

Valles Caldera National Preserve

Environmental Assessment For the Interim Grazing Strategy

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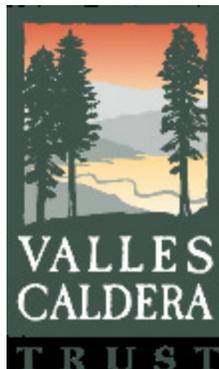
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Valles Caldera National Preserve

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Valles Caldera National Preserve
Interim Grazing Strategy Environmental Assessment

CHAPTER 1
Purpose and Need for Action

PROJECT SCOPE

This Environmental Assessment (EA) documents the analysis conducted for the Valles Caldera Trust proposal to begin an interim grazing program on the Valles Caldera National Preserve (VCNP) located in the center of the Jemez Mountains in north-central New Mexico. This analysis was conducted in accordance with the National Environmental Policy Act (NEPA) and the Council for Environmental Quality (CEQ) regulations.

PURPOSE AND NEED FOR ACTION

In Section 102A of The Valles Caldera Preserve Act (Public Law 106-248 July 25, 2000), Congress found that “1) the careful husbandry of the Baca ranch by its current owners, including selective timbering, livestock grazing and hunting, and the use of prescribed fire, have preserved a mix of healthy range and timber land with significant species diversity, thereby serving as a model for sustainable land development and use, 2) the Baca ranch can be protected for current and future generations by continued operation as a working ranch under a unique management regime..... to eventually become financially self-sustaining, 3) the unique nature of the Valles Caldera and the potential use of its resources with different resulting impacts warrants a management regime uniquely capable of developing an operational program for appropriate preservation and development of the land and resources of the Baca ranch in the interest of the public, and 4)) an experimental management regime should be provided by the establishment of a Trust capable of using new methods of public land management that may prove to be cost-effective and environmentally sensitive.” There is a need to assist area livestock operators by providing forage to supplement their normal ranch operations as well as to provide forage during times when limited due to drought, wildfire, or other management considerations (e.g. relief on home allotments) while providing for resource protection.

The Act states the VCNP should be a demonstration area for an experimental management regime adapted to this unique property which incorporates elements of public and private administration in order to promote long term financial sustainability consistent with the other purposes enumerated in this subsection, and to provide for sustained yield management of the Baca ranch for timber production and domestic livestock insofar as is consistent with the other purposes stated in Act.

Several assessments of range conditions since acquisition of the Preserve have found livestock grazing to be ecologically viable. The interagency National Riparian Service Team (NRST), Steve Leonard, BLM Range Conservationist, found sufficient forage exists to restore an economic level of livestock grazing if properly managed (April, 2002/See Analysis File). Given conservative stocking rates and a complete monitoring system in place, Kris Havstad (USDA, Agricultural Research Service, Jornada Experimental Range) found real opportunities to establish a well-managed and sustainable level of livestock grazing on the VCNP (Havstad; Jan, 2002/Analysis File).

PROPOSED ACTION

The Valles Caldera Trust specifically proposes to 1) on an interim (1-3 year) basis, graze between 0 to 2000 head of cattle in multiple herds in a multiple pasture grazing strategy between June 1 and September 30, and 2) conduct quantitative monitoring and research programs designed to assess the effects of grazing on the resources of the preserve, 3) construct six to ten elk-livestock exclosures for research and monitoring activities, to provide data to determine whether the grazing strategy is meeting the ecological objectives of the Preserve, and to provide a scientific basis for development of a comprehensive “Model” Grazing Strategy. The Trust proposes to provide short-term relief during period of during periods when forage availability is limited on adjacent range lands.

A interim grazing program is proposed for 1-3 years to re-establish grazing with modest stocking rates to determine and evaluate the logistics of running livestock on the VCNP, to determine whether existing range management facilities (fences, water developments, corrals, etc) are adequate, and to provide a scientific basis for development of a comprehensive long term “model” grazing program.

Livestock distribution would be managed by controlling access to salt and water sources, and herding by Range Riders. The timing and intensity of livestock grazing would be based on an assessment of forage conditions. Other than the livestock-elk exclosures no fences, water developments or corrals are proposed for construction. Reconstruction activities such as replacing fence posts or H-braces, relocation of alignments along existing fences or re-excavation of earthen stock tanks **are not proposed**. Existing fences and corrals will be maintained by replacing or tightening wire, altering wire height, adding “stays,” etc. Basically maintenance would keep these facilities in “cow proof” condition.

The Adaptive Management strategy would use data and information provided through monitoring, range readiness analysis, and research to adjust or modify livestock management and grazing strategies on a continuing basis (daily, monthly and yearly). In the simplest of terms; implement a project or action, monitor and research the implementation and effects, and then use that information to adjust or modify the project to reflect what has been learned.

DECISION TO BE MADE

The decisions to be made are whether or not to begin an interim grazing program while the Trust completes a comprehensive management program, where and how long livestock will graze, and how the herd would be managed on the Valles Caldera National Preserve. The decisions to be made include how many cattle, in what areas and to what level of forage use livestock would be assigned on the VCNP. The Executive Director of the Valles Caldera National Preserve will determine which alternative, if any, is best suited to implement an interim grazing program that addresses the key issues raised about this project. The Executive Director would also make decisions on whether or not to construct six to ten ungulate (elk-livestock) exclosures, how many to construct and what size and location. The Executive Director would also determine if the effects of the proposal warrant an Environmental Impact Statement.

VALLES CALDERA NATIONAL PRESERVE DIRECTION

Public Law 106 Section...establishes the overall management direction and guidelines. This proposed project would be implemented under the direction of the Act and the Valles Caldera Trust.

PUBLIC INVOLVEMENT AND SCOPING

Scoping is the process for determining the issues relating to the proposed action. The process includes distributing information about the project to the public through interdisciplinary meetings, public information sharing in the form of scoping letters, public Open House meetings, and through local newspapers.

The proposed VCNP Interim Grazing project was initiated in the fall of 2001. Internal scoping of the proposed actions within the Valles Caldera Trust, the Executive Director, the USDA Forest Service, and USDI Bureau of Land Management began informally in November and December of 2001. Further definition of the proposed actions and possible issues, and the selection of an Interdisciplinary Team began in January 2002.

Public involvement with this process included mailing two scoping letters to interested individuals and groups, New Mexico Department of Game and Fish, US Fish and Wildlife Service, Native American

Tribes, Pueblos and Nations in three states, State Representatives, State Congresspersons and Senators. The first mailing of letters requesting public comment involved over three hundred letters. The second letter had a mailing list of almost six hundred with an e-mail list of over 150 interested individuals, interest groups and, State and local news organizations.

Three Open House Public Meetings were held. The first meeting was held in Espanola on February 20, 2002, at the Centro Mission, the second at the Walatowa Visitor Center in the Pueblo of Jemez on February 21, 2002, and a third at the Sweeney Center in Santa Fe on March 28, 2002. Op-Ed articles, written by Gary Ziehe (Executive Director), were printed in the Albuquerque Journal and the Los Alamos Monitor.

Through this process, public input was used to further define the Key issues associated with the proposed actions identified during initial internal scoping.

AFFECTED ENVIRONMENT

PHYSIOGRAPHIC SETTING

The VCNP is composed of 89,000 acres located in the Valles Caldera and is located in the north central portion of New Mexico in the center of the Jemez Mountains. This mountain range lies between the Colorado Plateau, Southern Rocky Mountains, and the Basin and Range Geomorphic Provinces. The Valles Caldera is dominated by a dormant volcanic complex, which covers more than a thousand square miles. Features of the caldera include a rim of timbered mountains that enclose a series of open valles (valleys) separated by basalt and rhyolite domes that are generally forested (See Map A page 4). The largest of these is Redondo Peak on the southwest of the caldera that rises from 8,500 feet at the valley floor to 11,308 feet. The largest of the valles, the Valle Grande, is a depression more than 15 miles across at its widest and nearly 2000 feet below the surrounding terrain.

The caldera formed approximately 1.2 million years ago following an explosive pyroclastic eruption that emptied the magma chamber of the volcano resulting in its collapse, forming the caldera. The caldera is nearly a closed basin, rimmed by ridgelines and high mountain peaks forming a near concentric ring around the caldera. Subsequent dome building activity within the caldera created the five rhyolite domes in the northern 1/3 of the caldera. Unlike the rhyolite domes of the northern 1/3, Redondo Peak is a resurgent dome created by upwelling of magma forcing solid rhyolitic materials from the bottom of the caldera. The most recent volcanic activity involved the El Cajete eruption in the southwest portion of the caldera approximately 50,000 years ago. The geology is dominated by formations composed primarily of extrusive igneous materials of Bandelier tuff, Banco Bonito ash and rhyolite flows, Abiquiu tuff, and Lobato basalt. Minor influence of the Nacimiento Formation occurs in the most northwestern portion of the caldera.

The VCNP is dominated by forested hill and mountain landforms divided by vast valley plains (valles) and perennial streams. The majority of the VNCP is forested. Based on the Terrestrial Ecosystem Survey, of the approximately 88,561 acres of forested landscape, most is mixed conifer (53,609 acres), followed by pine (10,764 acres), and spruce-fir (8,203 acres). The remainder is composed of mountain meadows (wetlands/riparian ecosystems), mountain valley (upland grasslands) then sub-alpine grasslands (16,075 acres).

Locator Map A

Photo-Orthophotographic Image
[Maps not included in electronic version]

Table 1-1 Primary Plant Communities

Plant Community	Acres	Percent of Total
Grasslands/Meadows	16,075	18.1%
Ponderosa Pine	10,764	12.1%
Mixed Conifer	53,609	60.5%
Spruce-Fir	8,203	9.3%
TOTAL	88,651	100%

There are over 71 miles of perennial streams and many more of intermittent and ephemeral drainages across the VCNP. These are contained in two sub-watersheds; the East Fork Jemez River and San Antonio Creek.

Table 1-2 Capital Improvements

Improvements	
Buildings	51
Historic Cabins	16
Sheds	3
Geo-thermal Pads	34
Natural Gas Pipelines	1
Borrow Pits	9
Corrals	12
Stock Tanks (total)	143
Stock Tanks (disrepair)	12

The data presented in the above tables (Tables 1-1 and 1-2) are generated from Geographic Information Systems spatial and tabular data bases.

CURRENT CONDITIONS

The current conditions of any given resource (Grassland Ecosystems, Water Quality and Aquatic Habitats, Forested Ecosystems, etc) within the VCNP are the result of over one hundred years of, at times, intensive management and resource extraction. It is the intensity, duration and spatial extent of those management activities interacting with the soils, vegetation and climate established the existing conditions of today. The VCNP continues to have some of the most productive and resilient grasslands and forested communities in the southwest. Although the present condition of the plant communities (forest, grasslands and wetlands) as well as stream systems have been impacted by past management, they remain extremely diverse, productive and resilient today.

RANGE MANAGEMENT

In the late 1800's and early 1900's as many as 45,000 sheep occupied the ranch during the summer months. Sheep use all range resources (grasses, forbs and shrub species) and are capable of grazing steeper slopes and closer to the soil than other livestock. Grazing sheep with such intensity may have had a considerable effect on the conditions of browse and grassland resources of the VCNP and may have established the trends and conditions we see today. Bare soil may have been common which provides a very good seed bed for conifer establishment. The bare soil combined with fire suppression activities allowed for an expansion of forests into historic grasslands. Riparian and stream vegetation composition were likely degraded during this early grazing period. If the riparian areas supported

populations of willow and alder... they may have declined in composition during this time. Historical photography supports this hypothesis and suggests that riparian conditions have improved since the 1930's.

Grazing usually occurred from early May through October with little herd management. Forage use standards and ecological considerations were not applied. Stocking rates were based on economical considerations. Records monitoring implementation of the Conservation Plan by the NRCS* and discussion with previous ranch hands provide information on past stocking rates used by the Dunigans.

Reports documenting the earliest presence of livestock on the Valles Caldera date back to 1892. Sheep were first introduced with numbers approaching 45,000 prior to 1940's and were slowly replaced with cattle in the 1950's. Mixed herds of cattle and sheep were often run in the 1940s and 1950s; however, cattle herds have been run on the VCNP for the last 40 years. Cattle numbers were reported as high as 12,000 head at their peak. The last transfer of the land to the Dunigan's in the 1960's / 1970's began a period of more moderate livestock numbers. Attempts to place 8,000 cattle on the ranch were made, and were dropped back to 4,000 to 6,000 head of heifers and steers for most of the 1980's (Table 1-1, page 8). Stocking rates between 1992-1999 ranged from a low of 4960 (1996) to as many as 7200 (1995) head. The average number of steers run in the 1990s was 5964 (Randy McKee/Personnel comm.; July, 2002).

Table 1-3: Recent Stocking Rates

Year	Number Steers and/or Heifers	Estimated AUM's Stocked
1976*	3,500	9,800
1981*	4,000	11,200
1985*	6,000	16,800
1988*	5,600	15,680
1989*	5,230	14,650
1992	5870	16,436
1993	6404	17,931
1994	5510	15,428
1995	7200	20,160
1996	4960	13,888
1997	6734	18,855
1998	5282	14,789
1999	5749	16,097

Estimated AUM's stocked is a product of = number of steers/heifers X 0.7 (forage intake adjustment for animal size) X 4 months of grazing use (June to September).

One NRCS record (1987) mentions that the livestock capacity should be 4,500 yearlings plus or minus 800 (3,700 to 5,300 yearlings). Adjusting for livestock class (steers/heifers), at 0.7 AU per yearling and 4 month grazing period by livestock equates to 10,360 to 14,840 AUMs. In the 1980's the Natural Resources Conservation Service (NRCS) developed a Conservation Ranch Plan for the Dunigans. Ecological site descriptions were the basis for the range survey using soil mapping units from the Sandoval County Soil Survey (1983) to determine acreages by ecological site by pasture. Stocking capacities based on site productivity and range condition at the time of the inventory (1983) yielded 28,903 animal unit months (AUM's). An AUM is the amount of forage required to support one animal unit for 1 month. Generally, between 750 to 900 pounds of air-dry forage is required to support an animal unit month (AUM).

Water catchments were developed away lowland riparian areas on hill slopes to provide water for livestock in order to use forage resources on steeper mountain slopes, areas harvested for timber, and sub-alpine grasslands. However, it was difficult for the operator to “push” livestock into these areas and large numbers of livestock generally resided in the major valleys (valleys) grasslands and riparian areas throughout the grazing season. Most of these water developments were earthen stock tanks, which have not been maintained. As many as 12 of the 143 earthen stock tanks are known to have failed over the years and do not hold water today. Many more are silted in and have limited capacity for holding water.

Range Resource Current Conditions

Since the acquisition of the VCNP (July 2000), the Preserve has been absent of livestock. Elk have been the only grazing ungulate on the VCNP, with estimates by the New Mexico Department of Game and Fish of 2,500 elk. The forage base is found in lower elevation ecological sites of the Mountain Meadows and Mountain Valleys that primarily supply livestock forage as well. “Based on monitoring data and health assessments, these areas are ecologically functioning at reasonable levels (Havstad 2002/Analysis File).

There is a high probability, after 110 years of what at times was very high grazing pressure by various stocking densities of various classes of animals (sheep, cattle, and elk), that the ecological sites on the VCNP have had their capability to produce forage reduced. However, the soil and vegetation resources remain resilient and contain “all the pieces of the ecological puzzle.”

Vegetative Resources and Current Conditions

The non-forested communities of the Valles Caldera National Preserve are dominated by perennial, native bunch grasses. At lower elevations, in the valley basins, it has a wet meadow component. By contrast, the upper edges of the valleys are ringed with Ponderosa and mixed conifer forest. These forests are more extensive today than in times past. As a result, much of the forest margin is composed of young Ponderosa and mixed conifer stands encroaching into the historic grasslands. The principal disturbances affecting the non-forested communities are the lack of frequent fire and grazing by both elk and cattle.

The Valles Caldera National Preserve rangeland monitoring program, undertaken in the summer of 2001, recognized three separate range monitoring units or ecological sites. These range monitoring or ecological sites were nested within established NRCS Soil Survey and Ecological data. These are: Mountain Meadow (riparian-wetlands), Mountain Valley (upland grasslands), and Grazeable Woodland (sparsely forested). The units describe a gradient or range of conditions from the low, wet meadow rush and sedge dominated communities, through the expansive dry bunch grass valleys continuing up in elevation in to the grass and Ponderosa/mixed conifer forest margins.

Mountain Meadow Site

This site occurs in low basins and valleys, and below seeps and springs on mountainside slopes. Drainages associated with the site are not dissected or incised and run-off water is allowed to fan out. This results in high water tables with some surface water in the spring and summer. Slopes average less than 3 percent in basins and may range up to 15 to 20 percent when associated with seeps and springs on mountain side slopes. Elevation ranges from 8450 feet (2575 meters) to 8775 feet (2675 meters). Soils are moderately deep to very deep and are typified by the NRCS soil mapping unit 301 (Santarasa-Jarola complex).

Mountain meadow sites are dominated by non-grass graminoid species especially sedges and rushes. These are followed in prevalence by Kentucky bluegrass and Timothy (both non-native, naturalized

grasses). Other grasses include Tufted hairgrass, Pine Dropseed, Arizona Fescue, Wolftail, Rough Bent, Western wheatgrass, and Prairie junegrass. The forbs include Yarrow, Alsike clover, Woolly cinquefoil, Common dandelion, Beautiful daisy, and Heart-leaved buttercup. Very few shrubs are present on Mountain Meadow and Mountain Valley sites, with Shrubby cinquefoil being the only shrub sampled. No trees were sampled on the Mountain Meadow sites.

The **desired future conditions** for the Mountain Meadows is to have plant communities dominated by perennial native grasses, grass-like plants and forbs of both facultative and obligate species. Native willow species would be present where the potential may exist. Bare soil would be rare. Soil hydrology and the hydrologic regime would be free of the effects of roads, known sediment sources, and current forest densities. The soil ecology and nutrient cycling would be enhanced by a strong vigorous facultative and obligate wetland-riparian plant community that would provide very high levels of organic material provided by litter accumulations and deep dense rooting systems. Soils would support native plant communities at the full expression of their inherent fertility and productivity.

Mountain Valley Site

This site occurs on low hills and mountainside-slopes on all exposures. Slopes range from 0 to 10 percent. Elevation ranges from 8528 feet (2600 meters) to 9020 feet (2750 meters). As mentioned earlier, the soils are moderately deep to deep and typified by the NRCS soil mapping unit 302 (Tranquilar-Jaramillo complex) at the lower elevations and the 304 (Cosey-Hesperus association) at the higher elevations. The vegetation composition is associated with the soil characteristics with related but somewhat different species composition ratios.

In general, the Mountain Valley site are dominated by bunch grasses with Arizona fescue and Pine dropseed predominant at the NRCS 302 soil mapping unit sites, while Parry's oatgrass is more dominant at the 304 soil mapping unit sites. Other grasses include Kentucky bluegrass, Prairie junegrass, Mountain muhly, Rough bent, Fringed brome, and Tufted hairgrass. Forb composition is dominated by Beautiful daisy, Yarrow, Woolly cinquefoil, and Common dandelion. Other forb species include Pussytoes, and Alsike clover. Few shrubs are present: Shrubby cinquefoil being the only shrub sampled. Nor are there trees present on the Mountain Valley site. This site occupies elevated (upland) positions bordering the Grazeable. Non-native naturalized vegetation (e.g. Kentucky blue grass) is limited in composition (<14%).

The **desired future conditions** for the Mountain Valley is to have plant communities dominated by perennial native bunch grasses and forbs. Bare soil would be rare. Soil hydrology, ecology and nutrient cycling would be enhanced by a strong vigorous native bunch grass community that would provide very high levels of organic material provided by litter accumulations and deep dense rooting systems. Soils would support native plant communities at the full expression of their inherent fertility and productivity.

Grazeable Woodland Site

Approximately fifty-five percent of the VCNP is comprised of woodlands that have historically been utilized by wildlife and cattle. Much of this woodland is located deep within the interior forests physically separated from the Mountain Valley sites by long and deep forest margins. In order to maintain continuity and integrity of monitoring these woodland sites, the Grazeable Woodland sites are limited to those areas located above the upper margins of the Mountain Valley site. The Grazeable Woodland site occurs along the outer edges of the Mountain Valleys, and typically are south, west or east facing, with gentle to moderate slopes. It can be visualized as a transitional zone between the Mountain Valleys and true forested communities. The Grazeable Woodlands are the least uniform and

more heterogeneous of the three ecological sites. They are composed of Ponderosa pine, mixed conifer, spruce-fir and aspen stands of varying tree densities and canopy closure. All of which have a strong influence on the composition and productivity of the herbaceous understory.

Grazeable Woodland slopes range from 3 to 20 percent. Elevation ranges from 8774 feet (2675 meters) to 9350 feet (2850 meters). Soils are moderately deep to shallow, becoming rockier with increasing slope. This site is composed of the greatest number and variation of soil characteristics. The dominant Grazeable Woodland margin soil types are the NRCS 304 and 311 soil mapping unit(s).

The forest overstory in the Grazeable Woodland site is also variable, ranging in character from open savanna to closed canopy. There are also variations in composition and include the following types: relatively young even-aged Ponderosa encroachment stands (usually on the 311 soils), mixed old-growth Ponderosa with even-aged Ponderosa (logged stands), and a relatively open, mixed-age, mixed conifer type with Ponderosa, aspen and Douglas fir (also logged stands). Other trees found in association with this site include: White fir, Blue spruce, Engelmann spruce and Limber pine.

The understory of this unit tends to be dominated by Kentucky bluegrass, or by native bunch grasses, mostly Parry's oatgrass, Thurber's fescue, and Arizona fescue. Other grasses include Mountain muhly, Bottlebrush squirreltail, Pine dropseed, and Western wheatgrass. The forb component is dominated by Alsike clover, Common dandelion, Yarrow, Woolly cinquefoil, and Trailing fleabane. Common juniper dominates the shrub community at the higher elevations with a minor component of Wood's rose, Gambel's oak, and Gooseberry.

The **desired future conditions** for the Grazeable Woodlands on the lower 1/3 of mountain slopes and ridgelines, and south facing slopes would be returned to the forest structure, composition and density that once occurred during the historic high frequency, low severity wildfires. Understory composition would be dominated by bunchgrass communities. The variability in the understory composition would largely be controlled by the density of tree canopy. There would be a variety of stands of varying tree densities, age classes, and vegetative conditions across the landscape. Bare soil would be rare. Soils would support native plant communities at the full expression of their inherent fertility and productivity. Soil ecology and nutrient cycling would be returned to one that existed when organic matter was supplied primarily by grasses not conifer needles.

The following table displays the species composition for the three range sites described above. Note, the range sites are not dominated by non-native naturalized species or noxious weeds. Also of interest is the very low occurrence of bare soil.

Table 1-4: Ecological Site Data

Valles Caldera National Preserve Ecological Sites			
Structural Element	Mountain Meadow Composition / Cover	Mountain Valley Composition / Cover	Grazeable Woodland Composition / Cover
Total Grass Composition	39.52%	63.44%	49.81%
Total Forb Composition	26.43%	26.12%	18.58%
Moss and Lichen Composition	5.15%	4.78%	1.37%
Sedges and Rush Composition	28.87%	5.63%	8.52%
Shrub Composition	0.03%	0.02%	0.68%
Tree Composition	0.00%	0.00%	21.04%
TOTAL	100.00%	99.99%	100.00%
Bare Soil Cover / Exposed	0.67%	1.36%	0.79%
Surface Soil Cover	83.25%	81.38%	88.46%
Basal Plant Matter Cover	3.21%	9.31%	3.00%
Above Ground Litter Cover	90.33%	75.80%	88.58%
Canopy Height	18.80 cm	13.92 cm	17.28 cm
Non-Native Grass Composition	18.37%	9.79%	24.49%
Non-Native Forb Composition	7.34%	4.46%	6.61%
Total Non-Native Composition	25.71%	14.25%	31.10%
Dominant Plants > 5% Composition	CAXX, JUXX, POPR PHPR, ACLA, DECA BLTR	DAPA, BLTR, FEAR POPR, ERFO	POPR, PIPO, DAPA CAXX, FETH

Valles Caldera National Preserve, Rangeland Monitoring Baseline Report, January 11, 2002

TIMBER MANAGEMENT

Timber harvest began early with the first occupation of historic populations within the Jemez Mountains and the VCNP. Modest timber harvest in 1930's and later became more extensive and pervasive across the mountain landscape and within the VCNP. In the 1970's timber extraction and the associate road construction was accelerated on the VCNP. Hundreds of miles of roads were constructed for the extraction of forestry products from approximately 38,969 acres on the timbered domes, hills, mountains, and valley plains within the VCNP. The result was the conversion of mature forests to the young and early mature stands of today, and very high road densities (>10 miles/sq mile) when averaged across the entire VCNP. For example, the road density in the Jaramillo sub-drainage is approximately 14.4 miles/sq mile (Map B, page 13). This road network was poorly engineered and constructed, and has not been maintained. Most of the roads are native surface (not graveled) and are not properly drained. Road construction, timber harvest and "jammer yarding systems" that likely resulted in accelerated erosion and sediment transport off steep mountain slopes into stream systems. Roads act as extensions of the drainage system and over time have moved this sediment from the upland slopes and road surfaces into ephemeral, intermittent, and perennial streams.

The effect on the channel dynamics and aquatic habitat of the East Fork Jemez and San Antonio Creek is still evident today (See Hydrology and Water Quality). These streams system have very shallow gradients (near zero percent) and are described as "response" reaches (Montgomery and Buffington 1993) used here to imply that such a reach responds to the conditions above them in the watershed. Therefore the high road densities and sediment delivery to these stream systems during road construction and timber harvest, and from the existing conditions of the roads, still effect the aquatic habitat and channel stability.

GEOHERMAL INVESTIGATIONS

Geothermal investigations and drill pad development, in the 1970's created barren areas of highly mobile soils that are extremely difficult to re-vegetate and continue to produce sediment that affects water yield, water quality and aquatic habitat. An accurate assessment of the total acres of drill pad and other geothermal development has not been fully evaluated. Construction of the natural gas pipeline across the VCNP has caused increased sediment yields into San Antonio Creek. A test well in the upper San Antonio Creek produced artesian water flows that have increased water yield by several cfs (cubic feet per second).

HYDROLOGY, STREAM GEOMORPHOLOGY, AND WATER QUALITY

The East Fork of the Jemez River and the San Antonio Creek are east-west oriented stream systems originating within the VCNP on the eastern boundary. The East Fork originates between Pajarito Mountain and Cerro del Medio, and San Antonio Creek originates near Cerro Rubio (see Map C, page 16). The caldera forms a nearly closed basin and the stream systems exit through two locations. The San Antonio Creek leaves the caldera along the western boundary above the community of Thompson Ridge, changes to a more southern direction as it leaves the caldera and Preserve boundary, and ultimately forming the Jemez River with the East Fork Jemez River south of the community of La Cueva near Battleship Rock. The East Fork of the Jemez River exits the caldera near the Preserve entrance along the southern boundary. The East Fork subsequently changes flow to a southerly direction near the community of La Cueva, joining the San Antonio Creek and ultimately flowing into the Rio Grande River. Notable tributaries to the East Fork River include the Jaramillo and La Jara Creeks, and tributaries to the San Antonio Creek include the San Luis Creek, and the Rito de los Indios.

Road System Map B
[Maps not included in electronic version]

Nine miles of the 21-mile East Fork Jemez River are located within the Valles Caldera National Preserve. Due to the unique geology of the caldera the uppermost reaches of the stream (located within the Preserve) have a gradient close to zero percent (East Fork Jemez River Stream Inventory, SFNF 2002/Analysis File). Except for the headwater reaches and tributaries that occupy steep slopes, both the East Fork and San Antonio Creeks are largely shallow gradient streams as they flow through the very large broad valley plains landform for which the Valles Caldera is known. Streams as these in proper functioning condition are characterized as having high sinuosity (lots of meanders and bends), low width to depth ratios (narrow and deep), with predominately gravel substrates. The banks are generally heavily vegetated with a diversity of *Carex* and *Juncus* species, and numerous grasses and forbs. Along the shallow gradient streams within the VCNP, woody shrub species (willow and alder) are rare or absent along the East Fork Jemez and its tributaries as well as along the San Antonio Creek. The National Riparian Stream Team (October, 2001/Analysis File) found little or no potential habitat for willow species along these valle bottoms; however, there is anecdotal evidence that Bebb willow (*Salix bebbiana*) once occurred along La Jara (Willow) Creek and a few remnant clumps of old willow are found along steeper gradient reaches and cienegas (wet meadow) within the VCNP.

As mentioned previously, the majority of the lengths of both stream systems (the East Fork and San Antonio Creeks) within the VCNP are described as “response reaches” (Montgomery and Buffington, 1993). They essentially respond to the conditions of the channel and watershed above any given point along their length. “Source reaches” collect bedload sediments (transported material on stream bottom) and organic materials, while “transport reaches” largely transport sediments and water down-slope to response reaches in the stream system. There are also numerous intermittent and ephemeral channels throughout the caldera that contribute considerable seasonal flows during the spring snowmelt and during high intensity summer rainstorm events. The majority of the intermittent and ephemeral drainages are high gradient streams occupying steep mountain landforms that are source and transport reaches within forest ecosystems.

Existing Channel and Riparian Conditions

Intensive and extensive watershed assessments were performed during 2000 and 2001. Riparian condition was assessed in 2000 (McWilliams, 2002) through a coarse filter assessment method for properly functioning condition. These surveys established reference reaches that were later assessed by the Thalweg Watershed Area Link (T-Walk) methods and for benthic surveys to indicate water quality and highlight problems and concerns. The T-Walk assessment found some stream segments impaired.

A physical habitat survey of East Fork Jemez River was conducted by fisheries biologists in the summer of 2001 from the mouth to the headwaters (East Fork Jemez River Stream Inventory, SFNF 2002/Analysis File). Out of nine identified reaches (i.e., sections of the river classified according to changes in geomorphology or valley type), the uppermost two (reaches 7 and 8) are located within the preserve, as is a small portion of reach 6. The two reaches wholly within the preserve were classified as channel type E6 (Rosgen, 1996), a morphological stream type that is narrow and relatively deep, with a high sinuosity and low width:depth ratio characteristic of streams in high mountain meadows. When this stream type is disturbed beyond a “threshold” by changes in sediment supply, stream flow, or bank destabilization, the channel is susceptible to destabilization.

Existing channel conditions, along any one reach, reflects the conditions of the watershed and riparian area above that stream segment or reach. The majority of the San Antonio Creek is Functioning at Risk while large portions of the East Fork Jemez River are Functioning at Risk as well. Approximately 1.5 miles of the East Fork Jemez River (located within the Shipping Pasture) were found to be Non-Functioning. Portions of the East Fork Jemez River have shifted from a Rosgen F

type to a Rosgen C type as a result of bank destabilization and high sediment loads from a combination of previous management practices (East Fork Jemez River Stream Inventory, SFNF 2002). Grasses and other species normally found in upland positions (dry grasslands) have been found within the wetland areas, and are discussed in greater detail in the Vegetative Resources and Current Conditions section (page 16).

Watershed restoration reconnaissance conducted by hydrologists and soil scientists found that sediment loads were above normal bed loads causing structural and functional problems to the stream system. The current dominant source of sediments are from the road system due to the lack of drainage and water control structures, lack of surfacing material (gravel), poorly located and maintained roads, below grade roads, and poorly closed or abandoned roads (Watershed Restoration Reconnaissance August 2001, SFNF/Analysis File). Road densities on forested mountain slopes in the VCNP often exceed 10 miles per square mile of area. Direct connections of the road system to the stream system effectively increase the drainage density of the valleys and mountain slopes, allowing the roads to act as source areas for water and sediments. Over time the road system has transported sediments from upland slopes and road surfaces into the ephemeral, intermittent, and perennial drainages. The existing conditions of the riparian plant communities and channel conditions are due to historic grazing management, and existing high water yields and sediment load forces from timber harvest areas and roads.

Water Quality

Currently San Antonio Creek and the East Fork Jemez River do not meet State Water Quality Standards for their designated uses. Both the East Fork Jemez River and San Antonio Creek are designated for high quality cold-water fisheries. In New Mexico, the Surface Water Quality Bureau (SWQB) of the Environment Department is charged with regulatory responsibility. The SWQB reported water quality impairments to streams in the Valles Caldera and have listed both the East Fork and San Antonio Creek on the 305b report and the 303d list to the Environmental Protection Agency (EPA) for temperature, total suspended solids, fecal coliform, and stream bottom sediments (New Mexico Environment Department Surface Water Quality Division Water Pollution and Quality Report, 2000), and is continuing on a yearly basis.

Benthic invertebrate surveys were performed during 2000 (Jacobi, 2001/Analysis File) in the East Fork Jemez, San Antonio, Indian, and Jaramillo Creeks, and were used as indicators of water quality. The East Fork Jemez and San Antonio Creeks were rated using Jaramillo Creek as reference. The dominant organisms were primarily tolerant ones that can survive altered aquatic habitat. Based on these benthic invertebrate data Indian Creek (a reference reach for the VCNP) is not impaired. The Jaramillo and East Fork is moderately impaired and San Antonio Creek was slightly impaired (Steve McWilliams report, analysis file). Indian Creek is non-impaired.

Fisheries and Aquatic Habitat Current Conditions

The East Fork Jemez River Stream Inventory, SFNF 2002 (Analysis File) highlighted aquatic concerns in pool formation and excessive amounts of long riffles as well as altered width/depth ratios and stream types. The survey concluded that conditions of the East Fork Jemez River were outside the criterion for that channel type, indicating instability of the stream system. It appears that some F channel types are evolving toward C types as defined under the Rosgen classification system (Rosgen, 1996). The causes are due to excessive sediments being supplied, loss of undercut banks and straightening of channels. The National Riparian Stream Team (NRST: October, 2001/Analysis File) also found aquatic habitat deficiencies even though an E type should have less pools than other stream types. Coarse segments were limited, there were high levels of fine sediment, and width/depth ratios were outside normal channel conditions.

Map C-Stream System
[Maps not included in electronic version]

There is anecdotal evidence that the East Fork Jemez and San Antonio Creeks were populated by Native Rio Grande cutthroat trout (*Oncorhynchus clarki virginalis*). A 1892 report observed “mountain trout” within the caldera. This information predates the first stocking of non-native introduced species of fish in New Mexico in 1896. The Dunigan Family mentioned that they used to catch large brown trout. Currently there are populations of non-native rainbows and brown trout as well as associated species of fish reproducing in all the major perennial waters across the Preserve. Fish species currently inhabiting the streams of the VCNP include fathead minnows (*Pimephales promelas*), longnose dace (*Rhinichthys cataractae*), Rio Grande sucker (*Catostomus plebeius*), Rio Grande chub (*Gila Pandora*), brown trout (*Salmo trutta*), and rainbow trout (*Oncorhynchus mykiss*).

The current conditions of the aquatic habitat and channel conditions reflect past management practices on both the uplands and the riparian/stream areas (high road densities, jammer logging, intensive localized elk use, and previous sheep and cattle grazing practices). Pool habitat has been reduced due to filling by excess fine sediment and few relatively deep pools remain. Riffle habitat in this reach also exhibits excessive amounts of fine materials. In addition to aquatic habitat impacts, past use by livestock and current use of the area by elk and other wildlife are contributing to high fecal coliform levels. This also indicates nutrient input levels that are higher than normal which can impact fish habitat through decomposition of organic matter and excessive production of algae leading to high Biochemical Oxygen Demand (or BOD), with resulting low levels of oxygen in the stream at night or under cloudy conditions. See Map D (page 18) for areas and stream reaches thought by fisheries biologist to be sensitive to grazing activity.

A reach of the East Fork Jemez River starting at Jaramillo Creek and ends where water flowed subsurface on 5 September 2001 had a width:depth ration of 6, which is within the normal range of the Rosgen characterization of an E channel type, bank erosion was also noted in this reach, along with loss of undercut banks. Excessive fine sediments were noted in the riffle and glide-dominated habitat. Pool habitat was relatively rare (1.1% of the reach) with some relatively deep pools remaining (average depth 1.5 feet). Quality pool habitat exceeds depths of 3 feet. Several seeps and high quality springs were noted in this reach, with some of the seeps contributing warmer water (70°F) to the main stem (56°F at the time of the survey).

A reach of the East Fork Jemez River beginning near the entrance to Valle Grande and ending at the confluence with Jaramillo Creek was found to have streambank erosion, along with loss of undercut banks with a width:depth ratio of 14, which indicates a wider and shallower stream reach than would be found in a less disturbed system. Excessive fine sediment was noted within this reach. Monitoring by New Mexico Environmental Department in 2001 indicated that temperature, pH, fecal coliform and turbidity were exceeded on certain dates (NMED 2001 unpublished data). Pool habitat has been reduced due to filling of the streambed by excess fine sediment, with some relatively deep pools remaining. Riffle habitat in this reach also exhibits excessive amounts of fine materials. Spawning habitat throughout this reach, for trout, has been greatly reduced due to sedimentation.

Another East Fork Jemez reach was found to have riffle habitat dominating the reach, which included private and National Forest System lands. Excessive fine sediments were noted in this reach, along with loss of pool habitat due to aggradation of the streambed. Temperatures measured by thermograph within this reach (at the VCNP boundary) exceeded the forest standard for salmonid development 91 out of the 111 recorded days (Note: The state standards were exceeded 70 out of the 111 days recorded) (East Fork Jemez River Stream Inventory, SFNF 2002/Analysis File).

Aquatic Sensitive Areas Map
[Maps not included in electronic version]

SOIL RESOURCES

On the surrounding Santa Fe National Forest, soils were inventoried as ecological units in the Santa Fe National Forest Terrestrial Ecosystem Survey (SFNF TES, 1989). This survey considers soil genesis in an ecological context and combines the biotic (e.g. vegetation, animals) and abiotic (e.g. rocks, weather, atmosphere) aspects of soils using climate and vegetation to form an ecological unit. These ecological units were extended from the Santa Fe National Forest into the Valles Caldera National Preserve using professional judgment by the SFNF Soil Scientist Steve McWilliams, 2000. An initial map to depict the soil resource consistent with the surrounding survey was developed. Land management capability class, soil limitations and interpretations used in the TES were applied to the VCNP.

General limitations for soils found within the valles for grazing management facilities and practices include: severe limitations for embankments, excavations, and ponds (e.g. earthen stock tanks), and moderate susceptibility for frost heaving, which would effect the ability to develop, maintain, and repair stock tanks. Soils in the area are predominantly hydrologic soil group B with very high infiltration rates and slow runoff characteristics. The production potentials for riparian-wetland soils are upwards of 6000 pounds/acre near the streams and 3000 pounds/acre in the upland grassland positions (Santa Fe National Forest TES).

Soil formation processes are associated with factors such as vegetation, climate, and landform. Nutrient cycling pathways continue today as in the past when the soils formed. A notable exception would be grassland soils that are today dominated by forested ecosystems. In these cases, which exist primarily on the forested margin of grassland, a conversion from grasslands to forests has changed the quantity and quality of organic matter incorporated into soils and ultimately the soil nutrient pathways and soil ecology. The change in organic matter, light, and moisture has contributed to possible changes in soil micro flora and fauna from communities dominated by bacteria common to grasslands, to fungal dominated communities commonly associated with forest soils. Soils develop over time through pedogenic processes. This development produces the concept of a pedon, a natural three-dimensional body having similar properties. Through the comparison of like and unlike observable attributes, soils can be classified and a taxonomic system applied. Interpretations such as productivity, erodability, and suitability are derived from the classification and soil morphology.

Mountain Soils

Generally the soils of the mountains and domes have developed in place or from transported material from up slope. They vary in depth from very shallow (<25 inches) near rock outcrops to very deep (>36 inches). They generally have a dark surface covering of duff (needles, grass, and/or leaves) one to four inches thick. The mineral soil surface is a dark loam to a sandy-loam with considerable coarse fragments (rocks) of cobble to boulder size. The sub soil shows some development and is usually finer in texture, contains greater amounts of coarse fragments and is lighter in color than the surface. The substratum generally contains high amounts of igneous parent materials that have been slightly weathered. These soils support healthy productive forested ecosystems composed of Ponderosa pine at lower elevations, mixed conifer at mid elevations, and spruce-fir forests at the higher elevations. Forest soils (Grazeable Woodlands) support a variety of forested ecosystems (from Ponderosa pine to high elevation mixed conifer and spruce-fir forest), and are as productive today as in the past except for those areas that are now roads

Grassland/Wetland Soils

The soils on the valles have developed in place mainly from alluvium (water transported materials). They occupy the lower 1/3 of hill slope and valley landforms. Both Mountain Meadow and Mountain

Valley soils have a litter cover one to two inches thick from grasses and grass like plants. The mineral soil is deep to very deep with a dark loam to sandy-loam surface many inches thick. The sub soil is also dark with accumulations of clays, fine fractions, and organic material. The substratum varies depending on the distance from the stream courses to the surrounding domes and mountains. Coarse fragments vary in amount and size from gravels to boulders. Mountain Valley soils support very productive bunchgrass communities.

Riparian-wetland (Mountain Meadow) soils formed under the influence of anaerobic conditions near the streams and low lying valley positions. Their development under saturated conditions is evidenced by mottles and gleying within the soil matrix. These soils support healthy very productive riparian-wetland communities of facultative and obligate communities of grass and grass-like plants.

Current Soil Conditions

The soils throughout the VCNP, either forested or in grasslands are very productive and in satisfactory condition. Soil erosion (sheet, gully and rill erosion) is rare and where found is associated with historic road construction and un-surfaced (no gravel) road alignments, borrow pits, and geothermal drill pads. For example, **current** soil loss rates for mountain valley and meadow soils are approximately 0.2 tons/acre/year compared to natural soil loss rates of 0.1 tons/acre/year. The **tolerable** soils loss rate (the rate at which soil loss affects site productivity) is estimated at 4.1 tons/acre/year. The **potential** soil loss (the rate at which all vegetation is removed) exceeds 20/tons/acre/years (Santa Fe National Forest Terrestrial Ecosystem Survey (SFNF TES, 1991).

The National Riparian Service Team (NRST) found in some areas reduced effective ground cover has resulted in “drying” of the site through increased runoff due to reduced infiltrations and lack of vegetation litter, and has resulted in reduced productivity. Currently, grassland and wetland soils, although in satisfactory condition and lacking accelerated erosion, are producing below their natural capability. Two years without livestock grazing has not measurably changed this status and the current elk use is retarding the recovery. This is exemplified with a “duration in place” symptom where the same plants are grazed several times during the season which may explain the small localized areas of degraded wetland communities. The NRST found the transportation systems (roads) to be a significant contributor of sediment, and were concerned with vegetation changes such as encroachment of conifers into grasslands.

Concerns found by the National Riparian Service Team include:

Upland forest:

- Dense and decadent stands of multi- aged conifer
- Expanding acreage of Ponderosa pine
- Invasion of Ponderosa pine and mixed conifer into historical montane grasslands
- Rapid conversion of historic quaking aspen lands to conifer dominated acreage
- Reduction in available water ranging from .2 to .5 acre-feet per acre

Riparian Areas:

- Hydric (wetland and hydrophytic vegetation) component of the caldera has decreased
- Dry meadow, non-riparian plants, and conifer now occupy historic riparian and lack of mulch (litter)
- Current elk use retards recovery of soil and vegetation conditions
- Road conditions are presently slowing or reversing the improving riparian health trend in some areas

Transportation system:

- Inadequate surface drainage

- Ditch and lead-out ditch problems
- Stream channel impacts and increased drainage density
- Road and stream crossings

Grazing:

- Starting conservative stocking rates from traditional levels with change in livestock management to a low stress handling methods with a rotating system of pastures

Desired Future Conditions for Water Quality and Aquatic Habitat

The desired future conditions for the water quality and aquatic habitat are 1) to return the hydrologic regime to that which existed prior to extensive livestock grazing, road building and timber harvest, 2) to have the water quality of the East Fork Jemez River and the San Antonio Creek meet State water quality parameters, and 3) to have the East Fork Jemez River and the San Antonio Creek, and their perennial tributaries, support robust, healthy native fish populations.

The desired conditions for channel geometry are to have Rosgen E channels with deep narrow cross sections, very high sinuosity, accessible flood plains and interflow hydrology, well vegetated stable stream banks, and effective native perennial obligate and facultative riparian-wetland vegetation. It was found that the East Fork Jemez River and the San Antonio Creek in meadow reaches do not provide suitable habitat for willow and other shrub species; however, the desired future condition would be to manage these systems in a manner that would provide for willow reestablishment should unrecognized potential exist.

Areas of accelerated erosion and sediment sources from borrow pits and poorly engineered roads, and unstable stream banks would be rare. Borrow pits and drill pads would be re-vegetated or mitigated. Poorly engineered roads would be reconstructed to reduce sediment generation and transport. Road densities on steep mountain landforms would be reduced to just a few miles per square mile.

WILDLIFE MANAGEMENT/CURRENT CONDITIONS

The current elk herd were introduced into the Jemez Mountains, near the VCNP, in 1948 and in 1964-65. Since then the herd numbers have grown to several thousand in the Jemez landscape, many of which use the VCNP as summer range and during mild winters. The VCNP is an important elk breeding area in the Jemez Mountains, and is home to as many as 4000 head of elk during the summer months. In the winter of 2001-2002 below normal snowfall allowed the elk herds to remain on the VCNP throughout the winter. Aerial surveys were performed during the winter of 2001-2002 to determine the size of elk herds on the VCNP and found approximately 3300 head (NM Game and Fish Dept, 2002). Below normal snowfall generally occurs every 7-10 years; however, these conditions have been more common since 1996.

Elk Habitat

New Mexico Unit 6 contains the Jemez Mountains of north-central New Mexico. The VCNP is situated at the top of the Jemez Mountains and serves as summer range for a large portion of the elk herd in the Jemez Mountains. The Santa Fe National Forest (SFNF), Bandelier National Monument (BNM), Tribal lands (Pueblos of Jemez, Zia, Cochiti, San Ildefonso, and Santa Clara), and private land surrounding the Jemez Mountains at lower elevations serve primarily as winter range. Some elk do not follow the typical migration pattern, being “resident” elk that drift seasonally within their home range. During mild winters, a relatively small number of elk make the normal migration to lower elevations, choosing to stay within or near their summer range. For example, a large portion of the elk herd remained on the VCNP throughout the winter due to below normal snow accumulations. It was

estimated that 3300 head of elk remained on the VCNP throughout the winter of 2001/2002 (New Mexico Department Game & Fish). Current estimates of the herd size in Unit 6 a, b and c (Jemez Mountains) is approximately 4500 head.

Elk will use almost all habitat types (forested and non-forested) found throughout the Jemez Mountains. High elevation mountain grasslands, grazeable woodlands, and shrub fields provide much of the forage base for elk during the summer months, while low elevation arid and semi-arid grasslands, pinon/juniper woodlands and low elevation shrub fields provide much of the winter habitat. Elk typically favor grasses and forbs during the growing season and switch to browse during the winter and early spring while grass/forb forage is limited and low in protein. During dormancy, shrubs retain higher levels of protein than dormant grasses and are a very important source of nutrients during the winter. Typically, elk will favor grasses and forbs during the summer and use browse provided by shrubs during the winter months or during calving season. Remote grassland valleys, swales and sub-alpine grassland are important elk calving areas. The upper portion of the Valle Jaramillo, for example, is an important calving area, among others. Elk will use dense stand of conifers and aspen for thermal and/or hiding cover. Currently neither forage, browse, or thermal/hiding cover is a limiting factor within the Jemez Mountains.

Elk Management and Habitat Concerns:

1. Elk are relatively common and move throughout the Jemez Mountains between lands that are managed under contrasting missions/mandates.
2. Some people have questioned how well elk fit in the natural history of the Jemez Mountains.
3. Elk have an economic and aesthetic value associated with hunting, guiding/outfitting and viewing (note that much of the monetary value of the Valles Caldera National Preserve was associated with the area's elk population).
4. Elk can impact agriculture and other human uses/occupancy (e.g., vehicle collisions, impacts to residential areas).
5. Elk have ecological affects on vegetation (e.g., browsing of woody species such as aspen).
6. Elk have cultural value to Native Americans and conservationists (note that local Native Americans typically value mule deer more than elk).
7. Elk are a public resource and occur primarily on public lands in the Jemez Mountains. Broad public interest and social values complicate elk management.
8. And, other philosophies, values, or thoughts related to elk and/or habitat management.

Jemez Mountains Seeking Common Ground (SCG) committee (refer to Appendix A).

Habitat Conditions

The Jemez Mountains Seeking Common Ground (SCG) Committee concluded that social carrying capacity is generally lower than ecological carrying capacity. Past elk management decisions have fluctuated widely from year-to-year primarily due to social/political issues. In fact, the Jemez Mountains SCG project was initiated to address elk-related social/political issues. Evaluations of browse species throughout the VCNP conducted in the summer of 2001 found that browse use was heavy, with as much as 100% of the current years growth being browsed (Krantz et al. 2001). Favored browse plants include but are not limited to aspen, Gambels oak, New Mexico locust, Ocean Spray, and Shrubby cinquefoil.

The following issues or events influenced decisions on the “social/political” carrying capacity of elk:

- In 1997-98 the New Mexico State Game Commission decided to reduce elk numbers in the Jemez Mountains, mostly due to complaints from private landowners that elk were damaging crops and fences. Landowners also desired landowner permits that could be sold for profit.

- A relatively small number of elk occasionally occurred in Los Alamos and White Rock, foraging in resident's gardens or lawns.
- A request from then Congressman Richardson for the SFNF, BNM, and NMDG&F to complete a report on elk management issues in the Jemez Mountains. This report summarized public opinions/perceptions and recommended the establishment of the East Jemez Mountains Interagency Council and a collaborative elk management program.
- Concerns about elk use/impacts on BLM.
- Concerns from conservation and environmental groups about elk management.

In 2000, the NM Game Commission established an objective of approximately 4,500 elk. This number can be considered the current social/political carrying capacity. The Commission's decision was based on the information above as well as recommendations from the NMDG&F, public opinion, political influence, and agency/landowner involvement.

Desired Future Conditions of Elk-Livestock Interactions

Livestock is managed in a manner that provides large areas and enough forage and browse to support elk herds that seasonally occupy the boundaries of the VCNP. Livestock-elk conflicts would be negated by providing large areas vacant of livestock, including large and small valle systems, grazeable woodlands, steep sub-alpine grassland and shrub fields (browse communities) across the Jemez landscape. Shrub fields and aspen stands would be managed for young available browse and in quantities that existed when high frequency low severity fires burned in Ponderosa pine and mixed conifer habitats.

Mule Deer Habitat

Although mule deer are known to occupy the VCNP and other high elevation habitats within the Jemez Mountains, they typically require a large portion (one third) of their diet as browse provided by relatively young or shrub fields low in stature, often at lower elevations. Mule deer sightings on the VCNP are relatively rare. Oak fields, etc are not common on the VCNP and are provided in much greater abundance on other landforms within the Jemez Mountains. Low elevation habitats are considerably more important for mule deer than for elk. During summer months deer will often remain in low elevation areas due to their dietary needs.

The mule deer population across the Jemez Mountain landscape has declined considerably since the 1960's. It is recognized that a combination of over hunting, declining habitat (lack of young shrub fields), and disease reduced their populations considerably. In the years since, New Mexico Department of Game and Fish has instituted sharp declines in the areas deer can be hunted and reduced the number of mule deer permits. Control of wildfires over the last 100 years has considerably reduced the critical browse habitat for both elk and deer populations. Although elk require browse during the winter and early spring while grasses remain dormant, mule deer require browse throughout the year.

Proposed Threatened and Endangered Species

Six federally listed threatened and endangered, one proposed threatened, one candidate, twenty seven species of concern, and fourteen State of New Mexico threatened and endangered species are known or potentially could occur on lands within Sandoval County (USDI, FWS 2001; NMDG&F 1998; Sivinski and Lightfoot 1995). However, because of the specific habitats used by these species, they may occur within the broad borders of Sandoval County but not occur within the Valles Caldera.

The following serves only as an example of the general vegetative/habitat communities and the potential listed, proposed and species of concern that might use the Valles Caldera National Preserve.

Many of the more mobile species (birds, bats) may use several different communities throughout the year.

Shrub-grassland communities: The species of the shrub-grasslands include the bald eagle, Western burrowing owl, ferruginous hawk, loggerhead shrike, peregrine falcon, and New Mexico meadow jumping mouse. In addition, many species of bats use the shrub-grasslands as foraging areas.

Riparian/wetland communities: The species of this habitat include the bald eagle and peregrine falcon. In addition, many species of bats use the riparian/wetlands as foraging areas.

Forests: Sensitive species known or potentially found in ponderosa pine, mixed conifer, and spruce-fir forests include the Northern goshawk, Mexican spotted owl, Jemez Mountains salamander, American marten, and wood lily. In addition, many species of bats use the Ponderosa pine/mixed conifer community as foraging areas.

Special feature habitats: In addition to the three broad vegetative communities, numerous unique habitats (e.g., springs, caves, cliffs) exist within the area. These types of special habitats are generally confined to small areas and are scattered throughout the three broad vegetative communities. Bat species would use these areas throughout the Valles Caldera.

Desired Future Conditions for TES Species

The desired future conditions for Threatened, Endangered and Sensitive species is to have viable populations of TES species across the VCNP within their natural range of occurrence that was present prior to fire suppression, heavy livestock grazing, and timber harvest. Where the potential exists, their habitats would be represented spatially and temporally across the VCNP and Jemez Mountain landscape.

HERITAGE RESOURCES/Existing Conditions

Our understanding of the heritage resources on the VCNP is limited by the small amount of archaeological survey undertaken on this large and unique property. In total, approximately 3600 acres of archaeological survey have been reported within the Preserve; adding in surveys completed but not yet fully reported, the total surveyed acreage is just over 4000 acres. Survey coverage thus includes about 4.5% of the total landholding. With 1525 acres surveyed within or adjacent to the approximately 18,150 acres of the proposed grazing initiative, approximately 8% of the proposed project area has been surveyed.

Previous Archaeological Survey

Prior to federal acquisition of the Preserve in 2000, only four archaeological inventories had been undertaken on the Baca ranch. These included surveys for geothermal development, transmission line corridors, access roads, and an electric line corridor alongside Highway 4. Archaeological fieldwork for the geothermal and transmission line projects also included some test excavations.

The earliest work, in the 1970s and 1980s, was associated with geothermal development funded, in part, by the DOE and included two surveys conducted by the University of New Mexico's Office of Contract Archaeology. The first is summarized in Baker and Winter (1981) and included survey and testing of sites in a broad ~2000 acre area within the Redondo Creek / Redondo Border / Redondo Meadows area in the southwest quadrant of the caldera. The second survey (Eck 1980) was for a proposed (but never implemented) transmission line corridor that ran from the geothermal development area across the north-central portion of the caldera from west to east. The third project

included survey and testing associated with the Ojo Line Extension (OLE) project conducted between 1985 and 1990 (see Acklen et al. 1997 for summary). OLE surveys within the VCNP included a proposed transmission line corridor and several miles of proposed access roads on the eastern half of the Preserve. The fourth survey was conducted by the SFNF along a short stretch of Highway 4 (Elliott 1989).

Since federal acquisition of the Preserve in 2000, the Jemez District of the SFNF has conducted survey along approximately 65 miles of primary Preserve roads as part of the Valles Caldera Archaeology Program. Also, a PNM pipeline corridor was surveyed in 2001 by TRC Mariah Associates, a private archaeological consulting firm (Acklen et al. 2001). This pipeline route runs through the large grasslands on the north side of the caldera that includes the Valle San Antonio and Valle Toledo.

Several factors influence the character of the information derived from previous archaeological field investigations. First, all of these surveys are linear transects (i.e. roads, transmission lines, or pipeline corridors). Linear surveys decrease the extensiveness and probable representativeness of coverage, but maximize the likelihood of encountering sites, especially large sites. The locations of these surveys (around the base of mountains, through saddles and passes, and within likely historic and prehistoric transportation routes) enhance the rate of encountering sites by concentrating in high-probability areas but create a bias of documentation towards particular kinds of sites. Second, the projects were conducted during different periods by various investigators, which can sometimes produce results that are not comparable. However, in the case of these specific projects, there is considerable overlap among the investigators used (e.g. most of the work has been conducted either by UNM-OCA or by TRC) and, in most cases, the quality of field methods and reporting is quite high, even in the case of those investigations conducted prior to 1985 (i.e. Baker and Winter 1981).

While the knowledge gained from these few projects does not adequately summarize the archaeological record on the Preserve, it allows a reasonably accurate estimate of the *kinds* of sites within the project area.

Prehistoric and Historic Sites in the Preserve

Prehistoric sites

The kinds of prehistoric archaeological sites known to exist within the Preserve are dominated by large obsidian quarry sites and lithic artifact scatters of various sizes. Of the 130 sites recorded within the Preserve, 104 (80%) are lithic scatters or quarries. As can be expected, the documented quarry sites are associated with primary obsidian sources (i.e. *in situ* obsidian-bearing geological deposits). All of the known obsidian source areas in the Preserve are located within the proposed project area.

The most notable primary obsidian source area in the Preserve is at Cerro del Medio, a large Rhyolite dome on the east side of the caldera between Valle Grande and Valle Toledo. To date, the roads that encircle the entire base of this dome have been surveyed, indicating the presence of extensive quarries, some up to 2 km in length. The quarries appear to concentrate on the south, west, and north sides of the dome. There are fewer and smaller sites on the east side of Cerro del Medio (i.e. in the headwaters of the East Fork of the Jemez River in Rincon de los Soldados) where it appears that naturally occurring obsidian is less abundant and of poorer quality. The area proposed for cattle grazing includes several of the large Cerro del Medio quarry sites that are located on the south side of the dome along the northeast edge of Valle Grande. However, as many more of the Cerro del Medio quarries are located outside of the project area.

The other obsidian source deposits within the Preserve (at Rabbit Mountain, at Cerro Toledo, and in secondary stream deposits in Valle San Antonio) are not known to have large quarry sites. Certainly

there are no known quarries within the proposed project area except those associated with Cerro del Medio.

In addition to obsidian quarry sites there are numerous other lithic scatters of various sizes. Some large sites located close to Cerro del Medio appear to be habitation sites rather than simply lithic resource procurement and reduction assemblages; a few pieces of groundstone have been found at these sites. These large non-quarry lithic sites are found especially in the Valle Toledo, the Valle de los Posos, and along the main transportation route from the Valle Grande to the Valle San Antonio (i.e. from Jaramillo Creek at Cerro Pinon north to Valle Santa Rosa). The interpretation of multi-function and/or habitation also may be applicable to some of the quarry deposits on the south side of Cerro del Medio, where chert artifacts are surprisingly abundant. Not all of the lithic scatters are as dense or extensive as those discussed thus far. There are many lithic scatters of small to moderate size recorded in the Preserve, including nearly all of the lithic sites outside the proposed project area. Within the proposed grazing areas, smaller lithic scatters are common in Valle San Antonio, on the higher slopes above Valle Toledo, south and east of Valle de los Posos, and in the south half of the Valle Grande.

Other kinds of prehistoric sites recorded within the Preserve include eleven fieldhouses and eight rockshelters. There are no pueblos and no pithouse sites known within the Preserve. The eleven documented fieldhouse sites all occur in the Banco Bonito area in the southwestern quadrant of the Valles Caldera. No fieldhouse sites are known in the proposed project area. Documented rockshelters also are more common outside the proposed project area, but there are two known shelter sites in or adjacent to areas proposed for grazing.

Historic sites

Known historic sites on the Preserve are mostly related to logging activities undertaken on the Baca Ranch during the first half of the 20th century. There are twelve historic sites documented on the Preserve. These include mill features, isolated log cabins, trash scatters and dumps, and one logging town site that includes the remains of 24 log cabins. One site, a set of masonry culverts, is associated with transportation. However, as with prehistoric sites, we know that the actual number and distribution of historic resources is greater than those documented. For example, several of the buildings in the headquarters area probably were built between 1900 and 1920, and some of the roads likely date to the 19th century. None of the recorded or known historic sites are in the areas proposed for grazing. There are no historic cabins, corrals, or other features with standing walls within the proposed project area.

Desired Future Conditions for Heritage Resources

The desired future conditions for Heritage Resources is to have a complete survey and knowledge of the total assemblage of historic and prehistoric occupations of the Valle Caldera landform, including the temporal and spatial relationships involved with occupation and other land uses.

KEY ISSUES

Initially issues were identified by internal Interdisciplinary Team (IDT) Meetings. Issues were further developed through internal and external scoping of the proposed actions with Wildlife Biologists, Threaten and Endangered Species Specialists, Range Management Specialists, Archaeologists, Recreation and Land specialists, Fisheries Biologists, Hydrologists, and Soil Scientists, and the Public. We consulted with New Mexico Department of Game and Fish Habitat Specialists, and local representatives of Pueblos, Nations, and Tribes. Numerous responses during public meetings, phone calls and written letters and e-mails were received. The IDTeam in coordination with the Executive Director and Preserve Manager considered all the issues expressed pertaining to the scope of the

proposed actions and determined which are key to the project. Key issues are defined by the scope of the proposed actions. Only issues related to the proposed actions and scope of those actions were considered as an issue.

Key Issues drive the development of the alternatives and provide criteria for measuring each alternative. Other issues are either insufficient to drive alternative development, are beyond the scope of this project or the effects are mitigated through actions that limit the environmental effect.

Key Issues:

1. Water Quality and Aquatic Habitat

The physical effects of grazing (trampling, removal of biomass, etc.) on the grassland and riparian communities of the Valle Grande and Valle San Antonio could cause surface runoff and transport of sediment and manure, which could adversely affect the water quality, channel stability, and aquatic habitat of East Fork Jemez River and San Antonio Creek and their tributaries.

2. Elk-Cattle Forage Use and Behavior

The common use of a landscape and forage base by both elk and livestock could cause over use of the forage and browse plants in the VCNP resulting in adverse effects to the ecological and hydrological conditions of the VCNP. Cattle grazing could cause changes in elk behavior resulting in elk movement outside the Preserve in the surrounding Jemez Mountains, Santa Fe National Forest lands, Los Alamos Laboratory, and Bandelier National Park resulting in forage use on surrounding private, State, and Federal lands.

3. Socio-Cultural

The Valles Caldera National Preserve is one of the most aesthetically beautiful and culturally valued landscapes in New Mexico and the United States. Historically, the VCNP has been valued for its resources (forage, wildlife, geothermal, timber production) and its beauty. These interests remain strong today. Prehistorically and today, the Valles Caldera National Preserve remains a sacred and spiritually significant place for Native Americans and others of diverse backgrounds. These cultural interests may be affected by reestablishing grazing on the VCNP.

Non-Key Issues

The following are issues that are able to be mitigated or were found not being of sufficient concern to warrant addressing in development of an additional alternative:

4. Threatened Endangered and Sensitive species

Implementation of an interim grazing program on the VCNP could effect Threatened, Endangered and Sensitive species habitats, etc.

5. Deer Habitat

Implementation of a interim grazing program on the VCNP could put livestock and deer in competition for forage and browse within a common landscape.

6. East Fork Jemez Wild and Scenic River Designation

Implementation of an interim grazing program could effect the conditions and qualities for which the East Fork Wild and Scenic River was designated.

7. Economics

Implementation of an interim grazing program could effect the economics of the VCNP, local livestock industry and the surrounding communities.

CHAPTER 2
Description of Alternatives

ALTERNATIVES

This chapter displays detailed information about the alternatives of the proposed actions for comparison. The interdisciplinary team developed three action alternatives that respond to the issues and which were designed to meet the purpose and need for the project. All alternatives, including the No Action Alternative demonstrate a range of effects for the key issues from Section 1.

A comparison of the environmental effects by alternative is summarized in Table 2-5 at the end of this Section.

These alternatives to implementing the proposed actions were developed through an Interdisciplinary Team process using the Key Issues refined through information received during Public involvement.

LEGAL REQUIREMENTS

The alternatives for this project were developed to comply with the following federal laws:

The preservation of Antiquities Act, June 1906, and the National Historic Preservation Act, October 1966.

The National Environmental Policy Act (NEPA), 1969 --NEPA establishes the format, process and content requirements of environmental analysis and documentation. Preparation of the Valles Caldera National Preserve Interim Grazing Program is in full compliance with these requirements.

The Endangered Species Act, December 1973 --Establishes the policy that all federal agencies will seek to conserve proposed and listed endangered and threatened species of fish, wildlife, and plants. Biological evaluations have been conducted to determine possible effects to Proposed, Threatened, and Endangered species from the proposed activities.

Clean Air Act Amendments, 1977 --All alternatives were developed to meet the National Ambient Air quality standards through avoidance of practice that degrade air quality below health and visibility standards.

Clean Water Act, 1982 --All alternatives were developed to conform to the Clean Water Act, Amended 1982. This act establishes a non-degradation policy for all federally proposed projects.

ALTERNATIVES CONSIDERED, But Eliminated from Detailed Study

During initial scoping discussions with the Valles Caldera Trust and staff members, the interdisciplinary team was instructed to develop and evaluate alternatives that might have larger or smaller numbers. Based on professional judgment, knowledge existing conditions of the range resources and available forage, and as a very general and preliminary guideline for public consideration in the scoping letter, a 2,000 head ceiling was considered a reasonable maximum to begin an interim grazing program rather than beginning with historic stocking rates. In advance of the detailed forage capacity analyses, the Trust recognized that this number was a “ceiling number” that was partly subjective, and might be too high or too low for a comprehensive long-term grazing program. However, the Trust felt a conservative number of cattle (relative to the numbers of cattle that grazed during private ownership of the 1980s and 1990s) could practically be grazed in the interim.

An alternative was considered that would have proposed stocking rates higher than 2000 head of cattle, but this was not retained for development or detailed analysis. The alternative was considered to

address issues raised in public meetings, phone calls and letters that the proposed stocking rate ceiling should be similar to past stocking rates. Stocking rates greater than 2000 head would be counter to the current Valles Caldera Trust direction and policy to establish a modest interim grazing program.

An alternative was considered to assign forage in grazeable woodlands on the steeper slopes, old harvest units and high elevation grasslands, but this was not retained for development or detailed analysis. The alternative was considered in recognition of those range resources and their availability to meet the purpose and need. Due to the logistics of managing for widely dispersed forage resources, the uncertainty of water sources and concerns of area Pueblos the alternative was not fully developed.

An alternative was considered that would leave the VCNP vacant of livestock. This alternative was considered and carried into detailed analysis as the No Action Alternative. This alternative is considered in detail; however, it would not meet the purpose and need of this proposed project nor would it meet the expectations proposed by the Valles Caldera Trust to graze, on an interim basis, as many as 2000 head of livestock between June 1 and September 30.

ACTION ALTERNATIVES Considered in Detail

The following Action Alternatives were developed to meet the project purpose and need discussed in Chapter 1. These alternatives respond to the issues identified initially through internal and external scoping with Valles Caldera Trust, Federal Agencies (US Forest Service, Bureau of Land Management and US Fish and Wildlife Service), State and Local Agencies (New Mexico Department of Game and Fish). All actions consider the need to re-establish an interim grazing program and monitoring strategy while addressing the Key Issues. The written response from over fifty individuals and interest groups along with the participation of numerous people during our three Open House Meetings helped refine the Issues associated with the proposed actions. Each Alternative addresses the issues of Aquatic Habitat and Water Quality, Elk-Livestock Conflicts, and Socio-Cultural Issues to some degree.

DEFINITIONS

Assigned Use: The amount or percent of available forage calculated to provide for livestock needs. Generally described as an Animal Unit Month (AUMs) within a grazing pasture. Based on the potential production under Favorable and Unfavorable growing conditions, rangeland acres within pasture, and desirable allowable use by livestock.

Allowable Use: (1) The degree of utilization considered desirable and attainable on various parts of a ranch or pasture considering the present nature and condition of the resource, management objectives, and levels of management. (2) The amount of forage planned to be used to accelerate range improvement. (3) The amount of forage production provided for livestock consumption expressed as a percentage of the total annual forage production. 4) conservative use of annual forage production while providing appropriate amounts of plant residue and litter for range and watershed improvement.

Animal Unit: An animal unit (AU) is one mature cow of approximately 1,000 pounds and a weaned calf, usually 6 months of age, or their equivalent. Examples of other AU values for different class of livestock or ungulates include:

Steer/Yearlings/Replacement Heifers	0.7 AU
Elk	0.7-1.0 AU
Sheep	0.2 AU

Animal Unit Month: The amount of forage required by an animal unit for 1 month. This range analysis uses 900 pounds of air-dry forage as required to support an animal unit month (AUM).

Mountain Meadow: Wetland plant communities associated with Natural Resource Conservation Service (NRCS) soil map unit 301. Generally dominated by carex and juncus species.

Mountain Valley: Upland grassland communities associated with NRCS soil map units 302 and 308. Generally support bunch grass communities of fescues, oat grasses and other.

Grazeable Woodland: Forested land forms that are suitable for livestock grazing (NRCS soil map units 82, 83, 85, 304, and 311).

Forage Production: The amount of plant biomass produced, that is palatable to livestock, on a yearly basis. Generally expressed in pounds (air dried)/acre.

Weather and climate conditions such as degree of winter severity (snow-pack, spring run-off), amount of rainfall (frequency, duration and magnitude) coupled with changes in soil and ambient air temperatures influence production potentials during wet and dry conditions. These conditions provide varying amounts of air, water, and soil nutrients to plant roots encouraging plant growth or inhibiting plant production. Depending on plant species physiology, the growing season may be shortened or lengthened affecting spring green-up or overall rangeland plant growth.

Favorable Growing Conditions: Prevailing weather and climate that are beneficial to the development of herbaceous (grass, grass like plants and forbs) resources tending to promote or facilitate a higher level of production.

Unfavorable Growing Conditions: Prevailing weather and climate that diminishes the development of herbaceous resources tending to promote or facilitate a lower level of production. For example a prolonged chronic shortage of water during which the soil and water content is reduced to such an extent that plants suffer from lack of water. These conditions do not include drought.

Drought: Prolonged dry weather when precipitation is less than 75% of the average amount as defined by the Society of Range Management (SRM, 1989).

STOCKING RATE DETERMINATIONS

The Interdisciplinary Team pursued stocking rate determinations using the Sandoval County Soil Survey mapping units provide by the NRCS Sandoval County Soil Survey mapping units and their associated ecological site descriptions, production data collected by NRCS in 1983, and guidance contained in the National Range and Pasture Handbook (1997). The Rangeland Monitoring Baseline Report, prepared by Will Barnes (Jan. 11, 2001) provided information regarding current plant community species composition and structure.

The Interdisciplinary Team used NRCS Soil Survey Map Units of the 300 series (rangeland plant communities) immediately adjacent to and contiguous with the major valle systems (Valle Grande, Valle San Antonio, and Valle Toledo). Grazeable woodlands on slopes less than thirty percent immediately adjacent to and contiguous with the major valle systems were assigned use. Small areas of 300 series range sites and grazeable woodlands not immediately adjacent to the major valles or on slope greater than thirty percent were not assigned use. Commonly used standards for forage demand estimates for a cow/calf pair range between 750 to 900 pounds of forage production per month. The IDTeam used a conservative value of 900 pounds of forage of one cow/calf pair per month.

All forage production estimates are based on unfavorable-favorable growing conditions (weather/climate) using NRCS Range Ecological Site descriptions. Ecological site descriptions were compared to data derived from NRCS Conservation Ranch Plans for the Baca Ranch. Ecological site descriptions were the basis for the range survey using soil mapping units from the Sandoval County Soil Survey to determine acreages by ecological site by pasture.

Action Alternatives provide a range of assigned AUMs/Animal Numbers bracketed by unfavorable growing conditions (low end) to a maximum of 2000 head during favorable growing conditions (high end). No alternative would exceed the maximum herd size of 2000 head. Providing a range of assigned AUMs/Animal Numbers within an alternative would allow maximum flexibility for the Valles Caldera Trust to adapt ranching operations based on monitoring results, forage conditions, weather, elk-livestock interactions, research/monitoring activities, data collection, ungulate (elk-livestock) enclosure construction, recreation activities, wildfire, etc.

ACTIONS AND MITIGATION MEASURES COMMON TO ALL ACTION ALTERNATIVES

Adaptive Management and Research

Monitoring and research are fundamental components of each Alternative, as required as part of the Act establishing the Valle Caldera National Preserve and as a “key” component of any activities that are undertaken on the VCNP. The results and information gained through monitoring and research would be used in an Adaptive Management Process which would consider both economic and cultural interests as well as ecological. The management process is “adaptive” in that what is learned from month to month and year-to-year would be used to alter management approaches and strategies to meet the objectives of this and other projects (See Appendix A). Consolidation of information and data, and changed management strategies as a result of monitoring, would be incorporated into a yearly “Newsletter.” The Adaptive Management Strategy and research cannot be underestimated in its value as a learning tool for understanding certain aspects of management and ecology of the VCNP.

Changes in livestock numbers and allowable use may occur (within the range of the selected alternative) as a component of a proposed experimental design that is structured to evaluate grazing effects (frequency, duration, and magnitude of use), or on ecological processes, dynamics, ecological health and/or watershed protection, cattle and elk interactions, behavioral and distribution changes by elk, riparian restoration, and water quality. Proposed studies should be complementary to improving the knowledge and understanding of the VCNP and applicable to improving and sustaining the VCNP ranch operations.

During periods of drought, forage maybe provided to area livestock operators, based on range readiness assessments and other monitoring or research data for determining stocking rates and herd management. The Valles Caldera Trust may chose not to turnout livestock, reduce numbers or alter season of use, in any given year, as a result. Range readiness assessments would be performed by interdisciplinary/interagency teams.

Two questions specific to grazing livestock on the VCNP that research would like to address include:

- 1) how much forage and what plant species comprise an Animal Unit Month (AUM), for both cattle and elk. Although we know that between 750 to 900 pounds of forage will sustain an AUM; we lack a full understanding of what the species composition of the AUM is and what

the nutrient level of those plants and plant communities specific to the VCNP that contribute to the nutrient needs of cattle and elk.

- 2) what are the indirect of large herbivores grazing within the VCNP at the plant community and landscape scales over time.

Other ongoing research assessing ecological parameters would continue (See Appendix A). As part of each alternative, including the No Action Alternative, production-utilization cages would be established in both Mountain Valley and Meadow plant communities to assess use levels by livestock and elk. Rangeland Monitoring providing baseline data of the plant composition of riparian-wetland communities would occur. The elk-livestock exclosures would provide valuable data and insight into the combined and individual effects of grazing by livestock in riparian-wetland and upland grassland communities. These monitoring strategies would help researchers and land managers address uncertainties that exist with respect to elk-livestock interactions and the indirect ecological effects of grazed plant communities and aquatic habitat, in relationship to other past and planned management activities.

Season of Use/Herd Management

Season of use would occur between June 1 and September 30. Shortening the period of livestock use on either end of the proposed season of use could occur on or after June 1, to before or on September 30.

The Trust could delay, postpone, or cancel livestock entry on to the VCNP due to climatic conditions or for other reasons outside the scope of this analysis.

During the proposed season of use, the Trust may set stocking rates (number of AUs or AUMs) for Unfavorable and Favorable growing conditions, or drought at levels lower than those analyzed under each alternative. Under drought conditions the Trust would sight specifically assess available forage and assign use and stocking levels based on the available forage determined through interdisciplinary/interagency range readiness assessment. Stocking rates and use level would be within the assigned use values within each Alternative.

The interim grazing plan includes daily use of a Range Rider to distribute and make changes in stocking density during the period of grazing use by monitoring livestock and elk behavior and allowable use.

Upon arrival at the VCNP, all livestock will be confined for a specified period of time (3-5 days) to clean stomach contents of any noxious weed seeds.

Class of Livestock

Class of livestock and/or proportion of each class may include cow/calf, replacement heifer, and/or steers.

Monitoring (in addition to research activities)

Production/utilization cages for quantitative assessment of forage production and use.

Range Rider Daily Logs

Examples of entries into daily range rider monitoring logs would indicate where and long the herds grazed in any given area, where they watered and how long, notes on estimated use levels, the presence and number of elk, where and how long an elk herd remains in a given area and an estimate of forage use.

Monitoring Protocol

Production/Utilization assessment following stock movements
Data summaries
Year-End Monitoring Review
Field and Data Review by an Interdisciplinary Team
Yearly VCNP Newsletter

Ungulate Enclosures (Elk-Livestock)

The construction and maintenance of six approximately 6.3 acre ungulate enclosures are common to all **Action Alternatives (1-3)**. Three would be constructed within and encompassing the channel and riparian area of the East Fork Jemez River. The remaining three would be constructed within and encompassing the channel and riparian area of the San Antonio Creek. Each enclosure would be 8-10 feet in height, constructed of steel post and square mesh fence wire. The lower portions of each enclosure would be constructed of wooden rails spaced so rodents and small predators can access the enclosure while excluding ungulates. Methods are described in more detail in Appendix C.

Heritage Resource Protection

Known sites within pastures will be visited to establish baseline conditions and to identify any extant erosion or disturbance. On-going survey for any other projects (e.g. roads surveys) will seek to identify heritage resources that could be affected by elk and cattle grazing. Implementation and effectiveness monitoring would occur on known heritage resource site locations.

A specific rockshelter would be protected from livestock by placing two to three spruce trees (less than 9 inches at breast height) in front of the site to eliminate access by livestock.

Maintenance

The headquarters corral, non-historical hay sheds, and pasture fences would be maintained to support 1-5 horses for Range Riders and other administration and security uses. Fence lines known to be a hazard to elk movement could be modified by dropping or removing the top wire, and/or by removing segments of fence line not needed for ranching operation.

Special Use Pastures

The FIELDS, HEADQUARTERS TRAPS, and San Antonio TRAP were determined to be essential in facilitating ranch operations. It is anticipated that these pastures will experience grazing use by horses (riding stock for range rider and fencing crew) and by some cattle needing medical attention. The grazing capacities (forage production) for these pastures (948 AUMs during unfavorable conditions and 1,844 AUMs under favorable conditions) are not allocated towards supporting the main livestock herd(s).

ROUND MOUNTAIN and WILLOW MOUNTAIN pastures will be used during the delivery of cattle (on or about June 1) for quarantine, medical examinations, vaccinations, and handling prior to initiating the prescribed grazing system. Forage in these pastures was not used to calculate available AUMs in support of the herd.

SHIPPING pasture will be used only during the fall when cattle are brought into the shipping pens to be transported off the Valles Caldera National Preserve. Forage in these pastures was **not** used to calculate available AUMs in support of the herd.

SANTA ROSA, REDONDO and POLEO pastures would not be assigned use by livestock in any Alternative. It was determined that these pastures were more accommodating for wildlife than for livestock operations. These pastures are dominated by slopes exceeding 30%, are mostly forested (woodland dominance within pastures), and lack water availability and/or reliability. These pastures pose a higher degree of difficulty for Range Riders to work or herd livestock in the woodland and timber types. The forage production within these pastures was not allocated to livestock. AUMs are assigned for watershed protection and wildlife use.

JARAMILLO PASTURE AND UPPER SUB-DRAINAGE was not assigned use for livestock due to watershed conditions and the importance of these areas for elk, aquatic habitat, and other wildlife.

ALTERNATIVES AS THEY RELATE TO THE ISSUES

ALTERNATIVE 1

This alternative was developed with an emphasis on re-establishing a modest interim grazing program on the VCNP focusing on the large valles of Valle Grande, Valle San Antonio, and Valle Toledo (See Map E)). Use was not assigned for the Jaramillo Creek, Rio Seco, Rito de Rosa, Sulfur Canyon pastures, the southwestern portion of the VCNP, slopes greater than 30%, and past timber harvest units.

This alternative was developed to meet the basic purpose and need to re-establish a modest interim grazing program on the VCNP. This alternative addresses the Cultural Issues of those who wish to see livestock grazing on the VCNP. Leaving large areas of the VCNP vacant of livestock, and keeping stock out of Jaramillo Pasture and its upper sub-drainage and stream reaches, provide important elk habitat (forage and calving area) and the current unsatisfactory condition of the Jaramillo Pasture contributes to water quality and aquatic habitat.

Elk-Livestock Interactions Issues and Water Quality and Aquatic Habitat Issues are partially addressed by leaving many valle systems, steep slopes, and large areas void of stock. Culturally, this alternative provides for those who support re-establishment of a livestock grazing program on the VCNP. This alternative also partly addresses concerns of those who would prefer stock not be reintroduced by leaving large areas, smaller valle systems, and steep slopes vacant of livestock. This alternative avoids areas of known water quality, aquatic habitat and heritage resource concerns. An overall maximum forage use level of 35% for mountain meadow, mountain grassland, and grazeable woodlands was applied (See Map E page 37).

Assigned Use

35 % of the total annual forage production within:

Mountain Meadows (Riparian Areas)

Mountain Valley (Upland Grasslands)

Grazeable Woodlands

Unassigned Forage

The remainder of the total annual forage production remains for wildlife, plant community ecology, and watershed protection in Mountain Grassland, Mountain Meadows and Grazeable Woodlands.

Table 2-1 Numbers of Livestock/Alternative 1

ALTERNATIVE 1	Assigned Use	
Total Assigned AUMs	7,975	8,000 *14,085
Cow/Calf Pairs	1,994	2000 *3,760
Replacement Heifers	2,000 *2,849	2,000 *5,371
Stocker/Yearlings	2,000 *2,849	2,000 *5,371

*Note: Capability during Favorable Growing Conditions.

Note: Forage production is not a limiting factor when calculating available AUMs during favorable growing conditions.

Total area assigned to livestock use is approximately 17,752 acres leaving 71,248 acres vacant of stock for wildlife, watershed-fisheries and recreation uses without the presence of cattle.

Alt 1 Map E

[Maps not included in electronic version]

ALTERNATIVE 2

This alternative was developed with a greater emphasis on water quality and aquatic habitat issues by having lighter assigned use in riparian-wetland communities and sensitive areas identified by fisheries biologists. Elk-Livestock Interactions Issues are more strongly addressed by leaving more forage behind for wildlife, continued focus on the larger valles (leaving large areas without stock), and not assigning use on many valle systems, and steep slopes. Culturally, this alternative provides less for those who support re-establishment of a livestock grazing program on the VCNP. This alternative also partly addresses concerns of those who would prefer stock not be reintroduced by leaving large areas, smaller valle systems, and steep slopes vacant of livestock (See Map F).

Use was not assigned for the Jaramillo Creek, Rio Seco, Rito de Rosa, Sulfur Canyon pastures, the southwestern portion of the VCNP, slopes greater than 30%, and past timber harvest units. Leaving large areas of the VCNP vacant of livestock, and keeping stock out of sub-drainages and stream reaches that contribute to water quality and aquatic habitat, provides for Water Quality and Aquatic Issues (See Map F page 39)..

Assigned use for the Wetlands and Riparian Areas (NRCS soil map unit 301) is reduced from 35% to 15% providing further protection to Water Quality and Aquatic Habitat concerns. Elk-Livestock concerns are addressed by leaving many valles systems, steep slopes and large areas void of stock; however, no greater emphasis was applied to this issue than in Alternative 1. Culturally, this alternative provides less emphasis for those who support re-establishment of a livestock grazing program on the VCNP, and similar emphasis on addressing concerns of those who would prefer stock not be reintroduced as in Alternative 1. Again, this alternative avoids areas of known water quality and aquatic habitat concerns while limiting the forage demand on wetland-riparian plant communities

Assigned Use

35 % of the total annual forage production within:

Mountain Grasslands

Grazeable Woodlands

15% allowable use is assigned to wetland-riparian corridors found in;

Mountain Meadows (Wetland-Riparian Areas)

Unassigned Forage

The remainder of the total annual forage production remains for wildlife, plant community ecology and watershed protection in Mountain Grassland, Mountain Meadows and Grazeable Woodlands.

Table 2-2 Numbers of Livestock/Alternative 2

ALTERNATIVE 2	Assigned Use	
Total Assigned AUMs	5,423	8,000 *10,051
Cow/Calf Pairs	1,356	2,000 *2,521
Replacement Heifers	1,937	2,000 *3,590
Stocker/Yearlings	1,937	2,000 *3,590

*Note: Capability during Favorable Growing Conditions.

Forage production is not a limiting factor when calculating available AUMs during favorable growing conditions.

Total area assigned to livestock use is approximately 16,311 acres leaving 72,689 acres vacant of stock for wildlife, watershed-fisheries, and recreation uses without the presence of cattle.

Alt 2 Map F

[Maps not included in electronic version]

ALTERNATIVE 3

This alternative was developed with an emphasis on providing the greatest protection of the aquatic resources and water quality, and the greatest flexibility to respond to elk-livestock issues. This alternative places less emphasis on the Cultural issues for those who wish to maximize livestock grazing, and more emphasis on the Cultural interests who wish it is to see the valles absent of livestock. In this alternative any one the large valles (Valle Grande, Valle San Antonio, and Valle Toledo) could be vacant of livestock in any given year. Allowing for one of the larger pasture systems to go vacant of livestock, in any given year, provides flexibility to Valles Caldera Trust to adjust stocking levels and where cattle would graze. It also provides the Valles Caldera Trust the opportunity to adjust stocking levels to enable experimental designs that may prove valuable in improving and sustaining ranch operations (See Map G).

Assigned Use

35 % of the total annual forage production within:

Mountain Grasslands

Grazeable Woodlands

15% allowable use is assigned to wetland- riparian corridors found in:

Mountain Meadows (Wetland-Riparian Areas)

Unassigned Forage

The remainder of the total annual forage production remains for wildlife, plant community ecology and watershed protection in Mountain Grassland, Mountain Meadows, and Grazeable Woodlands.

The following livestock numbers in the table below illustrate the minimum number cow/calf pairs of 687 (least capacity area grazed/unfavorable conditions) to maximum number of cow/calf pairs of 1,689 based (greatest capacity/favorable growing conditions).

Table 2-3, Numbers of Livestock/Alternative 3

ALTERNATIVE 3	Assigned Use	
Total Assigned AUMs	2,749	6,756
Cow/Calf Pairs	687	1,689
Replacement Heifers	982	2,000
Stocker/Yearlings	982	2,000

Note:

Forage production is not a limiting factor when calculating available AUMs during any growing conditions.

Alt 3 Map G
[Maps not included in electronic version]

Table 2-4 Assigned Use by Pasture/ Alternative 3

Total Animal Number by Livestock Class

ALTERNATIVE 3		Unfavorable Conditions			Favorable Conditions	
	Valle San Antonio VACANT	Valle Toledo VACANT	Valle Grande VACANT	Valle San Antonio VACANT	Valle Toledo VACANT	Valle Grande VACANT
Cow/Calf	687	876	780	1286	1689	1460
Yearling Cattle	982	1251	1114	1837	2413	2086

Assigned USE Capacities (AUMs) of the Three Large Valles

ALTERNATIVE 3			Unfavorable Conditions			Favorable Conditions	
Valle San Antonio		1937 AUMs Valle San Antonio VACANT	1937	1937	3726 AUMs Valle San Antonio VACANT	3726	3726
Valle Toledo		1182	1182 AUMs Valle Toledo VACANT	1182	2113	2113 AUMs Valle Toledo VACANT	2113
Valle Grande		1567	1567	1567 AUMs Valle Grande VACANT	3030	3030	3030 AUMs Valle Grande VACANT
Total Assigned AUMs		2749	3504	3119	5143	6756	5839
Acres Stocked		10,370	12,649	11,687	10,370	12,649	11,687

ALTERNATIVE 4 (No Action Alternative)

Alternative 4 would not re-establish livestock grazing on the VCNP at this time. Boundary fence lines and interior pasture fences would be maintained. Fence lines known to be a hazard to elk movement could be modified by dropping or removing the top wire, and/or removing segments of fence line. The headquarters corral, hay sheds, and pasture fences would be maintained to support 1-5 horses for administration and security use. Corrals outside the headquarters area that normally support a cattle operation would receive minimal maintenance.

Ongoing and planned research assessing ecological parameters would continue. Production-utilization cages would be established in both Mountain Valley and Meadow plant communities to assess use levels by elk and base-line vegetation surveys and analysis would continue. Water quality sampling by the New Mexico Environment Department would continue, and stream channel cross sectional geometry assessments as well as numerous other avenues of research would be pursued. Baseline range monitoring assessing the composition of riparian-wetland plant communities would be initiated.

SUMMARY

Table 2-5 Summary of Numbers of Livestock by Alternatives

	Alternative 1	Alternative 2	Alternative 3	No Action Alt
Range Of Assigned AUMs	7,975-8,000	5,423-8,000	2,748-6,756	000
Cow-Calf Pairs	1,994-2,000	1,356-2,000	687-1,689	000
Replacement Heifers	2,000	1,937-2,000	982-2,000	000
Stocker/ Yearlings	2,000	1,937-2,000	982-2,000	000
Assigned Use Upland / Riparian	35% / 35%	35% / 15%	35% / 15%	0% / 0%

CHAPTER 3
Affected Environment/ Effects Analysis

AFFECTED ENVIRONMENT/ EFFECTS ANALYSIS

This chapter presents analysis, compares alternatives, and explains the effects of the alternatives presented in Chapter 2. Direct, indirect and cumulative effects are discussed. Detailed analysis is focused on resources related to the key issues described in Chapter 1 that are pertinent to the proposed actions. Additional information on the environmental consequences of implementing each alternative and the biological evaluation can be found in the Appendices to this document and in the analysis file. A summary of the proposed Alternatives is displayed in the table below.

Table 3-1 Alternatives Summary

	Alternative 1	Alternative 2	Alternative 3	No Action Alt
Range Of Assigned AUMs	7,975-8,000	5,423-8,000	2,748-6,756	000
Cow-Calf Pairs	1,994-2,000	1,356-2,000	687-1,689	000
Replacement Heifers	2,000	1,937-2,000	982-2,000	000
Stocker/ Yearlings	2,000	1,937-2,000	982-2,000	000
Assigned Use Upland / Riparian	35% / 35%	35% / 15%	35% / 15%	0% / 0%

KEY ISSUE: WATER QUALITY AND AQUATIC HABITAT

The physical effects of grazing (trampling, removal of biomass, etc.) on the grassland and riparian communities of the Valles Grande and Valles San Antonio could cause surface runoff and transport of sediment and manure, which could adversely affect the water quality, channel stability, and aquatic habitat of East Fork Jemez River and San Antonio Creek.

The New Mexico the Surface Water Quality Bureau (SWQB) of the Environment Department reported water quality impairments to streams in the VCNP and have listed both the East Fork Jemez River and San Antonio Creek on the 2000 305b report and the 303d list to EPA (temperature, total suspended solids, and stream bottom sediments). These water quality parameters are of great concern for fish habitat and water quality within the VCNP as well as to downstream designated uses. In addition, the East Fork Jemez River and San Antonio Creek are designated high quality cold water fisheries, and the East Fork Jemez Wild and Scenic designation begins just below the VCNP.

Water Quality-Aquatic Habitat: Direct, Indirect and Cumulative Effects

The following discussion of the possible effects on water quality and aquatic habitat necessarily focuses on the condition and composition of vegetation, the condition of the soils, and the effects that livestock and elk grazing have on those resources. Healthy vegetative communities and the soils from which they grow are at the center of the function of a watershed and strongly influence the processes and function of a watershed and water quality.

Alternative 1, 2 and 3

It is unlikely that the water quality of the East Fork Jemez River or San Antonio Creek would be measurably changed by implementing any of the proposed Actions (Alternatives 1, 2 or 3). It is also unlikely that implementation of Alternative 1, 2 or 3 would result in a decline in the aquatic habitat or fisheries of the East Fork Jemez River and the San Antonio Creek either directly, indirectly

or cumulatively. Combined with all foreseeable activities within the VCNP, there may be a slight improvement in the aquatic habitat and channel stability in the near term. Implementation of Alternative 1, 2 or 3 **should not** contribute to the possible listing of the Rio Grande Cutthroat Trout.

Relative to all Action Alternatives, implementation of **Alternative 1** has the greatest potential for affecting water quality and fish habitat due to the assigned use of 35% in both riparian and upland grasslands, and because it provides less flexibility for managing livestock; however, no measurable negative effects are anticipated. Meeting objectives for vegetation and soils conditions would be realized through maximum control of livestock provided by the herd management, including livestock distribution managed by range riders, low levels of forage utilization assigned to livestock, limited duration of livestock grazing on the VCNP, and limited areas of exposure to livestock.

Implementing **Alternatives 2 or 3** would have less potential to adversely affect water quality and aquatic habitat and greater potential for improvement than through implementation of **Alternative 1**. Since the proposed activities in **Alternative 2 and 3** minimize the assigned forage use to 15% within riparian-wetland communities, limits the assigned forage use to no more than 35% in upland grassland communities, and incorporates herd management through the use of range riders to meet those use objectives; it is unlikely that the water quality of the East Fork Jemez or San Antonio Creek would be measurably changed by implementing these Alternatives. Implementation of Alternatives 2 and 3 would not likely cause further destabilization of stream banks nor loss of undercut bank. Restricting the spatial extent livestock can access by eliminating larger portions in both watersheds in the VCNP further limits the potential direct, indirect and cumulative impacts (see Table 3-2, page 22). Alternative 1 would graze approximately 20% of the VCNP, 18% in Alternative 2, and 12-14% in Alternative 3. Positive trends in water quality parameters and stream characteristics are apparent (personal observation Steve McWilliams; Santa Fe National Forest Watershed Program Manager), and may be realized further as stream dynamics recover from impacts of historically grazing pressure (>80% use as recently as 3 years ago). Bare soil in upland grasslands is currently less than 2% and evidence of surface runoff contributing to sediment and organic matter additions to surface water supplies is negligible.

Limiting use in riparian-wetlands to no more than 15 percent would be achieved by allowing stock to access the perennial sections for water alone without allowing them to loiter in those areas.

The proposed use levels are well within recommendations and guidelines of State and Federal Agencies for stocking levels within riparian and upland grassland communities. Recommendations for a 3 to 4 inch stubble height (remaining grass height) resulting in a 40 to 50 percent utilization rate have been used as guidelines for riparian areas in the past. Guidelines have been established by the US Forest Service to allow for protection of riparian structure and function (vegetation and hydrologic conditions). A 6-inch stubble height or 37-44 percent utilization rate is suggested (Managing Grazing of Riparian Areas in the Intermountain Region, GTR INT 263, May 1989).

Montana Department of Natural Resources & Conservation suggests a varied strategy of improving riparian areas while allowing use. Montana Department of Natural Resources & Conservation has found that use of off stream water sources, limiting time in riparian through herding, managing for utilization rates of 35 to 65% depending on time of year, and varying season of use were some of the methods employed. Montana BLM Technical Bulletin 3 concludes that operators should not encourage livestock to loiter in the riparian zones. Historically on the VCNP use levels were as high as 80% of the riparian-wetland available forage production. Use in these communities was season-long rather limited to a short duration. Limiting the time spent in riparian areas is more important than either season of use or length of time in the pasture. The proposed herd management and levels of use

in **All Action Alternatives** meet the objectives of the above management guidelines and the recommendations of the National Riparian Service Team.

In addition, no single grazing system has been found to recover degraded riparian areas (Grazing Management for Riparian-Wetland Areas, TR 1737-14, 1997); however, the proposed assigned use and herd management is well within the recommendations in the report, and the anticipated changes in the level and timing of grazing both by domestic livestock and elk does address local vegetation conditions along and near stream banks. Proposed use levels in both upland and riparian area are well within these guidelines in All Action Alternatives.

Implementing **Alternative 3** would provide that one of the major Valles would remain vacant of livestock. The Valle Grande pasture, for example, could remain vacant of livestock under **Alternative 3**. The headwaters of the East Fork Jemez River originate from a spring complex in the upper end of the Valle Grande. The spring complex is a concern for both aquatic habitat and heritage resources. If the Trust decided to stock the Valle Grande pasture, however, the area would be avoided through herding of livestock by range riders. This is not to suggest that cattle could not access this area, but the area is not needed for livestock forage or water, and would not be considered in assigning forage use for livestock. In Alternative 3, the Trust has the option to leave this pasture vacant of stock, thus eliminating the potential direct effects.

Direct effects include accessing perennial stream systems for forage and water, livestock defecating in perennial stream or springs, trampling damage to stream banks, and the construction of livestock-elk exclosures. In All Action Alternatives livestock would be managed with the objectives of:

- 1) Limiting forage use and access to riparian-wetland areas to very short duration and minimal forage use to maintain or improve vegetative conditions and bank stability. Assigning no more than 15-35% of the annual forage production to livestock would maintain productive plant physiology, provide effective litter and soil cover, and provide organic matter (leaf litter) necessary for soil ecology, soil nutrient cycling, and hydrologic integrity.
- 2) Limiting the duration and intensity of forage use in riparian-wetland areas would maintain or improve hydrologic integrity by maintaining soil bulk density and infiltration characteristics, and reduce the potential of fecal material from livestock being incorporated into perennial streams by surface runoff.
- 3) Avoiding or reducing the duration and intensity of livestock use in stream reaches identified by fisheries biologist as being sensitive to fisheries habitat would effectively limit the potential direct, indirect and cumulative effects to aquatic habitat.
- 4) Avoiding or eliminating use in areas known to be in relatively poor conditions due to past heavy livestock use (Jaramillio Pasture and upper Jaramillio watershed, Rincon Pasture), sensitive areas (East Fork Jemez River springs), and past road construction or borrow pit excavation would allow for vegetation and hydrologic recovery without further effects by livestock grazing.

Historically, cattle may have congregated in the riparian areas. In fact it was often difficult to “push” livestock into high elevation meadows, steep slopes and old harvest units (anecdotal evidence). The effect was use levels as high as 80% of the annual forage production in riparian areas and the selective grazing of the most desirable forage plants resulting in a shift in species composition to one higher in

less palatable and/or upland species. Active management through herding with range riders would reduce the time spent in riparian areas from season long use to a few hours per day and would vary in location from day-to-day. Active management would also assure that livestock use within any given pasture would result in livestock not using “favored” areas but would be moved so that the same portion of the pasture would not be grazed more than once per season. These management strategies would effectively limit the time, duration and intensity of use in the riparian and upland areas while assuring forage use meets desired levels. The controlled use and distribution would aid in the long-term improvement in riparian conditions and assist in the establishment of woody species where conditions are suitable such as in the steeper tributaries to the main valleys.

Current evidence indicates a positive trend in channel function of the non-functioning reach along the East Fork Jemez River within the Shipping Pasture (McWilliams, 2000/Analysis File). This segment of the East Fork appears to have moved from a condition of Non-Functioning to one of Functioning at Risk. This trend would not be altered by implementing any of the Alternatives, including Alternative 4 (No Action). It is important to recognize that the function and channel stability (or the lack thereof) is primarily caused by high sediment yields (as much as 20 tons/mile/year) from low elevation poorly engineered and located roads, and the current water yield and former sediment delivery off the high density, high elevation road network. Current sediment yield from native surface roads (non-aggregate) and borrow pit locations exceed 20 tons/acre/year (SFNF Terrestrial Ecosystem Survey). Current soil loss rates on upland grassland communities are approximately 0.3 tons/acre/year compared to natural soil loss rates of 0.1 tons/acre/year (SFNF Terrestrial Ecosystem Survey). Rates of soil loss at which site productivities is affected is approximately 4.1 tons/acre/year.

Alternative 2 and 3 most strongly address water quality and aquatic habitat concerns by minimizing assigned use in riparian areas to 15% of the annual forage production. These Alternatives also, take into account the “sensitive areas” (Map D, page 19) identified by fisheries biologists by assigning less use in the wetland-riparian area along the East Fork Jemez. Although we do not have a similar “sensitive area” map of the San Antonio Creek, **Alternatives 2 and 3** address the similar landforms and vegetation communities the same by limiting forage use and access by livestock. Low grazing pressure on riparian communities provides the greatest opportunity for the vegetation composition to improve while minimizing the potential direct effects of mechanical damage (trampling) to riparian vegetation and stream banks, and effectively reduces the potential for fecal material entering surface water supplies. **Alternative 3** proposes the greatest flexibility in an active management scenario, providing for controlled herd management by allowing any one of the large valley pastures to be vacant of livestock in any given year. In addition, intensive management of livestock may indirectly allow for management of the elk herd by activities, and may limit their recent heavy use of riparian vegetation in the Valle Grande and elsewhere on the VNCP. Large elk herds have resided on the VCNP since their introduction in 1947 & 1966. The elk herds have resided on the VCNP during the growing season since acquisition due to limited disturbance by humans and no interactions with cattle. Effective ground cover in the form of vegetation and litter in upland and riparian area would not be altered and may improve as the vegetation conditions improves in both locations. Bare soil is rare (<2%) and is likely to be diminished as the cumulative effect of the proposed livestock management controls forage removal and alters the behavior of elk. Soil hydrologic characteristics (infiltration rates, soil bulk density, and ground cover) would improve in both upland and riparian area as a result of the proposed livestock management and the effect that this and other activities on the VCNP would have on the behavior of elk herds. As the soil and vegetation conditions improve we anticipate greater forage production to nearly double the current rates (SFNF Terrestrial Ecosystem Survey).

Alternative 4 (No Action)

The **No Action Alternative** eliminates the potential for effects to water quality and aquatic habitat by livestock. The direct and indirect effects of livestock grazing discussed under Alternative 1-3 would not occur. **The result of leaving the VCNP vacant of livestock would eliminate the direct and indirect effects of livestock grazing; however, the overall water quality and aquatic habitat may not improve measurably due to the influence and effects by elk grazing and from the transportation network.** Non-management (**No Action Alternative**) would allow elk to continue unaltered use of forage resource within the riparian areas and uplands, and wet wallowing within the areas adjacent to perennial streams.

In the two years the VCNP has been absent of stock, water quality parameters may have improved; although we currently do not have data to support this conclusion. Under the No Action Alternative, use of vegetation would be limited to near exclusive use by wildlife (occasional use by unauthorized livestock from surrounding Forest Service allotments may still occur). Forage use level would not likely be altered, and the diversity of grasses and shrubs could improve. Without a change in the behavior of the elk populations, however, this intuitively anticipated improvement in forage conditions may not be realized over the long term. The more palatable vegetative species that had decreased in abundance under very heavy livestock grazing could have an opportunity to re-establish and increase in frequency and spatial extent. However these increases would likely be restricted because of the continued heavy use of forage resources selectively by elk, resulting from the lack of disturbance of the reintroduced herd.

Not permitting livestock grazing would eliminate its effects on rangeland health, both positive and negative. Rangeland health is a product of temporal and spatial arrangements of vegetative composition, ground cover and vegetative production measured by indicators assessing soil stability, biotic integrity and hydrologic function. It is expected that rangeland health would be stimulated in the short-term, however, it could also decline in the long-term.

The VCNP climate, soils and vegetation have a great deal of resilience. Moisture is rarely limited and the soils are very productive. Both the soil and vegetation resources are evident today. Bunch grass still dominate upland plant communities (Barnes, 2002) and most riparian areas are still dominated by facultative hydric vegetation.

Cumulative Effects

The cumulative effects of implementing any one of the proposed Action Alternatives when combined with projects planned in the foreseeable future could improve riparian and channel dynamics, and water quality by reducing known sources of sediment. The design, construction, maintenance and use of the existing road structure have had the greatest management impacts on current water quality, timing, and flow. Past grazing (cattle, sheep, and wildlife) has had an impact over a wide area of the VCNP. Projects planned for the foreseeable future include: 1) road reconstruction to improve road drainage would reduce sediment transport, 2) re-vegetating borrow pits, and/or construction of sediment retention structures (weed free straw bale sediment dams) below borrow pits, road drainage structures, and eroding areas would further reduce known sources of sediment, and 3) reconstruction of bridges known to be effecting channel dynamics would improve channel dynamics. There may be a short duration (1 year) increase in sediment delivery to streams as road re-alignment and road prism reconstruction proceeds; however, mitigation measures (weed free straw bale sediment dams, dewatering perennial streams during construction, and seeding of bare soil created during construction) would limit the potential effects. The long-term effects of projects

planned for the foreseeable future would reduce sediment delivery to perennial streams improving channel dynamics and aquatic habitat.

Limited public access to the VCNP for recreational activities, and increased administrative activities could increase sediment production off existing roads due to increased use of the transportation system; however, improved road conditions through reconstruction would produce a net decrease in sediment production from roads. Roads throughout the VCNP would continue to produce elevated runoff volume during spring snow-melt and during high intensity rain storms events during the summer months. Currently there are no plans to decommission roads. Therefore, areas of high road density (harvest roads on mountain slopes) would continue to affect channel dynamics and aquatic habitat, particularly down stream response reaches of the East Fork Jemez River and San Antonio Creek.

During the last century the Valles Caldera has experienced the introduction of large ungulates, the construction of extensive road systems for the extraction of timber products, drilling for water and geothermal resources, and the construction of a pipeline across the Valles Caldera. These actions and the response over time to these activities leave us with the conditions we see today. Without addressing sediment production from currently non-surfaced and poorly engineered road systems, and the water yield from high elevation high road densities on forested mountain slopes, it is unlikely that measurable improvement in channel function within response reaches of the East Fork Jemez and San Antonio Creek would be realized. The improvement in the non-functioning reach of the East Fork Jemez River observed in the last two years may be attributed to elimination of very heavy grazing pressure in the early spring and fall when livestock were concentrated in the Willow and Shipping pastures for orientation and shipping purposes. The very heavy use of forage early in the growing season (April-May) combined with intense mechanical disturbance by livestock contributed to the instability caused by high sediment and water yields. The Shipping pasture would only be used for one to two weeks in the fall (September) rather than the historical use in the spring (May) and in the fall (October) for more extended durations. Livestock management through any of the Action Alternatives would not recreate historic grazing pressure or livestock concentrations on the VCNP.

It is unlikely that fecal coliform counts would diminish or increase through implementation of one of the Action Alternatives. Cumulatively water quality may improve with the reduction in the number of livestock from historic stocking rates and should anticipated changes in elk behavior be realized. Although we lack definitive data on the relative contribution of fecal matter and other material from cattle versus elk and other wildlife; based on recent research, we realize that different wildlife species contribute more pathogens than cattle.

A measure of water quality effects is that of water borne pathogens. Oocyst (dormant form of pathogens) production from cattle compared to elk and other wildlife species may provide some insight. An oocyst is used to measure water-borne pathogens and can be used as a measure of potential impacts to water quality. *Cryptosporidium parvum* oocysts, a relatively common water borne pathogen, is produced by wildlife as well as cattle. Production of *C. parvum* oocysts from cattle average approximately 6000 (150 oocysts/2.2 pound of fecal matter), compared to 140,000 oocysts produced by an adult striped skunk, and 41,000 oocysts produced by coyote adults (ER Atwill et al.). Although the relative contribution and cumulative effects of oocyst and other pathogen from cattle and other forms of wildlife is poorly understood, it is clear that cattle produce far fewer of these pathogens when compared to some wildlife species.

The indirect and cumulative effects of the proposed Action Alternatives and of all other projects planned in the foreseeable future are not likely to affect the down stream qualities, channel

characteristics or flow regimes within the East Fork Jemez Wild and Scenic River for which it was designated. No direct effects to the East Fork Jemez Wild and Scenic River are anticipated.

KEY ISSUE: ELK-LIVESTOCK INTERACTIONS

The common use of a landscape and forage base by both elk and livestock could cause over use of the forage and browse plants in the VCNP resulting in adverse effects to the ecological and hydrological conditions of the VCNP. Cattle grazing could cause changes in elk behavior resulting in elk movement outside the Preserve in the surrounding Jemez Mountains, Santa Fe National Forest lands, Los Alamos Laboratory, and Bandelier National Park resulting in forage use on surrounding private, State, and Federal lands.

Direct, Indirect and Cumulative Effects

Re-establishing livestock grazing on the VCNP (Alternative 1, 2 and 3) would place elk and livestock in direct competition for forage and water resources where livestock graze within the VCNP. Direct effects of elk would be essentially the same as for cattle with the direct effects including direct access to perennial stream systems for forage and water, elk defecating in perennial streams and springs, and trampling damage to stream banks.

Livestock would be present for only a portion of the year (June-September) and access only a small fraction of the entire VCNP (see Table 3-2 below). For a period of four months stock would compete with elk for some of the same areas and resources. If elk behavior were to remain constant, there would be direct competition for forage and water in these areas. Given that livestock would occupy as much as 20% of the total area within the VCNP in Alternative 1 and as little as 12% in Alternative 3, only a small portion of the entire VCNP landscape would be occupied by both livestock and elk during the grazing period, with an abundance of suitable habitat for elk in the remainder of the VCNP.

Table 3-2 Extent of Grazing On VCNP

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Acres Assigned to Livestock	17,752	16,311	10,370-12,649	000
Remaining Acres in VCNP	71,248	72,689	78,630-76,351	89,000
% of VCNP available to stock	20%	18%	12%-14%	00%

Forage Competition

When the overall availability of forage across the VCNP is considered beyond that which is assigned for use by livestock, the analysis indicates sufficient forage remaining to support the existing elk herd. We calculated the forage availability for elk, and we evaluated the annual forage available between the assigned use of 15 or 35% up to 40% where cattle would be present. This analysis included wetland-riparian areas, upland grasslands, grazeable woodlands, steep sub-alpine grasslands and previously harvest forested areas. We used 40% of the annual forage as a physiological threshold. Grazing of individual forage grasses beyond 40% of its annual production can result in a cessation of growth that can lead to physiological damage to the plant and ultimately the plant community. Grazing plants over 40% of their annual production could leave insufficient residual leaf area for photosynthesis required for carbohydrate production and nutrient storage in roots that can result in a decline in a plant production. Also, removal of more than 40% of the available forage may not allow for accumulations

of leaf litter on the soil surface required for effective ground cover and soil ecology. Table 3-3 displays the remaining forage available for elk and other wildlife beyond that which is assigned to livestock.

In determining forage availability for elk throughout the VCNP we considered:

- 1) Forage not assigned to livestock in the areas considered for livestock use;
- 2) Forage use up to 40% to calculate total forage availability;
- 3) Forage available on grasslands and riparian-wetlands outside the pastures where livestock would graze including grazeable woodlands, timber harvested areas and sup-alpine grasslands; and
- 4) We provide a range in the number of elk that can be supported by the remaining forage based on 0.7 to 1.0 AUM per elk for a **six month period**.

Table 3-3 Forage/AUMs for Wildlife

Alternative	AUMs Remaining Use up to 40% use Unfavorable Conditions	AUMs Remaining Use up to 40% use Favorable Conditions
Alternative 1	4,796	18,413
# of Elk	799-1,142	3,069-4,384
Alternative 2	7348	18413
# of Elk	1224-1750	3069-4384
Alternative 3	10022	19657
# of Elk	1670-2386	3276-4680

During unfavorable growing conditions in any **Action Alternative**, forage within the VCNP could be a limiting factor. The option not to graze livestock on the VCNP, or with reduced numbers, under any of the Action Alternatives would provide flexibility to the Trust to address any resource concerns. Alternatives 2 and 3 provide the Trust with less flexibility for annual decisions as to where livestock grazing may occur. During favorable growing conditions forage would provide sufficient forage to support the known population of elk (3300 head) as well as the proposed stocking levels under any of the **Action Alternatives**. There is an additional 21,467 acres of forested landscape within the VCNP that provides cover and thermal habitat for the elk populations. While these forested areas do provide browse and minimal forage, they are not included in the analysis of available forage for neither elk nor livestock.

Following the reintroduction of elk in the Jemez Mountains, activities such as grazing and hunting on the Baca Ranch have influenced elk behavior. It is likely that these activities have resulted in elk movement into remote areas of the caldera and the adjacent Jemez Mountain landscape. Since federal acquisition of the VCNP, however, the elk population has remained relatively undisturbed during the periods of their occupation of the caldera. It is important to note that the elk are not restricted to the VCNP but are capable of migrating off the caldera into the surrounding Jemez Mountain landscape, including the Santa Fe National Forest, Bandelier National Monument, Los Alamos National Laboratory, the Chama Wilderness, and private lands in search of forage, browse, and water resources. Indeed, in winters with substantial snowfall most elk are forced to migrate off the VCNP for a period of time to successfully access food.

Browse/Shrub Availability

Livestock typically do not favor browse plants when adequate grass forage is available. Elk, like cattle, do not favor browse plants when adequate grass forage is available; however, elk will favor browse during early spring and late fall when grass forage is limiting (spring) and when browse is most

palatable (fall). Currently browse provided by shrub species and aspen is limited throughout the VCNP. Browse plants are heavily grazed by elk with as much as 100% of one year's production being consumed in some areas (Krantz, J. K.; December 31, 2001). Historically, browse in the form of young shrubs and aspen were more plentiful within the VCNP and elsewhere on the Jemez Mountain landscape as a result of frequent low severity ground fires. The lack of fire and historic heavy grazing by elk and livestock has diminished browse availability.

Grazing livestock with forage use levels of 35% in the uplands and 35% (15%) in riparian areas would not create excess forage demand that would result in livestock use of browse. Shrubby cinquefoil is the primary browse plant within the open grassland pastures where livestock would be reintroduced. There would be little or no grazing pressure on shrubby cinquefoil by livestock; however, elk would continue to use this browse resource. In addition, elk but not cattle would be on the VCNP in late fall when browse plants (aspen, oak, ocean spray, snow berry and currants) are the most palatable. There should be little or no overlap of dietary needs of cattle and elk for the browse component.

Current estimates of elk herd size for the Jemez Mountain landscape (Unit 6) is 4500 head (NMDG&F) and during the winter of 2002 as many as 2500 elk remained on the VCNP due to below normal snowfall. Evaluation of forage conditions March 25, 2002 found forage use in the upper Jaramillo drainage was approximately 80% of the remaining forage from the previous year's growth provided by Kentucky bluegrass (Brett O'Haver, per. comm.). In addition, selective grazing by elk was evident. Elk were grazing on young growth provided by Kentucky bluegrass and riparian plant communities with little or no use of forage in upland plant communities. The least palatable grasses (Arizona fescue) showed approximately 15% use in the Jaramillo watershed, but little or no use was observed on this species elsewhere in the VCNP. Elk will selectively forage the most palatable grasses early in the spring prior to spring green up. Without disturbance by humans (hunting, vehicles, and livestock grazing), elk have remained on the VCNP in larger numbers than during times when the VCNP was actively managed as a ranch. The lack of disturbance combined with below normal snowfall has provided a sanctuary for the elk herd. The absence of disturbance has apparently changed their behavior reducing elk numbers residing outside the VCNP in areas they historically occupied across the Jemez Mountains. It can be anticipated that during winters with below normal snowfall larger than normal proportion of the elk herd will remain on the VCNP during the winter. During mild winter conditions, elk can consume much of the forage remaining from the previous years growth as well as a significant portion of the available browse.

Implementation of **Alternatives 1, 2 or 3** could alter current elk behavior. The reintroduction of livestock into the caldera, and the proposed livestock management activities (active herding by range riders), would likely cause the elk to seek more remote areas of the VCNP where livestock are not present. Elk would continue to use traditional areas heavily such as the Jaramillo watershed, old harvest units, and sub-alpine grasslands on steep south facing slopes. Active management of livestock along with the anticipated change in elk behavior would likely result in reduced grazing pressure on riparian-wetland communities in both the San Antonio Creek and East Fork Jemez River.

Cumulative Effects

The presence of livestock and herding practices combined with road reconstruction, recreation activities, and fall elk hunts could cause elk to seek areas that they periodically occupied prior to the Baca Ranch becoming the VCNP. Although we understand that during winters of below normal snow accumulations a relatively large (approx. 2500) elk herd would remain on the VCNP, how the elk herd would respond to the combined effects of a diversity of land management activities, including recreation and hunting. They are likely to change their behavior based on observations of the elk herds on the Valle Vidal on the Carson National Forest. Shortly following acquisition of the Valle Vidal

prior to implementation of active management, the elk herds behaved similar to those on the VCNP; however, following implementation of recreation, hunting, and other land management activities the herds remain remote (>300 yards distance) and used smaller meadows and steeper mountain terrain (per. Comm. George Long, Wildlife Biologist Carson National Forest).

Elk are likely to re-enter the Bandelier National Monument and portions of the Los Alamos National Laboratory where there is little or no disturbance, no hunting pressure, and suitable habitat. The elk herds are likely to re-enter traditional areas throughout the Jemez Mountains affecting private and Forest Service fence lines, grassland, and browse communities. The Cerro Grande Burned Area is immediately adjacent to the VCNP and currently provides considerable early browse in the form of regenerating aspen near the Pajarito Ski area and Gambels oak fields at lower elevations, and forage where seeding for watershed restoration has occurred. During the spring of 2001 there was little or no browsing pressure on these communities (JCP: personal observations). There is abundant browse and forage resources for elk outside the VCNP and the surrounding Jemez Mountains. These areas include the Cerro Grande Wildfire (2000), Dome Wildfire (1996), the Buchannon Rx Burn (1994), and the Lino Prescribed Burn (implemented 2001/Coyote Ranger District). Projects planned in the foreseeable future for implementation throughout the Santa Fe National Forest that would improve and/or provide forage and browse habitat include the Stable Mesa Prescribe Burn, Virgin Mesa Wildland Urban Interface (WUI) Project, the Chaparral WUI, Gallina WUI, Mesa Poleo WUI, and the San Pedro Mountain Landscape Forest Health projects. In addition, there is suitable summer and winter habitat in the Chama and San Pedro Parks Wildernesses.

The Jemez Mountains Seeking Common Ground (SCG) Committee concluded that social carrying capacity is generally lower than the ecological carrying capacity. Past elk management decisions have fluctuated widely from year-to-year primarily due to social/political issues. In fact, the Jemez Mountains SCG project was initiated to address elk-related social/political issues. Evaluations of browse species throughout the VCNP conducted in the summer of 2001 found that browse use was heavy, with as much as 100% of the current years growth being browsed (Krantz). Favored browse plants include but are not limited to aspen, Gambels oak, New Mexico locust, Ocean Spray, and Shrubby cinquefoil.

In 2000, the NM Game Commission established an objective of approximately 4,500 elk. This number can be considered the current social/political carrying capacity. The Commission’s decision was based on the information above as well as recommendations from the NMDG&F, public opinion, political influence, and agency/landowner involvement.

Elk Population Ecological Carrying Capacity:

Ecological carrying capacity is difficult to describe due numerous and many times confounding environmental, temporal, and biological variables. Given the fact that it is difficult to design scientific research to definitively establish “ecological” carrying capacity, one approach is to look at grazing data over the last 20 years to “back-in” to an approximation of ecological carrying capacity.

Assuming that historic data can give us a reasonable estimate of ecological carrying capacity, the grazing data from the last 20 years indicates that the Jemez Mountains, excluding Tribal and private lands (data not available), can support at least the equivalent of 9500 cattle year a cattle year is equal to the habitat needed to support one cow for 1 year.

Table 3-4 Elk Ecological Carry Capacity

Total cattle years	5,700 cattle years
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Total elk to cattle equivalents for an 8000 elk population	3,800 cattle years
Total	9,500 cattle years

A total of 9,500 cattle years are equivalent to 13,600 adult and sub-adult elk. Based on this, the Jemez Mountains, exclusive of Tribal and private lands, can support at least 9,500 cattle or 13,600 elk, yearlong...or a combination of cattle and elk.

This analysis indicates that the cumulative effects of elk-livestock interactions throughout the Jemez Mountains would be positive. Elk and livestock herd numbers are currently below the ecological carrying capacity.

Non-KEY Issue: MULE DEER HABITAT

Implementation of an interim grazing program on the VCNP could put livestock and deer in competition for forage and browse within a common landscape.

It is unlikely that the behavior or habitat of mule deer would be effected by the direct and indirect effects of implementing any Alternative (1-4). Currently the VCNP provides little suitable habitat for mule deer. Mule deer require relatively even proportions of grasses, forbs, and browse as well as thermal and hiding cover. Critical habitat for deer is often their winter range, of which, the VCNP provides little or none. As with the discussion concerning elk effects, there are areas surrounding the VCNP that provide young browse and forage, and important winter habitat.

Cumulatively future planned projects on the Santa Fe National Forest would contribute to the browse component that is limited when compared to historical conditions prior to the turn of the century when frequent low severity fires maintained open grasslands and available young or regenerating shrubs.

Non-KEY ISSUE: PROPOSED THREATENED AND ENDANGER SPECIES

Implementation of an interim grazing program on the VCNP could effect Threatened, Endangered and Sensitive species habitats, etc.

Implementation of any Alternative including the No Action Alternative would have a “No Effect” for all Threatened and Endangered Species. Please see the following table (Table 3-5).

Gunnison’s Prairie dogs Black-footed ferret

Prairie dogs (Gunnison’s) have been identified to be present within the Valles Caldera. Based on this analysis, grazing has not been shown to impact prairie dog colonies and that no activities are planned that would impact these colonies, the The VCNP Trust determined that implementation of the **Action Alternatives** (Alts 1, 2 or 3) and the **No Action Alternative** (Alt. 4) would result in a "No Effect" situation for the black-footed ferret.

No black-footed ferrets are known to exist outside of the captive and reintroduced populations in Wyoming, Montana, South Dakota, Arizona and New Mexico. The best information available indicates that the black-footed ferret is apparently extirpated from the wild in New Mexico. The available literature indicates that grazing (including intense use) does not have negative impacts on prairie dog colonies, which are the prey base for the black-footed ferret.

Because the proposed action (livestock grazing and associated activities) for the Valles Caldera has a "No Effect" for the Black-footed Ferret, there would be no incremental increase in the existing or foreseeable future cumulative impacts within New Mexico for this species. The cumulative impacts presently existing (e.g., federal, private, state activities) for this species would not change due to this action.

Southwestern Willow Flycatcher

No riparian/wetland areas of the size/structure needed to support Southwestern willow flycatchers have been identified within the Valles Caldera. In addition no activities that would impact riparian habitat would be allowed as part of the proposed action. The VCNP Trust has determined that implementation of the **Action Alternatives** (Alts 1, 2 or 3) and the **No Action Alternative** (Alt. 4) would result in a "No Effect" situation for the Southwestern willow flycatcher.

The VCNP Trust will continue to implement measures (through implementation of one of these Action Alternatives and other planned projects) to protect, improve, and enhance riparian habitat for all riparian species including the southwestern willow flycatcher. No habitat (e.g., riparian/wetland areas) of the size/structure have been identified on the Valles Caldera lands that would support the Southwestern willow flycatcher.

Because the proposed action (livestock grazing and associated activities) for the Valles Caldera has a "No Effect" for the Southwestern willow flycatcher, there would be no incremental increase in the existing or foreseeable future cumulative impacts within New Mexico for this species. The cumulative impacts presently existing (e.g., federal, private, state activities) for this species would not change due to this action.

Bald Eagle

During the most recent survey (2001) bald eagles were not using the Valles Caldera during the summer months when grazing will be occurring. In addition no activities are planned that would disturb their habitat (e.g. remove large trees, affect prey base-fish). Based on the analysis, the VCNP Trust has determined that implementation of the **Action Alternatives** (Alts 1, 2 or 3) and the **No Action Alternative** (Alt. 4) would result in a "No Effect" situation for the bald eagle.

Habitats (e.g., streams/rivers/waterbodies) have been identified on Valles Caldera lands that would support the bald eagle. No activities that would impact these habitats are planned or anticipated to occur. Bald eagles are known to migrate seasonally through the area and winter within the Valles Caldera. Grazing will be occurring from June thru September and no impacts on the bald eagle are anticipated.

Because the proposed action (livestock grazing and associated activities) for the Valles Caldera has a "No Effect" for the bald eagle, there would be no incremental increase in the existing or foreseeable future cumulative impacts within New Mexico for this species. The cumulative impacts presently existing (e.g., federal, private, state activities) for this species would not change due to this action.

Mexican Spotted Owl

Based on the analysis that the potential Mexican spotted owl habitat occurring within the Valles Caldera will not be grazed as part of the proposed action, the VCNP Trust has determined that implementation of the **Action Alternatives** (Alts 1, 2 or 3) and the **No Action Alternative** (Alt. 4) would result in a "No Effect" situation for the Mexican spotted owl.

Potential habitat (e.g., forest/canyon) exists on the Valles Caldera lands to support this species. However, this habitat is outside of the grassland habitat that will be grazed as part of the proposed action and no impacts are anticipated.

Because the proposed action (livestock grazing and associated activities) for each allotment has a "No Effect" for the Mexican spotted owl, there would be no incremental increase in the existing or foreseeable future cumulative impacts within New Mexico for this species. The cumulative impacts presently existing (e.g., federal, private, state activities) for this species would not change due to this action.

Mountain Plover

Mountain plover habitat is lacking within the Valles Caldera due to the lack of bare ground and grasslands that are maintained at a higher level than 4 inches. Livestock grazing has not been shown to affect mountain plovers and no activities are planned (e.g., land conversion, prairie dog control) that would affect what limited habitat presently exists. Based on the above, the VCNP Trust has determined that implementation of the **Action Alternatives** (Alts 1, 2 or 3) and the **No Action Alternative** (Alt. 4) would result in a "No Effect" situation for the mountain plover.

Mountain plover habitat is virtually non-existence within the Valles Caldera due to lack of bare ground and grasslands that are maintained at a higher lever than 4 inches. No actions (e.g., land treatments, prairie dog control) are planned within the Valles Caldera that would affect mountain plover habitat that presently exists.

Because the proposed action (livestock grazing and associated activities) for the Villes Caldera has a "No Effect" for Mt. Plovers, there would be no incremental increase in the existing or foreseeable future cumulative impacts within New Mexico for this species. The cumulative impacts presently existing (e.g., federal, private, state activities) for this species would not change due to this action.

Whooping Crane

Based on the analysis that no habitat exists (e.g., rivers/streams associated with agricultural fields) to support this species within the Valles Caldera, the VCNP Trust has determined that implementation of the **Action Alternatives** (Alts 1, 2 or 3) and the **No Action Alternative** (Alt. 4) would result in a "No Effect" situation for the whooping crane.

No suitable riparian/agricultural habitat occurs on the Valles Caldera. This population is designated as a non-essential experimental population. There are a very limited number of individuals (1-2) left in this experimental population. Whooping cranes would be considered rare migrants to the Valles Caldera area, and it would be extremely unlikely that any whooping cranes would occur within the area.

Because the proposed action (livestock grazing and associated activities) for the Villes Caldera has a "No Effect" for whooping cranes, there would be no incremental increase in the existing or foreseeable future cumulative impacts within New Mexico for this species. The cumulative impacts presently existing (e.g., federal, private, state activities) for this species would not change due to this action.

Yellow-billed cuckoo

No riparian/wetland areas of the size/structure needed to support yellow-billed cuckoo have been identified within the Valles Caldera. In addition no activities that would impact riparian habitat would be allowed as part of the proposed action. Based on the above analysis, the VCNP Trust has determined that implementation of the **Action Alternatives** (Alts 1, 2 or 3) and the **No Action**

Alternative (Alt. 4) would result in a "No Effect" situation for the yellow-billed cuckoo. No habitat (e.g., riparian/wetland areas) of the size/structure have been identified on the Valles Caldera lands that would support the yellow-billed cuckoo.

Because the proposed action (livestock grazing and associated activities) for the Valles Caldera has a "No Effect" for yellow-billed cuckoo, there would be no incremental increase in the existing or foreseeable future cumulative impacts within New Mexico for this species. The cumulative impacts presently existing (e.g., federal, private, state activities) for this species would not change due to this action.

Rio Grande Silvery Minnow

Based on the analysis that the Rio Grande silvery minnow does not occur within the Valles Caldera, the VCNP Trust has determined that the implementation of the **Action Alternatives** (Alts 1, 2 or 3) and the **No Action Alternative** (Alt. 4) would result in a "No Effect" situation for the Rio Grande silvery minnow.

Riparian and aquatic habitat management to protect and enhance riparian areas within the Valles Caldera will continue. Although such management practices aimed at restoring or maintaining Proper Functioning Condition (PFC) would benefit wildlife species and resource values (e.g., limit soil erosion) within the Valles Caldera, it is not expected that such efforts would provide measurable benefits to the Rio Grande silvery minnow.

Known distribution of the Rio Grande silvery minnow in New Mexico is limited (Cochiti Dam to Elephant Butte Reservoir). The Valles Caldera does not administer any lands or authorize any activities within or adjacent to known habitats of this species.

Because the proposed action (livestock grazing and associated activities) for the Valles Caldera has a "No Effect" for Rio Grande silvery minnow, there would be no incremental increase in the existing or foreseeable future cumulative impacts within New Mexico for this species. The cumulative impacts presently existing (e.g., federal, private, state activities) for this species would not change due to this action.

Table 3-5 Proposed Threatened and Endanger Species

Species	Classification	Determination of Affect	County
Mammals			
Black-footed ferret	Endangered	No Effect	Sandoval
Birds			
Southwestern Willow Flycatcher	Endangered	No Effect	Sandoval
Bald Eagle	Threatened	No Effect	Sandoval
Mexican Spotted Owl	Threatened	No Effect	Sandoval
Whooping Crane	Nonessential Experimental	No Effect	Sandoval
Mountain Plover	Proposed Threatened	No Effect	Sandoval
Yellow-billed cuckoo	Candidate	No Effect	Sandoval

Fish			
Rio Grande Silvery Minnow	Endangered	No Effect	Sandoval

KEY ISSUE: SOCIO-CULTURAL CONCERNS

The Valles Caldera National Preserve is one of the most aesthetically beautiful and culturally valued landscapes in New Mexico and the United States. Historically, the VCNP has been valued for its resources (forage, wildlife, geothermal, timber production) and its beauty. These interests remain as strong today. Prehistorically and today, the Valles Caldera National Preserve remains a sacred and spiritually significant place for Native Americans and others of diverse backgrounds. These cultural interests may be affected by reestablishing grazing on the VCNP.

Direct, Indirect and Cumulative Effects

Re-instituting grazing on the VCNP would affect some of these interests. The cultural effects of implementing any Action Alternative or the No Action Alternative would have an effect on the cultural interests of at least a portion of the interested public. These effects are extremely difficult to quantify and what follows is a qualitative assessment of those potential effects.

Some of the Identified Culture Interests:

Livestock operators interests in grazing livestock:

Cultural/Traditional values of grazing livestock.

Importance of raising livestock to provide meat and supplemental income.

Managing livestock on their own.

Recreating and touring Public (Aesthetic/Economic):

Camping/Hiking experience for recreationists.

VCNP touring or viewing from New Mexico Highway 4.

Hunting of elk by individuals and outfitter guides.

Fishing experience for anglers.

Spiritual (Aesthetics/Religious):

Spiritual significance for Pueblos (e.g. Jemez, Santa Clara, San Ildefonso, Santa Ana, Zia, Cochiti) and other Nations or Tribes (including Navajo).

Spiritual significance for individuals and groups.

Concerns of stock drifting to Pueblo lands.

Spiritual significance of landforms, heritage resource sites, and shrines.

New Mexico Livestock Operators

The effects of implementing Alternatives 1, 2 or 3 would have indirect and cumulative effects on a cultural level. Implementation of one of the Action Alternatives would partially meet some of the expectations of local ranches with respect to grazing on the VCNP.

The livestock community of northern New Mexico has expressed a great deal of interest in running livestock on the VCNP. Ranchers recognize that the VCNP has a healthy forage base that can support successful livestock operations. Existing permittees on the Santa Fe and Carson National Forests look forward to running stock on the VCNP, not only for an opportunity to expand or enhance their operations but to relieve pressure on Forest Service allotments. Others operators who rely on BLM permits or private land or who may be seeking new or additional summer grazing land view the VCNP as the potential source of new opportunity. Many expect or hope that livestock numbers would be near

the historical levels run by the Dunigan Family. Grazing up to 2000 head (**Alternative 1**) does not meet those expectations, and **Alternative 2 and 3** fall short by even a greater margin. Clearly, none of the Action Alternatives nor **Alternative 4 (No Action)** satisfies the hopes of those who desire intensive, large-scale livestock operations on the VCNP in the near future.

Additionally, livestock on the VCNP would be managed differently from livestock on traditional Forest Service or BLM allotments. Although some public land grazing associations rely on hired range riders, most livestock operators in northern New Mexico herd, doctor, and generally tend their own stock. Under Alternatives 1-3, however, livestock on the VCNP would be managed, herded, and doctored by employees of the VCNP and not the owners of the livestock and their family members. While this would relieve participating stockmen of many of the burdens of day-to-day management, some prospective participants have expressed concern that their opportunities for taking care of their stock and visiting their herd would be restricted.

The economic loss that could occur if livestock were not run on the VCNP would be realized as a loss of opportunity for livestock operators to participate, where historically, they have not had that opportunity because the Baca Ranch was stocked by steers from other areas. Not grazing livestock (Alternative 4) on the VCNP would not represent an economic loss to northern New Mexico ranchers, at least in comparison to ranch operations conducted by the previous owners. The Dunigan family stocked the ranch with steers recruited from outside the immediate region. Therefore, implementing Alternative 1, 2 or 3 represents an opportunity for local livestock operators, and Alternative 4 would represent a loss of opportunity.

Although many understand that the grazing fees to run stock on the VCNP would accommodate the cost normally borne by the owners of the livestock, many others are more than willing to perform such tasks at their own expense and effort. Normally northern New Mexico livestock operators (large or small operations) perform their own veterinary care (within their ability) or hire a vet to perform these tasks. Herding cattle is not traditionally done; however, livestock owners typically move their stock from pasture to pasture, and check on their herds frequently. Livestock operators would also not have an opportunity to perform cattle ranching activities that are important culturally and economically. activity.

Recreating Public

The recreating public sees in the VCNP opportunities to hike, fish, and “trek” across the valleys of the caldera. For generations now, folks have looked into the VCNP from New Mexico Highway 4 and from surrounding peaks on Forest Service lands wishing for the opportunity to explore one of the most beautiful places in New Mexico. Although the Alternatives do not address recreation nor is recreation part of the proposed actions, members of the public have expressed resentment that livestock would be the first “visitors” to the Preserve. Many also feel that livestock would detract from the aesthetic beauty of the Preserve and harm its ecological health.

People who feel that livestock should not be run on the Preserve would clearly be disappointed by implementation of Alternative 1, 2 or 3. These people would find only Alternative 4 (No Action) satisfactory. Implementation of Alternative 3 provides the opportunity to leave one of the major valleys (e.g. the Valle Grande) absent of stock and could provide a view without cattle along NM Highway 4.

It is likely that herding stock would alter the behavior of elk and could affect the opportunity for wildlife viewing. Many people familiar with the area will recall that large herds of elk, including concentrations of bulls, are frequently visible from NM Highway 4 and elsewhere along the perimeter

of the Preserve during recent years when the former owners grazed large numbers of steers. Nevertheless many individuals feel that opportunities for elk viewing and scenic enjoyment would be diminished by implementation of any action alternatives. Indeed, we expect that changes in elk behavior would occur with all the anticipated activities (cattle grazing, road reconstruction, research activity, hunting and recreation tours) and that could reduce the duration and frequency of when elk would occupy the Valle Grande and the rest of the Preserve.

The recreational experience of many would be diminished, for many people, by the presence of the livestock herds, “cow pies,” and mooing cows. Where many livestock operators may find the presence of livestock appealing, most recreationists would not. None of the alternatives, however, would affect winter recreational activities.

It is unlikely that the visual integrity of the Preserve, except for presence of livestock, would be altered by implementing Alternative 1, 2 or 3. Vegetation within the valleys would not be altered and forested communities would remain intact. It may be possible to see the elk-livestock enclosures from a distance, but these enclosures will be placed to minimize their impact on major scenic vistas. Moreover, the large size of the enclosures will cause them to appear more as pasture fences than as discrete, intrusive structures.

Anglers are concerned that opportunities for successful fishing would be diminished by declines in water quality and aquatic habitat. Many feel cattle are a primary cause of fishery degradation. In the VCNP, however, a thorough assessment of the conditions that contribute to the decline in the aquatic resources point to the cumulative effects of past timber harvest and road construction, the existing poor road conditions and lack of maintenance along with historic heavy grazing pressure has caused channel instability and declines in aquatic habitat. Historical heavy grazing by sheep and later by cattle has contributed to these conditions, and have helped to create the existing vegetative conditions in riparian-wetland areas. Continued heavy grazing by elk appears to maintain the present conditions. The monitoring program associated with Alternatives 1-3 (Chapter 1 Actions Common to All Alternatives) is designed to measure and describe the relative impacts of cattle and elk grazing on both stream-bank stability, and riparian and wetland vegetation. This information will provide a foundation for improved future management directed toward recovery of aquatic and riparian habitats.

Spiritual

Clearly the Valles Caldera and surrounding high mountain landforms and peaks hold tremendous spiritual significance to neighboring Pueblos and other folks. For hundreds of years the neighboring Pueblo communities surrounding and within the Jemez landscape have turned to this area for rituals and ceremonies that are extremely important to their spiritual ways of life and connections to the earth. Few outside the Pueblo communities understand the breadth of the activities and significance of the Jemez Mountains, including the VCNP, to their cultural and spiritual life. Hunting for game and gathering food was historically imperative to the local Nations, Tribes, and Pueblo communities. The evidence of neighboring Pueblos' presence is abundant in the form of lithic scatters and numerous other artifacts found in the VCNP (see Heritage Resources Chapter 1). The potential effects to artifacts by implementing any one of the Alternatives are addressed in the Heritage Resource section in this Chapter.

Concern over stock drifting over passes into the Pueblo of Santa Clara would be effectively mitigated through intensive herd management (See Chapter 2-Actions Common to All Action Alternative). Herd management should effectively limit the potential of stock migrating to the Pueblo of Santa Clara. The Valle Toledo pasture is immediately adjacent to the Pueblo of Santa Clara. Leaving the Valle Toledo pasture vacant of stock as one option in **Alternative 3** would limit the

potential of stock migration to surrounding lands. **Alternative 1 and 2** would limit this possibility by intensive herd management. Other concerns expressed by surrounding Native American communities deal with the possible desecration of spiritually significant areas, shrines, and landforms. The location and limited extent of proposed grazing in any of the Action Alternative limits these potential effects. High mountain peaks are not within proposed grazing areas. While we have only limited knowledge of the many areas important to Native American, we can say that by limiting the spatial extent of grazing and, thus, limiting the potential to alter spiritually important areas we are effectively limiting the possibility of affecting these areas.

HERITAGE RESOURCES

Potential effects to heritage resource properties include both direct and indirect impacts. In general, direct impacts of grazing may result through vandalism or from implementation of ground disturbing projects. Vandalism includes the intentional destruction of historic or prehistoric structures, illegal digging of artifacts, and collection of cultural material from the surface of a site. Examples of ground disturbing projects that could directly affect heritage resources include but are not limited to fence construction, cattle guard installation, earthen tank construction, and other range improvement activities which impact the surface of a site such as the installation of buried water pipelines. **Note that this grazing initiative specifically does not include any such ground disturbing activities. No livestock facilities or improvements are included in the project proposal.** The only planned ground disturbing activity is the proposed construction of elk-livestock exclosures.

Indirect adverse and cumulative effects to sites include but are not limited to: 1) increased erosion due to vegetation removal or changes in soil hydrology, 2) increased visibility and accessibility of heritage sites, 3) unintentional disturbance of sites including parking or driving over artifact scatters, 4) developing water facilities or building fence lines that result in the congregation or trailing of cattle in areas of high site density, and 4) driving heavy equipment off roads.

The following are the types of impacts that may occur on heritage resource sites related to cattle grazing in a given area:

- Artifact modification and breakage caused by trampling.
- Enhanced or exacerbation of existing erosion on archaeology deposits caused by hoof disturbance or vegetation removal.
- Surface feature alteration and ground disturbance on sites due to congregation of cattle generally around corrals or watering holes, or trailing along fence lines.
- Disruption of religious activities at sacred sites due to cattle being present or cattle manure being left behind.
- Damage to standing walls of ruins or cabins caused by leaning or bedding down near these masonry or log foundations.

While the effects of livestock for standing walls on prehistoric structures can be a concern in the Jemez Mountains surrounding the Valles caldera, no prehistoric sites with standing masonry walls are known to exist in the VCNP and their presence within the Preserve is considered highly unlikely.

Livestock Facilities

Construction of pasture fences, earthen stock tanks, pipelines and watering troughs, or corrals **are not proposed in any Alternative.** The livestock operation would use existing pasture fences, stock tanks, and corrals. However, existing facilities could require limited maintenance to diminish the effects of neglect. Cattle guards filled with silt might require heavy equipment to clean them out. Fences and corrals also would require limited maintenance. While these facilities already exist, no heritage resource clearance was conducted when they were initially installed. Prior to conducting ground-

disturbing maintenance, the areas would need to be surveyed and consultation with SHPO and neighboring tribes conducted. No such locations have been identified at present.

The only ground disturbing activity planned is the construction of elk-livestock exclosures in several riparian areas (See Chapter 2 Actions Common to All Action Alternatives). The actual locations for the exclosures have not yet been determined. Once the locations are identified, archaeological survey will be conducted to determine whether heritage resources are present. The location of exclosures in riparian areas has two implications for heritage resource protection. First, the probability of sites in such locations is less than in non-riparian grasslands located higher up the valley slopes. Second, the dense grassy vegetation in the riparian areas can diminish ground visibility to zero. The most effective survey strategy will be to use shovel probes (e.g. 25 cm diameter) placed at regular intervals to examine soils below the dense grasses. While this survey method is not often used in the southwest, it is well established as a common approach in many other areas of the country.

As exclosures rather than enclosures, these fenced areas would not concentrate the effects of livestock presence but rather minimize or isolate such effects. The only potential impact of the exclosures to extant archaeological properties is involved in the construction of the fencing; there is no anticipated potential for indirect or cumulative adverse effects. If proposed exclosure locations are found to have archaeological deposits, one of two approaches will be selected in consultation with archaeologists involved in the planning process and with the NM State Historic Preservation Officer. The first approach would be to relocate the exclosure to an alternate location without heritage resources. The second would be to use any exclosure located within a site as an opportunity to undertake archaeological monitoring of elk and livestock grazing effects. The information gathered about effects of grazing to vegetation and soils will be directly applicable to evaluating the potential for impacts of grazing to archaeological deposits. These monitoring locations would provide an opportunity to compare the actual effects of grazing outside the exclosure to ungrazed areas inside the exclosure. If the exclosures are allowed within archaeological sites, 1) the digging of fence posts would be undertaken as archaeological shovel testing by professional archaeologists and all other construction activities would be observed by archaeologists, and 2) a protocol would be created to make systematic observations prior to installation of the exclosures and then periodically over the course of the grazing initiative.

Grazing

The potential for direct and indirect effects of grazing to heritage resources in the Valles Caldera National Preserve varies little by location. Essentially there are three main valleys or pastures included in the grazing proposal. Overall, the kinds of sites within all of the pasture areas are lithic scatters and quarries, and a few rockshelters. **These sites are not likely to be adversely effected by the low intensity grazing proposed in the current grazing initiative through implementation of any Action Alternative.** Further, the use of range riders to keep cattle moving, to direct cattle away from sensitive areas, and to discourage congregating of livestock in favored areas minimizes the potential for most kinds of impacts of concern.

EFFECTS OF DIFFERENT ALTERNATIVES

The proposed grazing initiative is not expected to have an adverse effect to heritage resources, either directly or indirectly through implementation of Alternative 1, 2, or 3. Implementation of the No Action Alternative would eliminate any possible effects to heritage resources by livestock. The effects to the heritage resources by elk would continue without alteration of their behavior as is anticipated by herding of livestock and other activities within the VCNP.

The kinds of archaeological sites, conditions or activities that could be affected include: 1) artifact modification and breakage caused by trampling, 2) erosion of stable archaeology deposits through ground disturbance and vegetation removal due to congregation of cattle around corrals or water sources, or trailing along fence lines, and 3) disruption of religious activities at sacred sites by the presence of cattle or manure being left behind. For the kinds of archaeological sites that occur within the project area, the potential for all but the last effect is determined by the intensity and concentration of cattle grazing.

The low stocking rates and use levels would result in a low intensity of animal land use, and thus little potential for trampling or hoof effects on archaeological sites. Intensive herd management by range riders would minimize grazing concentration in any given area by increasing the movement and the dispersion of use across the valleys/pastures. Use of range riders to direct livestock away from areas that have heritage resource concerns, such as intact deposits within rockshelters or the presence of existing unstable sites, would effectively limit the potential for grazing livestock to affect Heritage Resources.

Two rockshelters identified in the project area will be treated as sensitive heritage resources requiring focused protection from cattle presence. This will be accomplished in one case by defining the pasture boundary across the road from the shelter locations, and in the second case by closing access to the shelter entrance. Further, in both cases range riders will be used to keep livestock away from these locations.

Implementation of the No Action Alternative (Alternative 4) would effectively eliminate any possibility of affecting heritage resources by grazing livestock, either directly, indirectly, or cumulatively. Here there would be no *direct* effect to heritage sites caused by cattle operations. However, existing conditions of unstable or altered heritage resources would continue. For example, erosion that is already occurring at archaeological sites would not be monitored. Erosion at dirt tanks as a result of neglect would not be evaluated for potential repair. Under the no action alternative these problems would persist and could have an undocumented negative effect on heritage sites. More broadly, the proposed grazing initiative is an excellent opportunity to observe and assess the actual effects of grazing. Information gained from this evaluation would not be gathered under the **No Action Alternative**, and future development of the long-term management plan would proceed without benefit of this information.

The cumulative effects of implementation of Alternative 1, 2 or 3 could but is unlikely to have adverse effects to the Heritage Resources of the VCNP. Potential cumulative effects that seem most relevant in the context of the Action Alternatives include combining the effects of the proposed grazing with 1) the effects of past grazing, 2) known or anticipated road maintenance activities, or 3) recreational access to the Preserve. As discussed above, adverse effects from grazing in areas with a legacy of erosion are unlikely because livestock would be managed in any Action Alternative to maximize the retention of vegetation, improve ground cover, and avoid known heritage resource sites or sensitive areas by herding with range riders. Ground disturbance from road construction and bridge replacement would require survey to inventory the presence of archaeological sites and to assess the current condition of such sites. Implementation of such projects would require that any adverse effects anticipated due to combination with grazing be addressed in the preservation and monitoring plan for those projects prior to implementation. Finally, the potential effects of recreational activities when combined with grazing are the most difficult to estimate and to control. Although it is unlikely that surface artifacts would become more visible through implementation of any one grazing alternative, the future presence of hikers, anglers, and campers does increase the potential of recreational artifact collection, minor excavation, and/or surface disturbance in areas that currently lack effective ground

cover. Any recovery of vegetation and decrease in erosion will diminish the overall visibility of artifacts, and thus reduce the potential loss of valuable archaeological information to collectors; all three Action Alternatives include measures to realize vegetation recovery and to decrease on-going erosion.

Non-KEY ISSUE: EAST FORK JEMEZ WILD AND SCENIC RIVER DESIGNATION

Implementation of an interim grazing program could affect the conditions and qualities for which the East Fork Wild and Scenic Jemez River was designated.

There would be no direct effects to the designated section of the East Fork Jemez Wild and Scenic River through implementation of any Action Alternative (1, 2 or 3). It is also, unlikely that the indirect and cumulative effects of implementation an Action Alternative would affect the qualities for which the Wild and Scenic East Fork Jemez River was designated. There is a possibility that the water quality may be improved cumulatively through implementation of all the projects planned in the foreseeable future through reduction in known sources of sediment and improved overall watershed conditions. Improvement in the overall watershed conditions within the VCNP may indirectly and cumulatively positively effect the Wild and Scenic Section of the East Fork Jemez River.

Non-KEY ISSUE: ECONOMICS

Implementation of an interim grazing program could affect the economics of the VCNP, local livestock industry and the surrounding communities. Based on \$10.00 per AUM to grazing livestock on the VCNP; there would be gross receipts of up to approximately \$80,000 (Table 3-6). These receipts would not be sufficient to support the entire costs of operating the VCNP through the interim grazing program. These dollars would cover a portion of the costs of range riders and fences repairs, but would not cover all operating costs, many of which cannot be fully attributed to the grazing program.

Table 3-6 Receipts from Livestock Grazing

	Receipts from Livestock Grazing
Alternative 1	\$79,750-80,000
Alternative 2	\$54,230-80,000
Alternative 3	\$27,490-67,560
Alternative 4 No Action	\$000

The County and local government would benefit from livestock running on the VCNP through taxes levied on privately owned livestock. This would be a net increase in funds over previous taxes when stock was brought into the VCNP from locals outside New Mexico.

Appendix A

Appendix B

Threatened, Endangered and Other Special Status Species

Six federally listed threatened and endangered, one proposed threatened, one candidate, Twenty seven species of concern, and fourteen state of New Mexico Threatened and Endangered species are known or potentially could occur on lands within Sandoval County (USDI, FWS 2001, NMDG&F 1998, Sivinski and Lightfoot 1995). However, because of the specific habitats used by these species, they may occur with the broad borders of Sandoval County but not occur within the Villas Caldera.

The following serves only as an example of the general vegetative/habitat communities and the potential listed, proposed and species of concern that might use the Valles Caldera. Many of the more mobile species (birds, bats) may use several different communities throughout the year.

Shrub-grassland communities: The species of the shrub-grasslands include the bald eagle, Western burrowing owl, ferruginous hawk, loggerhead shrike, peregrine falcon, and New Mexico meadow jumping mouse. In addition, many species of bats use the shrub-grasslands as foraging areas.

Riparian/wetland communities: The species of this habitat include the bald eagle and peregrine falcon. In addition, many species of bats use the riparian/wetlands as foraging areas.

Ponderosa pine/mixed conifer: The species of the ponderosa pine include the Northern goshawk, Mexican spotted owl, American martin and wood lily. In addition, many species of bats use the ponderosa pine/mixed conifer community as foraging areas.

Special feature habitats: In addition to the three broad vegetative communities, numerous unique habitats (e.g., springs, caves, cliffs) exist within the area. These types of special habitats are generally confined to small areas and are scattered throughout the three broad vegetative communities. Bat species would use these areas throughout the Valles Caldera.

Chapter 4 (Alternative A)

THREATENED, ENDANGERED AND OTHER SPECIAL STATUS SPECIES:

The potential for the listed, proposed and candidate species' presence, including their habitats within the area, and any impacts on them resulting from implementation of the selected alternative are examined in a Biological Evaluation (BE). The BE covers the livestock grazing program, including any associated actions, and evaluates all listed, proposed and candidate species potentially found within Sandoval County (Refer to Appendix ??).

Informal consultation with the U.S. Fish and Wildlife Service under Section 7 of the Endangered Species Act is in progress. The results of the consultation will determine the course of action(s) needed to avoid adverse effects on the species under consideration.

Chapter 4 (Alternatives B, C, Etc.)

THREATENED & ENDANGERED AND OTHER SPECIAL STATUS SPECIES:

Refer to Alternative A.

References

- New Mexico Department of Game & Fish (NMDG&F). 1998
BISON-M (Biota Information System of New Mexico). Biological Database for New Mexico. Done in cooperation with the Bureau of Land Management, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, Bureau of Reclamation, U.S. Forest Service, and the University of New Mexico. Santa Fe, NM. (March 26, 1998)
- Sivinski, R. and K. Lightfoot. 1995.
Inventory of Rare and Endangered Plants of New Mexico. New Mexico Energy, Minerals, and Natural Resources Department; Forestry and Resources Conservation Division, Santa Fe, New Mexico.
- U.S. Department of Interior, U.S. Fish and Wildlife Service (USDI, FWS). 2001.
New Mexico County List Endangered, Threatened, and Candidate Species and Species of Concern. U.S. Fish and Wildlife Service, New Mexico Ecological Services Field Office, Albuquerque, NM. (August, 2001)

Biological Evaluation

Other Special Status Species (Sandoval County)

Twenty nine species of concern and fourteen State of New Mexico Threatened and Endangered species are known or have the potential to occur within Sandoval County (refer to the following list). However, because of the specific habitats used by these species, they may occur with the broad borders of Sandoval County but may not occur on the Valles Caldera.

<u>Special Status Species</u> (USDI, FWS 2001, NMDG&F 1998 Sivinski and Lightfoot 1995)	Listing
Big free-tailed bat (<i>Nyctinomops macrotis</i>)	SC
Goat Peak pika (<i>Ochotona princeps nigrescens</i>)	SC
New Mexico meadow jumping mouse (<i>Zapus hudsonius luteus</i>)	SC/ST
American martin (<i>Martes americana origenes</i>)	ST
Fringed Myotis (<i>Myotis thysanodes</i>)	SC
Long-eared myotis (<i>Myotis evotis</i>)	SC
Occult little brown bat (<i>Myotis lucifugus occultus</i>)	SC
Spotted bat (<i>Euderma maculatum</i>)	SC/ST
Townsend's big-eared bat (<i>Corynorhinus townsendii</i>)	SC
Ferruginous hawk (<i>Buteo regalis</i>)	SC
Loggerhead shrike (<i>Lanius ludovicianus</i>)	SC
Northern goshawk (<i>Accipiter gentilis</i>)	SC
Western burrowing owl (<i>Athene cunicularia hypugea</i>)	SC
Bald eagle (<i>Haliaeetus leucocephalus</i>)	FT/ST
American peregrine falcon (<i>Falco peregrinus anatum</i>)	SC/ST
Arctic peregrine falcon (<i>Falco peregrinus tundrius</i>)	SC
Southwestern willow flycatcher (<i>Empidonax traillii extimus</i>)	FE/SE
Gray Vireo (<i>Vireo vicinior</i>)	ST
White-faced ibis (<i>Plegadis chihi</i>)	SC
Whooping crane (<i>Grus americana</i>)	XN/SE
Common Black-hawk (<i>Buteo gallus anthracinus</i>)	ST
Broad-billed hummingbird (<i>Cynanthus latirostris magicus</i>)	ST
Baird's sparrow (<i>Ammodramus bairdii</i>)	SC/ST
Flathead chub (<i>Platygobio gracilis</i>)	SC
Rio Grande silvery minnow (<i>Hybognathus amarus</i>)	FE/SE
Rio Grande sucker (<i>Catostomus plebeius</i>)	SC
Rio Grande cutthroat trout (<i>Oncorhynchus clarki virginalis</i>)	SC
Jemez Mountain salamander (<i>Plethodon neomexicanus</i>)	SC/ST
New Mexico silverspot butterfly (<i>Speveria nokomis nitocris</i>)	SC
San Ysidro tiger beetle (<i>Cicindela willistoni funaroi</i>)	SC
William Lar's tiger beetle (<i>Cicindela fulgida williamlarsi</i>)	SC
Wrinkled marshsnail (<i>Stagnicola caperatus</i>)	SE
Gypsum phacelia (<i>Phacelia sp.</i>)	SC
Gypsum townsendia (<i>Townsendia gypsophila</i>)	SC
Knight's milk-vetch (<i>Astragalus knightii</i>)	SC
Parish's alkali grass (<i>Puccinellia parishii</i>)	SC
Wood lily (<i>Lilium philadelphicum</i>)	SE

FE = Federal Endangered, FT = Federal Threatened, XN = Nonessential experimental, SC = Species of Concern, ST = State Threatened, SE = State Endangered.

The Southwestern Willow Flycatcher, Bald Eagle, Whooping crane, and Rio Grande silvery minnow which are state listed species are also Federally

listed species and have already been evaluated (refer to Biological Evaluation).

Background:

Healthy Rangeland: The proposed action will maintain healthy rangelands by incorporating light utilization and movement of animals to assure appropriate vegetation rest.

Riparian Habitat Management: All riparian habitats have been classified as to the functioning condition. Protective measures have been identified (e.g., herding) that would maintain or if necessary move the area into the Proper Functioning condition category.

Habitat Requirements: All of these species require very specific habitats or a combination of habitats (e.g., riparian, aquatic, old growth forest, etc.) which provides the appropriate food, water and cover for survival. If the habitats necessary for the survival of particular species are not present or will not be grazed as part of the proposed action then it is assumed that the species associated with those habitats would not be impacted from livestock grazing. Example: The Mexican spotted owl is identified to occur within Sandoval County. Spotted owls use habitats that are dense old growth forests sometimes associated with steep canyon habitat. These habitats do occur in places throughout the Valles Caldera, however, none of these areas will be grazed as part of the proposed action. Consequently the Mexican spotted owl which occurs within Sandoval County will not be affected by this action and a "No Affect" determination is appropriate.

Known Distribution: Many species have only been found in very localized situations within New Mexico (e.g., Goat Peak Pike-known only from the Goat Peak area) and would be very unlikely to be found on the Valles Caldera outside of their specific known areas.

Accidental Migrants: Several of these species are rare or accidental migrants to northern New Mexico (e.g., White-faced ibis, common black hawk, Arctic peregrine falcon etc.). These species are only rarely seen within northern New Mexico (a few times a year) consequently it is very unlikely that these species would be found on the Valles Caldera.

Special Status Species Evaluation:

Healthy Rangeland: By maintaining a healthy rangeland condition, managing livestock grazing activities so as not to contribute to any vegetation degradation, and protecting riparian areas, a "May Affect-Not Likely to Adversely Affect" determination is appropriate for the following species.

Big free-tailed bat (<i>Nyctinomops macrotis</i>)	SC
New Mexico meadow jumping mouse (<i>Zapus hudsonius luteus</i>)	SC/ST
Fringed Myotis (<i>Myotis thysanodes</i>)	SC
Long-eared myotis (<i>Myotis evotis</i>)	SC
Occult little brown bat (<i>Myotis lucifugus occultus</i>)	SC
Spotted bat (<i>Euderma maculatum</i>)	SC/ST
Townsend's big-eared bat (<i>Corynorhinus townsendii</i>)	SC
American peregrine falcon (<i>Falco peregrinus anatum</i>)	SC/ST
Ferruginous hawk (<i>Buteo regalis</i>)	SC

Loggerhead shrike (<i>Lanius ludovicianus</i>)	SC
Western burrowing owl (<i>Athene cunicularia hypugea</i>)	SC
Gray Vireo (<i>Vireo vicinior</i>)	ST
Broad-billed hummingbird (<i>Cynanthus latirostris magicus</i>)	ST
Baird's sparrow (<i>Ammodramus bairdii</i>)	SC/ST
Jemez Mountain salamander (<i>Plethodon neomexicanus</i>)	SC/ST
New Mexico silverspot butterfly (<i>Speveria nokomis nitocris</i>)	SC
San Ysidro tiger beetle (<i>Cicindela willistoni funaroi</i>)	SC
William Lar's tiger beetle (<i>Cicindela fulgida williamlarsi</i>)	SC
Gypsum phacelia (<i>Phacelia sp.</i>)	SC
Gypsum townsendia (<i>Townsendia gypsophila</i>)	SC
Knight's milk-vetch (<i>Astragalus knightii</i>)	SC

Riparian: Riparian/aquatic habitats that are found on the Valles Caldera will be protected from grazing by herding livestock away from the riparian habitat. Consequently a "May Affect-Not Likely to Adversely Affect" determination is appropriate for the following species.

flathead chub (<i>Platygobio gracilis</i>)	SC
Wrinkled marshsnail (<i>Stagnicola caperatus</i>)	SE
Parish's alkali grass (<i>Puccinellia parishii</i>)	SC

Habitat Requirements: All of the following species require very specific habitats or a combination of habitats (e.g., old growth forest, large cottonwood gallery forest, etc.) that if they occur with the Valles Caldera will not be grazed as part of the proposed action. Consequently a "No Affect" determination is appropriate for the following species.

American martin (<i>Martes americana origenes</i>)	ST
Northern goshawk (<i>Accipiter gentilis</i>)	SC
Wood lily (<i>Lilium philadelphicum</i>)	SE

Known Distribution: The following species have only been found in very localized situations within Sandoval county but are not known from the Valles Caldera. Consequently a "No Affect" determination is appropriate for the following species.

Goat Peak pika (<i>Ochotona princeps nigrescens</i>)	SC
Rio Grande sucker (<i>Catostomus plebeius</i>)	SC
Rio Grande silvery minnow (<i>Hybognathus amarus</i>)	FE/SE
Rio Grande cutthroat trout (<i>Onchorhynchus clarki virginalis</i>)	SC

Accidental Migrants: Several of these species are rare or accidental migrants to northern New Mexico. Because these species are only rarely seen within northern New Mexico (a few times a year) it is very unlikely that these species would even use any particular allotment, or be affected by the grazing operation. Consequently a "No Affect" determination is appropriate for the following species.

White-faced ibis (<i>Plegadis chihi</i>)	SC
Common Black-hawk (<i>Buteo gallus anthracinus</i>)	ST
Arctic peregrine falcon (<i>Falco peregrinus tundrius</i>)	SC

Based on the Environmental Assessment: (maintaining healthy rangeland and riparian habitat, known distribution, rare/accidental migrants, and specific habitat requirements, it has been determined that implementation of

the grazing program identified within the EA, would create a "No Affect" or a "May Affect-Not Likely to Adversely Affect" situation for all of these Special Status Species.

References

- New Mexico Department of Game & Fish (NMDG&F). 1998.
BISON-M (Biota Information System of New Mexico). Biological Database for New Mexico. Done in cooperation with the Bureau of Land Management, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, Bureau of Reclamation, U.S. Forest Service, and the University of New Mexico. Santa Fe, NM. (March 26, 1998)
- Sivinski, R., and K. Lightfoot. 1995.
Inventory of Rare and Endangered Plants of New Mexico. New Mexico Energy, Minerals, and Natural Resources Department; Forestry and Resources Conservation Division, Santa Fe, New Mexico.
- U.S. Department of Interior, U.S. Fish and Wildlife Service (USDI, FWS). 2001.
New Mexico County List Endangered, Threatened, and Candidate Species and Species of Concern. U.S. Fish and Wildlife Service, New Mexico Ecological Services Field Office, Albuquerque, NM. (August, 2001)

Biological Evaluation
For
Livestock Grazing

Valles Caldera National Preserve

April, 2002

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INTRODUCTION

This Biological Evaluation has been prepared to analyze the selected alternative as identified in the Environmental Assessments (EA) for livestock grazing within the Valles Caldera. It addresses the livestock grazing program, including associated actions, and evaluates all listed, proposed and candidate species potentially found within Sandoval County (refer to Table 1).

Six federally listed, one proposed threatened, and one candidate species are known or have the potential to occur in Sandoval County (USDI, FWS 2001-refer to Table 1). However, because of the specific habitats used by these species, the animals/plants may occur within the broad borders of the county but not specifically within the Valles Caldera. The potential for these species' presence, their habitats within the area, and any potential impacts on them resulting from implementation of the selected alternative are examined in this document.

DESCRIPTION OF THE SELECTED ALTERNATIVE (LIVESTOCK GRAZING PROGRAM)

Proposed Action Alternative (Grazing Management):

The primary objective of this program is to ensure that grazing management is suited to the environmental conditions and resource uses found within the Valles Caldera.

The class of livestock for the Valles Caldera is cattle with an occasional horse. No sheep or goats are permitted for grazing on the Valles Caldera.

No Action Alternative (No Change):

The No Action alternative would not allow livestock to use the Valles Caldera for grazing purposes.

SPECIES IDENTIFICATION

The Valles Caldera Directorate has prepared this Document on the threatened, endangered, proposed and candidate species shown in Table 1, as identified by the FWS (USDI, FWS 2001).

The Directorate has determined, based on this Biological Evaluation, that the implementation of the grazing program identified within the environmental assessment for the Valles Caldera will result in the following determinations for all the listed, proposed, or candidate species: "No Effect" (refer to Table 1).

CUMULATIVE IMPACTS

Cumulative effects are those effects of future non-federal (State, local government, or private) activities on endangered and threatened species or critical habitat that are reasonably certain to occur in the foreseeable future. Refer to the species evaluation section for an analysis of cumulative impacts for each species.

TABLE 1
THREATENED AND ENDANGERED, PROPOSED, AND CANDIDATE SPECIES

Species	Classification	Determination of Affect	County
<u>Mammals</u>			
black-footed ferret	Endangered	No Effect	Sandoval
<u>Birds</u>			
Southwestern willow flycatcher	Endangered	No Effect	"
bald eagle	Threatened	No Effect	"
Mexican spotted owl	Threatened	No Effect	"
whooping crane	Nonessential Experimental	No Effect	"
mountain plover	Proposed Threatened	No Effect	"
yellow-billed cuckoo	Candidate	No Effect	"
<u>Fish</u>			
Rio Grande silvery minnow	Endangered	No Effect	"

SPECIES EVALUATIONS

Black-Footed Ferret (*Mustela nigripes*)

Historical/Baseline Data

This species is usually associated with prairie dog towns in grassland plains, semi-arid grasslands and adjacent mountain basins. The black-footed ferret historically occurred over most of New Mexico (USDI, BLM 1984). The last confirmed sighting in New Mexico was in 1934 (USDI, BLM 1995). No black-footed ferrets are known to exist other than the captive and reintroduced populations in Wyoming, Montana, South Dakota, Arizona, and New Mexico. However remnant populations may still exist in portions of the former range (*ibid*).

The best information available indicates that the black-footed ferret is extirpated from the wild in New Mexico (NMDG&F 1996). However, in 1998, a captive breeding project was initiated in New Mexico at the Vermejo Park Ranch near Raton.

The most recent information from the FWS (USDI, FWS 1989) indicates that prairie dog towns of the following sizes would need to be surveyed for black-footed ferret populations prior to any impacting activities occurring: (a) 80 acres for black-tailed prairie dogs, and (b) 200 acres for Gunnison's prairie dogs.

It appears from the available literature that grazing (including intense use) does not have a negative impact on prairie dog colonies. In particular, black-tailed prairie dogs have been shown to prefer areas with short vegetation cover, which apparently allows them to view predators and maintain a complex social system (Fagerstone and Ramey 1996-1). Rates of prairie dog colony settlement and expansion have been shown to increase under intense livestock grazing and other human disturbance such as homesteading, fencing, cultivation, and the construction of water impoundments (Fagerstone and Ramey 1996-2). All of these land management practices reduce the height and density of grasses, and provide a desirable environment for prairie dogs to expand and establish new colonies. Fagerstone and Ramey (1996-3) found that prairie dog burrow densities in the Conata Basin of South Dakota increased twice as fast on sites grazed by cattle as on ungrazed sites.

Prairie dog colonies modify the grasslands in a similar manner as grazing cattle do, by their feeding activities. The rodents depend on being able to see terrestrial predators from a distance (Fagerstone and Ramey 1996-1) and modify vegetation by feeding on grasses and clipping unpalatable plants to ground level (Fagerstone and Ramey 1996-4). In well-established prairie dog colonies, large areas of bare soil are common (Fagerstone and Ramey 1996-5).

Prairie dogs were widespread on the Plains throughout the 1800s, being estimated to cover 283 million hectares (about 700 million acres) and to number over 5 billion (Fagerstone and Ramey 1996-6). To control prairie dog numbers, rodenticides were developed; in the early 1900s millions of hectares were treated with grains containing strychnine and other poisons, significantly reducing prairie dog numbers and eliminating most large colonies. By 1919, after 20 years of control efforts, the area occupied by prairie dogs was reduced to an estimated 40.5 million hectares (100 million acres; Fagerstone and Ramey 1996-7). In 1971 the estimated occupied areas in the United States was only 566,000 hectares (1.4 million acres; Fagerstone and Ramey 1996-8). Before that year, these control efforts eliminated approximately 99.8 percent of the prairie dog population in the

United States. From the available literature, it appears the decline in prairie dog colonies, and consequently the black-footed ferret throughout the west, was related to federal, state, and local poisoning programs. Also, land use practices reduced available habitat by converting vast areas of the Great Plains to agriculture and urban areas.

The prairie dog populations within New Mexico fluctuate up and down on a regular basis, mainly due to plague that occurs throughout New Mexico. Plague appears to be the limiting factor in controlling prairie dog colonies.

Effect Determination

Prairie dogs (Gunnison's) have been identified to be present within the Valles Caldera. Based on the analysis that grazing has not been shown to impact prairie dog colonies and that no activities are planned that would impact these colonies, the Directorate has determined that implementation of the grazing program identified within the EA for the Valles Caldera would result in a "No Effect" situation for the black-footed ferret.

Rationale

? No black-footed ferrets are known to exist outside of the captive and reintroduced populations in Wyoming, Montana, South Dakota, Arizona and New Mexico. The best information available indicates that the black-footed ferret is apparently extirpated from the wild in New Mexico.

? The available literature indicates that grazing (including intense use) does not have negative impacts on prairie dog colonies, which are the prey base for the black-footed ferret.

Cumulative Impacts

Because the proposed action (livestock grazing and associated activities) for the Valles Caldera has a "No Effect" on the Black-footed Ferret, there would be no incremental increase in the existing or foreseeable future cumulative impacts within New Mexico for this species. The cumulative impacts presently existing (e.g., federal, private, state activities) for this species would not change due to this action.

Southwestern Willow Flycatcher (*Empidonax traillii extimus*)

Historical/Baseline Data

The Southwestern willow flycatcher is found along riparian habitats (e.g., rivers, streams and wetlands) of the desert Southwest where dense groves of willows (e.g., *Salix*, *Baccharis* spp.), arrowweed, buttonbrush, boxelder and alder are present, often with a scattered overstory of cottonwood (Tibbitts et al. 1994). In some locations, exotic plants including tamarisk and Russian olive are also used for nesting. The bird is associated with multi-layered vegetation in close proximity to slack water. The surrounding vegetation of the nesting areas generally ranges from 12 to 21 feet high (*ibid*). Southwestern willow flycatchers breed in habitat where surface water is present (Sferra et al. 1995).

The southwestern willow flycatcher occurs statewide during migration. It breeds in the Chama, Rio Grande, Zuni, San Francisco, Gila, and probably Hondo basins, and in the San Juan and western Sangre de Cristo Mountains. Areas of key habitat include breeding areas in the vicinities of Zuni (McKinley County), Corrales (Sandoval County) to upper Elephant Butte Reservoir (Sierra County), Glenwood-Pleasanton (Catron County), and Cliff-Redrock (Grant County).

Riparian habitat loss or degradation and related impacts (e.g., parasitism by brown-headed cowbirds) are the primary causes leading to the endangered status of the southwestern willow flycatcher. Most of the areas still known to support the southwestern willow flycatcher have little or no livestock grazing. Potential threats from pesticides may also affect the southwestern willow flycatcher. This species migrates to the tropics in the winter, and the habitats it uses in wintering grounds are unknown. However, tropical deforestation may restrict wintering habitat for this and other neotropical migrants. The protection and restoration of riparian habitats are essential steps in the conservation of breeding southwestern willow flycatchers in New Mexico, with key elements being an overstory of tall trees, an understory of smaller trees or large shrubs, and nearby areas of surface water. This species is an important indicator species for the health of southwestern riparian ecosystems. Conservation of the southwestern willow flycatcher would aid in efforts to conserve riparian habitats.

Riparian habitats are found throughout the Valles Caldera around small springs and seeps to bordering larger creeks and rivers. However due to the elevation, climate and landscape riparian habitats have not developed the dense groves of willows, arrowweed, buttonbrush, boxelder, alder along with an scattered overstory of cottonwood necessary to support Southwestern willow flycatchers.

Riparian and aquatic habitat management to protect and enhance riparian areas within the Valles Caldera will continue. Although such management practices aimed at restoring or maintaining Proper Functioning Condition (PFC) would benefit wildlife species and resource values (e.g., limit soil erosion) within the Valles Caldera, it is not expected that such efforts would develop appropriate habitat for the Southwestern willow flycatcher.

Effects Determination

No riparian/wetland areas of the size/structure needed to support Southwestern willow flycatchers have been identified within the Valles Caldera. In addition no

activities that would impact riparian habitat would be allowed as part of the proposed action. The Directorate has determined that implementation of the grazing program identified in the EA for the Valles Caldera would result in a "No Effect" situation for the Southwestern willow flycatcher.

The Directorate will continue to implement measures to protect, improve, and enhance riparian habitat for all riparian species including the southwestern willow flycatcher.

Rationale

? No habitat (e.g., riparian/wetland areas) have been identified on the Valles Caldera lands that would support the Southwestern willow flycatcher.

Cumulative Impacts

Because the proposed action (livestock grazing and associated activities) for the Valles Caldera has a "No Effect" for the Southwestern willow flycatcher, there would be no incremental increase in the existing or foreseeable future cumulative impacts within New Mexico for this species. The cumulative impacts presently existing (e.g., federal, private, state activities) for this species would not change due to this action.

Bald Eagle (*Haliaeetus leucocephalus*)

Historical/Baseline Data

Bald eagles are generally associated with medium to large perennial streams, rivers and other water bodies that provide an adequate prey base and appropriate nesting/roosting habitat. Outside of these major river corridors (e.g., Rio Grande, Chama), the bald eagle has been observed to be a migrant only, due to the lack of any large streams, rivers or water bodies. Winter and migrant populations seem to have increased in New Mexico. Mid-winter numbers averaged about 430 birds per year between 1990 and 1994. Only two pairs were known to nest in the state.

Key habitat areas include winter roost and concentration areas (e.g., Navajo Lake in Rio Arriba County, Cochiti Lake in Sandoval County, the northeastern lakes from Raton to Las Vegas, the lower Canadian Valley, Summer Lake, Elephant Butte Lake, Caballo Lake, and the upper Gila Basin). Optimal habitats center on riparian and lacustrine environments where food, shelter, and potential nest sites are in the greatest supply. Bald eagles require large trees or cliffs near water where a good supply of fish, waterfowl, or carrion is available. Jackrabbits and other mammals are also taken, especially by (dry land) eagles. These eagles most notably occur between the Pecos Valley and the Sandia, Manzano, Capitan, and Sacramento Mountains, and on the Mogollon Plateau. Bald eagle declines were caused by pesticide-induced reproductive failure, loss of riparian habitat, and human disturbance (e.g., shooting, poisoning, and trapping).

The bald eagle population is in an upward trend throughout the United States. In July 1994, the FWS proposed to reclassify the bald eagle from endangered to threatened in the lower 48 states, including the southwestern region and Mexico. On August 11, 1995, this reclassification took place.

Bald eagles are known to migrate seasonally through the Valles Caldera area, and have been reported in the valle since at least 1979 (Johnson 2001). The preserve

appears to provide suitable nesting habitat, and there has been one anecdotal account of nesting bald eagles in the recent past (*ibid*). During a 2001 survey bald eagles were observed only during the fall and winter months within the Valles Caldera (*ibid*).

Effect Determination

During the most recent survey (2001) bald eagles were not using the Valles Caldera during the summer months when grazing will be occurring. In addition no activities are planned that would disturb their habitat (e.g. remove large trees, affect prey base-fish). Based on the analysis, the Directorate has determined that implementation of the grazing program identified in the EA for the Valles Caldera would result in a "No Effect" situation for the bald eagle.

Rationale

- ? Habitats (e.g., streams/rivers/waterbodies) have been identified on Valles Caldera lands that would support the bald eagle. No activities that would impact these habitats are planned or anticipated to occur.
- ? Bald eagles are known to migrate seasonally through the area and winter within the Valles Caldera. Grazing will be occurring from June thru September and no impacts on the bald eagle are anticipated.

Cumulative Impacts

Because the proposed action (livestock grazing and associated activities) for the Valles Caldera has a "No Effect" for the bald eagle, there would be no incremental increase in the existing or foreseeable future cumulative impacts within New Mexico for this species. The cumulative impacts presently existing (e.g., federal, private, state activities) for this species would not change due to this action.

Mexican Spotted Owl (*Strix occidentalis lucida*)

Historical/Baseline Data

The Mexican spotted owl occupies mountainous areas, with its preferred habitat consisting of dense, multi-storied forests with moderately closed to closed canopies (e.g., mature and old-growth forests). In addition, these owls have been found in canyon systems with little or no tree cover (USDI, FWS 1993). These canyon systems appear to provide the same or similar microclimate as the dense multi-storied forests. Mexican spotted owls use a variety of montane forest types, ranging from deciduous riparian woodlands, through pinyon-juniper, pine-oak, mixed conifer, and spruce-fir. Its breeding habitat is limited to forest communities, often the late seral stage coniferous forests of high commercial value. Home range for a single owl averages about 1,600 acres; while the home range for a nesting pair averages over 2,090 acres. Most nest trees are selected on moderate to steep slopes at elevations ranging from 6,000 to 8,000 feet. Most of the owl's activities during the breeding season occur within the nest site canyons. The owl primarily feeds on mammals but also preys upon birds, reptiles, and insects and drinks from small seeps/creeks. Foraging sites often include big logs, higher canopy closure, and dense areas of trees and snags.

The largest populations of Mexican spotted owls in New Mexico occur in the Gila National Forest in the west-southwest portion of the state and in the Sacramento Mountains in the south central portion of the state. Among the known locations of Mexican spotted owls throughout its range in 1990, 91% occurred on national forests, 4% on Indian reservations, 4% on national parks, and 1% on BLM lands.

The Mexican spotted owl is threatened by timber management practices, even-aged silviculture management practices in forest habitats, increased predation associated with habitat fragmentation, and fires. Secondary losses of habitat are due to urban and suburban expansion, water development in riparian corridors, agricultural development, fuelwood/oak harvest, reservoir development, and mining. Most riparian areas that have been lost or impaired in New Mexico have occurred at low to middle elevations. The importance of these riparian woodlands to the Mexican spotted owl is unknown, although winter use of these habitats has been documented. Also, riparian areas provide dispersal corridors between semi-isolated montane habitat regions.

Historically northern New Mexico contained forest stands that no longer exist today. Beginning in the 1800s homesteaders, owners of land grants, and private logging companies removed most of large commercial timber from the area. These past forestry practices have resulted in a lack of any dense, old-growth forests remaining.

An evaluation of forest/canyon habitats to support Mexican spotted owls was conducted within the Valles Caldera (Johnson 2001). Approximately 16% of the entire Valles Caldera preserve contains potential nesting and roosting habitat for the Mexican spotted owl (*ibid*). A survey of the best potential habitat was conducted four times in 2001 (*ibid*). No Mexican spotted owls were located during the survey, however, because not all potential habitat was surveyed, this does not preclude the existence of owls within the Valles Caldera (*ibid*). However, because of the elevation of the Valles Caldera (8,500-11,200 feet) which is on the high side of the known nesting criteria, even with the existence of an appropriate timber/canyon component Mexican Spotted Owls may not use the area.

Effect Determination

Based on the analysis that the potential Mexican spotted owl habitat occurring within the Valles Caldera will not be grazed as part of the proposed action, the Directorate has determined that implementation of the grazing program identified in the EA would result in a "No Effect" situation for the Mexican spotted owl.

Rationale

? Potential habitat (e.g., forest/canyon) exists on the Valles Caldera lands to support this species. However, this habitat is outside of the grassland habitat that will be grazed as part of the proposed action and no impacts are anticipated.

Cumulative Impacts

Because the proposed action (livestock grazing and associated activities) for each allotment has a "No Effect" for the Mexican spotted owl, there would be no incremental increase in the existing or foreseeable future cumulative impacts within New Mexico for this species. The cumulative impacts presently existing (e.g., federal, private, state activities) for this species would not change due to this action.

Whooping Crane (*Grus americana*)

Historical/Baseline Data

The whooping crane breeds mainly at Wood Buffalo National Park, Canada and winters mainly along the Gulf Coast of Texas at the Aransas National Wildlife Refuge. A few whooping cranes raised by foster parents (sandhill cranes) at Grays Lake, Idaho migrate with sandhill cranes to the Rio Grande Valley, New Mexico. These birds (down from a high of 33 to now only 1-2) winter mainly in the Bosque del Apache National Wildlife Refuge, located approximately 20 miles south of Socorro, New Mexico. This population is designated as a non-essential experimental population, and it is expected that these birds will die by the year 2006. Pairing and reproduction of this experimental flock never occurred.

Whooping cranes select an open expanse of shallow water in rivers, lakes, reservoirs and native wetlands for nightly roosting. These sites include stockponds, marshes, and flooded grain fields. Feeding sites include these wetland types and agricultural fields (particularly those containing waste grain or sprouting crops). They feed on small grains, alfalfa, winter wheat, aquatic plants, invertebrates, and small vertebrates. The whooping crane typically roosts on sand bars within the Rio Grande floodplain (NMDG&F 1988, 1995). Whooping cranes seasonally move up and down the Rio Grande corridor during their spring and fall migrations; however, they would be considered rare visitors to the area. Whooping cranes adhere to ancestral breeding areas, migratory routes, and wintering grounds, leaving little possibility of pioneering into new regions.

The conversion of wetlands and prairies to croplands contributed to the drastic decline of whooping cranes. Collisions with power lines and fences, predators, and disease are known hazards to wild whooping cranes in the Rocky Mountains.

No suitable riparian/agricultural habitat occurs within the Valles Caldera preserve.

Effect Determination

Based on the analysis that no habitat exists (e.g., rivers/streams associated with agricultural fields) to support this species within the Valles Caldera, the Directorate has determined that implementation of the grazing program identified within the EA for the Valles Caldera would result in a "No Effect" situation for the whooping crane.

Rationale

- ? No suitable riparian/agricultural habitat occurs on the Valles Caldera.
- ? This population is designated as a non-essential experimental population. There are a very limited number of individuals (1-2) left in this experimental population.
- ? Whooping cranes would be considered rare migrants to the Valles Caldera area, and it would be extremely unlikely that any whooping cranes would occur within the area.

Cumulative Impacts

Because the proposed action (livestock grazing and associated activities) for the Valles Caldera has a "No Effect" for whooping cranes, there would be no incremental increase in the existing or foreseeable future cumulative impacts within New Mexico for this species. The cumulative impacts presently existing (e.g., federal, private, state activities) for this species would not change due to this action.

Mountain Plover (*Charadrius montanus*)

Historical/Baseline Data

The mountain plover prefers flat, short-grass prairie and tends to avoid taller grasses and hillsides (USDI, BLM 1995). Suitable habitat occurs in areas often grazed by livestock (*ibid*). The bird prefers habitat comprised of large areas of bare ground and short grass (less than 4-inch-tall stubble). Prairie dog towns and turf farms are likely areas of use. Outside the breeding season, this species occurs in flocks of individuals up to several hundred feeding in alkaline flats, plowed ground, sprouting grain fields and grazed pastures (Terres 1982). Short vegetation, bare ground, and a flat topography are now recognized as habitat-defining characteristics (USDI, FWS 1999a). In addition to using prairie dog towns, mountain plovers show a strong affiliation with sites that are heavily grazed by domestic livestock (e.g., near stock watering tanks)(*ibid*). Nests are often located near woody plants, cow manure, rocks, fence posts, and power poles. It is territorial only during the breeding season. It does not require a free water source.

The mountain plover has been identified in numerous locations throughout northern New Mexico during surveys by the New Mexico Department of Game and Fish in 1995 (Williams 1995). The bird is likely to occur throughout the Jemez Mountains where short-grass prairie regions occur. No critical habitat has been established.

The following actions have created and are likely to continue to create impacts to mountain plovers and/or their associated habitat (USDI, FWS 1999a).

- ? Conversion of grasslands to croplands and urban uses
- ? Prairie dog control
- ? Mineral development
- ? Domestic livestock management

This EA has been prepared to evaluate livestock grazing management and associated activities that are anticipated to occur on the Valles Caldera. Conversion of grasslands to croplands and urbanization, prairie dog control, and mineral development are not occurring or planned within the Valles Caldera and were not addressed in the EA. Because these activities are not occurring or planned to occur within the Valles Caldera, they will not be discussed as part of this biological evaluation. If these or any other activities are planned to occur on Valles Caldera lands in the future, they would be analyzed through the EA process, including a biological evaluation before authorization of that action.

Livestock management practices have in the past and are presently encouraging vegetation growth by the development of grazing systems that allow growing season rest and limit the overall utilization levels. This type of management helps to minimize soil disturbance and ultimately erosion within the allotment and the overall watershed. These management practices, which allow vegetative cover to be maintained over the widest area possible, are helping to restore upland and riparian habitats to properly functioning condition.

Effect Determination

Mountain plover habitat is lacking within the Valles Caldera due to the lack of bare ground and grasslands that are maintained at a higher level than 4 inches.

Livestock grazing has not been shown to affect mountain plovers and no activities are planned (e.g., land conversion, prairie dog control) that would affect what limited habitat presently exists. Based on the above, the directorate has determined that implementation of the grazing program identified in the EA would have the potential to create a "No Affect" situation for the mountain plover.

Rationale

? Mountain plover habitat is virtually non-existence within the Valles Caldera due to lack of bare ground and grasslands that are maintained at a higher level than 4 inches.

? No actions (e.g., land treatments, prairie dog control) are planned within the Valles Caldera that would affect mountain plover habitat that presently exists.

Cumulative Impacts

Because the proposed action (livestock grazing and associated activities) for the Valles Caldera has a "No Effect" for whooping cranes, there would be no incremental increase in the existing or foreseeable future cumulative impacts within New Mexico for this species. The cumulative impacts presently existing (e.g., federal, private, state activities) for this species would not change due to this action.

Yellow-billed Cuckoo (*Coccyzus americanus*)

Historical/Baseline Data

The Yellow-billed Cuckoo is found along riparian habitats (e.g., rivers, streams and wetlands) of the desert Southwest where dense groves of willows (e.g., *Salix*, *Baccharis* spp.), arrowweed, buttonbrush, boxelder and alder are present, often with a scattered overstory of cottonwood.

Riparian habitat loss or degradation and related impacts (e.g., parasitism by brown-headed cowbirds) are the primary causes leading to the candidate status of the Yellow-billed Cuckoo. This species migrates to the tropics in the winter, and the habitats it uses in wintering grounds are unknown. However, tropical deforestation may restrict wintering habitat for this and other neotropical migrants. The protection and restoration of riparian habitats are essential steps in the conservation of breeding Yellow-billed Cuckoos in New Mexico, with key elements being an overstory of tall trees, an understory of smaller trees or large shrubs, and nearby areas of surface water.

Riparian habitats are found throughout the Valles Caldera around small springs and seeps to bordering larger creeks and rivers. However due to the elevation, climate and landscape riparian habitats have not developed the dense groves of willows, arrowweed, buttonbrush, boxelder, alder along with an scattered overstory of cottonwood necessary to support yellow-billed cuckoo's.

Riparian and aquatic habitat management to protect and enhance riparian areas within the Valles Caldera will continue. Although such management practices aimed at restoring or maintaining Proper Functioning Condition (PFC) would benefit

wildlife species and resource values (e.g., limit soil erosion) within the Valles Caldera, it is not expected that such efforts would develop appropriate habitat for the yellow-billed cuckoo.

Effects Determination

No riparian/wetland areas of the size/structure needed to support yellow-billed cuckoo have been identified within the Valles Caldera. In addition no activities that would impact riparian habitat would be allowed as part of the proposed action. Based on the above analysis, the Directorate has determined that implementation of the grazing program identified in the EA for the Valles Caldera would result in a "No Effect" situation for the yellow-billed cuckoo.

Rationale

? No habitat (e.g., riparian/wetland areas) have been identified on the Valles Caldera lands that would support the yellow-billed cuckoo.

Cumulative Impacts

Because the proposed action (livestock grazing and associated activities) for the Valles Caldera has a "No Effect" for yellow-billed cuckoo, there would be no incremental increase in the existing or foreseeable future cumulative impacts within New Mexico for this species. The cumulative impacts presently existing (e.g., federal, private, state activities) for this species would not change due to this action.

Rio Grande Silvery Minnow (*Hybognathus amarus*)

Historical/Baseline Data

The Rio Grande silvery minnow historically occurred throughout the Rio Grande downstream of Espanola, New Mexico; in the Pecos River downstream of Santa Rosa, New Mexico; and in lower portions of the Rio Chama (USDI, FWS 1999b). The Rio Grande silvery minnow can now be found in the middle Rio Grande, from Cochiti Dam to the headwaters of Elephant Butte Reservoir. This area has been designated as proposed critical habitat (Fowler-Propst 1999).

Water availability appears to be the main limiting factor jeopardizing the species. Irrigation operations have caused portions of the Rio Grande to dry up in recent years. Channel dewatering makes its extinction an immediate possibility (Fowler-Propst 1999). Decreases in water quality related to agricultural development and growth of cities may also be affecting the species. Its confinement to small areas and low flows also increases its susceptibility to predation and disease.

The Rio Grande silvery minnow occupies a variety of habitats in large, low-gradient streams with shifting sand or silty bottoms. During winter, it is most common in nearly still water with debris cover (Fowler-Propst 1999). Special requirements other than a flowing mainstream environment are not indicated for this species. It is believed to feed on diatoms, algae, larval insect skins, and plant material scraped from the bottom sediments.

Eggs and larvae of the Rio Grande silvery minnow are likely transported downstream from one reach of the Rio Grande to the next. Because of the presence of diversion dams, repopulation of upper reaches by adults is not possible. Therefore, this species is most common in the lowermost reaches of its current range.

The habitat for the Rio Grande silvery minnow is localized within an area in which the Valles Caldera does not administer any lands, nor manage any of the waters of the Rio Grande within this area.

Effect Determination

Based on the analysis that the Rio Grande silvery minnow does not occur within the Valles Caldera, the directorate has determined that the implementation of the grazing program identified in the EA would result in a "No Effect" situation for the Rio Grande silvery minnow.

Riparian and aquatic habitat management to protect and enhance riparian areas within the Valles Caldera will continue. Although such management practices aimed at restoring or maintaining Proper Functioning Condition (PFC) would benefit wildlife species and resource values (e.g., limit soil erosion) within the Valles Caldera, it is not expected that such efforts would provide measurable benefits to the Rio Grande silvery minnow.

Rationale

? Known distribution of the Rio Grande silvery minnow in New Mexico is limited (Cochiti Dam to Elephant Butte Reservoir).

? The Valles Caldera does not administer any lands or authorize any activities within or adjacent to known habitats of this species.

Cumulative Impacts

Because the proposed action (livestock grazing and associated activities) for the Valles Caldera has a "No Effect" for Rio Grande silvery minnow, there would be no incremental increase in the existing or foreseeable future cumulative impacts within New Mexico for this species. The cumulative impacts presently existing (e.g., federal, private, state activities) for this species would not change due to this action.

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Appendix C

VALLES CALDERA NATIONAL PRESERVE 2002 INTERIM GRAZING PROGRAM TERMS AND CONDITIONS

INTRODUCTION

The Valles Caldera National Preserve's (VCNP) Interim Grazing program for 2002 will be limited to a cow/calf, cow w/o calf, heifer, along with a bull operation. The objectives of this interim grazing program are to provide emergency relief to livestock owners, for research, education and demonstrations of livestock grazing as a component of natural resource conservation and management; to develop partnerships with livestock operators, state, federal, tribal and private entities on grazing management opportunities; and to develop a program where the cost of operating a livestock grazing and range management program will be covered by fees assessed as determined by the Valles Caldera Trust (VCT). If a livestock owner is selected to participate in the Valles Caldera Grazing Program, the following terms and conditions must be met and complied with by the participant:

1. ELIGIBLE PARTICIPANTS

Permittees on USFS and BLM lands, private land livestock operators and ranchers grazing on state trust and tribal lands are eligible to participate in the program. For the purpose of this program, an applicant is identified as 1.) a single owner, 2.) a partnership, or 3.) a corporation.

Only cattle that are owned by the applicant will be authorized on VCNP. All brands used on livestock must be recorded with the New Mexico Livestock Board and with the Valles Caldera Trust.

Not more than 25 cow units (cow/calf, dry cow, heifer, and bull) shall be allowed per participant unless excess capacity exists.

Participants will be selected by lottery to be conducted by the Valles Caldera Trust.

Access on the VCNP for those selected to participate in the interim grazing program may be allowed only for limited purposes as prescribed in the Grazing Lease. It is recommended that vehicles entering the Preserve be "pressured washed" prior to entry.

The Valles Caldera Trust reserves the right to reject any application from consideration.

2. GRAZING FEES

Participants will be assessed a fee of 36 cents per day per cow unit for the 2002 grazing period which is subject to change by the VCT. The fee covers the cost for a range rider, mineral supplements, veterinary care, forage and maintenance of range improvements and facilities.

Participants selected for the grazing program will be required to sign a Grazing Lease and pay in full the grazing fees prior to the scheduled entry into the Preserve.

3. HERD HEALTH

All livestock shall be free of contagious diseases, including brucellosis, trichomoniasis and other reproductive diseases.

All calves should be vaccinated prior to scheduled entry (recommend 8 –way vaccine and Cattle Master 4)

Only bulls approved by the agents of the VCT will be allowed to enter the VCNP. Bulls must be registered beef breeds. The age of the bulls will not be less than 15 months and not more than seven (7) years at the time of entry into the Preserve. A trichomoniasis test of bulls shall be conducted no more than 60 days before entrance into the VCNP.

Copies of proof of bull soundness (veterinary report) and registration documents will be delivered to the Preserve Manager or his/her designee prior to entrance on the Preserve.

One bull per 25 head or fraction thereof, of female stock will be required.

Each member having 25 head of permitted livestock will provide a bull. Those members having less than 25 head of permitted livestock will join a bull group to purchase or lease a bull so that each group provides one bull per 24 head of female livestock. Those participants who lease a bull will be assessed a bull fee which will be prorated among those needing this service.

All bulls will be placed on the VCNP at the beginning of the grazing season and will not be removed from the VCNP unless bulls are no longer serviceable.

4. LIVESTOCK IDENTIFICATION

All livestock, including calves, shall be ear tagged with identification such as owner's brand and owner's initials, name or number system. Ear tag must be furnished by the owner and must consist of a single color.

All ear tag information will be provided to the VCT on the application form.

5. LIABILITY

The VCT assumes neither responsibility nor liability for any injury to persons, equipment or loss of livestock while participating in the grazing program.

Appendix D

VALLES CALDERA NATIONAL PRESERVE

Interim Grazing Strategy

Range Readiness Report: August 1, 2002

Resource specialists from various agencies were gathered on July 30, 2002 at the request of the Valles Caldera Trust to perform an assessment of the Valles Caldera National Preserve. The Interdisciplinary Team were charged with determining;

- Range readiness as indicated by herbaceous plant phenology (stages of growth and development) and presence and depth of soil moisture.
- Estimate herbaceous production and degree of departure in plant growth from what would be expected for unfavorable conditions.
- Degree of departure in plant growth within the three large valles (Valle Grande, Valle Toledo and Valle San Antonio)

The Interdisciplinary Team sought clarification on stocking rate determinations (grazing capacities) for forage allocation to livestock and how these relate back to allowable use levels (utilization) as described in the Proposed Interim Grazing Program.

Changes were recommended as follows:

The VCNP adopted a conservative approach in allocating current forage production to arrive at stocking rates. An Animal Unit Month is determined to be one animal (cow/calf pair or equivalent) consuming 30 pounds air-dry forage per day per month, equivalent to 900 pounds air-dry forage per month. In addition allocation of current forage production consumed by grazing livestock was set below 40% to minimize stoppage of root growth.

Alternative 1 presents allocation of forage at 35% for Riparian Areas and 35% for Mountain Valleys and Grazeable Woodlands. Alternative 2 and 3 provides allocation of forage resources at 15% in Riparian Areas and 35 % in Mountain Valleys and Grazeable Woodlands.

Forage allocations of 35% for an Animal Unit Month (AUM) provides for 1,671 pounds of forage remaining on the site for watershed protection and wildlife and 900 pounds of forage for livestock consumption.

Forage allocations of 15% in Wet Meadows for an Animal Unit Month (AUM) provides for 5,100 pounds of forage remaining on the site for watershed protection and wildlife use and 900 pounds of forage for livestock consumption.

Stubble height measurements used by the NMSU Range Improvement Task Force have shown to maintain plant health and provide watershed protection. Forage use will be measured using the following conservative stubble heights for grasses;

- 2 – 4 inches for short grass, for example; Bluegrama, Kentucky Bluegrass
- 4 – 6 inches for mid grass, for example; Mountain Muhly, Pine Dropseed, Arizona Fescue
- 6 – 8 inches for tall grass, for example; Tufted Hairgrass, Parry's Oatgrass, Sedges and Rushes

Range Readiness

Standards for Region 2 and 3 of USDA National Forests were reviewed for

- Leaf development and length
- Presence and development of seed heads
- Formation of flowers

There were observations that some plant species (especially cool-season plants) within the interspaces had not yet begun leaf growth, or were just beginning to green up.

It was generally agreed that overall Range Readiness has been attained. Lack of livestock on the Preserve during this summer provided an opportunity for many rangeland plants to respond to recent rains to meet or exceed the standards for Range Readiness without grazing pressure from livestock.

Soil Moisture

Information collected on precipitation within the Preserve was reviewed, and at each assessment area soil moisture presence, depth, and available soil moisture was determined.

Precipitation amounts recorded at six sites within the Preserve for the 5-week period 6/26/02 through 7/30/02 are (from northwest to southeast):

- 4.2 inches - Valle San Antonio
- 2.2 inches - Valle Toledo
- 3.3 inches - Jaramillo Divide
- 2.4 inches – Redondo Divide
- 2.3 inches – Headquarters
- 2.4 inches – Valle Grande Rincon

Monsoon precipitation has been modest during this period, with many small rainfall events but few drenching storms.

Soil moisture was present at all sites, ranging in depth from 9 to 11 inches.

- Valle San Antonio appeared to have received the most recent and effective rains. Soil was moderately moist from 0 to 10 inches. The upper 0 to 1 inch was drying.
- Valle Toledo was slightly moist to 11 inches.
- Valle Grande was slightly moist to 10 inches.

Available soil moisture may be approaching a point that could limit additional plant growth in the Valle Toledo and Valle Grande.

Based on Range Readiness indicators and current soil moisture, it was generally agreed that the Valle San Antonio was slightly behind the other two Valles in plant development. However current soil moisture in the Valle San Antonio would provide for continued plant growth. It was generally agreed that within the next 10 to 14 days Valle San Antonio would be approaching comparable growth and production as found in Valle Toledo and Valle Grande. Continued effective rain and warm weather would support continued plant growth.

Monitoring Rangeland Resources

Monitoring protocol should use Key Area and Key Species concept. Methodology selected should include and not be limited to methods used by New Mexico Range Improvement Task Force (Monitoring Rangeland in New Mexico, Report No. 53);

- Two photo points at each monitoring site
 - Landscape level
 - Ground level
- Line intercept transect (100 meter), with 100 sample points recording plant species presence, litter, and barren ground stubble heights of nearest neighbor
- Herbaceous production, determined with 5 production frames
- Pellet group counts of wildlife
- stubble heights prior to and post grazing

Use levels should be measurable. Recommend stubble height measurements in lieu of ocular estimates of utilization levels; i.e. slight 0-20%, light 20-40%, moderate 40-60%, heavy 60-80%. The following stubble height measurements have been found to maintain plant health and provide watershed protection.

- 2 – 4 inches for short grass
- 4 – 6 inches for mid grass
- 6 – 8 inches for tall grass

The Interdisciplinary Team used as a comparison to the above stubble heights the Utilization Gauge developed by the USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. We compared selected species representing short grass and mid grasses provided in the Utilization Gauge and found that there was a degree of conservative use less than 40%. The range riders may find the gauge useful in monitoring range use.

The log record maintained by the range rider should include and not limited to:

- cattle movements
- pasture changes
- elk and cattle interactions.

These pieces of information are valuable in monitoring and evaluating:

- the interim grazing management system
- grazing use, and
- developing adaptive management strategies prior to the next grazing cycle.

It was generally agreed that permanent monitoring stations should be established to capture baseline resource conditions as mentioned above in Monitoring Methodology prior to grazing. Additional monitoring should be considered during the period of grazing use, from these monitoring stations, to ensure grazing use levels and forage availability are within the parameters set forth in the grazing environmental assessment. A minimum of two assessments would be recommended during the grazing period. With a final assessment when livestock are removed. Use of an Interdisciplinary Team should be continued for monitoring and review of data.

Riparian Areas

Riparian Areas were felt to be Key Areas. Managing for use levels in Riparian Areas will be challenging between elk use and cattle use. It was reasonable to expect that elk use had been substantially concentrated in these Key Areas during the growing season to date. Stubble height measurements would be better suited for making forage use measurements, however, the biggest challenge will be determining which animal (cattle or elk) are using the forage.

Discussions concerning adoption of a one-herd rotation system would offer advantages in meeting use levels and monitoring stubble heights prior to and after use within a section of riparian area; however, multiple herds may provide more flexibility when considering availability of water and forage resource.

Grazing Management

Projected earliest entry date of livestock onto the VCNP could be on or about August 15 to September 30, grazing approximately six (6) weeks. Livestock would be shipped in and moved out in rather fast succession. Grazing capacity of each Valle may change over time as resource conditions change, including and not limited to;

- **Availability of water in upland positions near or in proximity of grazeable Woodlands.**
 - Distribution and management of livestock.
 - Attainment of use levels on herbaceous vegetation determined by stubble heights.
 - Valles receiving additional effective precipitation to promote plant growth.
 - Number and commitment of range riders needed to service multiple herds while ensuring attainment of grazing use.

The degree of grazing use by wildlife on Riparian Areas supports the one herd concept in order to reduce the duration of use by cattle on riparian areas. One herd provides;

- shorter periods of grazing use within a specified area to attain use (stubble heights) levels
- increases period of rest for plant recovery post grazing.

During the assessment it was recognized that the grazeable woodland portion within the Valles were producing and/or had the potential to produce forage at levels comparable to the wet meadow ecological sites. Availability and dependability of water in proximity to these areas is essential in attaining distribution and use (measured by stubble height).

It was recognized that there are advantages and disadvantages associated with grazing management practices using single or multiple herd system as addressed in the EA. Forage availability in riparian-wetland communities was not assessed due to the recognized heavy of forage by elk prior to green up of upland and grazeable woodlands. Given the assigned use in riparian-wetland communities, the grazeable woodlands currently have the greatest potential for providing forage to the livestock herd. The availability of water to hold the cattle up in the grazeable woodlands may be unreliable. It was generally agreed that if water becomes limited in the grazeable woodlands, the herd could be split into multiple herds or the herd numbers could be reduced. Multiple herds may provide flexibility to access smaller water catchments in upland areas without reliance of water in the San Antonio and East Fork Jemez River.

Communication

There was agreement that communication would play an important role in the short and long term success of the Interim Grazing Program. It is recommended that timely updates on rangeland conditions and grazing management during any prescribed period of grazing use be provided to affected interests of Valles Caldera National Preserve, including and not limited to;

Valles Caldera Trust, board members

VCNP Executive Director, Preserve Manager and Range Foreman

Grazing operators

NMSU Cooperative Extension Service / Range Improvement Task Force

New Mexico Department of Game and Fish

Operational Challenges

Many items were discussed involving issues outside the scope of determining range readiness and grazing capacity, and are included here only for communication of concerns.

- The previous owners did not use the same grazing practices that are proposed through the interim grazing strategy.
- New challenges and learning experiences for many.
- **In this particular drought year the availability of upland water is substantially limited. Many tanks are dry, others are low, and some places (like Valle Toledo) only have a few sources of upland water even in normal years.**
- Ear tags colors, sort by color, gather and deliver by color of ear tag.
- Animal unit to mean any cow/calf pair, dry cow, replacement heifer and/or bull
- Stretch capacity (number of livestock) by reducing cow/calf pairs and increasing number of dry cows and replacement heifers. Daily forage consumption by dry cows and replacement heifers is less than cow/calf pairs.

Current Grazing Capacity of the VCNP

Much discussion was generated about the primary question “What is the current grazing capacity of the VCNP?” It was felt by some that forage resources available to date along with continued plant growth as a result of effective rains, and assuming unlimited water availability in the proximity of the grazeable woodlands, and acquiring good livestock distribution and use of the forage with grazing management that the Preserve could support around 1,500 to 2,000 head of livestock.

However, if rain events began to diminish and effective precipitation was limited the result would be; reduced plant growth and availability of water in the proximity of the grazeable woodlands thereby, influencing the distribution and use of forage in the uplands and possibly concentrating the use closer to the wet meadows. From this perspective, some felt that the Preserve could support around 1,000 to 1,500 head of livestock.

NOTE: The Interdisciplinary Team was assembled in short order with little to no prior knowledge of resources on the VCNP, nor opportunity to read earlier notes and reports provided to the Valles Caldera Trust, nor time to be fully briefed on the proposed action and alternatives developed for the Interim Grazing Strategy on the VCNP. Time constraints prevented the ID Team from fully sampling and assessing the water situation, wet meadow areas and the grazeable

woodland types. The above limitations prevented the ID Team from estimating grazing capacities as they relate to Alternatives 2 and 3.

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