forest Land Management Plan objectives. Annually prepare a operating plan with the permittee to allow for current allotment conditions. The permittee carries out the plans under the immediate direction and review of the District Ranger. Take corrective action if a permittee does not comply with grazing permit conditions designed to protect soil and water resources.

#### **22.11 - Controlling Livestock Numbers and Season of Use.**

1. Objective. Safeguard water and soil resources under sustained forage production. Managed forage utilization by livestock to maintain healthy ecosystems for all resource objectives.

2. Explanation. In addition to proper stocking rate and season of use specified in the grazing permit, periodic field checks are made to identify needed adjustments in season and livestock numbers. Checks include:

- a. Range readiness evaluations to assure that the soil is not too wet and that sufficient forage growth has occurred.
- b. Stock counts to assure that only permitted livestock enter the allotment.
- c. Forage utilization measurements to provide data, for grazing use pattern, improved livestock distribution, and stocking.
- d. Assessment of rangeland to verify soil and vegetative condition and trend.
- e. Assessment of streambanks to assure banks are not being degraded and contributing sediment to water courses.

When standards for allowable utilization are established they are incorporated into the allotment management plan.

3. Implementation. Allotments are administered by the District Ranger. Provisions are carried out by the grazing permittee as permit requirements. Field check and measurements are made periodically by the Forest Service. Livestock numbers and seasons of use may be changed annually to reflect current years climatic condition.

### **22.12 - Controlling Livestock Distribution.**

1. Objective. To manage sustained forage production and forage utilization by livestock while protecting soil and water resources. Maintaining healthy ecosystems for wildlife and other resources.

2. Explanation. Livestock use within allotments is typically not uniform due to variations in topography, water availability, vegetation type and condition. Several techniques are used to achieve proper distribution, or lessen the impact on areas which are sensitive or which would naturally be overused. These techniques include:

- a. Construction of fences, and implementation of seasonal or pasture systems of management.
- b. Water development in areas that receive little use and closing off water developments when proper use has been achieved.
- c. Riding and herding to shift livestock locations.
- d. Using salt or supplement feed as tools to gain proper distribution of livestock.
- e. Range improvements, prescribed burning, trail construction, or seeding.
- f. Prevention of intensive livestock grazing or concentrated livestock use on soils that have low bearing strength and are wet.

Open herding, limiting trailing, and use of new bed grounds are additional techniques used for sheep. Developing sufficient watering places is one way to limit the amount of trailing. Livestock distribution needs are determined through evaluations of range conditions and trends, including watershed condition assessments and utilization studies.

3. Implementation. Livestock distribution practices are carried out by the permittee under the direction and review of the District Ranger. Direction is incorporated in the allotment management plan and the annual operating plan, which are integral parts of the grazing permit and provides current Forest Service instructions. The instructions reflect current allotment conditions and vegetative trends.

### **22.13 - Rangeland Improvements.**

1. Objective. To improve, maintain or restore range resources, including soil and water through the use of rangeland improvements.

2. Explanation. Rangeland improvements are intended to enhance forage quality, quantity, and/or availability, and to provide protection to the other resources. Building fences to control the movement of livestock, improve watershed condition, and develop watering sites are just a few of the types of rangeland improvements implemented by the permittee or Forest Service as identified in the allotment plan. If a structure is causing soil erosion or water quality degradation the allotment plan will identify it and state corrective measures. Other measures may include stream channel stabilization efforts such as riprapping, gully plugging, and planting; or

mechanical treatments such as pitting, chiseling, or furrowing. Reseeding and/or fertilization may be done alone or in conjunction with any of these measures.

3. Implementation. The permittee is involved as a cooperator in rangeland improvements and may actually complete the work under Forest Service direction. Implementation may also be done by Forest Service crews or contractors. Range improvement needs are recognized in the range allotment planning process and are scheduled for implementation in the allotment plan and the 10-Year Forest Plan Implementation Schedule.

#### **22.14 - Determining Grazing Capability of Lands.**

1. Objective. To maintain or improve soil stability, soil productivity and water quality by grazing the land within its capability.

2. Explanation. This practice is an administrative and preventative control. Soil condition classes, based on the relationship of current and natural soil loss tolerances, are used to determine grazing capability. Only lands with soils in stable condition are considered as "full capability" range. Grazing capability ratings are then used in conjunction with other grazing considerations to determine the actual grazing capacity of an area.

3. Implementation. Soil condition class is determined by qualified soil scientists using Terrestrial Ecosystem Survey (TES). A range conservationist will use the soil condition class in determining the grazing capacity.

## **Monitoring**

Two types of monitoring are associated with allotment management plans (AMPs): implementation monitoring and effectiveness monitoring. Implementation monitoring (short-term) will measure whether or not forest plan standards and guidelines are being met, while effectiveness monitoring (long-term) will evaluate how effective management actions are at moving toward or achieving the desired conditions. Under either Alternative B or C, the following monitoring requirements will apply:

**Implementation monitoring**, which will occur yearly, is considered short-term monitoring and specifically includes using ocular inspections, photographs, vegetation sampling, Rapid Assessment Methodology and use of the established grazing intensity and utilization guidelines. Monitoring for the presence of musk thistle and Canada thistle will occur.

**Range readiness inspections** will be conducted prior to livestock entry onto the allotment to assess whether range readiness guidelines have been met. Allotment inspections conducted during the grazing season document compliance with the Annual Operating Instructions (AOI).

The Southwestern Region's monitoring utilization guideline is to have conservative ungulate utilization that is between 20 and 40 percent (30% average). Utilization measurements are made following procedures found in the Interagency Technical Reference<sup>6</sup> and with consideration of the direction provided by the Southwestern Region on obtaining and interpreting utilization data

---

6 Utilization Studies and Residual Measurements. Interagency Technical Reference. 1996. Cooperative Extension Service, USDA Forest Service and Natural Resources Conservation Service, and USDI Bureau of Land Management. Revised 1999.

(on southwest rangelands). [#116] Utilization will be monitored on key forage species which are native perennial grasses that are palatable to livestock. At a minimum, monitoring will include use in key areas<sup>7</sup>, but may include monitoring outside of key areas. Over time, changes in resource conditions or management may result in changes in livestock use patterns. As livestock use patterns change, new key areas may be established and existing key areas may be modified or abandoned in cooperation with the permittee(s). Utilization and residual stubble height in key areas is measured at the end of the growing season. Monitoring will include: (1) Middle Fork Lake 6" residual stubble height for Sangre de Cristo pea clam and White tailed ptarmigan habitat, (2) Two 1/4 acre and three 1/10 acre riparian meadows in the Main Fork and Long Canyon pasture to assess the condition and presence of upland grass species, and, (3) The Long Canyon/Gold Hill spring and Bull of the Woods riparian area to gauge effectiveness of the spring structure in terms of reducing pressure on the riparian area, and, (4) Compliance with a 20% (light) utilization threshold until July 23rd later in Long Canyon pasture to protect White-tailed ptarmigan nesting habitat.

**Effectiveness monitoring** is considered long-term monitoring and includes measurements to track condition and trend of upland and riparian vegetation, soil, and watersheds. Methods include a review of established (and permanent) Parker 3 Step transects and production/utilization studies that are conducted on an average of 10 years. Monitoring will be done following procedures described in the interagency technical reference and the Region 3 Rangeland Analysis and Training Guide. The data is interpreted to determine whether management is achieving desired resource conditions, whether changes in resource condition are related to management, and to determine whether modifications in management are necessary.

### Comparison of Effects by Alternative

This section provides a summary of the effects of implementing each alternative. Information in the table is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives.

**Table 3. Summary of Comparison of Effects by Alternative**

Measure/Indicator	Alternative A No Action	Alternative B Current Management	Alternative C Proposed Action
<b>Range Condition and Trend</b>	Good Condition and Upwards Trend	Good Condition and Stable Trend	Same as Alt. A

<sup>7</sup> A key area is a portion of rangeland selected because of its location, use or grazing value as a monitoring location for grazing use, range condition and trend. Key areas are usually ¼ to 1 mile from water, located on productive soils on level to intermediate slopes where prescribed use will occur first. They are 5 acres or more in size. Properly selected key areas will reflect the overall acceptability of current management. Because of slope, elevation and terrain factors, key areas for the Deer Creek Allotment may deviate from the recommendations noted above (Rangeland Analysis and Management Training Guide. 1997. USDA. Forest Service, Southwestern Region, Chapter 4-3).

<b>Measure/Indicator</b>	<b>Alternative A No Action</b>	<b>Alternative B Current Management</b>	<b>Alternative C Proposed Action</b>
<b>Composition and diversity in upland grassland meadows</b>	Blue grass meadows would transition to a more native meadow, riparian, and/or upland species composition.	Plant composition and diversity would be maintained but not improved as in Alt. A and Alt C.	Same as Alt. A
<b>Condition of Bull of the Woods wetland (Main Fork pasture)</b>	Improved vigor and the ability of riparian vegetation (shrubs and sedges) to stabilize soils and streambanks but impacts from recreation use continues	Streambank trampling and a decrease in riparian vegetation would continue.	Decreased streambank trampling and increased riparian vegetation would occur over time.
<b>Soil condition (soil stability and nutrient cycling)</b>	Soil nutrient cycling (organic matter) would improve due to increased litter and plant diversity gradual increases.	Soil conditions would remain stable. Soil loss would increase slightly but the loss would still be below or at a tolerate soil loss rating.	There would be a slight increase in vegetation cover, residual litter cover, and stubble height This would improve soil stability. Soil nutrient cycling (organic matter) would improve due to increased litter and plant diversity would gradually increase.
<b>Water quality and aquatic habitat</b>	Water quality and aquatic habitat would be maintained because there are no impairments.	Same as Alt. A	Same as Alt. A
<b>Riparian condition (streambank stability, shading, temperature)</b>	Reduced trampling and utilization would improve plant vigor and the ability of riparian vegetation to stabilize soils and streambanks. This would provide improved shading to maintain cool stream temperatures.	Trampling and livestock utilization would slightly decrease plant vigor and the ability of riparian vegetation to: (1) stabilize soils and stream banks, and (2) provide improved shading to maintain cool stream temperatures.	Riparian vegetation ground cover and shading would improve with lower utilization (as a result of rest rotation and with proper herding). This would provide more filtering of sediments from runoff, greater bank stability, and cooler water temperatures.
<b>Federally Listed</b>	There is no effect from any alternative.		

Measure/Indicator	Alternative A No Action	Alternative B Current Management	Alternative C Proposed Action
<b>Species</b>			
<b>Northern Goshawk (Forest Service sensitive species)</b>	There would be a beneficial effect because excellent prey base species habitat is maintained.	There would be short term displacement in foraging habitat with no effect to nesting habitat.	
<b>White-tailed ptarmigan (Forest Service sensitive species)</b>	There would be a beneficial effect due to no impact to nesting ptarmigan in alpine grasslands and an increase in ptarmigan forage species diversity.	The early entry date would impact (crushing, harassment, and/or abandonment of nests) 17% to 32% of nesting ptarmigan in alpine grasslands. Ptarmigan forage species diversity would be reduced due to a reduction in quantity and vigor of cool season grasses.	Lighter (20%) utilization until 7/23 would not result in abandonment of ptarmigan nests in alpine grasslands and there would be less impact to the quantity and vigor of cool season grasses (key ptarmigan forage).
<b>Sangre de Cristo pea clam (Forest Service sensitive species)</b>	Beneficial to habitat	May negatively affect specie habitat in long term	Short and long term benefits to habitat
<b>Management Indicator Species – Elk, Bighorn Sheep, White-tailed ptarmigan,</b>	No effect to population habitat trends – see Chapter 3 for specific environmental consequences		

# Chapter 3 - Environmental Consequences

This section summarizes the physical, biological, social and economic environments of the affected project area (analysis area) and the potential changes to these environments if the alternatives were implemented. It also presents the scientific and analytical basis for the comparison of alternatives presented in Table 3 – Summary of Comparison of Effects by Alternative. This chapter 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) and considers the best available science. The project record contains copies of the full reports for most of the resources.

## 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.

For this analysis, the Deer Creek Allotment boundary was the area used by each resource in evaluating cumulative effects, with the exception of recreation, wildlife, and noxious weeds who selected a larger boundary. Past, present, and reasonably foreseeable activities within the allotment are listed in Table 4. A map of those activities can be found in the project record. 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. Also see the project record for a list of past, present and reasonably foreseeable actions that were considered but eliminated from further analysis.

**Table 4. Past, Present, and Reasonably Foreseeable Activities**

No.	Project or Activity Name	Activity or Project Type	Status	Affected Area (or acres)
<b>Past, Present and Reasonably Foreseeable Activities within Deer Creek Allotment</b>				
1	Historic mining, ranching, and logging activities	Remnant ditches, industrial mining site, mine features, placer operations	Past – 1866	Several pastures within the allotment
2	Conversion of sheep permit to livestock and sheep	Grazing	Past - 1961	Deer Creek Allotment
3	Total conversion from sheep to livestock	Grazing	1964	Deer Creek Allotment
4	Mixed conifer encroachment	N/A	On-going	5 acres in Long Canyon Creek, Bull of the Woods, and the East Fork of

No.	Project or Activity Name	Activity or Project Type	Status	Affected Area (or acres)
				Red River
5	Private and commercial recreational uses – hiking, camping, hunting, horse-back and llama use	Recreation	On-going	allotment-wide
6	Trail maintenance	Forest Service maintenance	On-going	Forest Trails #56, #63, #64, #69, #90, #91
7	Elk and deer forage utilization	Grazing	On-going	An estimated 5% to 15% of forage use in key areas
<b>Past, Present and Reasonably Foreseeable Activities outside the Deer Creek Allotment</b>				
1	Non-native trout species introduction	Fish introduction	1944	0.55 miles (of 1.3 miles) of Columbine Creek
2	Livestock grazing on the adjacent Columbine, Red River/Black Copper allotments	Grazing	On-going	19,435 acres
3	Canada thistle populations	Noxious weeds	On-going	Taos Ski Valley , State Hwy 38
4	Musk thistle populations	Noxious weeds	On-going	Private lands throughout Taos County
5	Reduction in NM grazing permittees	Grazing	1987 to 1997	Reduction in grazing operations by 20% in Taos County
6	Taos Ski Valley	summer/winter resort	1954 to present	1,294 acres
7	Molycorp Mining	Mining	On-going	Red River Canyon
8	Pattison Trust development	Private land development	On-going	3,000 acres in the vicinity of Taos Ski Valley

## Rangeland Vegetation

The allotment has been monitored annually since the early 1960's via ocular inspections to help determine overall range conditions. Production/utilization (P/U) studies were completed in 1971-1975, 1977, 1979, 1991-994 and in 1999. Vegetative studies were completed in 2003 and 2004 and condition and trend was determined by performing a Parker three-step transect. Ocular (visual) inspections were conducted in 2005 and 2006. The majority of the allotment is in good condition and in a stable trend with annual forage utilization ranging from 11% to 30% from 2002 to 2005. Allotment wide, utilization has been within the 40% guideline and residual stubble heights of 4" has been met. However, the potential for over-utilization remains in the Main Fork pasture (see Chapter 1 pages 2-4 for information on vegetation existing and desired conditions).

## Environmental Consequences

### Effects Common to Both Action Alternatives

- The number of animal months permitted under either of the grazing alternatives (B and C) would not exceed the allowable capacity calculated for the Deer Creek allotment.
- In both action alternatives, a minimum riparian stubble height of 4" in key areas would be met and a maximum utilization of 40% (measured at the end of the growing season) would be permitted. In the fall season, the 4" stubble height residual would benefit soil and watershed conditions by limiting erosion from winter and spring runoff. See the wildlife section for the benefits to small mammals and prey base species.

### Alternative A

This alternative would not permit livestock to graze on the allotment. In the long term, (a 10-year period) change to upward trend is expected in plant composition, plant vigor, and plant density. Range conditions are currently good in all key foraging areas may improve under this Alternative. However, other use of the forage would still contribute to some utilization (i.e. wildlife and recreation). Based on the TEU forage production figures and past production/utilization studies, it appears that these sites are producing forage at or very near to their potential. Temperature and moisture during the growing season are the most limiting factors affecting plant growth on this allotment. Therefore, forage productions would be dependent on temperature and soil moisture levels. Based on evaluating how light to moderate to no grazing has affected any change in vegetation and considering that the allotment is already in good condition, any improvement is likely to be minimal and/or not readily apparent.

### Alternative B

This alternative would continue the existing level of grazing on the allotment in each of the key grazing areas within the allotment and range condition is expected to remain stable but in good condition over the next ten years because of the deferred rotation (some rest in pastures yearly). In the past 10 to 15 years, the allotment has received only light to moderate grazing pressure and with less than full permitted numbers of cattle grazing has resulted in good range conditions in the each of the key foraging areas, and this type of use would be expected to continue.

The continuation of a deferred rotation of pastures has not hampered forage species from developing even though a rest rotation system is not in place. Therefore, forage species would continue to be maintained but may not as readily as if a rest rotation of the pastures were in place for the short term or long term. By not having a range of dates for moving livestock onto the allotment, the time necessary to allow the phenology of the current forage species to develop and mature would not be provided. Better root establishment would not occur prior to livestock use. By not having flexibility when cattle are removed from the allotment, this system does not provide for opportunities to improve certain key areas. Removing livestock earlier than September 5th on certain years would improve stubble heights and watershed condition and protection. Livestock would come off earlier and allow for additional growth of forage depending on growing and moisture.

Under this alternative, use of the spring at the top of Long Canyon would be excluded for 2 to 5 years, allowing time for the spring to rehabilitate. To compensate for the loss of water, a maximum number of 25 cow/calf units would be allowed in the allotment to limit the amount of utilization of other riparian areas, which will be higher due to water loss. Also, seasonal livestock distribution patterns would change in the other two pastures due to less numbers and shorter season of use. Vegetative condition would remain stable in all pastures as there would be less cattle for this time period. Once the spring is rehabilitated, current number (50 c/c) would be restored in this pasture, and condition would remain stable because there is adequate capacity and spring would once again be available.

Under Alternative B, with the existing stocking levels, it is likely that forage production and plant composition trends are likely to continue and condition and trend would remain good and stable. This alternative is meeting Forest Plan direction and desired conditions for each of the management areas found within the boundaries of the allotment.

### **Alternative C**

Under Alternative C, the flexible season of use would allow forage plants to receive more time for root growth, formation of basal buds, formation and production of seed, and food storage, without annually having to defer entry through the Annual Operating Instructions. One pasture out of the three would be rested entirely from grazing and this would greatly improve the overall vigor, species composition, production and phenology of the vegetation within each of the pastures. However, measurable changes in vegetation condition in this allotment would not be so obvious because all pastures in this allotment currently are in good to excellent condition. There would be an improved response from blue grass meadows to a more native meadow species, riparian and/or upland species composition. This is currently obvious and would continue to be more in the next 5 to 10 years. This would be evident in all pastures of this allotment under this alternative. A change from stable to upward trend would occur over the next 5 to 10 years by implementing Alternative C.

A 6-inch residual stubble height would be maintained around Middle Fork Lake in order to maintain pea clam habitat (see wildlife section) and this would improve vegetative composition and diversity by adding to the already established carex, sedge, brome, and timothy.

Under this alternative the spring at the top of Long Canyon would be developed and would improve cattle distribution. Riparian areas in both Long Canyon pasture and Main Fork pasture

would receive less utilization improving both forage composition and vigor by having consistent water from the spring.

The current stocking levels would be well within the grazing capacity and would improve the forage conditions with the implementation of a rest rotation and current range guidelines. The trend would change to an upward status in both the short and long term. Forage species would be maintained and may improve in vigor and production more readily in the short term and be sustained in the long term. This alternative meets forest plan direction and desired conditions, and best improves grassland meadow vegetation and species composition within the entire allotment.

### **Cumulative Effects**

The cumulative effects boundary for this analysis was the allotment. Please refer to the specialist report in the project record for past and present actions (such as sheep grazing and recreation use) that were considered but eliminated from this analysis.

### **Ongoing Actions/Activities**

Elk, Rocky Mountain bighorn sheep, and a small number of mule deer can be found within the allotment. Wildlife utilizes approximately 5% to 15% of the forage in the key use areas according to transect data collect in 2003 and 2004 in all pastures. In addition, wildlife also graze in areas that are not accessible to livestock. These “inaccessible” areas have not been included in the allotment capacity. Cumulatively, there is adequate capacity on the allotment to accommodate both cattle and wildlife utilization while maintaining 40% or less utilization.

### **Reasonably Foreseeable Actions/Activities**

There have been approximately less than 5 acres of conifer trees encroaching upon the meadows in the lower elevation of each pasture that comprise some of the grazable acres within the allotment. However, conifer trees are not encroaching upon the high elevation meadows. Soils in these meadows are generally deep and in most cases experience seasonably high ground water tables. This high water table is the main reason conifer regeneration has not migrated into these zones. The encroachment on the lower elevation meadows may continue without natural wildfire use, and if this continues, the meadows will be lost to many uses not just grazing.

### **Summary**

Within the Deer Creek Allotment, there are no cumulative impacts predicted under any of the alternatives that would measurably influence vegetation conditions.

## **Soil, Water, and Air Resources**

All of the Deer Creek pasture and most of the Main Fork pasture are within the Red River Watershed (HUC 1302010105). The area of the Main Fork pasture around Bull of the Woods Meadow and all of the Long Canyon pasture lie within the headwaters of the Rio Hondo Watershed (HUC 1302010105). Both Watersheds flow in to the Rio Grande River.

### **Soil Condition, Stability and Nutrient Cycling**

Soil conditions in the allotment are based on data in the Terrestrial Ecosystem Survey of the Carson National Forest (Edwards et al, 1986). The soil condition ratings presented for the allotment are based on criteria from the USDA Forest Service Region 3 Supplement to the USFS Soil Management Handbook, which includes the Region 3 Soil Condition Rating Guide (USDA Forest Service, 1999).

Satisfactory soil stability ratings were assigned to (44% of the allotment) twelve soil types which include the majority of grassland, aspen, and wetlands in the allotment. Six Terrestrial Ecosystem Units (TEU) were identified as being in an unsatisfactory condition from a soil stability standpoint. According to field inspections conducted in 2003, 2004, and 2005, all unsatisfactory TEU's are in a stable soil stability trend (see rangeland vegetation report). These TEU acres are located at a very high elevation which limits the amount of time the cattle spend in that area. These soil units have subsoils that are sandy and rocky which contribute to the lack of ground cover. Field observations made in July and September of 2004 documented some evidence of wind erosion and pedestaling; but in all pastures (using range condition evaluation methods) stability was excellent with a stable trend (see rangeland vegetation report) and erosion is within the "tolerance level."

Soil nutrient cycling ratings and the data from the Terrestrial Ecosystem Survey of the Carson National Forest (Edwards et al, 1986) was considered in rating each soil type within the allotment. Factors considered in evaluating soil nutrient cycling are: percent vegetative plus litter ground cover, percent bare soil, vegetative composition, potential revegetation, and general comments. There is no soil types rated Unsatisfactory for nutrient cycling within the allotment.

### **Streams and Riparian Areas**

Within the allotment, there are 14 miles of stream channels and one spring that is used by livestock. The creek and rivers flowing through this allotment are as follows: Deer Creek (Deer Creek pasture), Long Canyon Creek (Long Canyon pasture), Rio Hondo (Main Fork and Long Canyon pasture), West Fork (Main Fork pasture), Middle Fork (Main Fork pasture), and East Fork (Main Fork pasture).

Channels in the Long pasture and the channel in the Bull of the Woods Meadow area of the Main Fork pasture flow to Arroyo Hondo Creek and on to Rio Grande. Channels in the remainder of the allotment flow to the Red River and on to the Rio Grande. There are no FEMA designated floodplains within Deer Creek Allotment, since this portion of the Carson National Forest is an unstudied area (FEMA FIRM maps, 1989, Taos County, NM, Map Index 350078-0275-C, & Panels 275 of 650). However, base floodplains occur along stream channels.

The riparian areas in the allotment are represented by two soil types, TEU 94 and 99. Small (1-3 acre) riparian grasslands are scattered along all channels in this allotment.

In 1990, 1991, and 1993, allotment field surveys were conducted by contractors to assess riparian conditions using the RASES (Riparian Area Survey and Evaluation System; USDA Forest Service, Southwestern Region, 1989) and GAWS (General Aquatic Wildlife System; USDA Forest Service, Intermountain Region, 1988) methodologies. The survey data was compared to forest plan desired future conditions for riparian (Forest Plan, MA 14). Seven out of eight streams were found to be meeting or exceeding desired future condition in all categories except percent shade over water. Stream bank protection was close to or over the 80% forest plan desired condition. However, percent shade over water was quite low for almost all streams. This may be associated to the steepness of each stream and close proximity of hiking trails along each stream. Fine sediments covering the channel substrate were low in all channel types due to their steep gradient, good vegetative cover on the banks and uplands. Trampling by ungulates was low for all the survey sites.

Reconnaissance was conducted in August of 2003 on Long Canyon, Middle Fork, Arroyo Hondo, and East Fork using the T-Walk Method (Ohlander, 2001). Deer Creek and Middle Fork Lake were not assessed because there is limited grazing access for cattle. Bank stability, trampling, and bank protection were visually assessed. Segments of the creek which was determined to represent present conditions meadows or wooded areas on the stream were assessed (Table 5, below). This assessment was conducted during or after livestock grazing. In order to compare data, an assessment should be conducted before grazing.

**Table 5. 2003 Riparian Field Survey**

<b>Stream</b>	<b>Segment and Location</b>	<b>Bank Stability %</b>	<b>Trampling %</b>	<b>Bank Protection %</b>	<b>Rating</b>
<b>Long Canyon</b>	# 1 Wooded (LC-1) UTM N: 4053422 E: 459276	95	10	85	Excellent
	# 2 Meadow along Trail (LC-2) UTM N: 4053615 E: 459261	70	80	60	Fair
	# 3 Meadow (LC-3) UTM N: 4053874 E: 459061	85	30	85	Good
<b>Middle Fork</b>	# 1 Wooded & Meadow (MF-1) UTM N: 4048721 E: 462801	80	25	75	Good
<b>East Fork</b>	# 1 Wooded & Meadow (EF-1) UTM N: 4050943 E: 465635	95	0	95	Excellent
<b>Arroyo Hondo</b>	# 1 Wooded (AH-1) UTM N: 4051055 E: 461251	95	15	90	Good
	# 1 Bull of the Woods (AH-2) UTM N: 4051886 E: 461700	90	40	90	Good

Long Canyon's Segment 1, Middle Fork Segment 1, East Fork Segment 1, and Arroyo Hondo Segment 1 were in good to excellent condition for the parameters surveyed.

Long Canyon's Segment 2 and 3 and the Arroyo Hondo Segment 2 had more livestock use in 2003 due to less water availability in a spring located at the top of Long Canyon Trail just below Gold Hill. When there is little to no water in this spring, cattle move to the riparian areas in both Long Canyon and Main Fork pasture in search of water. Although permittees move cattle out of riparian areas, but cattle tend to return without use of the spring.

**Long Canyon's Segment 2** is in fair condition for the parameters surveyed. It showed obvious signs of long-term livestock use, including Kentucky bluegrass and other increaser species, and obvious browsing impacts on the streambank. This segment also showed obvious impacts from recreational animals (horse and llamas) (see range report). Bank stability was 70%, using protocols developed by Region 3 Forest Service (2003). The majority of evidence of bank instability recorded in the field surveys was attributed to slumping banks, with over steepened eroding banks as a secondary source of instability. Bank soil protection (bank cover) was 60% using the same protocols. Evidence of bank soil protection recorded in the field surveys included perennial vegetation, rock, deep rooted species, and in a few cases logs, in order of prevalence. Trampling was recorded on 80% of the streambank (survey protocol: Benjeyfield and Svoboda, 2003). The trampling survey included past impacts from all species, plus current impact from wildlife. Trampling evidence recorded in the field surveys included: raw soil exposed due to bank shearing, increase in channel width at trampled sites, and roots exposed by hoof action, in order of prevalence. Turbidity from the trail was noticeable though not extreme at this flow level. Numerous game, livestock, and recreational fords were visible, although most were narrow with minimal bare soil exposure.

**Long Canyon's Segment 3** is a meadow around the headwaters of the Long Canyon Creek. It is in good condition for the parameters surveyed. This channel/ riparian system had been grazed for approximately two weeks. This segment showed some signs of long-term livestock use, including Kentucky bluegrass and other increaser species, and obvious browsing impacts on the streambank. There was little bank instability due to dense deep-rooted native vegetation recovering and binding the streambank soils. The only vegetation in this meadow was grass, some forbs, and sedges. No riparian shrub vegetation was present to contribute to bank stability and shading. Overall community composition appeared to be healthy, showing dominance by native riparian species, rather than by species that increase under high grazing pressure.

**Arroyo Hondo's Segment 2** is associated with the wetland meadow of Bull of the Woods (see Wetlands, below) and is the Arroyo Hondo headwaters. The riparian condition of this segment was rated as good and appeared to be in a stable trend.

For the most part, the channel segments and streambanks were well protected from impacts and were well shaded by native riparian species and Kentucky Blue grass. The sogginess of the meadow naturally excludes cattle from impacting the main part of this meadow and most livestock impacts were evident along the edge of the wet meadow. Drier plant species were starting to increase in abundance. These species along with livestock grazing tend to decrease soil moisture levels and water table. This will diminish the meadow's capacity to stabilize streambank soil. Large and small woody debris (which retains sediment and provides aquatic habitat) was lacking in the channel. Impacts here are not yet extreme because utilization is low to moderate.

## **Wetlands**

Surface water is relatively abundant throughout the allotment. In Main Fork pasture (Rio Hondo watershed) at the headwater of the Rio Hondo, there is one wetland that deserves emphasis. Field observations in September of 2005 found the wetland to be in good condition overall, with little to moderate use by livestock. This may be due to cattle avoidance of marshy areas surrounding much of the shorelines and permittee frequently moving their cattle out of this area. At the few and narrow sites where stable dry shoreline does exist, cattle have accessed the ponds for water, and slight impacts such as soil compaction and plant species alteration are visible. For the most part the wetland shorelines were undisturbed.

## **Water Quality**

Water quality and aquatic habitat in the allotment are managed under mandates of the Clean Water Act. No water quality impairments were listed for any waterbody within the allotment. Rio Hondo (NM-2-120 A\_607), West Fork (NM-2-120 A\_713), Middle Fork NM-2-120 A\_714), and East Fork NM-2-120 A\_715) are the only streams assessed by New Mexico Environment Department, Surface Water Quality Bureau. These creeks are fully supporting (IR Category 2) of most of its designated (domestic water supply, fish culture, irrigation, wildlife habitat, and high quality aquatic life). Attainment status of the remaining designated uses (livestock watering, secondary contact) is unknown because no reliable monitored data is available to make a determination<sup>8</sup>(2006-2008 State of New Mexico, Integrated Clean Water Act Sec. 303(d)/305(b) Report, Appendix A: The List).

## **Air**

The project area is in a rural air quality management area. Air quality in and around the area is high due to the relative isolation from urban centers, limited access, good vegetative ground cover, and the large scale of the analysis area. The forest plan standard for air quality states: “All management practices will be planned so that air quality will meet local, State and Federal standards” (Forest Plan, Air, p.1). Currently, the air quality in the project area meets forest plan direction.

## **Soils - Environmental Consequences**

### **Effects Common to all Alternatives**

- In TEU 823, 922, and 999, the unsatisfactory soil stability ratings are based in part on steep slopes of 40-120%, indicating that grazing is probably not a major factor in instability since cattle typically avoid steep slopes. Soil stability in these TEU's would not be likely to improve substantially under any of the alternatives.

### **Alternative A**

Under Alternative A, soil and vegetation conditions would generally improve. Elk and deer would continue grazing/ browsing the allotment, stimulating plant leader growth. Soil stability would

---

<sup>8</sup> 2006-2008 State of New Mexico, Integrated Clean Water Act Sec. 303(d)/305(b) Report, Appendix A: The List, Section V. Useful Definitions, pg. vi..

slightly improve due to higher percent vegetation cover, residual litter cover, and stubble height, with the decrease in utilization. Soil nutrient cycling (organic matter) would improve, due to increased litter and gradual increases in plant diversity. Greater organic matter content would improve productivity and nutrient availability to plants, while enhancing soil structure and improving water infiltration and retention. Along with stabilizing soils to prevent erosion, increased vegetation and litter would slow the velocity of hill slope runoff, resulting in further increases in infiltration, reduction in runoff, and improved storage of runoff in shallow and deeper aquifers. However, there would still be soil instability and soil compaction found on the allotment under this alternative due to recreational use. The fragile soils of TEU 340 and 341 would improve minimally due to the fragile nature of the alpine tundra. There would still be soil loss and deterioration from other forest uses such as hiking trails and wildlife trailing. In addition, these TEU's are comprised of 45% rock cover.

### **Alternative B**

Under Alternative B, soil and vegetation conditions would remain stable compared to current conditions. This alternative would graze every pasture every year rotating the time of year the cattle enter each pasture (deferred rotation). The grazing system would stimulate plant leader growth, but the vegetative recovery time from grazing would be considerable less compared to Alternative C. This alternative would increase soil loss slightly compared to alternative A, but this slight increase would still be below or at tolerate soil loss rating.

### **Alternative C**

Under Alternative C, soil and vegetation conditions would slightly improve compared to the current condition due to the rest rotation grazing system that would be implemented. The resting of pasture would slightly increase vegetation cover, residual litter cover, and stubble height; this in turn would improve soil stability. Soil nutrient cycling (organic matter) would improve, due to increased litter and gradual increases in plant diversity. Greater organic matter content would improve productivity and nutrient availability to plants, while reducing soil compaction and improving water infiltration and retention. Along with stabilizing soils to prevent erosion, increased vegetation and litter would slow the velocity of hill slope runoff, resulting in further increases in infiltration, reduction in runoff, and improved storage of runoff in shallow and deeper aquifers.

## **Riparian – Environmental Consequences**

### **Alternative A**

Removing livestock would allow upland and riparian vegetation and litter cover to increase, resulting in greater soil stability, greater infiltration, less soil compaction, slowing of runoff velocity, and improved filtering of sediments. Floodplain recharge would improve, which would in turn support deep rooted native riparian vegetation and more reliable channel base flows in late season. Reduced trampling and utilization would improve vigor and the ability of riparian vegetation (shrubs and sedges, in particular) to stabilize soils and streambanks, and provide improved shading to maintain cool stream temperatures. Improved bank stability would prevent over-widening of channels and gradually allow channels to narrow in where necessary, providing cooler stream water. Additionally, bank stability and improved filtering by floodplain vegetation would decrease sedimentation and turbidity in streams. Improved infiltration would diminish

flashy peak runoff events, thus reducing erosive power delivered to channels, while reducing sedimentation and turbidity. However, there would still be some effects to riparian and riparian channels from existing recreational use. This use would limit the amount of improvements seen by removing livestock from this allotment.

### **Alternative B**

Upland and riparian vegetation and litter cover would remain stable, maintaining soil stability, infiltration, lessening soil compaction, slowing of runoff velocity, and improved filtering of sediments. Floodplain recharge would remain at its current level, which would in turn support deep rooted native riparian vegetation and more reliable channel base flows in late season. Current trampling and utilization would slightly decrease vigor and the ability of riparian vegetation (shrubs and sedges, in particular) to stabilize soils and stream banks, and provide improved shading to maintain cool stream temperatures. Under current management, there would be slight increase in sedimentation as riparian and meadow vegetation is utilized and as cattle trample banks getting water.

In Alternative B, the spring would not be developed and a temporary reduction in permitted number (50 cow/calf to 25 cow/calf) would be implemented for a period up to 5 years (or when the spring area is rehabilitated). Without the use of this spring, cattle would continue to utilize the lower riparian areas of Long Canyon and Main Fork pasture. Some streambank trampling and a decrease in riparian vegetation would continue. However, the reduced number of livestock would not result in over-utilization of the riparian areas and would be within the 40% utilization guidelines.

### **Alternative C**

Effects to channels and riparian resources in the allotment would be greater than the effects of Alternative A, the no livestock grazing alternative, and less than effects under Alternative B. Channels and riparian resources would improve relative to existing conditions, due to regular rest years and the flexibility of stocking that is appropriate to forage availability and range conditions. Riparian vegetation ground cover and shading would improve with lower utilization (with proper herding), providing more filtering of sediments from runoff, greater bank stability, and cooler water temperatures.

Stream bank trampling would decrease, thus reducing sedimentation, channel over widening, and stream bottom deposits, all of which are important to improving water quality and aquatic habitat. Infiltration of snowmelt and rainfall would increase, while runoff velocity decreased, due to increased flow resistance by floodplain vegetation, and improved soil organic matter. Increased floodplain storage would support stronger floodplain and riparian vegetation cover, while providing improved late season channel base flows to support aquatic habitat and flush fine sediments from the channel bottom.

Under this alternative, the wetland in Bull of the Woods remain stable and possibly increase volume of riparian shrubs, which in turn would increase late season base flows considerably. The development of the Long Canyon/Gold Hill Spring should benefit riparian resources in the Main Fork and Long Canyon pasture by decreasing the utilization. Decreasing utilization in the riparian areas should decrease streambank trampling and increase riparian vegetation over time.

## **Water Quality and Aquatic Habitat – Environmental Consequences**

### **Alternative A**

Under Alternative A, water quality and aquatic habitat would be maintained. In all three pastures, vegetative ground cover and vigor, as well as litter cover, would improve, resulting in increased soil organic matter and increased soil stability, providing increased infiltration of snowmelt and precipitation, decreased runoff volume and velocity, and increased filtering/ trapping of sediments carried in runoff. Channel bank and bed erosion would be reduced with the decreased volume and velocity of runoff. Along with decreased runoff and sediment yield, improved infiltration throughout the allotment would increase shallow and deeper groundwater recharge, providing sustained flows to riparian meadows, streambank vegetation, and channels. Improved riparian vegetation and diminished grazing pressure on riparian plants would further stabilize streambanks, thus reducing sediments delivered directly to stream channels.

### **Alternatives B and C**

Under Alternative B, water quality and aquatic habitat would remain stable throughout the allotment because there are no current impairments. Under Alternative C, water quality and aquatic habitat would remain stable. With this alternative, riparian areas in each pasture would be rested for a complete year (one out of every three years) and this would allow for recovery in aquatic habitat and would cause no change in water quality or a slight improvement in water quality.

### **Regulatory Consistency**

All alternatives discussed comply with the federal and state laws, and forest plan direction. Alternative C (proposed action) would better attain desired future conditions through better livestock distribution.

### **Cumulative Effects**

The cumulative effects boundary for soils, water, and air resources is the Deer Creek Allotment boundary (See Map 1). Please refer to the specialist report in the project record for past, present, and foreseeable actions (such as sheep grazing, recreation use, and a new corral at Taos Ski Valley) that were considered but eliminated from this analysis.

### **Present and Foreseeable Action Considered:**

There have been less than 5 acres of conifer trees encroaching upon the meadows in the lower elevations of the Long Canyon and Deer Creek pastures that comprise some of the grazable acres within the allotment. However, conifer trees are not encroaching upon the high elevation meadows. Soils in these meadows are generally deep and in most cases experience seasonably high ground water tables. This high water table is the main reason conifer regeneration has not migrated into these zones. The encroachment on the lower elevation meadows may continue without natural fire use, and if this continues, the meadows will be lost to many uses not just grazing.

### **Cumulative Effects- All Alternatives**

The above actions considered within the analysis area could continue to influence range resources and soil conditions through decreasing grass vegetation cover and causing soil instability when combined with livestock grazing. However, the cumulative impacts predicted under any of the alternatives that would influence soil and watershed conditions would be slight if at all.

### **Air – Environmental Consequences**

#### **All Alternatives**

Grazing would not have direct or indirect effects on the air resources in this airshed. Because there are no measurable effects, there would be no cumulative effects to air quality as a result of any of the alternatives.

## Wildlife, Fish and Rare Plants

### Federally Listed Species

The U.S. Dept. of Interior (USDI) Fish and Wildlife Service (FWS) provided a list of Federal “Listed” species that occur in Taos County (USDI Fish and Wildlife Service 2007) for consideration of analysis for this action (USDA Fish and Wildlife Service 2007). None of the four Federal “Listed” species (Mexican spotted owl (*Strix occidentalis lucida*), bald eagle<sup>9</sup> (*Haliaeetus leucocephalus*), southwestern willow flycatcher (*Empidonax traillii extimus*), and black-footed ferret (*Mustela nigripes*) warranted further analysis due to no habitat in the proposed project area. The proposed project is also outside all “Critical Habitat” for Mexican spotted owl (MSO) and for the southwestern willow flycatcher both of which also did not warrant further analysis.

### Forest Sensitive Species

Of the 22 Forest “Sensitive” species (USDA Forest Service 2000) only three species listed below warranted further analysis<sup>10</sup>:

- Northern goshawk (*Accipiter gentilis*)
- White-tailed ptarmigan (*Lagopus leucurus*)
- Sangre de Cristo peaclam (*Pisidium sanguinichristi*)

### Northern Goshawk (*Accipiter gentilis*)

Suitable goshawk foraging and nesting habitat was delineated using Forest Service aerial photo (1990 flight, scale 1:12,000) interpretation and onsite field inspections. Suitable habitat for this species exists along the main stem of Deer Creek, Long Canyon and Middle Fork drainages.

Suitable nesting habitat occupies a total of 2,115 acres scattered on steeper slopes along the riparian corridors of each of the pastures. The allotment contains a total of 4,283 acres of suitable foraging habitat for goshawks except for south to southwest facing shrubby slopes and the northeast to the southern most high elevation spruce/fir and alpine vegetation portions. Suitable habitat falls primarily within Terrestrial Ecosystem Survey (USDA Forest Service 1987) map units #94, #99, #303, #308, #312, #313, #316, #317, #823, #911, #922, #948E, and #999 (minus the spruce/fir and alpine components of #999).

The nearest known sighting of goshawks are from protocol surveys near Pioneer Creek (2 to 3 mi. northeast) and indicate goshawks may be occupying suitable habitat within or adjacent to the

---

<sup>9</sup> The bald eagle was delisted from the Federal list of “Endangered and Threatened Wildlife and Plants” on 08/08/2007. It is now considered a USDA Forest Service, Region 3 Forest “Sensitive” species. The change in species status does not change any analysis considered for the eagle in this document.

<sup>10</sup> Rio Grande cutthroat trout has a high probability of occurring in Deer Creek within the allotment boundary. However, livestock grazing on this allotment occurs in alpine and subalpine meadows at the head of the watersheds for Deer Creek and away from stream habitat required by this species. Habitat is not affected by precipitation runoff originating from livestock grazing areas in the alpine & subalpine areas. Any sediment generated from livestock grazing in the head of the watershed would not be measurable downstream where Rio Grande cutthroat trout occur in the lower reaches of the Deer Creek stream system.

allotment. Goshawk use of this allotment is likely to focus on timbered foraging areas adjacent subalpine and alpine habitats. Based upon on-site inspection, these spruce fir habitats are in excellent condition and meet many of the desired conditions (canopy closure at 60% or greater, old growth occupies much of the habitat with VSS 5 and 6 ratings, interspersed forest openings less than 1 acre in size, dead and down large diameter logs at 10 to 15 tons/acre) for goshawk foraging as recommended by Reynolds et al. (1992).

## **Environmental Consequences**

### **Alternative A**

Implementation of Alternative A would provide the greatest benefit to goshawk that use the Deer Creek allotment for foraging and would maintain excellent prey base species habitat. The foraging areas of goshawks (prey based species habitats) would not be impacted by removal of protective cover and plant forage species or be displaced by livestock trailing between pastures.

### **Alternatives B and C**

Implementation of either Alternatives B or C would result in short term disturbance in goshawk foraging activities as a result of livestock trailing in/out of allotment pastures and passing through spruce fir habitats on their way to alpine grazing areas. In a review of research Richardson and Miller (1997) found raptors may decrease foraging effort or vacate foraging habitats due to human related disturbances. Livestock will be trailed through subalpine spruce fir on their way to reach alpine grazing “Key” areas. Typical trailing activities are of short duration and occur at most for only two to three days at a time per pasture as livestock enter or exit the pastures on the allotments. All three pasture units will have livestock trailing through goshawk foraging habitats. Impacts to goshawks with disturbance to their prey species is of a very short term nature with no long term impacts. Only goshawk foraging habitat may be affected by these alternatives.

Displacement or changes in goshawk foraging activities are indirectly related to the temporary effect of livestock causing displacement/disturbance to eight of the 14 principal prey base species (Reynolds et al. 1992) that occupy spruce fir habitats. Specifically these prey species are American robin, blue grouse, chipmunks, hairy woodpecker, mantled ground squirrel, northern flicker, red squirrel, and Stellar’s jay. Incidental grazing that occurs during trailing activities would be considered “light” (less than 20%) forage use and would not affect current habitat conditions for any of the eight prey species mentioned.

Goshawk nesting habitat would not be affected by implementation of Alternatives B or C since suitable nest sites would be located at lower elevations in mixed conifer habitat away from livestock trailing activities which occurs in the spruce fir habitat. Implementation of either grazing system or entry date in Alternatives B or C would have no impact on goshawks that might be foraging or nesting on the allotment. Livestock only trail through goshawk foraging habitats on the way to and from alpine grazing areas. Development (Alt. C) or non-development (Alternatives A & B) of the spring found in the uplands of Long Canyon pasture would have no impact on goshawk foraging and is not found in near or adjacent potential goshawk nesting habitat.

### **White-tailed ptarmigan (*Lagopus leucurus*)**

An estimated 325 acres of suitable habitat is available for this species within the alpine zone of this allotment. Poor quality ptarmigan winter ranges can be found in the upper 1/3rd of the Long Canyon pasture and immediately north to northwest of Middle Fork Lake (part of the Main Fork pasture). Summer range is found in the upper area of Long Canyon above timberline and north above timberline of the Main Fork pasture. The acreage is only a small portion of the ptarmigan alpine habitat in the Wheeler Peak Wilderness Area and is considered a part of the continuum of suitable habitat that extends southward outside the allotment boundary into the alpine areas of the Wheeler Peak, Walter Peak and Simpson Peak.

### **Environmental Consequences**

#### **Alternative A**

Implementation of Alternative A would benefit ptarmigan for the long term. Forage species diversity would be expected to improve in the alpine and near alpine habitat for ptarmigan under Alternative A. Grazing of alpine grasslands would only be associated with just wildlife forage utilization which is estimated to be only 5 to 20% (averaged over all pastures) and would constitute “light” grazing pressure. Braun (1971) stated that ptarmigan hens will move into the alpine grasslands if livestock grazing pressure is “light to non-existent”.

Under Alternative A Ptarmigan that nest in alpine grasslands would not be impacted by inadvertent livestock trampling and would not abandon nest sites found in alpine grasslands. Ptarmigan would likely stay on alpine grasslands longer and would have an abundance of sedge and forbs to feed on during the summer.

#### **Alternatives B and C**

Implementation of either Alternative B or C would impact ptarmigan nesting/forage use and distribution in the alpine grasslands of Long Canyon and Main Fork pastures. Ptarmigan summer diets are comprised mostly of sedges/grasses (20%) and forbs (70%) (Hoffman, 2006, May and Braun, 1972), with willow buds being the primary diet element (49-90%) in all other seasons. Summer livestock grazing would focus on alpine sedges and grasses and would consume forbs if intermixed with the sedge and grasses. Direct livestock impacts to ptarmigan would be a reduction in the amount of seed heads of alpine sedges and grasses found on summer alpine ranges due to livestock foraging. Hoffman (2006) citing other research found that ptarmigan will abandon alpine grasslands grazed by livestock and move into the steep slope krummholz habitats. This is especially true of ptarmigans with broods. Braun (1971) stated that hens will move into the alpine grasslands if livestock grazing pressure is “light to non-existent”.

Ptarmigan will generally start to have clutches hatch from July 5 through July 15 (Hoffman 2006) during the same time that livestock could be allowed onto the allotment. Generally ptarmigan nest adjacent shrubs in the krummholz areas or in alpine grasslands adjacent rocky areas with rocks that are at least 15 cm in diameter (Hoffman 2006). However, in a review of the literature Hoffman (2006) noted that up to 17 - 32 % of nesting ptarmigan may also nest in the alpine grasslands that have no associated rock or vegetative shrub cover. If livestock are directly pushed to alpine ranges upon entry to the allotment, ptarmigan hens may abandon the alpine grasslands under moderate grazing pressure of 30-40% forage utilization as stated under Alternatives B or C.

Hoffman (2006) citing other research found that ptarmigan will abandon alpine grasslands grazed by livestock and move into the steep slope krummholz habitats. This is especially true or ptarmigans with broods.

Implementation of Alternatives B or C may detrimentally impact some ptarmigan forage use, distribution and reproduction in the alpine ranges if livestock access the alpine ranges prior to July 23<sup>rd</sup>. Ptarmigan hens will not leave the nest site until the last egg of the clutch has hatched which could be as late as July 23<sup>rd</sup> (Hoffman 2006). It is possible some nest abandonment & eggs might be crushed by livestock in the alpine grasslands during this time if livestock grazing pressure is in excess of 20% (light).

Alternative B allows for a July 1 entry date on alpine grasslands which would maximize the amount of time livestock could impact ptarmigan nesting in alpine grasslands prior to July 23<sup>rd</sup>. However, Alternative C could have less impact on ptarmigan populations than Alternative B with implementation of flexible management practices that would restrict livestock grazing pressure (stocking levels) to maintain 20% forage utilization (light use) until after July 23<sup>rd</sup> when ptarmigan are no longer on the nest.

Implementation of Alternative B with a July 1 entry date could be detrimental to forage species diversity and limit the availability of seed heads for forage to ptarmigan during the nesting period. The early entry date would favor warm season grasses which typically seed out later than cool season grasses and can lead to changes in vegetative species composition. The growing season for these alpine grasslands are short with a “freeze free” period of only 30 days (USDA Forest Service 1987). Such a short growing season leaves little time for plants to mature and set seed (Chambers 1995). Grazing cool season alpine grasses early in the growing period before they set seed would result in a dominance of warm season grasses.

Implementation of Alternative C has a range of possible entry dates occurring from July 1 to July 15. Under Alternative C, an early entry date of July 1 is not likely adjacent Middle Fork Lake because of it being a high elevation alpine pasture. Even so, if an early July 1 entry date was to occur, the grazing pressure adjacent Middle Fork Lake is considered “light” and implementation of the annual rest rotation grazing system combined with the 6 inch stubble height requirement would enable this portion of the Main Fork pasture to withstand the effects of an early entry date with no long term detrimental effect to ptarmigan krummholz habitat or to ptarmigan that nest in the adjacent alpine grasslands.

However, under Alternative C recovery of species diversity and vigor of desired willow species in the Long Canyon and the Main Fork pasture (not adjacent Middle Fork Lake) may be delayed during the term of the permit as a result of a July 1 entry date in the ptarmigan habitat. Use of the early July 1 entry date under this alternative would have the same detrimental impact on forage species diversity in the Long Canyon and Main Fork pastures as previously stated in Alternative B.

Alternative C would not negatively impact ptarmigan habitat for the long term by providing the opportunity for changes in forage species diversity with delayed entry until July 15. Implementation of this alternative with the later July 15<sup>th</sup> entry date would have less of an impact upon ptarmigan habitat in the upper 1/3<sup>rd</sup> of Long Canyon pasture and in the portion of Main Fork pasture (away from Middle Fork Lake). Nesting ptarmigan would stay on the nest longer before livestock presence would cause them to abandon the alpine areas. Also the delayed entry would

provide greater benefit for forage species diversity by delaying grazing on cool season grasses. Milchunas (2006) in a review of plant community response to grazing states that alpine grassland grazing should be deferred until after most active plant growth has occurred. This implies that a later July 15 entry date would move toward a more desirable time for grazing and would benefit cool season grass seed development likely resulting in a diverse forage base for nesting ptarmigan. Also, Implementation of Alternative C could have less impact on ptarmigan populations when compared to Alternative B with implementation of flexible management practices that could restrict livestock grazing pressure (stocking levels) to maintain 20% forage utilization (light use) until after July 23<sup>rd</sup> when ptarmigan are no longer on the nest.

Rehabilitation of the Long Canyon / Gold Hill spring (Alternative B) or development of the spring (Alternative C) would have no impact on ptarmigan use of the alpine grasslands which overlap with livestock grazing use. This spring area does not have ptarmigan willow forage at, near or adjacent the spring site. Damage to the spring site in the fall of 2007 would have no impact to ptarmigan in the area. Citing other authorities Hoffman (2006) stated that although ptarmigan have been observed drinking water; their need for direct sources of water is poorly understood and that most of the water requirements needed by ptarmigan is probably obtained in their forage.

### **Sangre de Cristo pea clam**

Suitable habitat exists for this specie along the shoreline of Middle Fork Lake in the Main Fork pasture and at the Long Canyon / Gold Hill spring in the Long Canyon pasture. The habitat area in the Main Fork pasture adjacent Middle Fork Lake overlaps with a cattle (47 acre) “Key” area found adjacent to the west and north shore of Middle Fork Lake, and shares approximately 1,650 ft. of shoreline with the Lake. Watershed runoff from this “Key” area drains directly into the lake. The small size of the lake makes the population of clams extremely vulnerable to any alteration of its habitat; in particular, pollution is a threat to the species (Lang 2002 and NMDGF 1989).

The habitat at the spring in the Long Canyon pasture is a small (.07 acre) spring located at the alpine/timberline transition ecotone dominated by grasses at the spring and having groups of spruce/fir trees in nearby proximity. Prior to attempted development and disturbance to the site by the allotment permittees (in the fall of 2007) the grasses at the site was in good to fair condition and had signs of erosion and compaction from unrestricted livestock and wildlife access to the spring.

Current Middle Fork Lake pea clam habitat is in good shape based upon surveys done in 1995 and 1996 (Lang 2002). However, new populations or individuals of the Sangre de Cristo pea clam have not been found on the Carson National Forest since it was first described in 1987 (Taylor 1987). After its discovery in 1987, subsequent surveys (1995 and 1996) for the species presence in what appears to be suitable Sangre de Cristo pea clam habitat have resulted in negative findings both in Middle Fork Lake (point of discovery) and in adjacent suitable habitats. Therefore it is unknown whether or not the Carson National Forest contains any populations of this species.

Although surveys were negative for the presence of the Sangre de Cristo pea clam; other pea clam (*Psidium* sp.) species were present at the Middle Fork Lake site. Pea clam survey at the Long Canyon / Gold Hill site has not been performed. However, the habitat at the spring is suitable for peaclams. Because other species of pea clams can be found at Middle Fork Lake an assumption

can be made that this specie of pea clam has similar biological requirements of other pea clams found in Middle Fork Lake (NMDGF 1989) and that the water quality at Middle Fork Lake and the Long Canyon / Gold Hill spring site is sufficient to generally support pea clams. However, much of the biology of the Sangre de Cristo pea clam is unknown (Taylor et al 1985) and its particular sensitivity to changes in water quality is unknown.

## **Environmental Consequences**

### **Alternative A**

Implementation of Alternative A would provide short and long-term benefits toward protecting water quality conditions for Sangre de Cristo pea clam habitat at Middle Fork Lake by removing the peak of potential sources of fecal coliform from entering Middle Fork Lake. Potential impacts and sources of pollution would only come from wildlife foraging use in the watershed above Middle Fork Lake. Typically wildlife forage use is considered “light” and should leave residual forage heights in excess of 6 inches to filter fecal coliform sources coming from wildlife.

### **Alternative B**

Implementation of Alternative B would make no change to existing water quality and habitat conditions for the Sangre de Cristo pea clam. Although water quality at Middle Fork Lake meets the standards for a cold water trout fishery and is in good condition; continuation of Alternative B grazing practices in the past may have negatively affected this specie for the long-term since recent searches for this Sangre de Cristo pea clam have been negative, although other pea clams were found. Regardless of the presence of other species of pea clams found in those surveys; so little is known of Sangre de Cristo pea clam biology that it may now be impossible to determine if they are more sensitive to water quality changes than other pea clams but their absence in recent surveys is noteworthy. Based upon the best available scientific information and current habitat conditions, there would be no change in effect on this specie with implementation of Alternative B.

Under Alternative B the Long Canyon/ Gold Hill spring site would be protected for the short-term and not used by livestock as a water source until the spring site was restored to pre-disturbance conditions and stabilized from erosion. Pea clam habitat would be protected for 2 – 5 years over the short term. However, over the long term, if the protective fence is removed and livestock allowed direct access to the spring site, pea clams could be negatively impacted for the long term as livestock trampling is likely to accelerate erosion at the site, add fecal material directly to pea clam habitat, trample pea clams and disrupt the soil/water medium that pea clams inhabit at this site.

Restoration of the spring area is not likely within the short- term by the protective fence due to its occurrence at alpine elevation. Studies have shown that alpine vegetative communities are sensitive to disturbance and recovery from the effects of trampling is a long-term process (Willard et al. 2007) and could take decades to recover the vegetative and soil structure that once existed prior to disturbance (Barni et al. 2007, Scherrer and Pickering 2005).

### **Alternative C**

Implementation of Alternative C would have no impact on Sangre De Cristo pea clams where they occur and may have a beneficial effect toward improving pea clam habitat to near pristine conditions at Middle Fork Lake and remove the threat of potential sources of pollution at both Middle Fork Lake and at the spring in Long Canyon pasture. Implementation of this alternative would be in compliance with the recommendations of the “Conservation Habitat Assessment” (USDA Forest Service 1996a).

Improved habitat condition would come from the desired 6 inch residual stubble height maintained in the Main Fork pasture around Middle Fork Lake and by construction of the permanent fence around the spring (water source for livestock) in Long Canyon pasture. Implementation of Alternative C would provide both short-term and long-term improvements in pea clam habitat although recovery of the pea clam habitat at the spring in Long Canyon pasture may take decades to recover (Barni et al. 2007, Scherrer and Pickering 2005) from the disturbance that occurred in 2007.

### **Management Indicator Species**

All 11 MIS were considered in the Deer Creek Allotment analysis area. However because of limited habitat (vegetation) types found within the analysis area some species were dropped from further impact analysis. Only three species and two species groups were found to have the potential of being affected by implementation of continued grazing on the Deer Creek Allotment. They are:

- Rocky Mountain Elk — Forest generalist
- Rocky Mountain Bighorn Sheep — High elevation (alpine) grassland
- White-tailed ptarmigan — High elevation (alpine) grassland
- Resident Trout — Riparian (perennial stream)
- Aquatic macro-invertebrates — Riparian (perennial stream)

### **Rocky Mountain Elk**

The Carson Forest Plan identifies elk as an indicator of general forest habitat type (USDA Forest Service 1986, p.97). Forest-wide habitat trends for the elk are based on acres of available “occupied” habitat (general forest health). The entire allotment is considered elk habitat (5,370 acres) and occurs in New Mexico big Game Management Unit #53. On site inspections of the pastures on the allotment show elk are using a variety of habitats found on the allotment.

Over the last century, elk numbers on the Carson increased (Catanach and Weybright 1995, Dunn and Weybright 1995). Currently the population trend for elk on the Carson National Forest is considered stable (USDA Forest Service 2007). Forest-wide, it is estimated that elk habitat use on the Carson National Forest has increased by 61,314 acres utilizing most all habitat types on the forest including piñon and sagebrush vegetation types. Forest-wide the trend for Rocky Mountain elk habitat from 1986 to 2005 is estimated to have increased from 1,362,760 to 1,424,074 acres or upward by almost four percent and is currently considered stable (USDA Forest Service 2007).

## Environmental Consequences

### Effects common to all Alternatives

- Implementation of any alternative would not affect population trends or habitat trends for elk on the Carson National Forest.

### All Alternatives

Cattle grazing under alternative A would not affect elk use of the available habitat on the allotment but under Alternatives B and C livestock grazing could cause short term displacement of elk during summer months in only one pasture at a time. Stewart et al. (2002) found both elk and deer will move out of livestock “key” areas when cattle are present and will typically forage on steeper gradient slopes away from cattle grazing areas. Elk would be expected to gradually reoccupy pasture areas once cattle leave the pasture.

### Cumulative Effects

Cumulatively, populations of elk have not been affected by grazing impacts associated with forage competition from domestic livestock, regardless of the alternatives proposed. Additional increases in available foraging habitat have occurred wherever timber harvests or forest openings have been created such as at the Red River and Taos Ski Areas which is within the range of migratory movements of elk on this allotment. Elk will use these openings at Taos Ski Valley. However, elk do not use the available summer and fall forage available on ski runs located at Red River Ski area. The Red River Ski Area is too intensely used for summer recreation activities, which cause elk to stay away from these areas. In addition, these areas are too low in elevation and near the town of Red River to be suitable for summer and fall ranges. Habitat improvement projects such as water developments, prescribed burns, timber harvest, fuel wood sales and the clearing of piñon-juniper woodlands helped to distribute use of existing herds into unoccupied habitats.

### Rocky Mountain Bighorn Sheep

This species is an indicator for the presence of alpine, subalpine tundra and mountain meadow grassland (USDA Forest Service 1986, p.97). The Deer Creek allotment overlaps an estimated 325 acres of alpine bighorn sheep range in the Columbine-Hondo Wilderness Study Area with the Long Canyon pasture and extends into alpine ranges of the Wheeler Peak Wilderness Area in the Main Fork pasture. Year-round suitable habitat for the Rocky Mountain bighorn exists on this allotment above timberline. Bighorn sheep have been seen in the alpine ranges of Gold Hill (located between the Deer Creek and Long Canyon pastures) and in the alpine ranges of the Main Fork pasture. Bighorn sheep habitat conditions in the Wheeler Peak Wilderness, Columbine-Hondo WSA and the Latir Peak Wilderness are good and stable (USDA Forest Service 2007). There has been no loss of alpine grassland habitat on the Deer Creek allotment. The habitat trend for Rocky Mtn bighorn sheep on the Carson NF is considered to be stable (USDA Forest Service 2007).

## **Environmental Consequences**

### **Effects Common to all Alternatives**

- Implementation of any of the alternatives would not change bighorn sheep Forest-wide habitat trend or population trend.

### **Alternative A**

Implementation of Alternative A would be better than Alternatives B or C and would provide the best benefit for bighorn sheep habitats and would allow bighorn sheep full access to available forage without inter-specific forage competition from domestic livestock. Forage utilization from bighorn sheep in their historic alpine ranges would have a “light” grazing intensity (includes elk forage use).

### **Alternatives B and C**

Existing species forage diversity under implementation of Alternative B would remain static with no improvement expected for cool season grasses. Forage conditions of bighorn sheep alpine ranges would not be diminished over their current condition for the short term but they would not improve over the long term because of both the system of grazing used (in which all pastures are grazed at some point in the year) and the early July 1 entry date. This same would also be true under Alternative C if the early July 1 entry date is used.

However, Alternative C is somewhat better than Alternative B since it incorporates a rest-rotation grazing strategy that compensates to some degree the effects of an early July 1 entry date. The annual rest period for a pasture does allow for some improvement in cool season grasses and would gradually improve forage species diversity. Also implementation of the annual rest-rotation grazing system would allow a place for wildlife and bighorn sheep to graze without inter-specific competition with livestock. Implementation of Alternative C would improve forage quality for the long term in the Main Fork and Long Canyon pastures where overlap of livestock grazing and bighorn sheep grazing occurs. Forage species diversity would benefit more if the July 15 entry date is used more frequently than the July 1 entry date. Milchunas (2006) in a review of plant community response to grazing states that alpine grassland grazing should be deferred until after most active plant growth has occurred. The “freeze free” period for these high elevation alpine rangelands is only 30 days (USDA Forest Service 1987). This implies that a later July 15 entry date would move toward a more desirable time for grazing and would benefit cool season grass seed development. Implementation of this alternative would be beneficial for the long term forage condition of bighorn sheep alpine ranges. Implementation of Alternative C would meet the objective of “Strategy #8.2” of the 2005-2014 “Long range plan for the management of Rocky Mountain bighorn sheep in New Mexico...” (NMDGF2005).

### **White-tailed Ptarmigan**

The white-tailed ptarmigan is an indicator species for the presence of alpine tundra and sub-alpine deciduous shrub (USDA Forest Service 1986, p.97). No management actions have been implemented since the time of the Forest Plan to cause a change in the number of acres of available habitat on the Carson National Forest. The overall habitat trend for the white-tailed ptarmigan on the Carson National Forest is stable (USDA Forest Service 2007). While the actual

numbers of ptarmigan on the Carson National Forest are unknown, persistent sightings indicate the ptarmigan is still present (although rare in occurrence); the population trend for ptarmigan appears to be stable across the forest on the Carson National Forest (USDA Forest Service 2007).

Based upon past livestock use patterns on the Deer Creek allotment; current livestock (cattle) grazing use does conflict with ptarmigan that nest in the alpine grasslands in the Long Canyon and Main Fork pastures.

### **Alternative A**

Implementation of Alternative A would not change Forest-wide ptarmigan habitat or population trends. Alternative A would benefit ptarmigan for the long term. Alternative A would benefit ptarmigan for the long term. Ptarmigan would not be indirectly harassed by livestock and would not abandon nest sites found in alpine grasslands. Ptarmigan would stay on alpine grasslands longer and would have an abundance of sedge and forbs to feed on during the summer.

### **Alternatives B and C**

Under Alternatives B or C, there would be no change to ptarmigan Forest-wide habitat trend but may have a minor effect to ptarmigan alpine grasslands and Krummholz habitat quality. This ptarmigan habitat to some extent overlaps livestock “Key” areas which utilize the alpine grasslands. To get to these alpine ranges livestock traverse across 40-60% slopes (ptarmigan habitat with Krummholz vegetation) and typically spend little time in the Krummholz ecotone grazing. However, livestock will spend time in the alpine ranges; the area of principal overlap with ptarmigan habitat during the summer. The steep slope areas that have krummholz vegetation in the Long Canyon and Main Fork pastures has limited distribution and is a relatively rare habitat important to ptarmigan. The effect of these two alternatives may seasonally affect forage availability to ptarmigans.

However, implementation of either Alternative B or C would impact ptarmigan populations to some extent for those ptarmigan that utilize alpine grasslands for nesting and forage use in the Long Canyon and Main Fork pastures. Hoffman (2006) noted that up to 17 - 32 % of nesting ptarmigan may nest in the alpine grasslands. It is possible some nest abandonment & eggs might be crushed by livestock in the alpine grasslands if livestock enter these ranges prior to July 23<sup>rd</sup> and if livestock grazing pressure is in excess of 20% (light) forage utilization prior to July 23<sup>rd</sup> (see discussion of livestock impacts on ptarmigan in the “Forest Sensitive Species” section of this document for more detail.)

Implementation of either Alternatives B or C should not change the status of the ptarmigan population from “stable” on the Carson NF since the timing of the grazing impacts proposed is no different than what has historically occurred since 1967. However, Alternative C would have less impact on ptarmigan populations than Alternative B with implementation of flexible management practices that could restrict livestock grazing pressure (stocking levels) to maintain 20% forage utilization (light use) until after July 23<sup>rd</sup> when ptarmigan are no longer on the nest. Braun (1971) stated that hens will move into the alpine grasslands if livestock grazing pressure is “light to non-existent”

## **Resident Trout**

Resident trout species are used as indicator species for quality perennial stream and riparian vegetation (USDA Forest Service 2007). Resident trout species include Rio Grande cutthroat trout (*Oncorhynchus clarki virginalis*), brown (*Salmo trutta*), brook (*Salvelinus fontinalis*), and rainbow trout (*Oncorhynchus mykiss*). The Forest-wide habitat trend for resident trout on the Carson National Forest is currently stable (USDA Forest Service 2007). There are approximately 7 miles of perennial streams (Deer Creek, Long Canyon, Middle Fork Creek, and West Fork of the Red River) on the allotment and all of the streams are known to contain resident trout except Deer Creek.

Only approximately .02 miles are adjacent to livestock “key” areas in small open meadows scattered along the lower reaches of Long Canyon Creek in the Long Canyon pasture where livestock graze when they trail in and out of the pasture. These areas adjacent Long Canyon stream are in excellent forage conditions (most of which is heavily timbered and not accessible to livestock) receive short duration (less than 5 days of grazing) during trailing events and trout habitats are not impacted by livestock grazing. Livestock “key” areas are located at the heads of respective watersheds away from trout habitats along the Long Canyon pasture.

## **Environmental Consequences**

### **Effects Common to all Alternatives**

- No alternative would affect the forest resident trout population trend. Due to the trout stocking programs performed by NMDGF on the Carson National Forest, the forest-wide population trend for resident trout species is stable (USDA Forest Service 2007).
- No alternative would change in the forest wide habitat trend in resident trout habitat along stream channels on the Deer Creek allotment.

### **Aquatic macro-invertebrates**

Aquatic macroinvertebrates or aquatic insects are indicators for quality perennial stream and associated riparian vegetation. The primary habitat requirement for aquatic macroinvertebrates is perennial water in streams that contain resident trout (USDA Forest Service 2007). There are approximately 7 miles of perennial streams on the Deer Creek allotment and aquatic macroinvertebrates occur in all the streams and in Middle Fork Lake. Of these miles of streams approximately .02 miles are adjacent to “key” areas that receive grazing activity along Long Canyon Creek in the Long Canyon pasture. Since 1986 most areas of the forest, physical condition of aquatic habitat appears to be stable or improved and the Forest-wide trend in available habitat appears to be stable (USDA Forest Service 2007). Population trends for aquatic macroinvertebrates on the Carson National Forest are healthy and appear to be stable (USDA Forest Service 2007).

## Environmental Consequences

### All Alternatives

- Regardless of the alternative implemented, there is no impact on forest-wide aquatic macroinvertebrate habitat trend. Livestock “key” areas are located at the heads of respective watersheds away from aquatic macroinvertebrates habitats.
- Overall, diverse communities of aquatic macroinvertebrates are represented forest-wide, and are considered stable unless an influence or significant event affects a local or given reach of stream. None of the alternatives would change the Forest-wide aquatic macroinvertebrates population trend.

### Avian Species

New Mexico Partners in Flight (PIF) identifies physiographic areas and high priority migratory bird species by broad habitat types. They also developed a list of priority breeding bird species by habitat type. The US Fish and Wildlife Service released its Birds of Conservation Concern 2002 report (webpage - <http://migratorybirds.fws.gov/reports/bcc2002.pdf>). The environmental assessment for this project uses information from both the New Mexico PIF website (<http://www.hawksaloft.org/pif.shtml>) and the Birds of Conservation Concern Report for the Southern Rockies/Colorado Plateau Bird Conservation Region (BCR) #16 for the migratory bird analysis. 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 project area 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.

### Montane Shrub Species

In the montane shrub habitat type, the highest priority species include Lucifer hummingbird, MacGillivray’s warbler, green-tailed towhee and black-chinned sparrow. The project is outside the range of the Lucifer hummingbird and above the known elevation limit for occurrence of black-chinned sparrow which only migrates through the forest. None of the alternatives would affect MacGillivray’s Warbler. Principal grazing areas are in the subalpine to alpine ranges and do not occur in habitat areas for this species. None of the alternatives would affect Green-tailed Towhee (see specialist report in project record for more information).

### Mixed Conifer Forest Species

Highest priority species include northern goshawk, Mexican spotted owl, Williamson's sapsucker, olive-sided flycatcher, dusky flycatcher and red-faced warbler. Williamson’s sapsucker and dusky woodpecker were observed in mixed conifer during breeding bird surveys in 2004, as well as red-naped sapsucker, hairy woodpecker, northern flicker, plumbeous vireo, warbling vireo, Steller’s jay, violet-green swallow, mountain chickadee, red-breasted nuthatch, white-breasted nuthatch, pygmy nuthatch, house wren, hermit thrush, Virginia’s warbler, yellow-rumped warbler, western tanager, green-tailed towhee, chipping sparrow, black-headed grosbeak, Dark-eyed Junco, pine siskin, and mourning dove. The red-faced warbler is not found on Carson National Forest. Please refer to the Forest Sensitive species write up for effects to Northern Goshawk and Mexican

Spotted Owl. No alternative would effect Williamson's sapsucker, the olive-sided flycatcher, and the dusky flycatcher (see specialist report in the project record for more information).

**Spruce-Fir (subalpine) Species:**

The habitat occurs roughly from 9500 feet to tree line. Highest priority species include blue grouse and boreal owl. The blue grouse was observed in spruce-fir during breeding bird surveys in 2004, as well as broad-tailed hummingbird, hairy woodpecker, northern flicker, western wood-pewee, Cordilleran flycatcher, warbling vireo, Steller's jay, Clark's nutcracker, violet-green swallow, mountain chickadee, red-breasted nuthatch, white-breasted nuthatch, pigmy nuthatch, brown creeper, house wren, ruby-crowned kinglet, Townsend's solitaire, hermit thrush, yellow-rumped warbler, western tanager, dark-eyed junco, and pine siskin. No alternative would effect the Boreal Owl because there is no overlap in time period of use that would affect boreal owl prey base species habitat conditions in the spring by livestock.

**Table 6. Spruce-Fir Species**

Species	FWS/ PIF	Important Features and Life History Considerations	Effects
<b>Blue Grouse</b>	PIF	<ul style="list-style-type: none"> <li>• Nests in virtually all montage forest communities with relatively open tree canopies out of 1.2+mi (2+km) from forest edge; prefer forests dominated by ponderosa pine or Douglas-fir.</li> <li>• Nests almost always on ground with some overhead cover usually under shrubs, rock overhangs, logs or stumps; may nest at base of large trees with no immediate cover in older mature forests.</li> <li>• Nest site may change from barren at time of laying to lush and well-concealed at hatch. Generally nests within 164-492ft (50-150m) of free water.</li> <li>• Suggestion of a positive correlation between</li> </ul>	<ul style="list-style-type: none"> <li>• Alternative A and C should benefit this species by providing more grass for concealing nest sites, especially near Middle Fork Lake in the Main Fork pasture.</li> <li>• Alternative A would be more beneficial for the species.</li> <li>• Alternative B would have a negative affect upon nesting habitat at the margins of livestock "key" areas adjacent shrub &amp; timber habitat types adjacent Middle Fork Lake in the Main Fork pasture. There is the potential of livestock trampling nest and killing young. This would not have a measurable negative effect to the grouse population.</li> </ul>

Species	FWS/ PIF	Important Features and Life History Considerations	Effects
		<p>density of birds and age of dominant trees up to about 10 yrs post-logging and a negative correlation after that.</p> <ul style="list-style-type: none"> <li>Density of birds decreases as tree canopy increases.</li> </ul>	

**Alpine tundra Species**

The highest priority species include White-tailed Ptarmigan and Brown-capped Rosy-Finch.

**Table 7. Alpine tundra species**

Species	FWS /PIF	Important Features and Life History Considerations	Effects
<b>White-tailed Ptarmigan</b>	PIF	See “Forest Sensitive Species” write-up	
<b>Brown-capped Rosy-Finch</b>	PIF	<ul style="list-style-type: none"> <li>Uses cirque headwalls, talus slopes and permanent or late-melting snowfields.</li> <li>Nests on cliffs or on the ground, both with an overhanging rock for concealment.</li> <li>Nests often placed near snowfields and situated so that sunlight does not hit the nest.</li> <li>Frequently forages at the edges of snowfields for seeds and torpid insects gleaned from snowbanks.</li> </ul>	<ul style="list-style-type: none"> <li>Alternative A and C should benefit this species by providing more grass for concealing nest sites.</li> <li>Alternative A would be more beneficial for the species.</li> <li>Alternative B would have a minimal impact upon rock overhang nesting habitat at the margins of livestock “key” areas adjacent shrub &amp; timber habitat types.</li> </ul>

### **Cumulative Effects – All Species**

Historic cumulative impacts associated with livestock grazing have detrimentally affected ptarmigan for the long term. Historic overgrazing associated with domestic sheep grazing, up until 1953 may have directly contributed to the decline of willows and alpine tundra meadows necessary to ptarmigan quality. Available records show 300 to 520 head of domestic sheep were grazed on the Deer Creek allotment, principally in the alpine grasslands from 1934 to 1953. In 1953 the livestock class was changed from domestic sheep to 50 head of cattle effectively changing the location of livestock “Key” areas away from the alpine grasslands and ptarmigan habitat. The same change in livestock class did not occur until 14 years later (1966) on the adjacent Columbine allotment.

Cumulative impacts associated with domestic sheep grazing on the adjacent Columbine allotment including sheep grazing on the Deer Creek allotment may have affected ptarmigan winter range habitat suitability over the greater Latir-Wheeler range. Available grazing records on the adjacent Columbine allotment show 2,400 to 2,090 head of domestic sheep were grazed in the alpine grasslands from 1929 to 1935 and then incrementally reduced over time until only 150 head of sheep were permitted on the adjacent Columbine allotment in 1964. Reductions in permitted numbers of domestic sheep were made due to severe erosion of the alpine grazing area, indicating excessive grazing had effectively removed ground cover species to the point that bare soil was exposed (possibly permanently reducing the willow component in ptarmigan winter ranges). In a comparison of historic grazing patterns on alpine vegetation Bock, et al. (1995) found that chronic severe defoliation will deplete limited plant nutrients such as phosphorus and lead to increased plant mortality and soil nutrient depletion. The decline of ptarmigan populations in New Mexico is thought to be due to past unregulated sheep grazing, which altered crucial willow habitat, and also due to unregulated harvests by shepherders (Braun 1979).

In 1966 the livestock class on the adjacent Columbine allotment was changed from domestic sheep to 100 head of cattle effectively changing the location of livestock “Key” areas away from ptarmigan habitat in the krummholz on both allotments. Elimination of domestic sheep grazing in 1966 reduced most of the impact associated with domestic livestock on the krummholz habitats of ptarmigan, however ptarmigan that rely upon alpine grassland ranges are still impacted by domestic livestock grazing.

Combined Rocky Mountain bighorn sheep and elk forage utilization in this allotment along specific areas of the Krummholz ecotone may be affecting recovery of tall willow species needed to support a population of ptarmigan. Current willow populations needed for winter survival can only be found in a few spots of TEU’s #340 and #341 and comprises less than a "trace" of percent cover. Grazing from Rocky Mountain bighorn sheep in the Krummholz ecotone may mask any desired improvement in forage condition of tall willow species needed in ptarmigan krummholz winter ranges. Under Alternatives B or C combined forage use by livestock and wildlife (elk and bighorn sheep) in alpine grasslands may continue impact a portion of the ptarmigan that nest in alpine ranges in a similar manner that has occurred in the past. Past cumulative effects on ptarmigan habitat will not be additive to the impacts of implementation of Alternatives B or C, however these alternatives may have a negative effect on ptarmigan nesting and reproduction if livestock enter alpine ranges prior to July 23<sup>rd</sup>.

Overgrown forest conditions could lead to an increased potential of stand replacing fires. These fires if outside the natural range of variability of intensity for the analysis area could lead to a high removal of forested stands and increase sediments within streams. This could affect the

goshawk by destroying nesting and foraging habitat. It may affect the Sangre de Cristo peaclam by increasing sediments in the streams or lakes. Implementation of Alternatives B or C would not have an additive impact to cumulative effects on goshawks.

The introduction of non-native (exotic) trout species may have had a cumulative effect on populations of native pea clam species, such as the Sangre de Cristo pea clam. Small trout associated with younger age classes feed almost exclusively on benthic fauna of the lake (Lang 1998). Exotic trout species were first stocked in Middle Fork Lake in 1933 with fingerling (3 to 5 inch) "Yellowstone" native cutthroat trout, then with fingerling rainbow trout in 1941 and 1950 (USDI n.d.). In addition, the upper Red River was stocked with brook trout beginning in 1927 through 1929 and with rainbow beginning in 1928 (USDI n.d.). Middle Fork Creek is a tributary to the East Fork of the Red River upstream migration could occur by exotics going from the Red River and eventually to Middle Fork Lake. Brook trout currently occupy Middle Fork Lake. Only implementation of Alternative B would continue to have an added impact to trout habitat, Sangre de Cristo pea clams, and aquatic macro invertebrates at Middle Fork Lake.

Introductions of exotic trout species have a very detrimental impact upon native wild trout populations, causing extinction or hybridization of the native trout species elsewhere. The decline in distribution and populations has also been attributed to the introduction of exotic (non-native) trout; hybridizing with rainbow trout and increased food and space competition from brook and brown trout (Rinne 1995).

Conversely genetic hybridization and competition among resident trout are not significant factors since over time they will out compete and dominate the native wild trout. Restoration activities for the benefit of native wild trout (Rio Grande cutthroat) have been relatively small in scale, but could become a factor on other resident trout species. Restoration activities may reduce the number of streams with more than one species of resident trout over time as the extent of restorations increase to benefit only native wild trout. Implementation of Alternatives B or C would not be additive to the impact non-native trout have on native Rio Grande cutthroat trout on the allotment.

Additional cumulative impacts to the Sangre de Cristo pea clam include a snow/debris flow that occurred in early 1991 at Middle Fork Lake. This debris flow occurred in the early spring and filled in at least 20% of the depth of the Lake essentially burying half of the suitable pea clam habitat and populations of pea clams thought to exist at that time.

## Heritage Resources

There have been ten, one hundred percent archaeological surveys amounting to about 400 acres, which amounts to less than ten percent of the total 5370-acre Deer Creek Allotment being systematically covered, although the majority of the 470 grazable acres have been inventoried. In August 2000, July 2004, August 2006, and September and October 2007, the Questa District Archaeologist completed one hundred percent surveys of associated with recording the Deer Creek Allotment, consisting of access trails, pastures, watering holes, and range improvements.

There are eight heritage sites recorded within the Deer Creek Grazing allotment, and five sites on access trails used by livestock outside of the allotment. The sites include a log cabin; a copper mining prospect with log buildings, heavy machinery and a large waste pile; a mining-related site with a log feature; a boiler and steam engine from a sawmill; a telephone line and fire lookout; a wagon road; two prehistoric lithic scatters; and two possibly prehistoric or historic rock features. Previously recorded sites include a historic livestock corral used until the 1960s, and a segment of the Big Ditch that crosses through Main Fork pasture. The ditch was constructed in 1869 to deliver water from the headwaters of the Red River on the Deer Creek Allotment over to placer operations on the west slope of Baldy Mountain for use in hydraulic placer mining.

The archaeological clearance and IS&A for the Deer Creek Grazing Allotment was signed March 6, 2001, and the archaeological clearance and IS&A for Long Canyon Spring Development and Taos Ski Valley pipe corral was signed September 8, 2005, all in compliance with Section 106 of the National Historic Preservation Act. The NMSHPO concurred that continuing the current grazing practices and making the range improvements would have “no effect” on heritage resources. Additional survey, new site recordings, historical background, and information on site conditions in the Deer Creek Allotment is found in Carson Forest Report #2000-02-133-B and the accompanying site forms. A review of the current preferred action and alternatives, as well as the archaeological clearance signed March 6, 2001 shows that the documents meet the standards of the 2006 Forest Service Region 3 Grazing Protocol signed with the New Mexico State Historic Preservation Office (SHPO).

Initial analysis and scoping for the Deer Creek Allotment began in 2001, and the project was listed every year since on the annual list of proposed actions sent to the tribes. A letter based on an analysis which described the proposed permit renewal and solicited comments, was issued on June 21, 2004, as well as September 23, 2005, to the sixteen tribes who regularly consult with the Carson National Forest. Information on the Long Canyon Spring development and Taos Ski Valley Pipe Corral was sent to the Tribes on May 27, 2004. Tribal consultation was completed for the earlier Deer Creek Allotment proposals with no significant concerns, and a letter based on the current analysis, proposal, and results of recent archaeological surveys was sent for comment to the sixteen Tribes who regularly consult with the Carson National Forest on December 17, 2007. A March 1, 2008 response from the Navajo Nation stated their recognition of the Sangre de Cristo Mountains as a Cultural Sacred Site. The HPD-TCP recommends mitigation to avoid the area of concern that threatens Traditional Cultural Properties. The Navajo Nation requested they be notified in case of inadvertent discovery of Navajo habitation sites, plant gathering areas, human remains and objects of cultural patrimony; and recommended we consult with other tribes within the vicinity. With the exception of replies stating they have no concern, or that they be notified in the case of inadvertent discovery of cultural sites, we have received no additional comments on the project.

## Environmental Consequences

### All Alternatives

Reissuing the grazing permits under current or reduced activity levels, or any of the alternatives would not have a significant impact on heritage resources. Because cattle tend to congregate at sites near riparian pastures, meadows, and alpine grasslands, the proposed mitigations in Alternative C such as a reduction in stocking numbers, a rest rotation schedule, maintaining a 4" stubble height in riparian areas, maintaining 20% to 40% usage, and the development of the Long Canyon spring would help keep impacts from cattle to a minimum (although these impacts would continue to be monitored by archaeologists and range personnel). Achieving and maintaining allotment desired conditions is expected to benefit heritage resource properties by providing improved vegetation cover and more stable soils, thereby reducing the potential for direct or indirect impacts to heritage resources.

### Cumulative Effects

Other related activities, when combined with livestock grazing that could cumulatively impact heritage resources on this allotment are recreation activities. The recreation uses in this area, such as tourism, hiking, outfitting, camping, and horseback riding, are having an adverse effect on heritage resources, as what is left of the cabins are being taken apart and removed by the public, piece by piece. The sites have damage and artifact collection at historic sites located along Forest recreation trails from hikers, campers, hunters, sheep herders, animal wranglers, and groups, such as removal of structural wood and corner fireplace rocks to use in campfires, use of the cabin interiors as temporary livestock corrals, and building fires on the floor in the cabin interiors. A lithic scatter site has been impacted from a road and a trail, as well as having the undisturbed portion of the site located on a riparian pasture used by animals and people.

Monitoring of the surface artifacts and structural features over the past twenty years at the sites shows the impact is not significant from a single source like cattle grazing. Cumulative affects of animal grazing and public use on recreation trails and roads would continue to have some impact on heritage sites over time. The archaeologist has posted informational signs at the historic sites regarding laws that protect heritage resources, and would continue to monitor the conditions from recreation, grazing and other sources, to assess whether or not additional protection mitigation beyond the indirect efforts of the rest rotation schedule, spring development, and relocated salting stations should be taken.

## Social and Economic Environment

The grazing operation for the Deer Creek allotment is a "community allotment" operation. There are 3 individuals permitted to graze their livestock on the allotment, all of whom live in Taos County. The permittees use private lands to graze their livestock when they are not on the allotment. All permittees supplement their income from what they earn raising livestock. One of the current permittees has held a permit on the allotment since 1969. The others have acquired their permits since then. Small-scale producers stress the importance of the quality of life that ranching provides them and their families. Owning livestock is an important way of reaffirming ties to their ancestral lands and heritage. Preserving this working relationship with the land so it can be passed on to their children along with a feeling of self-sufficiency is a cornerstone of their values. Generally speaking, the more rural and remote the community, the more important the ranching option becomes (Eastman and Gray, 1987; Raish, 1995).

### **Alternative A**

Alternative A would not permit livestock grazing on the allotment and the existing permits would be terminated. The effect on the permittees would depend on how well they could adjust their operations. The permittees may be able to find other sources of grazing land, but privately leased grazing is typically three to four times more expensive than on Federal land. This would obviously cut into whatever profit margin the ranching operations can generate. Or the permittees would not be able to find suitable alternatives to grazing on Federal lands and this would result in the permittees selling off a portion or all of the livestock, or supplemental feeding their herds for an additional two to three months of the year.

Losses in income would be greatest under the no grazing alternative. Currently the permittees generate an estimated total gross annual income of approximately \$5,696 from the operation of the Deer Creek allotment permits, which consists of almost one quarter of their overall operations (2½ months/year). Supplemental feeding or alternate pastures would cost up to \$1/day/head. This may not seem like very much, but this cost can exceed the revenue generated by the operation during this period of time. In the Questa area, alternative grazing areas are difficult to find and are generally not available during this time of year, due to the timing of irrigation and raising of hay crops. These areas don't generally become available until after hay crops are harvested when they are grazed to reduce stubble, thus the most likely result for these permittees would be a reduction or elimination of their grazing activities.

The losses in income from livestock would result in declines in the economic well-being of the permittees. Most permittees in that situation would try to adjust their operations to absorb the income losses rather than sell their ranches because maintaining the ranching life-style is important to them. Life-style changes would include decreasing their spending, diversifying operations to make them less dependent upon ranching and possibly family members seeking more "outside" work to bring in more income.

Eliminating grazing completely may also create the impression of unfairness or "taking" by the Federal government. Some recreation visitors may view removing all cattle from the allotment favorably. Under this alternative, the permittees would have to find alternate sources for the placement of their livestock, reduce the numbers of animals in their herds, or completely cease operations.

Alternative A would not meet the purpose and need of contributing to the social and economic well-being of affected livestock operators and their families, as well as to the economy of local communities and counties.

### **Alternative B**

Under Alternative B, livestock would be permitted to graze with the same terms and conditions of their current permit. The permittees could potentially derive an estimated total gross annual income of approximately \$5,696 from the operation of the allotment permit under current permitted livestock numbers and season of use. In recent years, the permittees have voluntarily taken non-use on their permits due to drought conditions and other personal considerations. The permittees have a variety of costs associated with the operation of these permits, including time to administer and manage the permits, which is estimated at approximately 320 hours (sixteen 10-hour days for each of two permittees) during the grazing season. Additional costs include

maintenance of approximately 1.5 miles of fence and a grazing fee of \$1.35 (FY 2007) per head month.

Continued grazing under the current terms and conditions would allow existing traditions, sense of community and personal identity to continue. The permittees would continue to have responsibility for checking up on their grazing animals and maintaining improvements on the allotment, but this investment of time and cost would generally be considered worthwhile in order to retain authorization for grazing the same numbers of livestock for the same season in the same location. Alternative B would meet the purpose and need of contributing to the social and economic well-being of affected livestock operators and their families, as well as to the economy of local communities and counties.

### **Alternative C**

Under Alternative C, livestock would be permitted to graze with a range in the permitted season of use. The permittees could potentially derive an estimated total gross annual income of approximately \$2,848-\$5,696 from the operation of the Deer Creek allotment permit under proposed livestock numbers and season of use. In recent years, the permittees have voluntarily reduced stocking or taken non-use on their permits due to drought conditions and other personal considerations. The permittees have a variety of costs associated with the operation of these permits, including time to administer and manage the permits, which is estimated at approximately 320 hours (sixteen 10-hour days for each of two permittees), when fully stocked during the grazing season. Additional costs include maintenance of approximately 1.5 miles of fence and a grazing fee of \$1.35 (FY 2007) per head month. In addition, under this alternative they would invest approximately \$3,000 in materials for a spring development along with the labor needed to construct it.

Continued grazing under the proposed terms and conditions would allow existing traditions, sense of community and personal identity to continue. The permittees would continue to have responsibility for checking up on their grazing animals and maintaining improvements on the allotment, but this investment of time and cost would generally be considered worthwhile in order to retain authorization for grazing similar numbers of livestock for a similar season in the same location. Alternative C would meet the purpose and need of contributing to the social and economic well-being of affected livestock operators and their families, as well as to the economy of local communities and counties.

### **Cumulative Effects**

Ranching and the grazing of domestic livestock has been part of the Southwest culture for 400 years. In 1598, sheep were introduced into the Rio Grande pueblos. Other livestock soon followed. Cattle herds were estimated at 172,000 in 1880, but grew to over 1.5 million head in the 1890's (Baker et al., 1988). The total number of permitted livestock on National Forests in the Southwestern Region has dropped dramatically during the past century (Figure 1). The majority of these reductions occurred to large-scale operations and particularly to sheep and goat operations. From 1915 through 1954, between 60 and 70 percent of all grazing permittees on the Carson and Santa Fe National Forests had herd sizes of less than 10 cattle (Atencio, 2001). Today approximately 75 percent of permittees have herd sizes of less than 50 head with 15 percent having 10 head or less. Only seven percent of all operations have herd sizes of greater than 100 head.

The number of permittees has also declined during the past several decades. Throughout the region many small and medium operations have been absorbed by larger operations. In northern New Mexico grazing associations have allowed several small permittees to operate together on larger allotments for better management. This has given the perception that there are fewer families involved in grazing on the Carson National Forest. This is not necessarily a straightforward reduction as there may be ten to 20 families in one association or permit. According to the 1997 Agriculture Census, there were 276 cow/calf operations in Taos County, which was down 20 percent from 1987. The actual number of cow/calf pairs was down 18 percent to approximately 7,600 pairs in the county. The majority (53%) of these pairs were on operations with less than 50 head. Although the reduction or elimination of this permit would represent only a small fraction (less than 1%) of the overall inventory in the county, it would continue the declining trend in the county.

Eliminating cattle grazing on the Deer Creek allotment may force the permittees to use their own private lands to levels that may have detrimental effects on the land. Eliminating grazing in this region will change the traditional land uses and values for most local people and with it they lose their ties to the land. Under this scenario Forest Plan objectives would not be met.

## **Environmental Justice/Civil Rights**

A specific consideration of equity and fairness in resource decision-making is encompassed in the issue of environmental justice and civil rights. As required by law and Executive Order, 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.

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 A**

Elimination of livestock grazing on national forest system lands would negatively affect the (subsistence) lifestyle of term grazing permittees who rely on these lands as part of their ranching operations.

### **Alternatives B and C**

Continuation of livestock grazing on national forest system lands would assist in maintaining the (subsistence) lifestyle of term grazing permittees who rely on these lands as part of their ranching operations.

## Wilderness, Wild and Scenic Rivers, and Recreation

### Wilderness

Much of the Deer Creek Allotment is within a designated wilderness area or a wilderness study area. Approximately 10% is within Wheeler Peak Wilderness, and approximately 70% is within the Columbine-Hondo Wilderness Study Area (WSA). The portion of the allotment that is outside the WSA is located in the area of Middle Fork Lake and Bull of the Woods Meadow (see Map 1). The Columbine-Hondo Wilderness Study Area encompasses 43,276 acres and was classified as a WSA in the New Mexico Wilderness Act of 1980. The elements of wilderness character are defined at 36 CFR 293 and include opportunities for solitude, challenge, inspiration, and a primitive experience; and a natural ecological succession.

### Environmental Consequences

#### Mitigation for Alternatives B and C

- Permittee and their wranglers would use weed-free feed or pellets when bringing horse feed into the WSA.

#### Alternatives A-C

Alternative A, would have a small positive effect on the opportunity for solitude and inspiration since chance encounters with allotment riders and livestock would be eliminated. Alternatives B and C would have the potential for a small adverse effect to the opportunity for solitude and inspiration. None of the alternatives should have an effect on the opportunity for challenge or a primitive experience. All of the alternatives comply with the Wilderness Act of 1964 since livestock grazing predated the designation of the WSA and none of the alternatives include any new improvements such as fences, roads or trails or the use of mechanized equipment. With mitigation, Alternatives B and C, would be consistent with the forest plan.

### Wild and Scenic Rivers

Deer Creek, a tributary of Columbine Creek; Long Canyon Creek, a tributary of the Rio Hondo; and Middle Fork Creek and West Fork Creek, tributaries of the Red River are free-flowing and have outstandingly remarkable values of fish and wildlife, which makes them eligible for nomination as a Wild and Scenic River. Long Canyon and the Middle Fork of the Red River are also eligible for scenery and riparian values. In addition, the Middle Fork also has outstanding historic value for “The Big Ditch”. Since none of the alternatives would have an adverse effect to values contributing to the eligibility of free-flowing streams within the allotment, all of the alternatives comply with the Wild and Scenic Rivers Act of 1968, and are consistent with forest plan standards and guidelines.

### Recreation Opportunity Spectrum (ROS) and Visual Quality

The forest plan emphasizes providing a full spectrum of recreation opportunity. For management of recreation opportunity, the Forest Service uses a classification system called the Recreation Opportunity Spectrum (ROS). Recreation opportunity within the allotment is classified as Primitive (Forest Plan, Recreation, p.3). Since the WSA is managed as Wilderness, a high quality

recreational experience is a management objective. This includes offering a high opportunity for isolation from other people, independence, and closeness to nature (Forest Plan, Recreation-4).

The forest uses the Visual Management System to place relative values on scenery based on uniqueness of the scenery, levels of recreation use, public concern with scenic beauty and degree of visibility. These values determine the appropriate level of management objectives for visual quality (VQO's) (1973 USDA Forest Service). Scenery in Management Area 17 (Wilderness) has a VQO of "Preservation" (Forest Plan, MA 17 Wilderness-1) where only ecological changes are visually evident (1973 USDA Forest Service, Volume 2, p. 29).

## **Environmental Consequences**

### **All Alternatives**

Alternative C does include a spring development; however, the planned construction would be placed within the timber and would still meet the "Primitive" ROS class. Therefore, none of the alternatives would change the "Primitive" ROS class. All alternatives meet the Visual Quality Objective of "Preservation", where only natural processes are apparent in the landscape. All alternatives are consistent with the forest plan direction regarding ROS and VQO's

### **Recreational Opportunities**

Although there have been no reported conflicts between recreation users and livestock in the past several years, we are aware that some people's backcountry experience can be affected by seeing domestic livestock and their droppings, especially by users of Columbine-Twining National Recreation Trail, Wheeler Peak Trail, Bull-of-the-Woods Meadow, and in the high elevation meadows in upper Long Canyon (public contacts made in Cruces Basin Wilderness, 1995-1999). For some backcountry users seeing one head or any sign of livestock could adversely affect their recreation experience, while for others livestock in the Forest has cultural and/or historic meaning that enhances their visit. These diverse values are not judged to be good or bad, right or wrong.

There are several trails located within the allotment. Forest Trails (FT) 63 and 69 are part of the Columbine-Twining National Recreation Trail and cattle are driven onto the allotment on this trail. Grazing occurring in the small meadows located adjacent to the trail in the upper canyon. The upper 0.25 miles of the Long Canyon Trail (FT 63) traverses a steep hill slope. That segment is eroded by fall-line traffic by ungulates, and may be partially related to grazing.

During the summer, light dispersed camping occurs in the meadows in upper Long Canyon and there is heavier dispersed camping in the area of Middle Fork Lake and Bull-of-the-Woods meadow. Overnight use elsewhere is very light. Several commercial recreation providers operate within this allotment, providing guided llama and horseback overnight and day trips, and backpacking trips for the general public and youth groups. Users may encounter livestock operations on trails and in the parking lot, during entry and exit of cattle to and from the allotment. Current recreation use, in combination with livestock grazing, is resulting in greater than 40% utilization in a ½ acre meadow in upper Long Canyon near the headwaters and adjacent to FT 63.

All the values that make up wilderness character, trail conditions, scenery, and user conflicts contribute to the opportunity for a high quality experience. The effects on these values are filtered

by the perception of the user when the opportunity for a high quality recreation experience is considered, and therefore it is less direct. For some backcountry users seeing one head or any sign of livestock could adversely affect their recreation experience.

### **Environmental Consequences**

The opportunity for a high quality recreation experience could be indirectly affected by livestock grazing. All the values that make up wilderness character, trail conditions, scenery, and user conflicts contribute to the opportunity for a high quality experience. The effects on these values are filtered by the perception of the user when the opportunity for a high quality recreation experience is considered, and therefore it is less direct.

### **Mitigation Applied to Alternatives B and C**

- Since effects to the Columbine-Twining National Recreation Trail from livestock drives can be controlled with routine trail work, grazing permittees will be required to participate in maintaining the trails used to drive livestock onto the Allotment.

### **All Alternatives**

Alternative A, the no-grazing alternative, would eliminate any chance of user conflicts and effects to trails from livestock grazing, since livestock would be removed entirely from the allotment. Grazing would continue under Alternatives B and C and could have some level of impact on the recreation experience of users that are sensitive to seeing livestock or signs of livestock in the backcountry.

Of the grazing alternatives, Alternative C would have less impact on recreation users, since in Alternative C there is a greater potential for fewer cows. Adding stubble height requirements would lead to moving the cows sooner from the favored openings and ponds, thus reducing cow/recreation user encounters. In addition, the spring development near Gold Hill would help improve livestock distribution. Although Alternative C, has a lower potential for user conflict, the degree of conflict under either grazing alternative is expected to be light, based on the lack of complaints over the past ten years. Hiking trails are used to drive livestock onto the Allotment. These trails would be less affected in Alternative C, since there is a potential for fewer numbers of animals.



# 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

## **Local Government**

Village of Questa

## **Tribes**

Pueblo of Jemez

Jicarilla Apache Nation

Pueblo of Nambe

Pueblo of Picuris

Pueblo of Pojoaque

Pueblo of San Ildefonso

Pueblo of San Juan

Pueblo of Santa Clara

Pueblo of Taos

Pueblo of Tesuque

Pueblo of Zuni

The Hopi Tribe

The Navajo Nation

Southern Ute Tribe

Ute Mountain Ute Tribe

Comanche Tribe

## **Organizations**

Forest Guardians

Wildearth Guardians

Wild Watershed

Sierra Club Santa Fe Group

Forest Trust

Center for Biological Diversity

Northern NM Stockman's Association

Carson Forest Watch

Forest Conservation Council

New Mexico Cattle Grower's Association

Amigos Bravos

## **Businesses**

Taos Ski Valley

## **Individuals**

Leo Valencia

Al Johnson

Erminio Martinez

Buell Pattison

Elizardo or Lupe Archuleta

Dion Gonzales or Wanda Salazar



# Chapter 5 - References

- Allred, Kelly. W. 1997. *A Field Guide to the Grasses of New Mexico*. 2nd Edition. New Mexico State University. Las Cruces, New Mexico.
- Atencio, Ernest. 2001. *Of Land and Culture: Environmental Justice and Public Lands Ranching in Northern New Mexico*.
- Baker et al. 1988. Baker, R.D.; Maxwell, R.S.; Treat, V.H.; Dethloff, H.C. 1988. Timeless heritage: A history of the Forest Service in the Southwest. FS-409. Washington D.C.: U.S. Department of Agriculture, Forest Service. 208p.(Chapter 11. Grazing: Controlling Use to Maintain Productivity. Pp. 991-105).
- Barni, E., M. Freppaz and C. Sinscalco. 2007. Interactions between vegetation, roots, and soil stability in restored high-altitude ski runs in the Alps. *Artic, Antartic, and Alpine Reserarch*. 39(1):25-33.
- Bock, J. H., C. L. Jolls, and A. C. Lewis. 1995. The effects of grazing on alpine vegetation: A comparison of the Central Caucasus, Republic of Georgia, with the Colorado Rocky Mountains, U.S.A. *Artic and Alpine Research*. 27(2): 130-136.
- Braun, Clait E. 1971. Habitat requirements of Colorado White-tailed Ptarmigan. In: *Proceedings of Western Assoc. State Game and Fish Commissions* 51: 284-292. Colorado Division of Wildlife.
- Braun, Clait E. 1982. Letter written to J. F. Lehmkul, Wildlife Biologist for USDA Forest Service, R3, Albuquerque, NM. (Dated 02/18/1982). 2p.
- Braun, Clait E. 1979. White-tailed ptarmigan and sage grouse investigations, New Mexico. Memorandum to Jack R. Grieb, Director, Colorado Division of Wildlife. August 15, 1979
- Braun, C. E.; Hoffman, R. W.; Rogers, G. E. 1976. Wintering areas and winter ecology of white-tailed ptarmigan in Colorado. *Special Report No. 38*. State publication code W-R-S-38-76. Colorado Division of Wildlife.
- Brown, T. C. and D. Blinkley. 1994. Effect of management on water quality in North American Forests. *Gen. Tech. Rept. RM-248*. Fort Collins, CO.: USDA Forest Service, Rky Mtn. Forest & range Exp. Sta. 27p.
- Castelle, A. J., A. W. Johnson, and C. Conolly. 1994. Wetland and stream buffer size requirements – a review. *J. Environ. Qual.* 23:878-882.
- Catanach, M.H. and D. Weybright. 1995. Big game surveys: elk population trends, distribution and harvest information. Final Report, 1 April, 1989: NM W-093-R-37/Job 2/Segments 32-36. Santa Fe, NM: New Mexico Department of Game and Fish. 26 p.
- Chambers, J.C. 1995. Disturbance, Life history strategies, and seed fates in alpine herbfield communities. *Amer. J. of Botany* 82:421-433.
- Clary, Warren P., and Leininger, Wayne C. 1989. *Managing Grazing in Riparian Areas in the Intermountain Region*. General Technical Report INT-263.
- Clary, Warren P., and Leininger, Wayne C. 2000. Stubble height as a tool for management of riparian areas. In *Journal of Range Management* 53(6), November, 2000.
- Dick-Peddie, W. A. 1993. *New Mexico Vegetation, past, present, and future*. Univ. of NM. Press. 244p.

- deBuys, 1985. deBuys, William. 1985. Enchantment and Exploitation. Albuquerque, NM: University of New Mexico Press.
- Duff, Donald A., tech ed. 1996. Conservation assessment for inland cutthroat trout: distribution, status and habitat management implications. General Technical Report RM-GTR-256. Ogden, UT: US Department of Agriculture, Forest Service, Intermountain Region. 120 p.
- Dunn, W. C., and D. Weybright. 1995. Big game surveys: data analysis and interpretation. Final Report, 8 August, 1994: NM W-093-R-36/Job 17/Segment 36. Santa Fe, NM: New Mexico of Game and Fish. 20 p
- Eastman and Gray. 1987. Eastman, Clyde; Gray, James R. 1987. Community grazing: practice and potential in New Mexico. Albuquerque, NM: University of New Mexico Press.
- Edwards, M, G Miller, J Redders, R Stein, & K Dunstan, 1986. Terrestrial Ecosystems Survey of the Carson National Forest, USDA Forest Service, Southwest Region, Albuquerque, NM
- Emery, 1999. Emery, M.R. 1999. "Social Values of Specialty Forest Products to Rural Communities". In Proceedings of the North American Conference on Enterprise Development Through Agroforestry: Farming the Forest for Specialty Products, ed. Josiah, S St. Paul: University of Minnesota.
- Finch, D. M. 1992. Threatened, endangered, and vulnerable species of terrestrial vertebrates in the Rocky Mountain Region. Gen. Tech. Rep. RM-215. Fort Collins, Colo: USDA, Forest Service. Rocky Mtn. Forest and Range Exp. Sta. 38pp.
- Gary, H. L., S. R. Johnson, and S. L. Ponce. 1983. Cattle grazing impact on surface water quality in a Colorado front range stream. J. Soil and Water Conservation. 38:124-128.
- Hassell, M.J. 1972. "Hassell Report" – The People of Northern New Mexico and the National Forests. USDA Forest Service, Internal Report.
- Hoffman, R. W. 2006. White-tailed ptarmigan (*Lagopus leucura*): A Technical Conservation Assessment. USDA Forest Service Rky Mtn Region Species Conservation Project. Available: [www.fs.fed.us/r2/projects/scp/assessments/whitetailedptarmigan.pdf](http://www.fs.fed.us/r2/projects/scp/assessments/whitetailedptarmigan.pdf) 71p.
- Holechek, Jerry L. and Dee Galt. 2000. Grazing Intensity Guidelines.
- Hoover, R. L. and D. L. Wills, ed. 1987. Managing forested lands for wildlife. Colo. Div. of Wildl. in Cooperation with USDA Forest Service, Rocky Mountain Region, Denver, Colo. 459pp.
- Hubbard, J.P.. 1978. Revised check-list of the birds of New Mexico. New Mexico Ornithological Soc. Publ. No. 6. McLeod Printing Co., Albuquerque, NM. 110pp.
- Hughes, Lee. E. 1990. Twenty Years of Rest-Rotation Grazing on the Arizona Strip – An Observation. Rangelands, June, 1990.
- Hurd, Emerenciana. L., Shaw, Nancy L., Mastrogiuseppe, Joy, Smithman, Lynda C., Goodrich, Sherel. Field Guide to Intermountain Sedges. USDA Forest Service, Intermountain Research Station. General Technical Report RMRS-GTR-10.
- Kauffman, J. B. and W. C. Krueger. 1984. Livestock impacts on riparian ecosystems and streamside management implications...a review. J. Range Mgmt. 37:430-437.

- Kennedy, P. L. and D. W. Stahlecker. 1986. Prey base analysis by habitat site, Taos Resource Area, near Questa in Taos County, New Mexico, (Peregrine Falcon prey). US Dept. Int., Bureau of Land Mgmt. contract no. YA-551-CT4-340074. Eagle Environmental, Inc., Albuquerque, NM., Unpubl. Rep.
- Lang, Brian K. 2002. Status of aquatic mollusks of New Mexico. New Mexico Dept. of Game and Fish, Conservation Div., Santa Fe, NM. USDI, Fish and Wildlife Serv. Fed. Aid Grant E-20(5-9). 25p.
- Lang, Brian K. 1998. A macroinvertebrate (Mollusca and Crustacea) survey of Latir Lakes 1-3, Rio Costilla Park, Taos County, New Mexico. New Mexico Dept. of Game and Fish, Santa Fe, NM, Unpubl. 9p. Appendix.
- Ligon, J. S. 1961 New Mexico Birds and Where to Find Them. Univ. of New Mexico Press. In cooperation with NMDGF.
- Long, George. 2002. Evidence for White-tailed Ptarmigan presence in Latir Peaks Wilderness Area. Pers. Communication 06/26/2002 w/ G.Long of Questa Ranger District, Carson NF.
- Milchunas, D. G. 2006. Responses of plant communities to grazing in the Southwestern United States. Gen. Tech. Rep. RMRS-GTR-169. Fort Collins, CO: U.S. Dept. of Agric., Forest Service, Rky. Mtn> Research Sta. 126p.
- Mosley, J.C., P.S. Cook, A.J. Griffis, and J. O'Laughlin. 1999 (Internet Edition). Guidelines for Managing Cattle Grazing in Riparian Areas to Protect Water Quality: review of research and best management practices policy. Idaho Forest, Wildlife and Range Policy Analysis Group, Report No. 15. December, 1997. University of Idaho, online at: <http://www.cnrhome.uidaho.edu/default.aspx?pid=69352>
- National Geographic Society. 1987. Field guide to the birds of North America 2nd ed. 464p.
- NMED.SWQB. 2003-2005. TMDL's at: <http://www.nmenv.state.nm.us/swqb/303d-305b/2006-2008/2006-2008NMIntegrated303d-305bReport.pdf>
- New Mexico Department of Game and Fish. 1998. A macroinvertebrate (Mollusca and Crustacea) survey of Latir Lakes 1-3, Rio Costilla Park, Taos County, New Mexico. New Mexico Dept. of Game and Fish, Santa Fe, NM. Unpubl. 9p. Appendix.
- New Mexico Department of Game and Fish (NMDGF). 2004. BISON (Biota Information System of New Mexico): Biological database for New Mexico Version 1/2004 (040610 Northern goshawk). NMDGF in cooperation with USDI BLM, USDI FWS, USDI Bureau of Reclamation, US Army Corps of Engineers, USDA Forest Service and Univ. of New Mexico.
- New Mexico Department of Game and Fish. 2004. BISON (Biota Information System of New Mexico): Biological database for New Mexico Version 1/2004 (060140 Sangre De Cristo Peaclam). NMDGF in cooperation with USDI BLM, USDI FWS, USDI Bureau of Reclamation, US Army Corps of Engineers, USDA Forest Service and Univ. of New Mexico.
- New Mexico Department of Game and Fish. 2004. BISON (Biota Information System of New Mexico): Biological database for New Mexico Version 1/2004 (041530 White-tailed Ptarmigan). NMDGF in cooperation with USDI BLM, USDI FWS, USDI Bureau of

- Reclamation, US Army Corps of Engineers, USDA Forest Service and Univ. of New Mexico. [http://fwie.fw.vt.edu/states/nmex\\_main/species/041530.htm](http://fwie.fw.vt.edu/states/nmex_main/species/041530.htm)
- New Mexico Department of Game and Fish. 1988. Handbook of Species Endangered in New Mexico, B-334:1-2.
- New Mexico Department of Game and Fish. 2005. Long-range plan for the management of Rocky Mountain bighorn sheep in New Mexico, 2005-2014. New Mexico Dept. Game and Fish. Santa Fe, NM. 53p.
- New Mexico Department of Labor. 2005. Economic Research and Analysis.
- New Mexico Range Improvement Task Force. 2002. Rapid Assessment Method.
- New Mexico Water Quality Control Commission. 2000. Water Quality Standards for Interstate and Intrastate Streams. Effective Oct. 12, 2000. Santa Fe, NM. 45p.  
<http://www.nmenv.state.nm.us/swqb/Standards/index.html>
- Ohlander, Corky. 2001. T-Walk Stream Health Manual, USDA Forest Service Region 2
- Parsons, C.T., P.A. Momont, T. Delcurto, M. Mcinnis and M.L. Porath. 2003. Cattle Distribution patterns and vegetation use in mountain riparian areas. *J. Range Manage.* 56:334-343l.
- Paulson, Harold A. and Fred N. Ares. 1962. Trends in Carrying Capacity and Vegetation on Arid Southwestern Range. *Journal of Range Management*, 14: 78-83.
- Platts, W. S. 1979. Livestock grazing and riparian/stream ecosystems – an overview. Pages 39-45. in *Proceedings, Forum-Grazing and riparian/Stream Ecosystems*. O. B. Cope ed., Trout Unlimited.
- Raish, Carol. 1995. Historic land use and grazing patterns in northern New Mexico. U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Experiment Station. RM-GTR-272: 189-197p.
- Raish, Carol and Alice McSweeney. 2003. Economic, Social, and Cultural Aspects of Livestock Ranching on the Espanola and Canjilon Ranger Districts of the Santa Fe and Carson National Forests: A Pilot Study. USDA Forest Service, Rocky Mountain Research Station, General Technical Report RMRS-GTR-113
- Reynolds, R. T.; R. T. Graham; M. H. Reiser; and others. 1992. Management recommendations for the northern goshawk in the southwestern United States. Gen. Tech. Rep. RM-217. Fort Collins, CO: U.S. Dept. of Agric., For. Serv., Rocky Mtn. For. and Range Exp. Sta. 90p.
- Richardson, C. T. and C. K. Miller. 1997. Recommendations for protecting raptors for human disturbance: a review. *Wildlife Soc. Bull.* 25:634-638.
- Rinne, J. N. 1995. Rio Grande cutthroat trout. Pages 24-27 in M. K. Young, tech ed. Conservation assessment for inland cutthroat trout. Gen. Tech Rpt. RM-256. Fort Collins, CO. USDA Forest Service, Rky Mtn. Forest and Exp. Sta. 61p.
- Rominger, E. M. 2006. 2006 Summer alpine surveys. New Mexico Dept. of Game & Fish, Santa Fe, NM. 2p.

- Rominger, E.M. 2002. Evidence for White-tailed Ptarmigan presence in Latir Peaks Wilderness Area. Communication 06/26/2002 with G. Long of Questa Ranger District, Carson NF.
- Rosgen, D, and L Silvey. 1998. Field guide for Stream Classification. Wildland Hydrology Books. Pagosa Springs, Co.
- Ruyle, George and Phil Ogden. 1993. What is an A.U.M.? Range Management Specialists, School of Renewable Resources, College of Agriculture, University of Arizona, Tucson, Arizona.
- Scherrer, P. and C. M. Pickering. 2005. Recovery of alpine vegetation from grazing and drought: data from long-term photoquadrats in Kosciuszko National Park, Australia. Arctic, Antarctic, and Alpine Research. 37(4):574-584.
- Stephenson, G.R. and R.C. Rychert. 1982. Bottom sediment: a reservoir of *Escherichia coli* in rangeland streams. J. Range Manag. 35(1): 119-123.
- Stewart, K. M., T. Bowyer, J. G. Kie, N.J. Cimon, and B.K. Johnson. 2002. Temporal/spatial distributions of elk, mule deer and cattle: resource partitioning and competitive displacement. J. Mammology. 83:229-244.
- Taylor, D. W. 1987. Fresh-water mollusks from New Mexico and vicinity. Bull. #116. NM Bureau of Mines & Mineral Res., Socorro, NM. 51p
- Taylor, D. W., J.P. Hubbard, and J.W. Eley. 1985. Sangre de Cristo pea-clam (*Pisidium*, species undescribed). New Mex. Dept. Game and Fish, Handbook Spec. End. in New Mexico: MOLL/SP/PI/AA:1-2.
- Tiedemann, A. R., D. A. Higgins, T. M. Quigley, and H. R. Sanderson. 1989. Stream Chemistry Responses to Four Range Management Strategies in Eastern Oregon. Research Paper PNW-RP-413. Portland, OR: USDA Forest Service. Pacific NW Res. Sta. 9p.
- United States Census Bureau. 1997. 1997 US Census Data. Economics and Agriculture Census. Available via internet. Agriculture Census for Taos County, New Mexico, 1997.
- United States Congress. 1964. Public Law 88-577 (16.U.S.C. 1131-1136). National Wilderness Preservation System Act (Wilderness Act of 1964).
- United States Congress. 1968. Public Law 90-542, 82 Stat. 906, as amended; 16.U.S.C. 1271 (note), 1271-1287). Wild and Scenic Rivers Act.
- United States Congress. 1968. Public Law 90-543, 82 Stat. 919, as amended; 16.U.S.C. 1241 (note), 1241-1249). National Trails System Act.
- United States Congress. 1980. Public Law 96-550, 94 Stat. 3221, as amended; 16.U.S.C. 1132, Sec. 103.(a) (2). New Mexico Wilderness Act of 1980.
- USDA Forest Service. 1986. Carson National Forest Plan, as amended. United States Forest Service, Southwest Region. Albuquerque, New Mexico.
- USDA Forest Service. 2008. Deer Creek Allotment Quick Silver Investment Analysis. Lucy Aragon (including miscellaneous documentation of cost estimates). Carson National Forest. Unpublished. Taos, NM.

- USDA Forest Service. 1986. Final environmental impact statement, Carson National Forest Plan. Albuquerque, NM: US Department of Agriculture, Forest Service, Southwestern Region. 386 p.
- USDA Forest Service, Intermountain Region. 1988. General Aquatic Wildlife System (GAWS)
- USDA Forest Service. 2007. Management Indicator Species Assessment, Carson National Forest. Carson National Forest Supervisor's Office, Taos, New Mexico.  
[http://www.fs.fed.us/r3/carson/plans/%20assessment/2007\\_mis\\_assessment.shtml](http://www.fs.fed.us/r3/carson/plans/%20assessment/2007_mis_assessment.shtml).
- USDA Forest Service. 1997. Range Analysis and Management Handbook. USDA, Forest Service, Region Three, Albuquerque, New Mexico, USA. 101 pgs.
- USDA Forest Service. 1996. Record of Decision for Amendment of Forest Plans, Arizona and New Mexico. Forest Service, Region 3, Albuquerque, NM. 96p.
- USDA Forest Service. 2000. Region 3 Sensitive species list (Excel spreadsheet 07/21/1999 revised 02/23/2000). Forest Service, SW Region, Albuquerque, NM. .
- USDA Forest Service. 1973. National Forest Landscape Management, Volume 2. p.29.
- USDA Forest Service, Southwestern Region. 1979. National Recreation Trails, Columbine-Twining Trail 63, 64, 69 and 71.
- USDA Forest Service. 1990. Noxious Weed Management. Forest Service Manual, FSM 2080.
- USDA Forest Service, Southwestern Region. 1989. Riparian Area Survey and Evaluation System (RASES)
- USDA Forest Service, Southwestern Region. 1990. Soil and Water Conservation Practices, Forest Service Handbook, FSH 2509.22
- USDA Forest Service, Southwestern Region. 1990. Soil Management Handbook, Forest Service Handbook, FSH 2509.18.2
- USDA Forest Service. 1987. Terrestrial Ecosystem Survey of the Carson National Forest. United States Forest Service, Southwest Region. Albuquerque, New Mexico.522p.
- USDA Forest Service. 2001. Wild and Scenic River Eligibility Report, Carson National Forest Wild and Scenic Eligibility Report. Taos, New Mexico.
- USDA Natural Resource Conservation Service. 2007. New Mexico State Listed Noxious Weeds.  
<http://plants.usda.gov/java/noxious?rptType=State&statefips=35>.
- USDI Bureau of Land Management. 1994. Final Environment Impact Statement, Rangeland Reform '94. U.S. Department of Interior, Bureau of Land Management.
- USDI Bureau of Land Management. 2000. NM Standards for Public Land Health and Guidelines for Livestock Grazing Management, 2000.
- USDI Fish and Wildlife Service. Fishing Stocking New Mexico 1883-1969. Unpubl. Records of USFWS "Service Library" in Wash. D.C. Includes New Mexico Game & Fish Dept.records 1944-1969.

- USDI Fish and Wildlife Service. 2007. Listed and Sensitive Species in Taos County. Fish & Wildlife Service, Southwest Region Ecological Serv.  
[http://www.fws.gov/ifw2es/NewMexico/SBC\\_view.cfm?spcnty=Taos](http://www.fws.gov/ifw2es/NewMexico/SBC_view.cfm?spcnty=Taos)
- USDI, U.S. Fish and Wildlife Service. 1995. Mexican spotted owl recovery plan. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.
- Young, M.K., tech ed. 1995 Conservation assessment for inland cutthroat trout: distribution, status and habitat management implications. General Technical Report RM-GTR-256. Ogden, UT: US Department of Agriculture, Forest Service, Intermountain Region. 120 p.
- Willard, B. E., D. J. Cooper and B. C. Forbes. 2007. Natural regeneration of alpine tundra vegetation after human trampling: a 42 year data set from Rock Mountain National Park, Colorado, USA. *Arctic, Antarctic, and Alpine Research*. 39(1):177-183.



## Chapter 6 – List of Preparers

### ID Team Members:

Paula Cote	Interdisciplinary Team Leader
Lucy Aragon	Forest Natural Resource Coordinator (Social and Economics)
George Long	Questa District Wildlife Biologist (Wildlife)
Michael Casados	Questa District Range Staff (Rangeland Vegetation)
Alyssa Radcliff	Questa District Range Technician (Soils, Water, and Invasive Species)
Mary Ann Elder	East Zone Recreation Staff (Recreation, Wilderness, Wild and Scenic River, Visuals)
Carrie Leven	Questa Archaeologist