Chapter 3. Environmental Consequences

This section summarizes the physical, biological, social, and economic environments of the affected analysis area and the potential changes to those environments due to implementation of the alternatives. This section also presents the scientific and analytical basis for the comparison of alternatives presented in Chapter 2.

To comply with NEPA requirements of analytic and concise environmental documents (40 CFR 1502.2), the resources identified as potentially affected by the proposed action or as a special concern are described. [5] Environmental components that do not exist within the ecosystem boundaries such as wilderness areas and wilderness study areas, are not discussed in detail.

The environmental consequences or effects are changes from present baseline conditions. Some of the environmental effects are confined to wild horse activity within the Jicarilla Wild Horse Territory. Others are cumulative with environmental effects from other past, present and reasonably foreseeable actions and cover an area beyond the JWHT.

Soil and Watershed

The District is located on the northeastern-most part of the San Juan Basin, which is characterized by an asymmetrical layering of sedimentary rocks. Many of the soils on the JWHT are deep and well drained, formed from alluvial or residual materials derived from sandstone, siltstone, and shale. The dominant types of erosion occurring on the District are wind erosion and water erosion. There is little evidence of mass wasting, except along a few steep canyon walls with intermittent surface water flows. Streambank erosion is widespread because most of the waterways are actively downcutting.

The type and quality of vegetation cover have crucial impacts on erosion rates, soil productivity, and soil condition, all of which contribute to watershed health. Activities that damage vegetation and increase the amount of bare soil in a watershed such as road construction, well pad and pipeline construction, and grazing accelerate natural soil erosion. [226] Heavy grazing by horses, cattle, deer, and elk on newly reseeded oil and gas pipelines and locations often cause the reseeding to fail.

For the purpose of determining the existing condition of the soil resource for this area analysis, an evaluation of soil condition for each Terrestrial Ecosystem Survey (TES) map unit was made. This evaluation utilized existing information contained in the interpretive tables for the map unit and other pertinent sources of information as found in the Carson National Forest 1987 TES publication. [16] The TES map units within the allotment were evaluated by comparing the soil loss rates as predicted by the Universal Soil Loss Equation (USLE) model. The relationship of current soil loss to soil loss tolerance was used as an indication of soil condition.

Soil condition is also determined by evaluating surface soil properties. This is the critical area where plant and animal organic matter accumulate, begin to decompose and eventually become incorporated into soil. It is also the zone of maximum biological activity and nutrient release. The physical condition of this zone plays a significant role in soil stability, nutrient cycling, water infiltration and energy flows. The presence and distribution of the surface soil horizon is critically important to vegetative productivity. Two classes of soil condition are recognized:

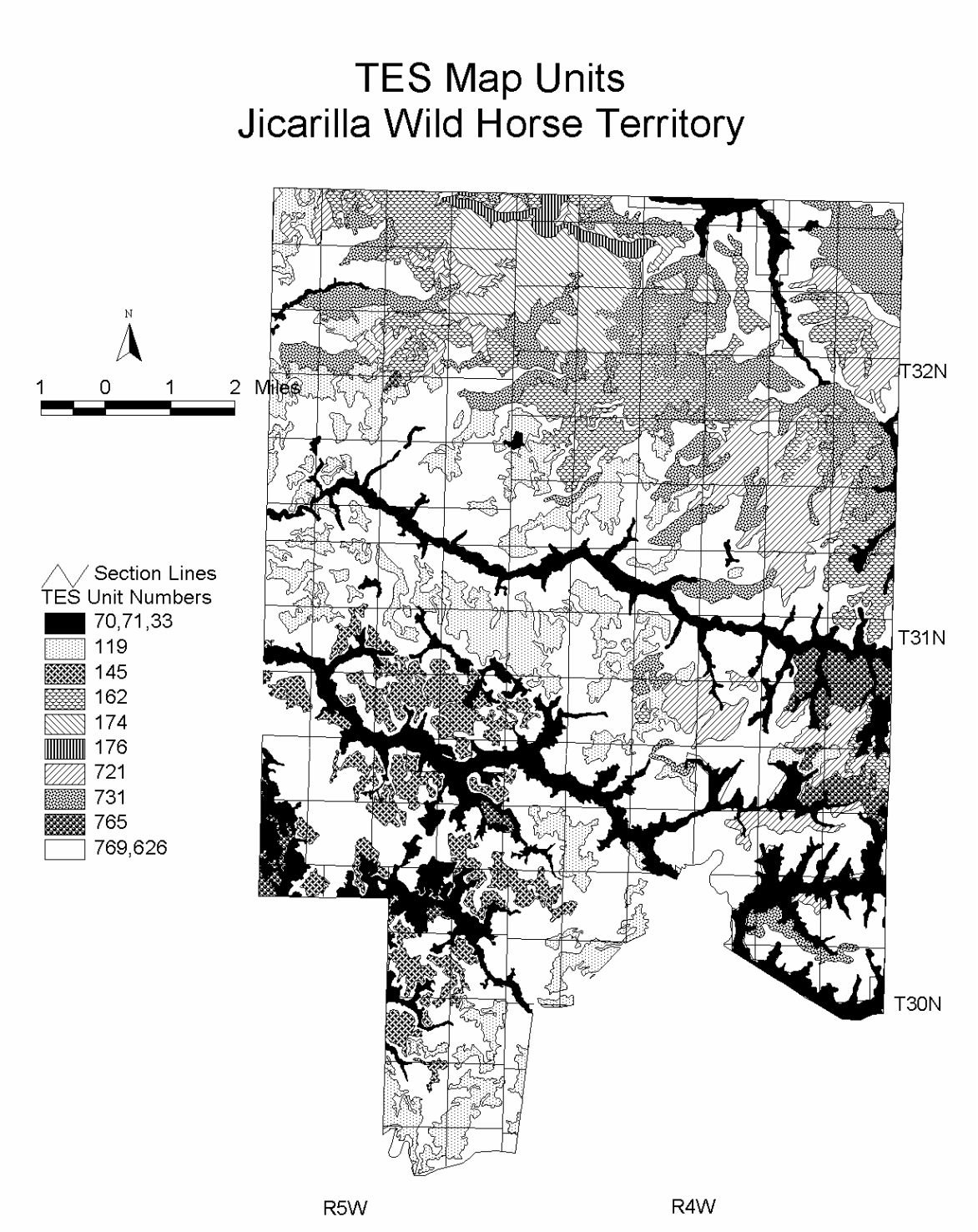

Figure 3. Terrestrial Ecosystem Survey Units Within the Jicarilla Wild Horse Territory

Satisfactory - Indicators signify that soil function is being sustained and soil is functioning properly and normally. The ability of soil to maintain resource values and sustain outputs is high. It is desirable for current soil loss to be below the tolerance levels established for each soil map unit. The soil loss tolerance, a reference condition established in the TES, is the maximum rate of soil loss from sheet and rill erosion that can occur while sustaining inherent soil productivity. Soils within the tolerance are considered in satisfactory condition.

Unsatisfactory - Indicators signify that loss of soil function has occurred. Degradation of vital soil functions result in the inability of soil to maintain resource values, sustain outputs, and recover from impacts. Soils rated in the unsatisfactory category are candidates for improved management practices or restoration designed to recover soil functions. If the current soil loss is above the tolerance levels established for each soil map unit then the soils are considered to be in unsatisfactory condition.

It is desirable for current soil loss to be below the tolerance levels established for each soil map unit. The soil loss tolerance, a reference condition established in the TES, is the maximum rate of soil loss from sheet and rill erosion that can occur while sustaining inherent soil productivity. Concentrated surface water flows often result in gully erosion, a process that causes erosion at a much faster rate than sheet and rill erosion and the primary cause of the unsatisfactory condition ratings for portions of some watersheds.

Parker 3 step transect methodology was used to evaluate soil stability within 3 TES units where historical range/soil transects were located. [39] Transects with fair soil stability with stable trends are considered satisfactory.

Soil Conditions

Soil conditions for TES units 119, 145, 162, 174, and 765 with the potential for moderate or slight erosion appear to be reasonably stable with unsatisfactory soil conditions estimated at 2 percent of the unit acreage. Those acres in unsatisfactory condition are generally related to oil and gas roads, pipelines, and well locations or portions of the unit that are adjacent to areas of heavy grazing use by horses, cattle or elk

Table 3. Terrestrial Ecosystem Survey Map Unit Information

TES Unit	Acres	Percent	% Slope	Potential Erosion Hazard	Topography	Estimated Acres of Unsatisfactory Soil Conditions	% of the Unit in Unsatisfactory Condition
70 71	7,514	10	0-15	severe	valley plains 6900-7500 ft.	3,757	50
119	7,888	11	0-15	moderate	elevated plains 7200 ft.	158	2
145	3,119	4	0-15	moderate	elevated plains 6900-7500 ft.	62	2
162	5,842	8	0-15	slight	plains 7500 ft.	120	2
174	2,970	4	0-15	moderate	plains 7900 ft.	60	2
176	477	0	40-80	severe	hills and scarps 7900 ft.	48	10

TES Unit	Acres	Percent	% Slope	Potential Erosion Hazard	Topography	Estimated Acres of Unsatisfactory Soil Conditions	% of the Unit in Unsatisfactory Condition
721	5220	7	0-40	severe	plains, hills and scarps 7500-8500 ft.	261	5
731	7,000	9	15-80	severe	scarps and hills 7500 ft.	700	10
765	1,284	2	0-40	moderate	plains and hills 7200 ft.	26	2
769 626	33,078	45	15-80 mostly >40%	severe-unclassified	hills and scarps 6900-7900 ft.	estimated ~3301	10
Total	74,392	100				8493	

Estimates for unsatisfactory condition acreages were estimated based on TES information, field inspections, GIS mapping, and professional knowledge of the JWHT. [16, 48, 147, 158]

TES map units 176, 731 and 769/626 make up 40,555 acres within the JWHT (54% of the JWHT) and are associated with slopes generally 40 percent or greater. The potential erosion hazard on these units is considered severe due to steep slopes. In 1987 when the TES was completed, current erosion for TES map units 176, 731, and 769/626 was estimated to be less than the tolerance, the maximum level of soil loss that can occur while sustaining site productivity. Herbaceous vegetation is generally limited on these sites, while woody vegetation along with rock or cobbles make up the majority of ground cover. Overall, TES units 176, 731 and 769/626 do not appear to have unsatisfactory soil conditions except along the toe of slopes adjacent to valley bottoms such as Bancos, Cabresto, and Carracas canyons, where grazing use primarily from horses and cattle has reduced plant cover and where runoff is concentrated from higher slopes. Also contributing to unsatisfactory conditions are roads constructed for gas development, gas well locations, and pipelines. Acres in unsatisfactory soil condition have not been mapped, but are estimated to be 10 percent of TES units 176, 731 and 769/626.

TES unit 721 (5,220 acres) falls in the potentially severe erosion hazard category because of soil type and slope. This unit is primarily located on the Carracas Canyon allotment. Soils in this unit appear to be relatively stable. Soil condition information was collected on one site within map unit 721 that exhibited a satisfactory soil condition rating. In 1987 (when the TES was completed) current erosion for TES unit 721 was estimated to be less than the tolerance level. [16] Acres in unsatisfactory condition are generally related to portions of the unit that are adjacent to areas of heavy grazing use by horses or roads constructed for gas development, pipelines, and well locations. It is estimated that 5 percent of the TES unit is in unsatisfactory condition.

TES map unit 70/71 (7,514 acres) also falls into the potentially severe erosion hazard, because of the soil type and it's susceptibility to gullying. Map unit 70/71 is the primary soil type that is grazed throughout the JWHT. Consequently the majority of range/soil transect information is gathered within this unit. Soil condition was evaluated on 6 sites within TES map unit 70/71 using Parker 3 step methodology. [39] Transect information is presented in Table 4. Those transects located in Cabresto Canyon were rated at poor or very poor soil stability. Only one transect

was located in Bancos Canyon, and it was also rated in poor soil stability. Other transects in Mule, Buzzard, and Lynch Ranch areas had fair soil stability. Poor soil stability is considered unsatisfactory soil condition.

In August 2003, a soil and watershed inspection indicated that the Lion, Cabrero, and Cabresto canyon areas were in unsatisfactory soil condition. [158] Extensive sheet, rill, and gully erosion are very common throughout this unit. Range inspection notes from 1998 specify that there were serious concerns about soil conditions in the Cabresto/Bancos Canyon area and that rill and wind erosion were active and needed to be addressed. [42] During drought conditions in 2002 a broad scale watershed assessment was prepared for the Jicarilla Ranger District. [226] The assessment states that, “there is little or no grass and forb cover under current conditions in Bancos and Carracas watersheds, due to the drought and grazing pressure by the high population of wild horses, in addition to cattle and elk.” There were 12 head of cattle permitted on the JWHT in 2002. Map unit 70/71 in Bancos Canyon is essentially roadless, with only one crossing, however the area has very serious erosion impacts throughout the canyon bottom (see Figure 5). Current unsatisfactory soil conditions have not been mapped throughout the JWHT, however it is estimated that 50 percent, or roughly 3,757 acres of TES unit 70/71, is in unsatisfactory condition.

Table 4. Soil Stability by TES Unit From Fall 2003 Range/Soil Transect Data [16, 260a]

Allotment	Location	TES Unit	Soil Stability/Trend	Site
Bancos	Lynch Ranch	70/71	fair/stable	reseeded 1973 sagebrush
Bancos	Mule Canyon	70/71	fair/stable	reseeded 1973 sagebrush
Bancos	Buzzard Park	70/71	fair/stable	piñon-juniper, ponderosa pine
Bancos	Cabresto Canyon	70/71	very poor/down	reseeded 1973 sagebrush
Cabresto	Cabresto Canyon	70/71	very poor/down	sagebrush, canyon bottom
Cabresto	Bancos Canyon	70/71	poor/down	piñon-juniper, sage
Carracas	Lower Carracas Canyon	721	fair/down	piñon-juniper, ponderosa pine
Carracas	Upper Carracas Canyon	174	fair/stable	ponderosa pine/meadow

The total acreage of unsatisfactory soil conditions on the JWHT is estimated to be 8,493 acres. Unsatisfactory soil conditions are scattered throughout the JWHT and are attributed primarily to gas development activities, grazing by wild horses, cattle grazing and some use by elk, all combined with long-term drought. Of greatest concern is map unit 70/71 where half the unit is in unsatisfactory condition.

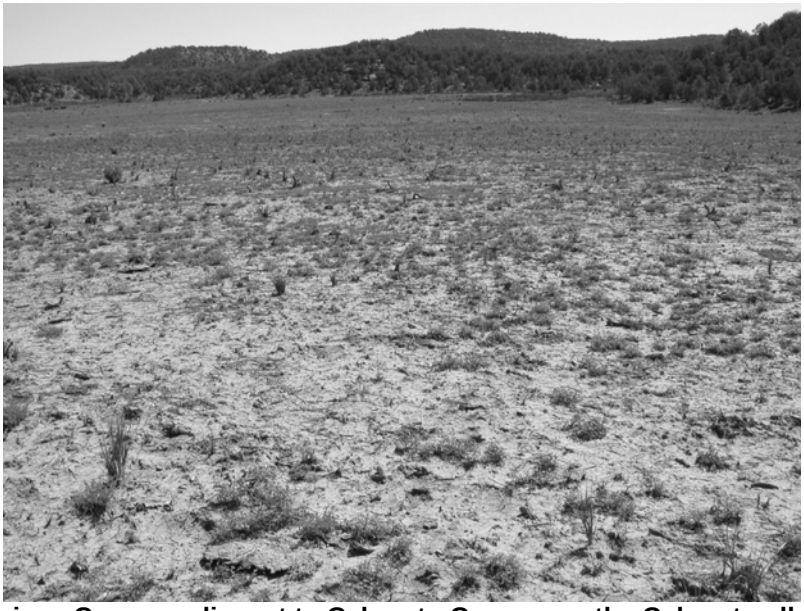

Figure 4. American Canyon adjacent to Cabresto Canyon on the Cabresto allotment taken in the fall of 2003. TES map unit 70/71, key grazing area ½ mile from water. Drought combined with heavy grazing use has left this previously reseeded flat with little protection from erosion. Herbaceous cover is primarily made up of annuals with some western wheatgrass and blue grama.

Figure 5. The Cabresto Allotment in Bancos Canyon taken in fall of 2003. Severe rill and gully erosion at the toe of the slope between TES map units 70/71 and 769. Erosion of this nature is common in Bancos Canyon.

The watershed assessment completed for the Jicarilla Ranger District in 2003 states:

If wild horse populations were managed according to the current management plan, reductions of up to 130 horses would be necessary. An environmental assessment for a new management plan is currently under development by District resource specialists and may propose new optimum numbers for the herd based on forage production and utilization. Due to the importance of grasses and forbs to the soil productivity and erosion control in the Wild Horse Territory, predominantly within the Carracas and Bancos watersheds, and the damage sustained to this vegetation by the aggressive grazing by these wild horses, it is clear that some reduction in herd size is essential to improve watershed condition. [226]

Dr. Jerry Holechek discusses erosion protection in his textbook *Range Management-Principles and Practices*. He states:

The best protection against erosion is to establish and maintain a good vegetative cover. Livestock affect watershed properties by removal of plant cover and through the physical action of their hooves. Reduction in the plant cover can increase the impact of raindrops, decrease soil organic matter and soil aggregates, and increase soil crusts. The primary effect of hoof action is compaction of the soil surface. Removal of cover and soil compaction reduce water infiltration rates, increase runoff, and increase erosion. [36]

Watershed Conditions

The following information is primarily taken from the 2003 Watershed Assessment for the Jicarilla Ranger District. [226]

Bancos, Carracas, and La Jara watersheds are all part of the Upper San Juan 4th-level hydrologic unit (14080101) or sub-basin. Bancos watershed, which drains into the San Juan River below Navajo Lake, is the only watershed with most of its area (55 percent) on National Forest System lands. National forest is located in the middle to upper part of the watershed. Only 25 percent of the Carracas watershed, which outlets into Navajo Lake, is on the Carson National Forest. The Jicarilla Ranger District in the Carracas watershed is in the middle of the delineated area. La Jara watershed runs into the San Juan River downstream from the Bancos watershed. In the La Jara watershed, the Jicarilla Ranger District (28% of total area) is also located in the center of the area. [226] Table 5 shows the 5th code watersheds and acreages within the JWHT.

Table 5. 5th Code Watersheds in the Jicarilla Wild Horse Territory

Watershed	Total Watershed Acres	Acres Within JWHT	Percent Watershed
Bancos	107,986	53,451	50
Carracas	51,940	13,193	25
La Jara	185,112	7,748	4

Riparian

Riparian habitat represents less than 30 acres of the JWHT. This habitat is found scattered in isolated tracts generally less than 1 acre in Bancos, Cabresto, Eul and Carracas canyons with the majority located in Bancos canyon. A mix of coyote willow, Gooding's willow, peachleaf willow, and Freemont cottonwood are found in some of these areas. Other vegetation associated with this habitat includes sedges, rushes, blue grama, rubber rabbitbrush, big sagebrush, squirreltail, and dropseed species. These are all ephemeral streams and riparian vegetation is limited to small areas primarily in subirrigated canyon bottoms or where a seep or a constructed sump is present.

Water Quality

The Bancos, Carracas and La Jara watersheds are located in the Upper San Juan Subbasin. The Upper San Juan is currently identified on the 2002 – 2004 State of New Mexico §303(d) List for Assessed River/Stream Reaches Requiring Total Maximum Daily Loads (TMDL'S) as a water quality limited water body (Assessment Unit ID NM-2406_00). The designated uses impaired are warmwater and coldwater fisheries. Probable cause of impairment is mercury in fish tissue, and the magnitude is listed as Moderate. Probable sources of impairment are listed as Atmospheric Deposition and other Unknown Sources. Because the Bancos, Carracas and La Jara watersheds drain into Navajo reservoir, sediment has not been identified as a probable cause of water quality impairment

> *The lack of quality vegetative cover and the acreage of surface disturbance, combined with a predominance of naturally erodable soils and relatively high peak flows generated by storm water runoff combine to cause accelerated erosion throughout the District.* [226]

> *Current sheet and rill erosion can be attributed to the lack of ground cover due to sparse vegetation, especially native grasses and forbs that hold soil in place during rainfall and runoff events. Lack of ground cover and sparse vegetation has been attributed to bare ground from construction activities for gas development, which removes 2 to 3 acres of native vegetation for well pads, in addition to road construction and pipeline installation. The past few years of drought, combined with overgrazing by wild horses in addition to forage utilization by cattle and elk,*

have severely damaged the understory vegetation that provides protection from erosion and filters sedimentation from surface water runoff before reaching the stream system. [226]

Comparison of Alternatives

Past, Present, and Reasonably Foreseeable Activities

The past, present and reasonably foreseeable activities that will be used to analyze the cumulative effects on vegetation are: Livestock and wildlife grazing and activities associated with natural gas development (roads, pipelines and well pads).

Alternative A

Even with favorable weather conditions, range conditions would rapidly decline as the wild horse population continues to climb. Acres of unsatisfactory soil conditions in TES map unit 70/71 would continue to increase. It is expected that within the next 5 years all 7,514 acres of TES map unit 70/71 would be in unsatisfactory soil condition. Unsatisfactory soil conditions in TES map units 176, 731, and 769/626 would likely double to 8,000 acres in the same time frame as heavy grazing use climbs up slope, while the valley bottoms continue to decline in productivity. Soil loss from gullying, rilling and overland flow would persist, reducing long-term productivity of the soil and limiting the future potential for site stability recovery. Reseeding on gas related pipeline and well locations within the JWHT would continue to fail also -- increasing the acres in unsatisfactory condition. Decline of watershed conditions would persist relative to degrading soil conditions.

Cumulative Effects

Effects described above include the cumulative effects of livestock and wildlife along with the impacts of horses on soils, specifically ground cover. Effects of natural gas development and production would reduce the effective ground cover since revegetation efforts on the JWHT would be seriously hampered (see also Gas Development section).

Alternative B

Alternative B would decrease grazing use to 30 percent available forage, providing flexibility for managing wild horse and livestock numbers and improving soil conditions. Increases in vegetation biomass retained on site and returned nutrients to the soil would help stabilize current erosion rates, particularly on TES units 70/71, 176, 731, and 769/626. Reseeding success on gas related pipeline and well locations would dramatically improve with decreased grazing pressure, also reducing acres in unsatisfactory condition. Overall unsatisfactory soil conditions associated with grazing would be expected to improve to satisfactory over 10 percent of the acres within the next 10-year period. Watershed conditions would show signs of recovery with improvement in soil conditions. It is likely that some areas in unsatisfactory condition would not respond to decreased grazing pressure. In these areas, reseeding coupled with restricted grazing use may be necessary to increase herbaceous ground cover to achieve satisfactory conditions.

Cumulative Effects

Effects described above include the cumulative effects of livestock and wildlife along with the impacts of horses on soils, specifically ground cover. Both wild horses and natural gas development and production would have cumulative effects on soils through reductions in ground cover and soil productivity. Natural gas related activities would tend to have more extensive effects than wild horses.

Alternative C

Like Alternative B, Alternative C would decrease grazing use to 30 percent of available forage. Flexibility in the management of wild horse and livestock numbers would result in an improvement of soil conditions. Increases in vegetation biomass retained on site and returned nutrients to the soil would help stabilize current erosion rates, particularly on TES units 70/71, 176, 731, and 769/626. Reseeding success on gas related pipeline and well locations would dramatically improve with decreased grazing pressure, also reducing acres in unsatisfactory condition. Overall unsatisfactory soil conditions associated with grazing would be expected to improve to satisfactory over 10 percent of the acres within the next 10-year period. Watershed conditions would show signs of recovery with improvement in soil conditions. It is likely that some areas in unsatisfactory soil conditions would not respond to decreased grazing pressure. In these areas, reseeding coupled with restricted grazing use may be necessary to increase herbaceous ground cover to achieve satisfactory conditions.

Cumulative Effects

Effects described above include the cumulative effects of livestock and wildlife along with the impacts of horses on soils, specifically ground cover. Both wild horses and natural gas development and production would have cumulative effects on soils through reductions in ground cover and soil productivity. Natural gas related activities would tend to have more extensive effects than wild horses.

Alternative D

Alternative D would decrease grazing use to 30 percent of available forage during non-drought years and would incorporate some flexibility in managing wild horse and livestock numbers, thus improving soil conditions. During drought periods, it is expected that grazing use would climb well above the 30 percent use level, thus slowing improvement in soil conditions. During periods of extended drought, soil conditions would not improve and could potentially decline. Depending on drought conditions, upgrading soil conditions to satisfactory could be as much as 5 percent or as little as zero over the next 10-year period. Watershed conditions would show signs of recovery with improvement in soil conditions. It is likely that some areas in unsatisfactory soil conditions would not respond to decreased grazing pressure. In these areas, reseeding coupled with restricted grazing use may be necessary to increase herbaceous ground cover to achieve satisfactory conditions.

Cumulative Effects

Effects described above include the cumulative effects of livestock and wildlife along with the impacts of horses on soils, specifically ground cover. Both wild horses and natural gas development and production would have cumulative effects on soils through reductions in ground cover and soil productivity. Natural gas related activities would tend to have more extensive effects than wild horses.

Vegetation and Range Condition

Based on the Geographic Information System (GIS) and Rocky Mountain Resource Information System (RMRIS) databases, the Jicarilla Wild Horse Territory contains the following vegetation types:

Table 6. Vegetation Composition Within the Jicarilla Wild Horse Territory

Vegetation Type	Acres	Percent
Grass/sagebrush	7,714	10
Shrubs	3,395	5
Piñon-juniper	50,031	67
Ponderosa pine	12,590	17
Mixed conifer	662	1
Total	74,392	100

There are five major types of vegetation in the JWHT – grass/sagebrush, shrubs, piñon/juniper, ponderosa pine and mixed conifer. Riparian is a very minor component. Figure 6 displays the distribution of vegetation across the territory.

Forest Plan Management Areas 11 and 12: Revegetation areas (grasslands) and sagebrush comprise 7,597 acres of the wild horse territory and occur along canyon bottoms in deeper, more productive soils. Sagebrush is associated with rabbitbrush, four-wing saltbush, shadscale and some grasses (blue grama and western wheatgrass). The key grazing areas throughout the JWHT are located in the grass/sagebrush habitat type. Roughly 3,000 acres of these units have been burned and approximately 2,000 acres have been reseeded. The reseeded acres were sown with crested wheatgrass, pubescent wheatgrass, perennial ryegrass, and ladak and black medic alfalfa. Areas reseeded were cleared through burning sagebrush or crushing piñon and juniper trees. Burned areas were primarily in American, Cabrero, and Cabresto canyons. Piñon-juniper crushed areas are on Bancos, Quintana, and Martinez mesas.

In past years, these reseeded areas have dramatically increased available forage for grazing, producing from 1200-3500 lbs of forage per acre. [26a] Reinvasion of sagebrush, decline of reseeded grasses, severe drought, and heavy grazing use have combined to reduce production on these sites. In the fall of 2003, monitoring found that forage production ranged from 215 pounds per acre to less than 50 pounds. [273] Productivity is highly variable from year to year, however, overall there has been a decline in production between 50 and 75 percent or more on these sites. These are important key grazing areas for cattle during the summer months, elk during the winter, and horses year-round.

Forest Plan Management Area 13: A mountain shrub community (3,395 acres/4%) made up of Gambel oak, mountain mahogany, bitterbrush, serviceberry, cliff fendlerbush and snowberry dominate the steep, north-facing slopes. Various sedges and grasses are associated with these browse species. Grasses consist mostly of muttongrass, bluegrass, junegrass and piñon ricegrass. Piñon-juniper, ponderosa pine, Douglas-fir, chokecherry, skunkbush and big sagebrush are also found scattered through this vegetation type. Deer and elk use this habitat type intensively for winter forage.

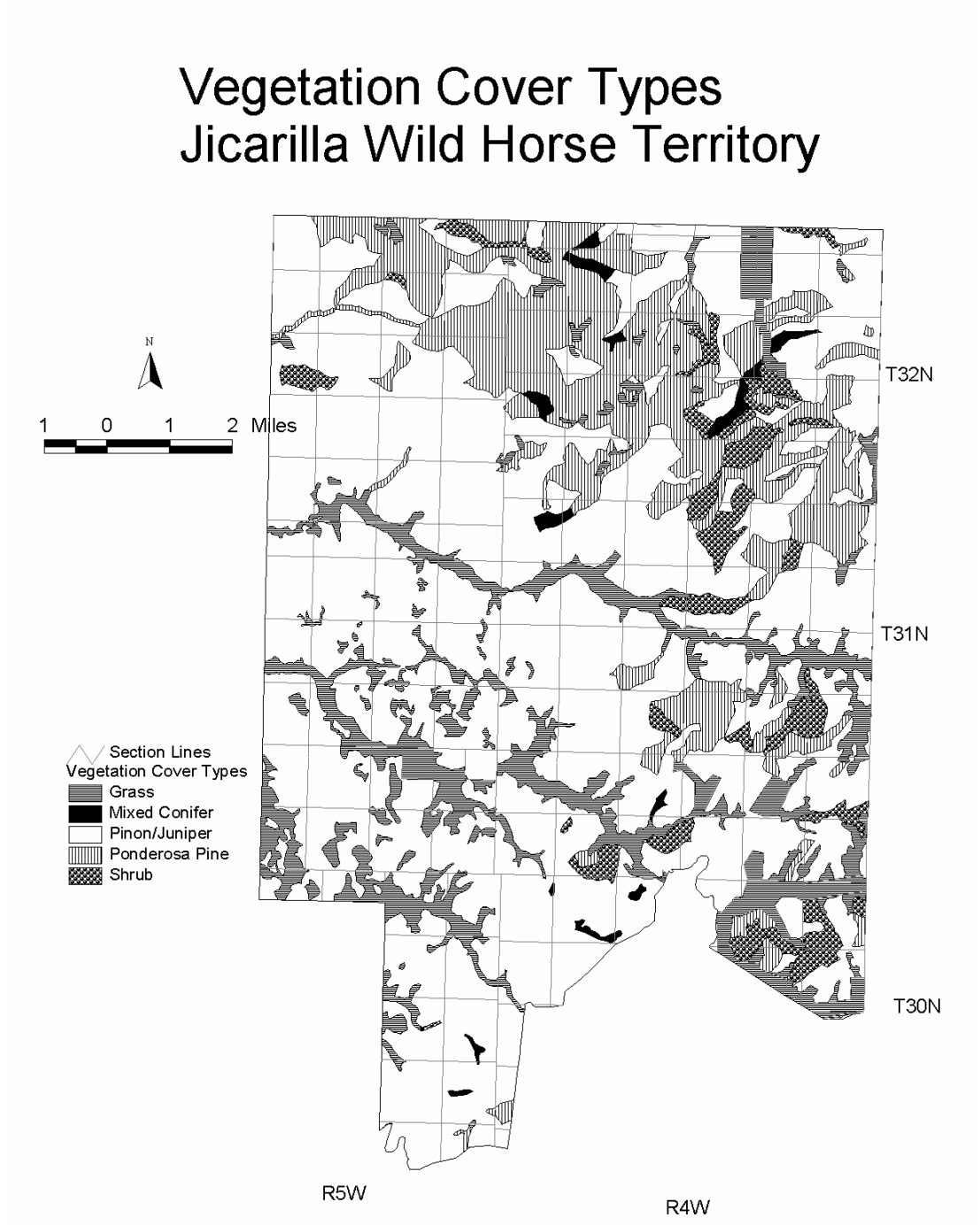

Figure 6. Vegetation Within Jicarilla the Wild Horse Territory

Forest Management Area 4: Ponderosa pine under 40 percent slope (12,590 ac/17%), is found in the higher elevations on ridges, north-facing slopes and head-canyons. Ponderosa pine is often associated with piñon-juniper in this area. Shrub species include Gambel oak, mountain mahogany and antelope bitterbrush. The pine understory consists of some sagebrush, sedges, blue grama and mutton bluegrass. This vegetation type is found primarily on the Carracas Allotment portion of the JWHT. It is an important browsing and grazing area for deer and elk. Horses also use it extensively as summer range.

Forest Management Area 8: Piñon pine and Rocky Mountain juniper (PJ), make up the majority of the area within the JWHT (49,782 acres). Gambel oak, sagebrush, and bitterbrush are the primary browse species. Western wheatgrass, blue grama, and galleta make up most of the perennial grass understory. Cattle, horses, elk, and deer extensively utilize these areas. The primary limiting factor for grazing use by cattle, horses, and elk is the lack of water on a large portion of the management area.

Mixed conifer is made up of Douglas-fir and ponderosa pine and is found at the highest elevations, on north-facing slopes and in small canyons. The area is small (662 acres), and is not separated into a Forest management area. The primary contribution for this vegetation type is hiding cover and habitat for wildlife. The majority of this habitat is scattered throughout the west part of the Carracas Allotment.

Riparian areas are estimated to be less than 30 acres of the JWHT. These are primarily scattered subirrigated areas, seeps, or sumps, in the canyon bottoms of Bancos, Eul, Cabresto, and Carracas canyons. A sump is a hole, generally about the size of a small dirt tank, dug with heavy equipment down to the water table. Included in these acres are sub-irrigated areas in the bottom of Bancos Canyon that have small willow thickets, and small areas dominated by inland salt grass. There is no running water in these sub-irrigated bottoms. A mix of coyote willow, Gooding's willow, peachleaf willow, and Fremont cottonwood are found in some of these areas. Other vegetation associated with this habitat includes sedges, rushes, blue grama, rubber rabbitbrush, big sagebrush, squirreltail, and dropseed species. These are all ephemeral streams and riparian vegetation is limited to small areas primarily in subirrigated canyon bottoms or where a seep is present.

Grazing Allotments

There are three grazing allotments associated with the JWHT -- Carracas, Bancos and Cabresto. Forty-four percent (31,918 acres) of the JWHT lies within the Carracas Allotment, however livestock use is limited to the Carracas Canyon area. The allotment is managed as a seasonal cow/calf operation through a 10-year term grazing permit and a temporary use permit -- 8 head are permitted under the term permit and another 4 head are under a temporary permit. The Carracas uses a one-pasture grazing system and grazing is permitted from May 16 to October 15. Livestock grazes approximately 5,000 acres (15%) of the 31,918 acres on the Carracas allotment.

Twenty-one percent, (15,399 acres) of the JWHT lies within the Bancos Allotment, excluding private land. The allotment is managed as a seasonal cow/calf operation with 80 head through a 10-year term grazing permit. The Bancos uses a four-pasture rest/rotation grazing system and grazing is permitted from May 16 to October 31.

Thirty-five percent (27,079 acres) of the JWHT lies within Cabresto Allotment. The allotment has a seasonal cow/calf operation with 101 head through a 10-year term grazing permit. The Cabresto uses a one-pasture grazing system and grazing is permitted from June 1 to October 31. Prior to 1955, the Carracas, Cabresto and Bancos allotments were one allotment, called the Carracas Allotment.

Existing Range Condition and Trend

Since the 1930's, Forest Service range conservationists and technicians have periodically measured changes in plant composition, vigor and diversity, as well as soil characteristics. These components are the key indicators of range condition. The condition rating is an estimate of how the current vegetation and soil community compares with its capabilities.

Grazing by wildlife, wild horses and livestock may impact vegetation by changing the mix of species in the plant communities being grazed; by changing the density and frequency of perennial forage plants; and by impacting the vigor of the grazed plants. These three vegetation effects are combined into five range condition classes (excellent, good, fair, poor, very poor), which reflect the relative effects of grazing on vegetation. In addition to range condition classes, range trend demonstrates whether range conditions are improving or declining.

Range trend expresses the direction of change (if any) in range condition in response to past and existing wild horse and livestock management practices or other land use activities, in combination with other environmental factors (FSH 2209.21 CH 40.5-2). [39] A stable trend means soil is held in place by vegetation, forage species are all aged, and reproducing vegetation cover is being maintained. A stable trend also indicates the mix of species is being maintained, as well as density and frequency of perennial forage plants and plant vigor. It is important to note that range condition on a downward trend may not necessarily be "bad". For example: the encroachment of sagebrush and juniper trees may indicate a downward trend in grass species that benefit livestock. However, the new vegetation type may provide hiding cover and browse for wildlife. A downward trend does indicate a reduction in forage availability for horses, cattle and wildlife that benefit from grasses and forbs, which may reduce the grazing capacity on grazing allotments and the JWHT.

Table 7. Range Transect History: Range Condition and Trend [26a, 260a]

Allotment	Location	Site	1954-56	1975	2003
Bancos	Lynch Ranch	reseeded 1973 sagebrush	poor/up	good/up	poor/stable
Bancos	Mule Canyon	reseeded 1973 sagebrush	not available	excellent/up	fair/stable
Bancos	Buzzard Park	piñon-juniper, ponderosa pine	poor/stable	fair/up	poor/stable
Bancos	Cabresto Canyon	reseeded 1973 sagebrush	not available	excellent/up	poor/down
Cabresto	Cabresto Canyon	sagebrush canyon bottom	poor/stable	fair/up	poor/down
Cabresto	Bancos Canyon	piñon-juniper, sagebrush	poor/stable	fair/up	poor/down
Carracas	Lower Carracas Mesa	piñon-juniper, ponderosa pine	poor/stable	poor/up	poor/down
Carracas	Upper Carracas Mesa	pine/meadow	not available	poor/down	poor/down

TES map unit 70/71 is the primary grazing soil type throughout the JWHT and where most key grazing areas are located. Consequently the majority of range transect information is gathered within this unit. In the fall of 2003, range conditions and trend information was gathered using Parker 3 Step methodology on 8 sites within the JWHT. [39, 26a] Six of these sites were located in TES map unit 70/71. Transect information is presented in Table 7. In 2003, transects located in the Cabresto Canyon area, (Lion and Cabrero canyons) were in poor range condition with downward trends. Only one transect was located in Bancos Canyon and it was also rated in poor range condition with stable trends. Other transects in Buzzard and the Lynch Ranch area were in poor condition with stable trends. Poor condition is considered unsatisfactory range condition. Only transects in Mule Canyon were in fair condition with stable trends which is considered satis-

factory. Both transects on the Carracas Mesa showed poor range conditions with downward trends. These are located in TES unit 174.

Figure 7. Range transect in Cabresto Canyon taken September 1973, two years after chaining and reseeding primarily with crested wheat.

Figure 8. Range transect taken in same location as previous photo in fall 2003. The site is invaded with sagebrush and the seeded species are only a remnant.

Figure 9. Plot photo in Cabresto Canyon on the Bancos Allotment taken in fall 1973.

Figure 10. Same plot photo as previous figure taken in fall 2003.

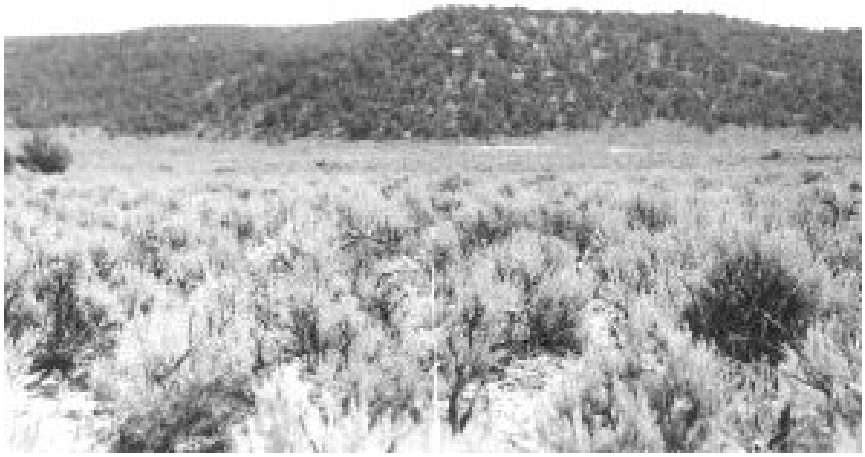

Figure 11. Range transect photo from fall 1973 in Cabresto Canyon on the Cabresto Allotment.

Figure 12. Same photo location as previous figure. Transect data indicates a decline in range condition from fair with and upward tend in 1973 to poor with a downward trend in 2003.

Figure 13. Range Transect Photo from fall 1973. Reseeding in the Lynch Ranch area on the Bancos Allotment.

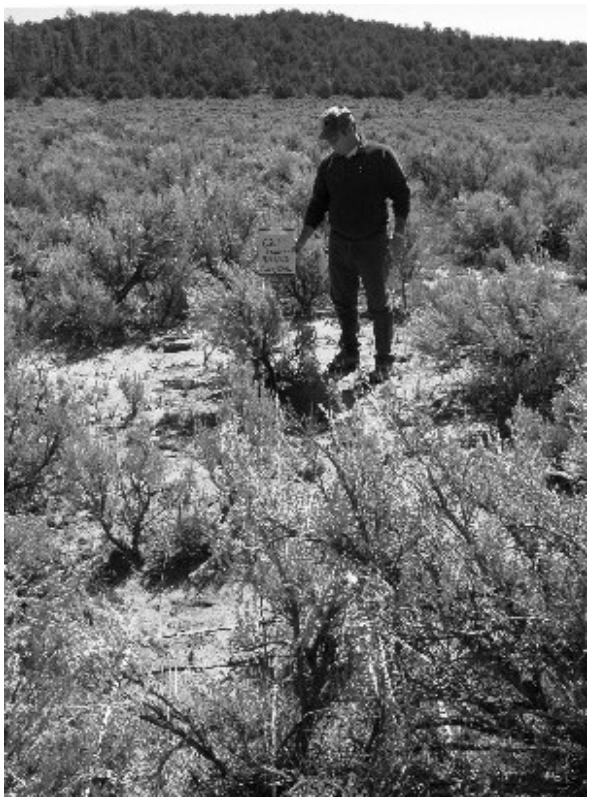

Figure 14. Photo taken in same location as previous figure in fall 2003. The site is invaded with sagebrush and the seeded species are only a remnant.

Figure 15. Range transect photo in fall 1973 in Bancos Canyon on the Cabresto Allotment.

Figure 16. Same photo location as previous figure. Transect data indicates a decline in range condition from fair with and upward tend in 1973 to poor condition with a downward trend in 2003. Notice the difference in grazing use. This is an area currently being grazed hard by horses. Even the sagebrush is heavily browsed.

Figure 17. Range transect plot photo taken fall 1973 in Bancos Canyon on the Cabresto Allotment. Notice the western wheatgrass seedlings in the plot.

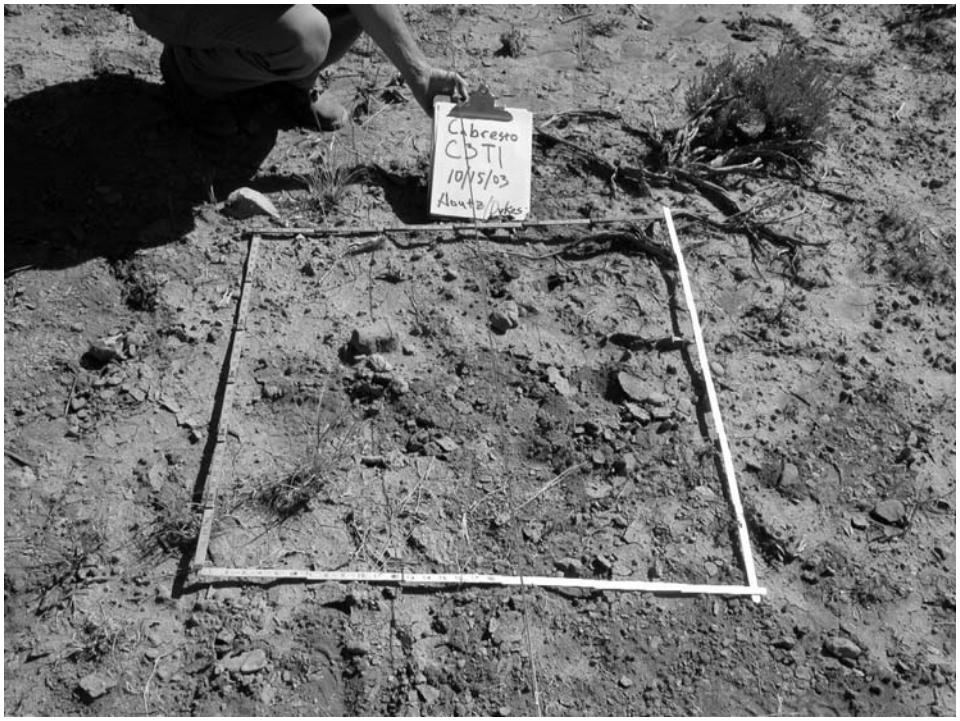

Figure 18 Same photo location as previous figure. The comparison of the two plots look similar, however the absence of the western wheatgrass in this photo is an important indicator of a downward trend.

It is apparent that range conditions in the primary grazing areas on the JWHT are in poor condition. This includes areas on the Carracas Allotment where cattle grazing is limited or non-existent.

Table 8. 1975 Combined Range Analysis for the Bancos, Cabresto and Carracas Allotments on the JWHT. [26a]

Range Condition	Sagebrush/ Grassland	Steep Slopes Shrubland	Mixed Conifer/Ponderosa Pine	Piñon-Juniper Woodland	Total Acres	% of JWHT
Excellent	--	--	--	--	--	--
Good	1,409	--	--	--	1,409	2
Fair	1,159	828	2,739	1,843	6,569	9
Poor	5,984	573	11,559	35,850	53,966	72
Very Poor	395	--	--	12,053	12,448	17
Total	8,947	1,401	14,298	49,746	74,392	100

The last year when range conditions were mapped on the JWHT was in 1975. While this data is 30 years old, range conditions have not improved, based on range transect data from 2003 as shown in Table 8 and documented range inspections. [3, 42, 50, 165,179, 246, 26a, 260a]

In 1975, the piñon-juniper woodlands and mixed conifer/ponderosa pine vegetation types by far had the majority of the poor and very poor range conditions. While some of these poor conditions could have been attributed to heavy grazing use by horses, cattle and wildlife, the majority was associated with increases in tree canopy and a loss of herbaceous vegetation. These are also the current conditions. As fire has been excluded from the ecosystem over the last 100 years piñon pine, ponderosa pine and a variety of juniper trees have increased in density. Over the last 30 years, tree canopy cover of these woodland sites has increased and little change could be expected without large blocks of trees being thinned, mechanically treated or burned with prescribed fire. While changes in grazing management may help up to 10 percent of these acres, most would not improve without major reductions in tree overstory.

The 1,409 acres shown in good condition in Table 8 and pictured in Figures 2 and 8 were seeded to crested wheat and chained to clear the sagebrush. It is natural for non-native species such crested wheat to decline over time and for sagebrush to reestablish in areas where it was removed by chaining or other means. The primary concern at this time is that the sites cannot even be rated in fair range condition. Lost forage production on these reseeded sites also have major implications on grazing capacity on the JWHT.

From the standpoint of wild horse management, the sagebrush/grassland vegetation type is the most important. While there are pockets of this type in most of the TES units, the largest portion falls within TES unit 71/70, with some in units 119, 145 and 174. This is where management of grazing animals can have the greatest impact on unsatisfactory range conditions. By improving these acres, grazing on steeper slopes and in less accessible areas would also improve.

Forage Production and Utilization

Forage production is the amount of biomass plants can produce. Utilization of vegetation by grazing animals affects vegetation composition and productivity. Utilization is defined as the percentage of the current year's herbage production consumed or destroyed by herbivores. Over-utilization can cause some plants to decline in frequency and distribution and to lose vigor and sustainability. Maximum allowable use is the amount of use key species can sustain without physiological damage.

The allowable level of utilization for range forage is estimated after considering numerous factors, such as the threshold for physiological damage for the plant species, intensity of management, type and class of livestock, conflicts with other range uses, capability of the land to produce forage, season of use, and conflicts with watershed and soil conditions. The Region-wide Forest Plan amendment issued June 5, 1996 [23] for the management of Mexican spotted owl and northern goshawk habitat includes additional standards and guidelines for grazing management on the Carson National Forest. It states, "Forage use by grazing ungulates will be maintained at or above a condition which assures recovery and continued existence of threatened and endangered species." [23]

The amendment guidelines describe how to identify key forage monitoring areas and to develop site-specific forage use levels. An allowable use guide is included in the amendment. The allowable use for all ungulates on the Jicarilla Wild Horse Territory is 30 percent. This level is what would be required to produce an upward trend in range condition for the territory (*Considerations Concerning Stocking Rates* Appendix C). Depending on the intensity and duration of grazing use, the speed of recovery from over-utilization may vary.

Cattle, horse and wildlife tend to concentrate grazing where water and forage are present. Wild horses are likely to range farther from water and use rougher ground than cattle. However, on the JWHT during the winter months the horses are apt to concentrate use in open sagebrush bottoms at lower elevations and then a portion of the herd will move up to higher elevations on Carracas Mesa during the summer. In past years, livestock grazed the same open bottoms during the summer months. These factors tend to lead to overgrazing in the bottoms and near ponds and springs, with less grazing on mesa tops and steeper slopes. The majority of key grazing areas fall within these canyons bottoms. Such patterns are especially apparent on the Cabresto, Carracas and Bancos canyons, where horses and livestock are concentrated. Except for 12 head of cattle on the Carracas allotment, the allotments in the JWHT have been in non-use since 2002 because of the poor range conditions and increasing horse numbers.

Table 9. Actual Cattle Grazing Use Over the Past 20 Years on Allotments Within JWHT

Year	Bancos	Cabresto	Carracas
Permitted Use	80	101	12
Actual Use			
2004	0	0	0
2003	0	0	0
2002	0	0	12
2001	50	51	8
2000	45	101	12
1999	45	101	12
1998	45	71	12
1997	50	70	12
1996	50	70	12
1995	50	101	12
1994	50	101	12
1993	45	85	12
1992	71	85	8
1991	36	56	8
1989	27	0	8
1988	59	0	8

Year	Bancos	Cabresto	Carracas
1987	62	0	8
1986	67	101	8
1985	67	101	8
1984	63	68	8

Wild horse reductions - A Wild Horse Management Plan was implemented in 1976 to manage a wild horse population of 60 head within the JWHT. [27, 28] Since 1977 horses numbers have fluctuated between 242 in 1978 and 53 in 1990 (Table 15). Currently there are estimated to be 232 horses, not including the 2004 foal crop.

Prescribed burning - To stimulate palatable browse and grass forage for wildlife, livestock and wild horses, over 3,000 acres on the Carracas Mesa and 1,500 acres in the Cabresto Allotment have been prescribed burned and portions reseeded in the last 10 to 15 years. These included: 3,420 acres in 1998 in Carracas, Cottonwood and Cedro canyons; 890 acres in 1993 in Saltoro and Bancos canyons; 60 acres in 1992 in Bancos Canyon; and 200 acres in 1991 in Turkey Canyon, for a total of 4,570 acres in 10 years. Many of these are the key grazing areas for ungulates. Because of four years of drought, most of these areas are in fair to poor condition, with a few sites now reverting to cheatgrass, big sagebrush and rubber rabbitbrush.

Oil and gas development – Areas that are cleared for well pads and pipeline rights-of-way are reseeded and provide forage for grazing ungulates. They began exploring and drilling in the 1940s, but did no site restoration at that time. Beginning in the 1970s, pads, pipelines, roads and other bare soil areas were seeded with grasses and forbs, resulting in some vegetation cover. Unfortunately many of these reseeded areas have received very heavy grazing use during the drought conditions over the last 5 years. Reseeding done on recently disturbed areas have either succumbed to the drought or received enough grazing pressure that they have not been successful.

Grazing Capacity

Vegetation condition and trend and expected utilization rates are used to estimate productivity. Estimated productivity for domestic livestock and wild horse grazing is expressed as grazing capacity. Grazing capacity is the available production for wild horses and livestock within the allowable use - over and above what is used by grazing wildlife.

The methodology prescribed in *Considerations Concerning Stocking Rates* (Appendix C) developed and currently utilized on the Apache-Sitgreaves National Forest was used to estimate grazing capacity for the JWHT. This methodology combines vegetation typing and production information with Geographical Information System (GIS) data. Factors for slope and distance to water are combined with estimated ungulate use by species (Appendix C). This analysis included deer, elk, wild horses and cattle. Specific knowledge by resource staff was also integral in bringing this information together to create an estimated grazing capacity. For this analysis wildlife use is held constant for each alternative since the Forest Service does not control wildlife populations. Consequently, during years of extended drought, wildlife numbers do not decrease and use a much larger share of available forage.

One of the concerns brought forward by the public during scoping for the Jicarilla wild horse proposal was the request to accurately explain which species is the cause for heavy grazing use and poor range conditions on the JWHT. The assumption is that livestock are the major culprit. Livestock grazing is a major concern, however, for many years only 12 head of cattle have grazed the Carracas Allotment, roughly 44 percent of the JWHT. Carracas Mesa has never lent itself well to livestock grazing; consequently it has had only limited cattle use. On that portion of the

JWHT, range conditions associated with key grazing areas are in poor and even very poor range condition. Carracas Mesa receives extensive grazing use in the fall and winter by elk and deer and then heavy grazing use in the summer by wild horses. The meadows and parks are thick with weedy annuals such as sunflower, curlycup gumweed, showy golden eye, and cheatgrass.

In April 2002, a field tour was held to inspect the Bancos Allotment. Cattle had not been on the allotment since October. Even this early in the season grazing use was already from 50-70 percent of the current years growth. “The obvious problem is utilization by wild horses. There is some wildlife use, but it does not appear to be significant. This conclusion was reinforced when we proceeded to monitor conditions on the Laguna Seca Allotment. There is no wild horse use on that allotment and current year’s utilization is probably less than 5 percent. The elk and deer populations are no different from that on the Bancos Allotment.” [147]

A portion of Bancos Canyon lies within the Cabresto Allotment. It is difficult for cattle to get into Bancos Canyon; consequently it receives considerably lighter grazing use from cattle. However, it receives heavy use from horses. During the January 2004 horse survey flight, 58 horses were counted in Bancos Canyon, 20 in Carracas Canyon, and 80 in Cabresto Canyon. There have been inferences in the scoping for this project that horses do not use the canyon bottoms and if they do it is only light use. This is simply not the case. Over the last three years there have been only 12 head of cattle on the JWHT and yet grazing use has continued to be well over 50 percent in the key grazing areas. They can and do use steeper slopes than cattle, but they will spend much of their time grazing valley bottoms if given the opportunity. Personnel on the Jicarilla Ranger District have come to know many of the individual horses on the territory, because their bands are routinely seen in the same canyon bottoms where the major Forest roads are located. [272a, 273, 165, 179]

Figure 19. Typical opening on Carracas Mesa, which receives heavy grazing use from horses. The site is dominated by annuals. In the background is a large stand of sunflowers.

Table 10. Comparison of Grazing Use (Animal Unit Months) By Cattle and Wild Horses 1994-2004.

Year	Cattle	Wild Horse	Total
2004	0	2,784	2,760
2003	0	2,616	2,616
2002	103	2,316	2,419
2001	902	1,884	2,786
2000	1,289	1,428	2,717
1999	1,284	1,116	2,400
1998	971	No data	--
1997	1,086	1,680	2,766
1996	1,086	No data	--
1995	1,332	No data	--
1994	1,332	1044	2,376

An animal unit month (AUM) is the forage needed for one cow for one month. A cow calf pair is considered 1.32 AUMs. 1 AUM was used for horses. The 1976 Wild Horse Management Plan called for managing the herd at an average of 60 animals. That would be 720 AUMs of grazing. If wild horse numbers had been kept closer to 60 head, range and soil conditions on the JWHT would still need attention, but would not be as serious as they are at the present time.

Comparison of Alternatives

Table 11 shows the expected forage utilization over the entire JWHT for each alternative. The expected utilization is from cattle, horses, elk and deer.

Table 11. Comparison of Estimated Utilization on the JWHT By Alternative

Alternative	A No Action	B	C Proposed Action	D
Estimated Utilization Under Favorable moisture and Improving Range conditions	* 30-50% and increasing until a die off occurs	20-30%	20-30%	20-30%
Estimated Utilization Under Drought Conditions	* 60-80% and increasing until a die off occurs	20-30%	20-30%	30-50%

* With the high herd numbers associated with Alternative A, there would be serious potential for 25 – 50% die off of the horse herd as occurred during the hard winter of 1978.

As indicated in Table 11, Alternative A would allow for soil and range conditions to continue degrading throughout the JWHT. Alternative D would not facilitate improvements in range and soil conditions during drought years. With the flexibility to adapt wild horse numbers to available forage, alternatives B and C would have the greatest potential for improving range and soil conditions.

Table 12 displays forage production and forage available for grazing by alternative. The available forage is 17 percent of what is produced. Appendix C describes the methodology for assessing forage availability based on distance to water and slope. Combined elk and deer grazing use is held constant for each alternative.

Table 12. Estimated Annual Forage Production (lbs.) and Allocation

	Total Annual Forage Production	Forage Available for Grazing	Forage Allocated to Elk and Deer	Forage Available to Wild Horses and Cattle
Estimate Under Favorable Moisture and Improving Range Conditions	10,538,810	1,842,471	612,850	1,229,621
Estimate Under Drought Conditions	5,289,801	924,950	612,850	312,100

Table 13. Estimated Capacity For Each Alternative

	Wild Horses	Cattle	Elk	Deer
Alternative A	300+ year-round	0	325 wintering 81 summering	700 wintering 175 summering
Alternative B Favorable moisture and Improving Range conditions	112 year-round	140 summer	325 wintering 81 summering	700 wintering 175 summering
Alternative B Drought	20 year-round	46 summer	325 wintering 81 summering	700 wintering 175 summering
Alternative C Favorable moisture and Improving Range conditions	105 year-round	140 summer	325 wintering 81 summering	700 wintering 175 summering
Alternative C Drought	50 year-round	14 summer	325 wintering 81 summering	700 wintering 175 summering
Alternative D Favorable moisture and Improving Range conditions	150 year-round	116 summer	325 wintering 81 summering	700 wintering 175 summering
Alternative D Drought	100 year-round	no cattle	325 Wintering 81 summering	700 wintering 175 summering

Past, Present, and Reasonably Foreseeable Activities

The past, present and reasonably foreseeable activities that will be used to analyze the cumulative effects on vegetation are: Livestock and wildlife grazing, natural gas development, and pine bark beetle infestations.

Alternative A

Even with favorable weather conditions, range conditions would rapidly decline as the wild horse population continues to climb. Grazing use would exceed the 30 percent use levels needed to improve poor range conditions ranging from 60-90 percent. Heavy grazing use would cause current poor range conditions to move toward very poor. Acres of poor range condition in sage/grassland bottom sites would continue to increase. It is expected that within the next 5 years all 7,514 acres of sage/grassland bottom sites would be in poor or very poor range condition. Poor range conditions on slopes with piñon and juniper would be expected to double to 8,000 acres in the same time frame as heavy grazing use climbs up slope, while the valley bottoms continue to decline in productivity. Soil loss from gullying, rilling, and overland flow would persist, reducing long-term productivity of the soil and limiting the future potential for site stability recovery. Reseeding on gas related pipeline and well locations within the JWHT would continue to fail also -- increasing the acres in unsatisfactory condition. The herd population would increase until a die off of horses occurred -- most likely in connection with a hard winter.

Cumulative Effects

Effects described above include the cumulative effects of livestock and wildlife along with the impacts of horses on vegetation. Effects of natural gas development and production would actually reduce the available forage since revegetation efforts on the JWHT would be seriously hampered (see also Gas Development section). The effects of pine bark beetle infestations could increase available forage as stands of piñon and ponderosa die.

Alternative B

Alternative B would decrease grazing use to 30 percent available forage, providing flexibility for managing wild horse and livestock numbers and improving range conditions. Increases in vegetation biomass retained on site and returned nutrients to the soil would help stabilize current erosion rates, particularly on steeper piñon and juniper sites adjacent to valley bottoms. Reseeding success on gas related pipeline and well locations would dramatically improve with decreased grazing pressure, also reducing acres in unsatisfactory condition. Overall poor range conditions associated with grazing would be expected to improve to fair range condition with stable trends over 10 percent of the acres within the next 10-year period. It is likely that some areas in poor or very poor range conditions would not positively respond to less grazing pressure. In these areas, reseeding coupled with restricted grazing may be necessary to increase herbaceous ground cover to achieve fair range conditions with stable trends.

Cumulative Effects

Effects described above include the cumulative effects of livestock and wildlife along with the impacts of horses on vegetation. Effects of natural gas development and production would maintain available forage as revegetation success improved with a smaller horse herd on the JWHT. The effects of pine bark beetle infestations could increase available forage as stands of piñon and ponderosa die.

Alternative C

Like Alternative B, Alternative C would decrease grazing use to 30 percent of available forage. Flexibility in the management of wild horse and livestock numbers would result in an improvement of range conditions. Increases in vegetation biomass retained on site and returned nutrients to the soil will help stabilize current erosion rates, particularly steeper piñon and juniper sites adjacent to valley bottoms. Reseeding success on gas related pipeline and well locations would dramatically improve with decreased grazing pressure, also reducing acres in unsatisfactory condition. Overall poor range conditions associated with grazing would be expected to improve to fair range condition with stable trends over 10 percent of the acres within the next 10-year period. It is likely that some areas in poor range condition would not positively respond to less grazing pressure. In these areas, reseeding coupled with restricted grazing may be necessary to increase herbaceous ground cover to achieve fair range conditions with stable trends.

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Alternative D

Alternative D would decrease grazing use to 30 percent of available forage during non-drought years and would incorporate some flexibility in managing wild horse and livestock numbers, thus improving soil conditions. During drought periods, it is expected that grazing use would climb well above the 30 percent use level, thus slowing improvement in range conditions. During periods of extended drought, range conditions would not improve and could potentially decline. Depending on drought conditions, upgrading range conditions to fair range conditions with stable trends could be 5 percent or as little as zero over the next 10-year period. It is likely that some areas in poor range conditions would not positively respond to less grazing pressure. In these

Alternative B

Alternative B would decrease grazing use to 30 percent available forage, providing flexibility for managing wild horse and livestock numbers and improving range conditions. Increases in vegetation biomass retained on site and returned nutrients to the soil would help stabilize current erosion rates, particularly on steeper piñon and juniper sites adjacent to valley bottoms. Reseeding success on gas related pipeline and well locations would dramatically improve with decreased grazing pressure, also reducing acres in unsatisfactory condition. Overall poor range conditions associated with grazing would be expected to improve to fair range condition with stable trends over 10 percent of the acres within the next 10-year period. It is likely that some areas in poor or very poor range conditions would not positively respond to less grazing pressure. In these areas, reseeding coupled with restricted grazing may be necessary to increase herbaceous ground cover to achieve fair range conditions with stable trends.

Cumulative Effects

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Like Alternative B, Alternative C would decrease grazing use to 30 percent of available forage. Flexibility in the management of wild horse and livestock numbers would result in an improvement of range conditions. Increases in vegetation biomass retained on site and returned nutrients to the soil will help stabilize current erosion rates, particularly steeper piñon and juniper sites adjacent to valley bottoms. Reseeding success on gas related pipeline and well locations would dramatically improve with decreased grazing pressure, also reducing acres in unsatisfactory condition. Overall poor range conditions associated with grazing would be expected to improve to fair range condition with stable trends over 10 percent of the acres within the next 10-year period. It is likely that some areas in poor range condition would not positively respond to less grazing pressure. In these areas, reseeding coupled with restricted grazing may be necessary to increase herbaceous ground cover to achieve fair range conditions with stable trends.

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Alternative D would decrease grazing use to 30 percent of available forage during non-drought years and would incorporate some flexibility in managing wild horse and livestock numbers, thus improving soil conditions. During drought periods, it is expected that grazing use would climb well above the 30 percent use level, thus slowing improvement in range conditions. During periods of extended drought, range conditions would not improve and could potentially decline. Depending on drought conditions, upgrading range conditions to fair range conditions with stable trends could be 5 percent or as little as zero over the next 10-year period. It is likely that some areas in poor range conditions would not positively respond to less grazing pressure. In these

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The effects of pine bark beetle infestations could increase available forage as stands of piñon and ponderosa die.

Jicarilla Wild Horses

In the administration of wild free-roaming horses and their environment (36 CFR 222.21), the Carson National Forest is responsible for "maintaining a thriving ecological balance considering them [wild horses] an integral component of multiple use and regulating their population and accompanying need for forage and habitat in correlation with other uses…" [40] An appropriate management level (AML) is the optimum number or range of wild horses that results in this balance. The long-term viability of the herd depends on many variables, including herd/band dynamics, interaction with domestic (private/tribal) horses, forage availability, weather conditions (e.g. drought), and numbers of other ungulates present.

Wild Horse Population

Within the last decade, population census and monitoring on the JWHT has been comprised of annual aerial census and year-round observations by Forest Service employees. Current estimates place the population at 236 subadults and adults, with 20-30 surviving foals expected for 2004. The total herd size by mid-summer 2004 is expected to exceed 250 horses.

Accurate population estimates for planning and management activities are essential. The management applications of either removal or contraception (or a combination of both) are based on the size of the herd to be reduced and the intervals between regulating the population; however these goals are only as accurate as the population estimate. Wild horse managers need accurate and defensible aerial surveys. [221] Aerial surveys have been conducted for 28 of the last 34 years on the JWHT beginning in 1971 (see Table 15).

Although the current wild horse total for all of the herds in the West is very large (37,186 animals), the management goal for most herds is small. The BLM's stated AML goals are to manage 41 percent of the wild horse herds at a census number of less than 50 horses, and 54 percent of the herds at a population of less than 100 horses. Genetic effective population size, the population of active breeding individuals within a herd, for some of these herds is set too low to maintain a long-term, viable breeding population. A population between 150 and 200 head or an effective breeding population of 50 head is considered a minimum to maintain genetic diversity.

At first glance, these statistics appear to be cause for concern. However if there is even occasional gene flow between two or more herds resulting in at least one or two successful breeding animals every generation that produced breeding offspring, the genetic resources of all the groups would be maintained. A wild horse generation is equal to 5-14 years. Groups of two or more subpopulations with independent population dynamics, but connected by low levels of movements and gene flow, are referred to as a metapopulation. [221, 229]

Documentation since the early 1900s indicates that the JWH herd moved from BLM to Forest Service System lands and onto the Jicarilla Apache Nation. The Jicarilla Apache Nation is concerned about the number of horses that have moved off the Jicarilla Ranger District and onto their lands, due to drought and poor range conditions on the JWHT. [124] In 2003, 180 horses were counted during an aerial survey on the Jicarilla Apache Tribal lands adjacent to the JWHT. [90] While some of the horses on tribal land are a mix of domestic breeds, there is also a large percentage that exhibits similar physical characteristics to the horses on the JWHT. It is evident that an interchange of horses is ongoing between the JWH herd and the Jicarilla Apache Nation horses.

As range conditions on the JWHT declined over the last several years, 7 to 20 Jicarilla wild horses have also chosen to reside along the north boundary of the JWHT, along the San Juan

River in Colorado -- where they can move from the JWHT to private and state land and onto the Southern Ute tribal lands. There they mix with feral horses and horses from private land. The Wild Horses and Burros Act is very clear that it is the responsibility of the managing federal agency to remove wild horses from private lands at the land owners request (Appendix D). In the spring of 2003, nine wild horses were relocated from private lands back to the JWHT at the request of the private landowner. Again these horses have moved to the edge of the JWHT because of drought and poor range conditions.

Horses also move to the east onto BLM lands. Currently there is a written memorandum of understanding with the BLM that the agency will allow up to 23 wild horses to graze on BLM land, as long as they migrate there naturally. [20] Generally these horses move off the forest during the winter months and then back on during the summer. During the 2004 aerial survey, 13 horses were counted on BLM lands. [260]

The winter of 1978-79 was severe with deep snow on the JWHT. The wild horse count in the spring of 1978 was 242 head. The horse population was high and they were in poor physical condition during the winter of 1978-79. In spite of attempts by the Jicarilla Ranger District personnel to airlift in hay, one hundred and thirty horses starved on the JWHT. There is a concern present range conditions with limited forage availability and a severe winter with heavy snows could create the same scenario if herd numbers are not managed within the capability of the land.

Jicarilla wild horses are extremely resilient and able to subsist on very marginal range. During recent winters, horses have relied heavily on browsing big sagebrush and rubber rabbitbrush, since herbaceous forage has been limited. In most cases, these shrubs are not primary browse species for horses. Rubber rabbitbrush is toxic at high levels of consumption. In 2002, drought conditions during the growing season were extreme and little forage was left for winter grazing. The horses were in very poor physical condition. In 2003, drought conditions continued however, there were late rains with accompanying late fall green up. The horses wintered in much better condition.

Managing for improved rangeland conditions would improve the availability of key forage species and improve horse herd health through the winter months. This in turn will improve birth rate and survivability of foals.

Band Size

Each year an aerial survey is conducted using a helicopter to help in collecting information on the JWH herd. During these surveys an attempt is made to count both adults and juveniles. In 2003 and 2004, the Forest Service began photographing as many of the bands as possible. Coupled with photos taken from the ground, this is helping identify individual bands and their territories. In 2004, 33 bands were counted. Band sizes ranged from 3 to 11 horses with an average of 5. These numbers fall within the average for band size based on documentation from other wild horse herds. [221]

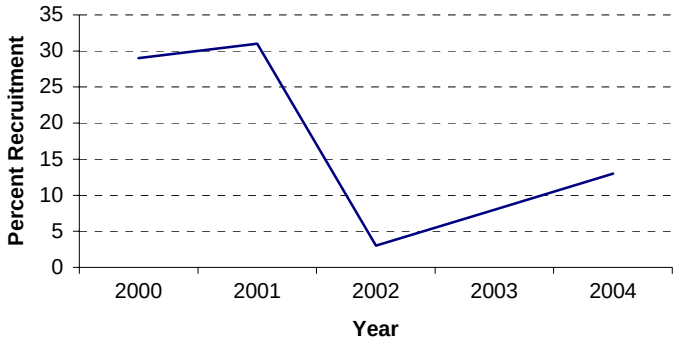
Sex Ratio

Exact sex ratio information has not been collected to date. Sex ratio cannot be gathered aerially and ground surveys are difficult on the Jicarilla Ranger District because of topography. The aerial band count is useful in estimating the sex ratio, but not all bands are structured the same. Bachelor (male) bands are common, but not always easy to identify from the air. Another problem is that studs will occasionally allow other studs into their bands. However with the band information from the aerial surveys and data from prior year gathers, it is estimated that the sex ratio for the JWH herd is 45 percent female and 55 percent male. A population of horses favoring

males tends to have a larger number of active breeding bands, which can be valuable in conserving genetic material. With more breeding males in the population, genetic material is shared from a broader male base. These numbers fall within the average for band size based on documentation from other wild horse herds. [221]

Recruitment

Recruitment is the total number of horses added to a population -- taking into account surviving foals and deaths of mature horses. A comparison of annual aerial surveys is made to estimate recruitment. Since there have been no adoptions since 1998, this provides an opportunity to see how the herd has grown over the 1999-2003 period. The juvenile population from the surveys in 2003 was 16 percent and 13 percent in 2004.



Year	2000	2001	2002	2003	2004
Percent Recruitment	29	31	3	8	13

Figure 20. Percent Recruitment Within the Jicarilla Wild Horse Population from 2000-2004

Both the summer and fall of 2001-2002 were extremely dry. This may account for the drop in recruitment. The fall of 2003 had some moisture and a late fall green up. The horses were in much better condition during the 2004 winter, which may account for the slightly higher recruitment rate. Over the 5 year period there appears to be a decline in recruitment. This would be expected given the high number of horses, the drought and poor range conditions.

Horse Color

There are some color variations within the Jicarilla horse herd. In some areas of the JWHT there are dominant colors or colors that are more common. Color is useful in identification of individual horses and bands. Information on color was based on aerial surveys and gathers from 1997 to 2004.

Table 14. Horse Color on the Jicarilla Wild Horse Territory

Color	Bay	Black	Sorrel	Brown	Paint	Palomino/Buckskin
% of Herd	71	10	9	5	4	1

Gathering

Gathering wild horses is not an easy task and can be dangerous for both the horses and the humans involved in the gather. During scoping and the 30-day comment period, several comments expressed interest in gathering methods. Some comments were against gathering horses using a

helicopter in the spring. Some suggested that a walking roundup should be used instead of helicopters to minimize stress on the horses.

Table 15. Wild Horse Surveys 1912-Present [1]

Year	Number
1912	1000
1913	750
1914	500
1915	150
1916	200
1917	200
1919	300
1922	400
1923	420
1924	420
1925-46	No data
1947	100
1948	100
1949	100
1950	100
1951	70
1952	68
1953	45
1954	52
1955	57
1956	75
1958	50
1959	50
1960	46
1961	78
1962	105
1963	105
1964	100
1965	95
1966	90
1967	55
1968	75
1969	78
1970	50

Year	Number
1971*	48
1972	63
1973	46
1974	122
1975	101
1977	225 -11 adopted
1978	242 - 9 adopted
1979**	204 - 15 adopted
1980	80 - 12 adopted
1981	115 - 48 adopted
1982	60
1983	?? – 14 adopted
1985	80 - 15 adopted
1986	?? – 9 adopted
1987	144 – 20 adopted
1988	?? – 33 adopted
1989	94
1990	53
1991	?? – 39 adopted
1992	??
1993	?? – 7 adopted
1994	87 – 42 adopted
1995	??
1996	??
1997	140 – 70 adopted
1998	?? – 30 adopted
1999	93
2000	119
2001	157
2002	161
2003	182
2004	197

Helicopter Gathering

Several different methods have been tried through the years on the Jicarilla Wild Horse Territory for gathering wild horses. These have included roping on horseback, baiting (using salt or water to lure horses into a trap) and using horseback riders to herd horses into holding pens. All of these have been marginally successful. However, helicopter gathering on the JWHT has been used since 1981, and has proven to be both humane and very successful. Helicopter gathering

[1] Since 1977 aerial surveys have been conducted most years. It has been estimated that 20 percent of the wild horse population is missed during aerial surveys. [271]

consists of using a helicopter to herd wild horses into a holding pen, usually set up along a normal travel route for the horses.

Of the 370 horses gathered on the JWHT since 1977, 301 have been with the use of a helicopter. Out of those gathered over a 20-year period, 4 deaths have been associated with helicopter gathers. Three of the deaths were related to loading horses into trailers at the trap site, once they were captured. [128] Helicopter use is the primary method the Bureau of Land Management employs to gather horses throughout the West, and is considered their standard operating practice. [248a] Even highly publicized wild horse herds such as the Pryor Mountain Wild Horse herd in southern Montana and the Little Book Cliffs herd in western Colorado continue to utilize helicopters for gathering horses. [255, 257, 258] Research on two separate wild horse herds gathered by helicopter and adopted found no evidence that there were any deleterious effects on behavior or reproduction (Journal of Range Management 53:479-482). [47]

Tranquilizer Darting

In 1978 tranquilizer darting from helicopter was attempted. After the tranquilizer took effect, the horses were sling loaded by helicopter back to a holding facility. Several horses died in the operation. This method was abandoned altogether.

Walking Round Up

The walking round up is a method that has recently been tried on the El Rito Ranger District of the Carson National Forest. This was the first time this method has been used by a federal agency. Those involved in the gather follow the horses on foot and walk them into a holding pen. No horses were gathered during the El Rito walking round up attempt.

Baiting

Baiting horses is another option for gathering. The primary form of baiting used in the past was placing a holding corral around a water source with “finger gates” that act as a one-way gate. Once the animal was inside it could not escape. In the past it has proven to be very labor intensive, with limited success on the JWHT. [128]

Other baiting methods can be used such as different feed types or salt. Baiting was used in the spring of 2003, when nine horses left the JWHT and were grazing in a very small wheat pasture on private land. The horses were in poor condition and the private landowner fed the horses hay for over 30 days in his field. All nine horses were baited with hay into a holding pen and then returned to the JWHT. Baiting was also recently tried on the El Rito Ranger District, where other methods had failed. In an attempt to gather 30 horses, 20 were gathered. Baiting would be strongly considered in future gather efforts.

Roping

Roping horses from horseback was used in the past as a primary means of catching wild horses. It has not been successful in gathering large numbers of horses on the JWHT. [128] If not handled correctly, it can be dangerous to both the wild horse and the horse and rider. Roping may be necessary in some situations such as when horses have left the JWHT and moved onto adjacent private or federal lands. If a helicopter is used to assist in these operations it is considered helicopter assisted roping.

Summary

Walking gathers and baiting are options that would be considered in future gathers. Helicopter gathering would not be ruled out as an option. Roping may also be used, but only as necessary.

If a helicopter is used in gathering horses, helicopter assisted roping may be used when horses have left a band that has been or will be gathered. Helicopter assisted roping would not be used as a primary means of gathering horses on the JWHT.

If other methods become available that are humane and reduce stress on the horses, they may be considered. Decisions on gather methods would be made based on cost, the season of the year, the area to be gathered, the number to be gathered, history of the band or bands to be gathered, and contractor availability. Any helicopter assisted capture and handling activities would be conducted in accordance with Bureau of Land Management's Standard Operating Procedures for Removal and Safety for Wild Horse Herds. [245]

Genetic Viability

Inbreeding is rare in wild horses and burros. Genetic problems due to inbreeding depression have been encountered in a few small, isolated populations of wild horses or wild burros [221]. To guard against potential inbreeding problems, surveys of the genetics of wild horses and monitoring genetic effective population sizes should be conducted so that management intervention may be proactive. Genetic research by the BLM Wild Horse and Burro Program is extensive and ongoing and that information is being integrated into the Wild Horse Program on the Carson National Forest.

Population goals for management of some wild horse herds are too low to meet conventional standards for minimum genetically viable sizes. This is not a matter of immediate concern since many of these herds may have gene flow to other herds, thus forming a metapopulation. Even very limited gene flow (e.g., one to two breeding animals every generation) between subpopulations will protect against inbreeding. [221]

Some populations may possess genetic uniformity to a certain "type" or breed of horse. Management interests, however, may be specific to maintaining a maximum diversity of genetic material that appears representative of each herd. Promotion of diversity will minimize the effects of genetic drift or the random loss of genetic material from mating processes, and maximize genetic health of the herds. [229] In some instances, management may need to evaluate ways to introduce genetic material into a herd that appears genetically deficient, in order for the herd to be self-sustaining over the long-term. [229] In 1988, 7 studs were relocated from wild horse herds in Wyoming to the JWHT. These horses were introduced to help maintain genetic diversity and adoptability of horses on the JWHT

Some potentially unique groups and phenotypes of wild horse herds occur. The genetic and heritable components of any possibly unique traits or unique groups of wild horses should be tested during a comprehensive analysis of common ancestries among the herds. Similar or closely related herds of horses should be identified for any genetic augmentation of wild horse herds. [221]

Metapopulation refers to two or more local breeding populations that are linked to one another by dispersal activities of individual animals. The Jicarilla wild horse herd and the Jicarilla Apache Nation's horse herd interchange animals and are a metapopulation. These populations may have unique demographic features, but ultimately many share some genetic material if interbreeding is occurring between individuals. This sharing of genetic material may act to enhance genetic diversity within participating herds and as such, these populations should be evaluated as one larger metapopulation. An exchange of only 2 or 3 breeding age animals (specifically females) every 10 years is often sufficient to maintain genetic diversity within a given herd. [229]

Regardless of control strategy, genetic variation is lost much more slowly if young animals are treated (e.g., removed or rendered temporarily infertile). The most practical program will likely involve both contraceptives and periodic removals. Contraceptives could reduce herd growth rate and are likely to be cost-effective, while removals permit managers to rapidly adjust sex ratio, age structure or overall population size.[230]

Contraception

Research into the use of contraceptives, such as *porcine zona pellucida* (PZP), to limit the growth of wild horse herds has been ongoing since the 1970s, both in herds on western rangelands and on several eastern barrier islands. Four herds on eastern barrier islands are currently managed with immunocontraceptive agents. Tests with immunocontraceptives have been conducted on a few of the larger wild horse herds in Nevada. However, no free ranging western horse herds have yet been managed at their respective AML level with contraceptives. [221]

While the US Food and Drug Administration considers PZP an experimental agent, the contraceptive does appear to meet most of the safety concerns of the BLM. The BLM currently has several ongoing research studies with the vaccine. PZP does not enter the food chain, its effects passively wear off with time if the injections are terminated, normal reproduction can be resumed, following up to seven years of use, and it does no harm if injected into mares that are already pregnant (they continue to carry foals to term).

Best results using PZP are achieved following an initial “primer” dose followed by annual “booster” shots. The initial injection, or primers, may be administered to mares following gathers when they are in chutes during capture. A second booster shot is then required for each year of immunocontraception. Following the second or third year of treatments, a booster is only needed every other or every third year. Following cessation of the annual treatments, the agent and the antibodies passively decline, anti-fertility effects wear off, and normal reproductive function is resumed the subsequent year. However, following seven or more years of treatment, the anti-fertility effects may be permanent for individual mares. [223] [224]

Progress is continuing on development of a time-release pellet vaccine of PZP that will allow almost two years (~22 months) of fertility control with only a single shot injection. Progress on this time-release form is encouraging, although efficacy rates are variable and may be slightly lower (~ 85%) than for the conventional multiple injection program. Currently, the vaccine cannot be administered remotely every two years. [221]

For most wild horse populations, 70 percent of all reproductively active females would need to be maintained in an infertile state to achieve a stable population. Regardless of control strategy, genetic variation is lost much more slowly if young animals are treated (i.e., removed or rendered temporarily infertile). The most practical control program would likely involve both contraceptives and periodic removals. Contraceptives could reduce growth rate and are likely to be cost-effective while removals permit management to rapidly adjust overall population size. [222]

The cost of gathering 70 percent of breeding mares to treat with the contraceptive every two years could render contraception alone impractical since most of the horse population would need to be gathered to access the breeding mares. If single year contraceptives were used to maintain infertility, a very intensive management program including remote delivery would be necessary. The BLM is currently carrying out intensive studies on three small populations of wild horses using the single year vaccine and remote delivery. [225] There are no wild horse populations in western states that are being managed solely through the use of PZP.

Permission to conduct research using PZP is covered under an Investigational New Animal Drug Exemption (INAD #8857) filed with the Food and Drug Administration (FDA) by the Humane Society of the United States (HSUS). All BLM wild horse management areas must provide approved gather plans and environmental assessments detailing the contraception research before the research can be initiated in any specific area. Permission must be granted by the HSUS. [225] The BLM is currently working with HSUS to put in place a Field Trial Plan for Wild Horse Fertility Control for the use of PZP under the stated guidelines.

To date, the Forest Service has not entered into any research program for the use of the PZP vaccine. However, the opportunity may exist to initiate a research program under existing BLM protocol established in their *Field Trial Plan for Wild Horse Fertility Control*.[225] Implementing a research program would require working closely with HSUS and the maker of the vaccine. The actual research plan would require the approval of HSUS.

Contraception alone cannot be used to reduce herds of wild horses that are substantially over AML or to limit population growth. Contraception along with the gather and removal program could assist in achieving these two goals. [221]

Management Options

Selective Criteria for Removals

Up to the last gather in 1998, the goal for removal of wild horses on the JWHT has been to remove most of the horses captured except for a few select animals. A few select horses considered important for maintaining structural soundness and reducing dominant colors were released back onto the JWHT. Capture efforts generally occurred at two sites for each gather.

Overall, the main objective for selective removal is to maintain the viability, adaptability, and character of the established herd, which includes keeping breeding bands together as much as possible. The appropriate philosophy involves retention of the natural working integrity of the population, allowing the majority of the decisions to be driven by the horses themselves. Priority is given, therefore to retaining dominant stallions, established lead and/or partner mares, and reproductively successful mares within each established family group. This approach also recognizes the importance of maintaining reproductively fit horses to assist with long-term perpetuation of the population as recommended by Dr. Gus Cothran, professor and director of the University of Kentucky, Equine Parentage Lab. [229] Once the appropriate management level is achieved, removals should concentrate on young animals which have not as yet entered the breeding ranks of the population and have the greatest ability to adapt to adoption and domestication.

Age Structure

Wild horses five years and younger would be targeted for removal during gathers. The majority of horses between six years of age and older could be returned to the range. Horses greater than 20 years of age would be returned to the range unless there is serious concern for their well-being.

Sex Ratio

Removals should result in a female to male sex ratio ranging from 60:40 to 40:60 with an ideal ratio of 50:50. It has been suggested that removals which increase the sex ratio slightly in favor of males tends to support a social structure of many smaller harems over that of fewer larger harems, which results in a positive impact on the effective genetic herd size.

Color

Color balance would continue to be a consideration during removals, but not the major factor in determining selection of animals to be removed. Maintaining the diversity of color in the herd is important, but overall health of the herd, including genetic make-up, herd demographics and herd social structure, should override color in the selection process. The introduction of animals to the herd with color variations would continue, but again color alone should not be the only factor considered when selecting horses for introduction. Horses with color associated with health problems would be considered for removal.

Conformation

Horses with undesirable physical disabilities that are hereditary in nature would be removed to prevent passage on to future generations.

Trap Site Locations

To maintain even distribution, gathering and removing horses from several locations within the range would continue. Dr. Cothran recommends removal of horses from the range should not concentrate on one geographic area over another, thus promoting genetic health of the herd.

Contraception

The use of contraception measures would be considered in the future for population management of the Jicarilla Wild Horse Territory. Contraception could provide a means of reducing the annual growth rate of the herd, which would increase the time frame between gathers while maintaining the genetic diversity. In addition, fertility control use on younger mares allows these mares to advance in maturity prior to foaling thus reducing stress and physical demands on these young animals. Contraception planning and administration would follow closely the protocol described in the *BLM Field Trial Plan for Wild Horse Fertility Control*. [225]

Blood-Draws for Genetic and Health Studies

Blood samples would be drawn from horses removed during gather efforts when appropriate or as needed. If conditions and facilities allow, all horses gathered would be tested with priority given to animals turned back onto the JWHT. Samples would also be tested for equine infectious anemia or other pertinent disease concerns. Samples would be forwarded to the University of Kentucky, Equine Parentage Lab or a similar facility offering the same level of reliability for genetic analysis. An analysis of genetic data from blood samples would be performed to establish a genetic bank of information, including monitoring genetic diversity and effective population size for the JWH herd. Along with analysis, the lab would make herd management recommendations based on the analysis of genetic information. The recommendations for management would be used to help make decisions that maintain a long-term healthy, viable herd of wild horses on the JWHT.

Management Options for Maintaining Genetic Diversity

Some examples for maintaining genetic diversity are:

- To introduce one or two horses to the herd every generation to increase genetic variability. Females are preferred because they are less likely to cause drastic changes in the makeup of the population with unpredictable results.
- To remove primarily young animals once the AML has been achieved. Culling young horses maintains the genetic material present in fit and actively reproducing animals. [229]

- To continue to monitor genetic components within the herd.

Introduction of Horses

The University of Kentucky, Equine Parentage Lab could make management suggestions that include introducing horses from outside of the JWH herd to maintain genetic diversity. If this were deemed necessary the following criteria would be used for selection of wild horses to be introduced into the herd:

- Horses would be from wild horse herds that have similar genetic background (based on DNA analysis) and exhibit similar physical characteristics.
- Horses from a geographic area containing habitat similar to the JWHT.
- Younger mares (2-5 years old).
- Only horses that exhibit structural soundness without physical defects.

Adoption

The Carson National Forest is the only National Forest in the United States that holds it's own adoptions. Most of these horses go to local families in the northern New Mexico area. Once a horse is adopted, the wild horse remains the property of the US Government for one year. After a year, if the animal is in good condition and the pen and housing requirements have continued to be met, the animal becomes the property of the adopter. Horses are not tracked after the first year following adoption.

From the perspective of the Carson National Forest this has been a very successful program and there is always a waiting list of potential adopters. Many of these have had success with their horses and want another. There have been instances where an individual has not taken care of an adopted horse. The horse is removed to another home and the person's name is taken off the list of potential adopters.

Some comments were made relating to the need for an overall review of the National Wild Horse and Burro Adoption Program. This is well beyond the scope of this analysis. Wild horses which are gathered and removed will be put up for adoption, in accordance with the Wild Free-Roaming Horses and Burros Act of 1971, as amended and 36CFR 222.29. [25, 40] Horses that are not adopted through the Carson National Forest's local adoptions may be turned over to the BLM Wild Horse and Burro Adoption Program.

Monitoring

Aerial surveying would continue to be the primary means of estimating total population on the JWHT. Aerial surveying accuracy varies with terrain and tree canopy cover. In Nevada in open sagebrush habitat 15 percent or less are generally missed in surveying. On other ranges with heavy tree canopy cover and rough terrain half to two thirds of horses can be missed in aerial surveying.[271] On the JWHT it is estimated that 20 percent of horses are missed during aerial surveying. Aerial surveying would include documenting band size, photographs of bands and individual horses, and adult/juvenile counts. Ground monitoring is also valuable for assessing the condition and location of horses throughout the year. Ground monitoring would continue to be an important part of herd monitoring.

Comparison of Alternatives

Past, Present, and Reasonably Foreseeable Activities

The past, present and reasonably foreseeable activities that will be used to analyze the cumulative effects on vegetation are: Livestock and wildlife grazing, natural gas development, and pine bark beetle infestations. As the pine bark beetle continues to attack piñon and ponderosa pine, understory forage may become available for horses to graze as the trees decline and die. Watershed improvement structures such as dirt sediment tank are frequently constructed as a mitigation measure to reduce soil loss from well pad construction. These structures are used as an important water source by wild horses. Past history and observation of the JWHT have not shown these activities to have negative direct impacts on the wild horses. Well locations are frequently used by horses for loafing areas. In addition, the horses are exposed daily to vehicle and human traffic, which have little apparent effect on reproduction or herd band activity.

Alternative A

Under this alternative, wild horses on the JWHT would not be managed at an appropriate management level. Numbers would continue to climb, increasing competition for forage between horses and wildlife with negative impacts to range conditions. No cattle would be allowed to graze the allotment due to poor conditions. The potential for a large-scale die off of horses from starvation during a severe winter would be inevitable. Contraception would be considered as a population control method, but would only slow the growth of the herd.

Under this alternative, wild horse numbers would expect to increase from 3 to 20 percent per year. Since no horses would be gathered and adopted, horses would move off all sides of the territory, onto BLM, Southern Ute tribal lands, Jicarilla Apache tribal lands and private lands. The Jicarilla Ranger District would continue to have an active gather program as private land owners, the BLM and adjacent Indian nations begin requiring the District to remove horses as required in the Wild Free-Roaming Horses and Burros Act. [25] Horses gathered would be placed back on the JWHT.

Cumulative Effects

Effects described above include the cumulative effects of livestock and wildlife along with the impacts of horses on soils, specifically ground cover. Existing and future watershed improvement structures would continue to provide important water sources for wild horses.

Alternative B

The appropriate management level under this alternative would be a range between 15 and 118 horses. Because of the current drought conditions, several initial gathers of horses would be required to bring the population down to the appropriate management level. During years of favorable moisture and improving range conditions, the horse population could climb to 118. During extended drought, horse numbers could potentially be reduced to 20 horses. The small number of horses could jeopardize the genetic variability of the herd, however as the population declines, recruitment from the Jicarilla Apache Tribal lands would be expected. With such a low number of horses the possibility of disease or extreme weather conditions could extirpate the herd. A subsequent reintroduction of horses would be necessary to maintain the wild horse herd on the JWHT. Winter herd health would improve with a reduction in the number of grazing animals on the territory. Contraception would be considered as an option along with gathering.

Gathers would be required when available forage was not sufficient to meet the needs of wildlife, livestock, and the wild horses. Frequency of gathers would be dependent on precipitation pat-

terns, forage production, and herd recruitment. Because of the current drought conditions several initial gathers of 70-100 horses each would be required to bring the population down to the appropriate management level within the 15-118 range. Subsequent gathers would be required when available forage was not sufficient to meet the needs of wildlife, wild horses, and livestock. It would be expected that the herd would increase roughly from 10 to 20 percent per year. Gather methods would be determined based on cost, the season of the year, the area to be gathered, the number to be gathered, and contractor availability. Horses gathered would be adopted. Management as described in the *Management Options* section would be implemented as needed to maintain the health and genetic viability of the herd.

Cumulative Effects

Effects described above include the cumulative effects of livestock and wildlife along with the impacts of horses on soils, specifically ground cover. Existing and future watershed improvement structures would continue to provide important water sources for wild horses.

Alternative C

The appropriate management level under this alternative would be a range between 50 and 105 horses. During years of favorable moisture and improving range conditions the population could climb to 105. During drought conditions the numbers could drop to 50 horses. This alternative would allocate available forage first to wildlife and balance the remaining forage between permitted livestock and wild horses. Winter herd health would be improved with a reduction in the number of grazing animals on the territory. Contraception would be considered as an option along with gathering.

Frequency of gathers would be dependent upon precipitation patterns, forage production, and herd recruitment. Because of the current drought conditions several initial gathers of 70-100 horses would be required to bring the population down to the appropriate management level within the 50-105 range. Subsequent gathers would be required when available forage is not sufficient to meet the needs of wildlife, wild horse, and livestock. It would be expected that the herd would increase roughly from 10 to 20 percent per year. Gather methods would be determined based on cost, the season of the year, the area to be gathered, the number to be gathered, and contractor availability. Horses gathered would be adopted. Management as described in the *Management Options* section would be implemented as needed to maintain the health and genetic viability of the herd.

Cumulative Effects

Effects described above include the cumulative effects of livestock and wildlife along with the impacts of horses on soils, specifically ground cover. Existing and future watershed improvement structures would continue to provide important water sources for wild horses.

Alternative D

The appropriate management level under this alternative would be a range between 100 and 150 horses. During years of favorable moisture and improving range conditions the population could climb to 150. In a closed population between 150 and 200 head, an effective breeding population of 50 head is considered a minimum to maintain genetic diversity. This alternative would come closest to meeting the minimum population for genetic diversity during periods when the population was at 150 head of horses.

During drought conditions the numbers could drop to 100 horses. This alternative would allocate available forage first to wild horses, and then to wildlife, with the remaining forage allocated to

permitted livestock. Winter herd health would be improved with a reduction in the number of grazing animals on the territory. Because of the current drought conditions an initial gather and removal of 100 horses would be required to bring the population down to the appropriate management level within the 100-150 range. Subsequent gathers would be required when available forage was not sufficient to meet the needs of wildlife, wild horses and livestock. Contraception would be considered as an option along with gathering. Management as described in the *Management Options* section would be implemented as needed to maintain the health and genetic viability of the herd.

Cumulative Effects

Effects described above include the cumulative effects of livestock and wildlife along with the impacts of horses on soils, specifically ground cover. Existing and future watershed improvement structures would continue to provide important water sources for wild horses.

Wildlife

The Jicarilla Wild Horse Territory is home to numerous wildlife species including Rocky Mountain elk, mule deer, mountain lion, bobcat, black bear, turkey, fox, ringtail cat, golden eagles, and Abert's squirrel. The Carracas, Bancos, and Cabresto canyons within the JWHT are of particular importance to wildlife because they have sumps in the drainage bottoms that act as perennial springs.

Threatened and Endangered Species

The bald eagle and Mexican spotted owl (MSO) are two federally listed species that occur on the JWHT.

Bald Eagle

Bald eagles are listed as threatened. They are winter residents on the district, but do not nest in the area. They roost in large trees and snags, usually on prominent ridgelines along major drainages. They are known to use Carracas and Bancos canyons for roosting, with nine documented winter roost sites within the JWHT. Their presence is attributed to the territory's close proximity to Navajo Reservoir. The eagles fly inland from the lake to roost primarily in larger ponderosa pines and snags along major drainages. They typically are seen on the district from early fall to late spring.

Mexican Spotted Owl

The Mexican spotted owl is listed as threatened, and additional critical habitat for the owl is proposed. Surveys for Mexican spotted owl have been conducted in all suitable nesting habitat on the Jicarilla Ranger District. [272a] Within the JWHT, there are approximately 1,200 acres of suitable/capable nest/roost habitat, all of which received complete 2-year surveys according to MSO survey protocols between 1990 and 1995. Typical nesting/roosting habitat used by the owls is scattered and isolated in mixed conifer stands found in the heads of canyons. Two territories have been established based on the presence of one pair and a single bird. One territory (based on a single owl) is located mostly within the boundaries of the JWHT. Both territories, however, have been unoccupied since 1993.

On November 18, 2003, the US Fish and Wildlife Service published a proposal to designate critical habitat for the Mexican spotted owl on National Forest System lands (68 FR 65020). [278] Three critical habitat units (SRM-NM-11, 12 and 13) are proposed on the Jicarilla Ranger District. The JWHT contains all of SRM-NM-13 and part of SRM-NM-12.

Wild horses and owls do not directly interact, however over-utilization of the range could lead to the decline of prey species necessary for the Mexican spotted owl's survival. [22, 23] The current range condition and trend for the Jicarilla Wild Horse Territory is fair/stable to poor/downward (see Vegetation section). Such conditions are likely to cause prey species for MSO to decline, thus affecting the suitability of the area for nesting spotted owls.

Forest Service Sensitive Species

The Southwestern Region of the Forest Service compiles and maintains a list of Forest Service sensitive species, which are also evaluated in site-specific environmental analyses. The northern goshawk and the Ripley milkvetch, a sensitive plant, are sensitive species that may inhabit the JWHT.

Northern Goshawk

Goshawks are forest-dwelling raptors that typically use stands of large ponderosa pine, with open understory. They are predatory birds that feed on rodents, small songbirds, lizards and other small prey. Since a goshawk is dependent upon the abundance of prey, the amount of existing forage for prey is important for the bird's survival. Approximately 11,000 acres of the wild horse JWHT have been surveyed for goshawk between 1991 and the present. One goshawk post-fledgling family area has been established on the Jicarilla Ranger District, and it is located within the JWHT.

Like the Mexican spotted owl, wild horses and goshawks do not directly interact, however over-utilization of the range could lead to the decline of prey species necessary for the goshawk's survival. It is likely, current range condition trends are causing a downward trend in prey species for the goshawk.

Ripley's Milkvetch

Ripley's milkvetch is a perennial, herbaceous plant found growing in sagebrush, piñon-juniper woodland and Gambel oak thickets in ponderosa pine forest at elevations of 7,000 to 8,250 feet. This is one of the few New Mexico milkvetches that is a desirable forage plant. Because of minimal or no toxic effects, deer, elk and all classes of livestock relish it. Because of its palatability, it is considered a gauge of overgrazing and grazing management practices.

The first New Mexico collection of Ripley's milkvetch was in 1947, and the first collected specimen on the Carson National Forest was on the Tres Piedras Ranger District in 1950. The plant is found in Conejos County, Colorado and Taos and Rio Arriba counties in New Mexico. Many of the areas where populations of Ripley's milkvetch are found are also managed as grazing lands. Between the time Ripley's milkvetch was first discovered on the Tres Piedras Ranger District in 1950 and 1988, few plants were recorded. This has changed dramatically. Plants are now observed growing by the thousands in high concentrations throughout the district, as individuals and/or growing in clusters within ponderosa pine or piñon-juniper woodlands with Arizona fescue understory and on volcanic substrate. On-going surveys have discovered previously unidentified population sites and Ripley's milkvetch plants are well distributed and in a healthy and vigorous condition. Although there is no known population of Ripley's milkvetch located on the Jicarilla Ranger District, there is still a possibility of it occurring there. In 1985, a plant survey was conducted on the district, however, Ripley's milkvetch was not found. The district is scheduled to survey for both the Ripley's and Chaca milkvetch in 2004.

Ripley's milkvetch seems to have a disturbance dependent ecology. This species has been documented to thrive in the aftermath of wildfire and prescribed burning. Recent fires on the Carson National Forest in the piñon-juniper (e.g., 1996 Hondo Fire) have increased available habitat disturbance conditions and increased this species' occupancy on National Forest system lands for the short-term. Populations also seem to thrive from land disturbing activities such as brush cutting and chaining of piñon-juniper woodlands. As landscapes recover from disturbance Ripley's milkvetch populations will likely decline.

Comparison of Alternatives

Alternative A

Alternative A would allow overgrazing in key areas to increase and range conditions would continue to decline. Grazing use would exceed the 30 percent use levels needed for MSO and goshawk prey species. Competition between wildlife and horses for available forage and cover would continue throughout the territory. It is questionable if prey base cover and forage would be

available in Mexican spotted owl or northern goshawk habitat. The bald eagle uses the area for winter territory. The bald eagle is primarily a fish and carrion feeder. Since, there is no fish on the district; the bald eagle is feeding mostly on carrion. If the overgrazing continues it is likely that there would be an increase in carrion during harsh winter conditions since the wild horses, elk and deer would be in poorer condition with less forage available for them during this time. No potential or suitable habitat (mixed-conifer/steep canyons) for the MSO would be negatively impacted by this alternative.

Alternative B

Alternative B would decrease grazing use to 30 percent available forage. Vegetation conditions would improve as the wild horse population is managed at a number in line with forage remaining after what is allocated for wildlife and livestock. Competition between wildlife, livestock and horses would be minimized and prey base cover and forage would be available in MSO and goshawk habitat over time as the area recovers from current poor conditions. The bald eagle would continue to winter in the area. And not be affected by this alternative. Although potential or suitable habitat for the MSO exists in the mixed-conifer and steep canyons that may be used by wild horses, this alternative would primarily affect the prey species instead of removing nesting or roosting habitat.

Alternative C

Like Alternative B, Alternative C would decrease grazing use to 30 percent of available forage. Vegetation conditions would improve as the wild horse population is balanced with permitted livestock grazing use. Competition between wildlife, livestock and horses would be minimized and prey base cover and forage would be available in MSO and goshawk habitat. No potential or suitable habitat (mixed-conifer/steep canyons) for the MSO would be negatively impacted by this alternative.

Alternative D

Alternative D would decrease grazing use to 30 percent of available forage during non-drought years. Some improvement in vegetation conditions would occur as the number of horses are reduced, however during periods of extended drought it would be expected that grazing use would be well above 30 percent, with vegetation conditions being moderately impacted. Overgrazing in key areas would continue during these periods with corresponding competition between wildlife, and horses. Prey base cover and forage would be available in MSO and goshawk habitat, but could be affected during drought year. If current drought conditions continue and grazing is over the 30 percent, it will take longer for the habitat to recover from current conditions. Although potential or suitable habitat for the MSO exists in the mixed-conifer and steep canyons that may be used by wild horses, this alternative would primarily affect the prey species instead of removing nesting or roosting habitat.

Management Indicator Species

Eleven wildlife species were identified as MIS to monitor the conditions of the forest's ecosystems. [13] The Forest Plan provides direction on managing quality habitat for management indicator species by management area (MA). All eleven management indicator species or species groups were considered for the Jicarilla Wild Horse Territory analysis. Seven species and one group were found to have the potential of being affected by the alternatives and were evaluated in detail. Based upon the analysis area not being within the current or potential range for Rocky Mountain bighorn (MA 9 - high elevation grassland), white-tailed ptarmigan (MA 9 - high eleva-

tion grassland), resident trout (MA 14 - riparian, no perennial streams), or aquatic macroinvertebrates (MA 14- riparian, no perennial streams), these species were not evaluated in this analysis.

This environmental assessment is based on the Forest Plan. The MIS that may be affected by the proposed activities, their key habitat components for measuring quality habitat and representative habitats by management area are displayed in Table 16:

Table 16. Management Indicator Species Habitat Within the Jicarilla Wild Horse Territory

Management Indicator Species	Key MIS Habitat Component for Quality Habitat	Forest Plan Management Areas Within the Analysis Area Managed for Quality Habitat
Brewer's Sparrow (*Spizella breweri*)	sagebrush	MA 12 - Sagebrush
Plain (Juniper) Titmouse (*Baeolophus ridgwayi*)	piñon-juniper canopies	MA 8 – Piñon-juniper
Abert's Squirrel (*Sciurus aberti*)	interlocking canopies	MA 4 - Ponderosa Pine <40% MA 5 - Mixed Conifer and Ponderosa Pine >40% MA 7 - Unsuitable Timber
Hairy Woodpecker (*Picoides villosus*)	snags	MA 1 – Spruce-fir <40% MA 3 – Mixed Conifer <40% MA 4 - Ponderosa Pine <40% MA 5 - Mixed Conifer and Ponderosa Pine >40% MA 6 – Aspen MA 7 - Unsuitable Timber MA 14 - Riparian
Red Squirrel (*Tamiasciurus hudsonicus*)	mixed conifer	MA 3 – Mixed Conifer <40% MA 5 - Mixed Conifer and Ponderosa Pine >40% MA 6 – Aspen MA 7 - Unsuitable Timber
Rocky Mountain Elk (*Cervis elaphus canadensis*)	general forest	MA 1 – Spruce-fir <40% MA 3 – Mixed Conifer <40% MA 4 - Ponderosa Pine <40% MA 5 - Mixed Conifer and Ponderosa Pine >40% MA 6 – Aspen MA 7 - Unsuitable Timber MA 8 – Piñon-Juniper MA 9 – High Elevation Grassland MA 12 – Sagebrush MA 14 - Riparian
Merriam's Turkey (*Meleagris gallopavo*)	old growth pine	MA 3 – Mixed Conifer <40% MA 4 - Ponderosa Pine <40% MA 5 - Mixed Conifer and Ponderosa Pine >40% MA 7 - Unsuitable Timber

Site-specific environmental effects on these species' habitats are described by alternative. After the site-specific effects analysis, there is a discussion of how the appropriate management level for wild horses on the JWHT for each alternative might affect these MIS and their habitats across Carson National Forest.

Brewer's Sparrow

In the Carson National Forest, the Brewer's sparrow is an indicator species for sagebrush. [14] Potential Brewer's sparrow habitat is well distributed across the district. The current geographic information systems (GIS) vegetation data identifies 81,752 acres of sagebrush habitat on the Forest. [116a] The Jicarilla Ranger District has approximately 7,703 acres of sagebrush. The Carson MIS Assessment estimates that Brewer's sparrow habitat between 1986 and 2002 has been in an upward trend of about 55 percent and is in good condition.

Alternative A would continue to remove sagebrush or put it in a condition where it no longer supports the Brewer's sparrow in certain areas. While Alternative A could impact quality habitat for Brewer's sparrow by wild horses grazing on the sagebrush in certain areas, it is not a large enough area to cause a downward forest-wide trend. The other alternatives should benefit sagebrush and continue the forest-wide habitat trend.

Forest-wide monitoring of Brewer's sparrow and other birds began in 2003 and is continuing in 2004, however, it is too early to determine any forest population information from this effort. Throughout its range, the Brewer's sparrow is listed as globally secure and common, widespread and abundant. Monitoring information from the North American Breeding Bird Surveys in New Mexico from 1986 to 1999 indicate population and trends are fairly stable for the entire state. Alternative A could affect local groups of Brewer's sparrow; however the area is too small to affect population trends for the forest. Implementation of any alternative should not change the stable trend.

Plain (Juniper) Titmouse

The plain titmouse is an indicator species for piñon-juniper canopies. [14] Potential habitat for plain titmouse is abundant and well distributed across the district. Forest-wide habitat trend for this species is based on acres of available quality or "occupied" habitat identified. The plain titmouse habitat from 1986 to 2002 is estimated to have declined 6,680 acres or about two percent forest-wide.

While none of the alternatives would contribute to the habitat decline in the JWHT, the downward trend of piñon canopies across the forest is likely to continue as piñon trees die from bark beetles and drought.

The titmouse was observed in one of the piñon-juniper transects on the district in 2003. [257] As 2003 was the first year of forest-wide bird monitoring is not yet available on population trend. Throughout its range, the plain titmouse is listed as globally secure and common, widespread, and abundant. Monitoring information from the North American Breeding Bird Surveys in New Mexico from 1968 to 1999 indicate population and trends are slightly down for the entire state. None of the alternatives would affect the population trend. It is expected the population would continue to decline due to beetles and drought.

Abert's Squirrel

Forest-wide habitat trend for this species is based on acres of available quality or "occupied" habitats (interlocking canopies in ponderosa pine) identified in the Carson Forest Plan EIS [14] compared to an estimate of existing acres of similar habitat. Abert's squirrel habitat from 1986 to 2002 is estimated to have increased from 53,220 to 63,190 acres or an upward trend of about 20 percent. None of the alternatives proposed would remove Abert's squirrel habitat, therefore, there are no anticipated effects to the forest-wide habitat trends.

The Abert's Squirrel is known to reside on the district, and was documented to have the highest density (0.02 squirrels/ha) of any other districts on the Carson NF. [255a] However, these values are significantly below densities found at other locations and times. This is believed to be due, at least partially from the long-term drought in the region and the timing of the surveys. Population monitoring was initiated for Abert's squirrel in 2003, so information on forest population trends is not yet available.

Throughout its range, the Abert's squirrel is listed as globally secure and common, widespread, and abundant. In New Mexico, the Abert's squirrel is listed as apparently secure, uncommon, but not rare. The Abert's squirrel population on the forest is considered to be stable, and although lower than potential, are viable populations. None of the alternatives proposed would change the trend forest-wide.

Hairy Woodpecker

Forest-wide habitat trend for the hairy woodpecker is based on acres of available quality or "occupied" habitat (present of snags and down logs). Hairy woodpecker habitat from 1986 to 2002 increased from 106,880 acres to 112,444 acres or an upward trend of five percent. None of the alternatives proposed would remove hairy woodpecker habitat, therefore, there are no anticipated effects to the forest-wide habitat trend.

Since 2003 was the first year of forest-wide bird monitoring, data is not yet available on forest population trends. Throughout its range, the hairy woodpecker is listed as globally secure and common, widespread and abundant, although it may be rare in parts of its range, particularly on the periphery. Monitoring information from the North American Breeding Bird Surveys in New Mexico from 1968 to 2000 indicates population and trends are stable, abundant and not declining. None of the alternatives would affect hairy woodpecker populations. Implementation of any alternative would not change this stable trend.

Red Squirrel

Red squirrel principally utilizes and is an indicator for the presence of mixed conifer. There are small, widely scattered patches of this type of habitat on the district. A small mammal survey conducted in 2003 in the largest block of mixed conifer indicated a complete lack of red squirrel sign. [255b] Therefore, the red squirrel is thought to not inhabit the district.

Rocky Mountain Elk

Forest-wide habitat trends for elk are based on acres of available "occupied" habitat (general forest health). Elk habitat from 1986 to 2002 increased from 1,362,760 acres to 1,424,074 acres of habitat or an upward trend of almost 4 percent. The entire Jicarilla Wild Horse Territory is considered elk habitat.

Alternative A would reduce the amount forage available in the area for the elk and could lead to making the habitat unacceptable for elk especially during drought. Alternative D could affect the elk during years of drought since the forage is designated toward wild horses as the highest priority. Alternatives B and C would make more forage available as the range condition improves. Since the JWHT has only 5 percent of the forest habitat and not all of that would be unsuitable for the elk, none of the alternatives would cause the forest's habitat trend to decline.

It is estimated that there are approximately 175 resident deer and 81 resident elk in the JWHT. Big game populations increase in the winter, with migratory animals estimated at 700 deer and 325 elk. The exact numbers of big game vary depending on weather conditions. Aerial survey data show that deer population numbers have been fluctuating around a constant for the last 15

years, while the elk population seems to have peaked in the early 1990's and is slightly declining. These populations have been acceptable to the Forest Service and the New Mexico Department of Game and Fish for the last several years. Since there is very few tracts of private land within and adjacent to the JWHT, depredation by elk on private land has not been a problem.

NM Department of Game and Fish and the Forest Service jointly conduct annual surveys during January for elk. There is elk survey data available from 1981 to present. The data shows a steady or increasing population from 1981-1993, and a slightly decreasing population since then.

Throughout its range, the elk is listed as globally secure and common, widespread and abundant. Within the United States, elk is listed as secure and common, widespread, and abundant. The population trend for elk on the Carson National Forest is up from 1986. None of the alternatives would affect the forest-wide trend.

Merriam's Turkey

Forest-wide habitat trend for the Merriam's turkey is based on acres of available quality or "occupied" habitat. This is based on roost tree availability as identified in the Carson Plan EIS [14] compared to an estimated of existing acres of similar habitat. Merriam's turkey habitat from 1986 to 2002 is estimated to have increased from 117,300 to 118,572 acres or a slight upward trend of about one percent. No roost trees would be affected by any of the alternatives.

The FS and the NM Department of Game and Fish have cooperated in transplanting over 60 birds since 1988 on the district. The two agencies plus BLM also cooperatively conduct yearly gobbler surveys to track population trends. These surveys do not provide population numbers, but can show upward or downward trends. Results of these surveys had shown a steady or slightly increasing population since 1996. It is estimated that there are 600-800 turkeys on the district.

Monitoring information from the North American Breeding Bird Surveys in New Mexico from 1968 to 1999 indicates population and trends are stable, abundant and not declining. Since 1966 the population trend of the Merriam's turkey in the western part of the United States has increased over 33 percent. The population trend for the Merriam's turkey on the Carson National Forest is also considered to be upward. Alternative A could affect the available of insects and cover for poults. This could have a local affect on the turkey, but would not affect the forest-wide trend. The other alternatives would not affect forest trend.

Migratory Birds and Associated Habitat Types

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

The following species are not included because they do not have habitat in the area, do not occur in this area, or only migrate through the area.

Table 17. Priority List of Migratory Birds Considered But Not Analyzed

Species	FWS/PIF	Habitat Type
Gunnison sage grouse	FWS	Sagebrush/not in New Mexico (NM)
Marbled godwit	FWS	Grassland/ central NM
Snowy plover	FWS	Barren sandy beaches and flats/ southern NM
Sprague's pipit	FWS	Alpine meadows
Solitary sandpiper	FWS	Sandy beaches and flats/central and eastern NM
Crissal thrasher	FWS/PIF	Montane shrub/southern NM
Swainson's hawk	FWS	Prairies and plains/migration only
Short-eard owl	FWS	Marshes and tundra
Peregrine falcon	FWS/PIF	Cliff near water
Northern Harrier	FWS	Grassland near riparian
Black swift	FWS/PIF	High elevation riparian, cliffs, waterfalls
Lucifer hummingbird	PIF	Canyons in extreme southwest NM
Wilson's phalarope	FWS/PIF	Wet meadows
Chestnut-collared longspur	FWS	Moist upland prairie
Yellow-billed cuckoo	FWS/PIF	Riparian habitat/not enough to support in area
Red-faced warbler	PIF	High mountains southwestern NM
Greater pewee	PIF	Pine-oak woodlands southwestern NM
Olive warbler	PIF	High mountains southwestern NM
Black-chinned sparrow	PIF	Brushy mountain slopes southern NM
Long-billed curlew	PIF	High plains, rangeland eastern NM
Scissor-tailed flycatcher	PIF	Semi-open country eastern NM
Dicksissel	PIF	Alfalfa fields, prairies eastern NM
Cave swallow	PIF	Caves in southern NM

The following sections describe habitats found on the JWHT and the migratory birds that are typically found in these habitats. All species described have not been located within the JWHT, but have the potential of occurring.

Great Basin Desert Shrubland

Highest priority species include loggerhead shrike, sage thrasher, Bendire's thrasher and sage sparrow. In addition, the BCR list includes the burrowing owl.

Table 18. Priority Species for Great Basin Shrubland

Species	FWS /PIF	Important Features and Life History Considerations	Effects
Burrowing owl	FWS	• Preferred habitat is opened to dense stands of shrubs and low trees. • Breed in grasslands, prairies, or opened areas near human habitation. • Beetles, grasshoppers, and crickets form the majority of the owl's arthro-pod diet.	Alternative A could impact the owl by reducing prey species in the area due to the condition of the range. Alternative B, C, and D would benefit prey of the owl as the range condition improves.
Loggerhead shrike	PIF	• Shrub component within grassland habitat critical. • Nest height above ground depends on	Alternative A would negative impact the shrub component of the shrike due to the continue degrading of the sagebrush

Species	FWS /PIF	Important Features and Life History Considerations	Effects
		shrub height. • Shrubs with spines or barbed wire fence useful for impaling prey before eating.	habitat. Alternatives B, C, and D would benefit the shrike as the sagebrush condition should improve over time.
Sage thrasher	PIF	• Sagebrush obligate species prefers sage-dominated grasslands and shrubby arid lands. • Prefers nesting substrates >70cm with minimal bare ground present • Nests are placed in areas of dense scrublands with a concealing vegetation canopy cover.	Alternative A would negative impact the sage thrasher due continual degrading of the sage habitat, due to the fact it requires large dense sagebrush. Alternatives B, C, and D would benefit the sage thrasher as the sagebrush condition should improve over time.
Bendire's thrasher	FWS PIF	Nests are typically placed 0.7 meters to 1.5 meters in height above the ground in semi-desert shrubs, cacti, or trees	Alternative A would benefit the Bendire's thrasher since it is especially prevalent in degraded grasslands in northwestern New Mexico. Alternatives B, C, and D would have a negative affect on the Bendire's thrasher as the grassland condition improve over time.
Sage sparrow	FWS PIF	Prefers semi-opens habitat with tall (1-2 meters), evenly spaced, large canopy shrubs of pure big sagebrush or interspersed with butterbrush, saltbush, shadscale, rabbitbrush or greasewood, occasionally in sagebrush-juniper habitat.	Alternative A could have an negative since two of the habitat objectives is to have a high percentage (>75%) of live sage within stands of sagebrush and to maintain evenly spaced sagebrush from 10-20 m (3-6 ft). Alternatives B, C, and D would benefit the sparrow as the sagebrush condition should improve over time.

Montane Shrub

High priority species include MacGillivray's warbler and green-tailed towhee.

Table 19. Priority Species for Montane Shrub

Species	FWS /PIF	Important Features and Life History Considerations	Effects
Green-tailed towhee	PIF	• At lower elevation, prefers more mesic areas with diverse shrub species (sagebrush, piñon-juniper, and/or greasewood). • Nests in areas of high shrub density, nest are approximately 70 cm in height above the ground.	Alternative A could impact the towhee by reducing the quality of the shrubland. Alternative B, C, and D would benefit prey of the towhee as the range condition improves.
MacGillivray's Warbler	PIF	• Preferred shrubby habitats in spruce-fir and fir forests including riparian shrubland with a herbaceous understory, commonly forbs, but sometimes grasses, and sedges. • Uses riparian habitat for breeding. • Generally feeds on invertebrates.	Alternative A would negative impact the riparian component of the warbler due to the continue degrading of the riparian habitat. Alternatives B, C, and D would benefit the shrike as the riparian condition should improve over time.

Piñon-Juniper Woodland

High priority species include ferruginous hawk, gray flycatcher, gray vireo, Bendire's thrasher and black-throated gray warbler. BCR species also include Virginia's warbler, and piñon jay. Species recorded on the District in the 2003 Breeding Bird Survey include the gray flycatcher, black-throated gray warbler, Virginia's Warbler, and piñon jay.

Table 20. Priority Species for Piñon-Juniper Woodland

Species	FWS /PIF	Important Features and Life History Considerations	Effects
Ferruginous hawk	FWS PIF	• Require close proximity to high quality grassland or irrigated agriculture land. • Prefers forest edge or mature isolated, flat-topped junipers, with thick branches for nesting. • In northwest New Mexico; often nests on rock spires. • Highly sensitive to human disturbance. • Prey mainly consists of small to medium-sized mammals.	Alternative A would impact the hawk by affecting the quality of the grassland the condition of the range. Alternative B, C, and D would benefit prey of the hawk as the range condition improves.
Gray Flycatcher	PIF	• Prefers open piñon-juniper forest, often with interspersed ponderosa. • Shrub cover cannot be too dense; prefers approximately 60%. • Logging and fire may create new habitat after several years.	Alternative A would negative impact the shrub component of the shrike due to the continue degrading of the sagebrush habitat. Alternatives B, C, and D would benefit the shrike as the sagebrush condition should improve over time.
Gray vireo	PIF	• Prefers open piñon-juniper woodland or juniper savanna with a shrub component (35-45% cover). • In northwest New Mexico; found in broad-bottomed, flat or gently sloped canyons in areas with rock outcroppings on near ridge tops. • Antelope bitterbrush, mountain mahogany, Utah serviceberry and big sagebrush are shrubs found in northwest areas, with large amounts of bare ground between herbaceous plants forming ground cover. • Feeds on ground and up to 16 feet. • No water required.	Alternative A could potentially affect the goal to maintain 50-65% shrub cover over large areas in mature piñon-juniper forest. Alternatives B, C, and D would benefit the sage thrasher as the shrub condition should improve over time.
Bendire's thrasher	FWS PIF	See Great Basin Desert Shrub table	
Black-throated gray warbler	FWS PIF	• Prefers large stands of piñon-dominated woodland. • Often found in dense forests with a canopy. • Understory can be variable. • Uses edges: tree/shrub or tree/grass. • Current breeding bird survey trends for	None of the alternative would affect this species

Species	FWS /PIF	Important Features and Life History Considerations	Effects
		the western U.S. region show this species increasing slightly.	
Piñon jay	FWS	• Inhabits piñon-juniper woodlands, ponderosa pine, and lodgepole pine forests at middle elevations (5000-7500 feet). • Population may be regulated by the size of the pine seed crops. • Nests in pinions 3-18 feet high and ponderosa pines 5-78 feet high.	None of the alternative would affect this species.

Ponderosa Pine Forest

High priority species include northern goshawk, flammulated owl, Virginia's warbler and grace's warbler. BCR list includes Williamson's sapsucker. Grace's Warbler was recorded during breeding bird surveys in 2003.

Table 21. Priority Species for Ponderosa Pine

Species	FWS /PIF	Important Features and Life History Considerations	Effects
Northern goshawk	PIF	See Forest Service Sensitive Species	
Flammulated owl	FWS PIF	• Secondary cavity nester. • Most closely associated with open ponderosa pine forest, but may use Douglas, white fir, blue spruce, aspen or larger scrub oaks, piñon-juniper canyons and clearings. • Nest holes are made mostly by flickers or sapsuckers. • Almsost exclusively insectivorous. • U.S. populations are highly migratory.	Alternative A could impact the owl by reducing prey species in the area due to the condition of the range. Alternative B, C, and D would benefit prey of the owl as the range condition improves.
Virginia's warbler	FWS PIF	• Mostly ponderosa pine forest; always open with well-developed herbaceous or dense woody understory as a special requirement. • Nesting areas nests built on ground, in a depression or at base of a shrub, concealed by dead leaves or overhanging foliage or grasses, but especially Gambel's oak. • Percentage of dead trees is negatively correlated with nesting area.	Alternative A could potentially negative affect due to the fact the loss of grasses, there is no buildup of fine fuels to maintain fire, which is an integral part of this ecosystem. Alternatives B, C, and D would benefit the Virginia's warbler as the grass cover should improve over time. Due the present of gas well, the use of fire in the system will be limited.

Species	FWS /PIF	Important Features and Life History Considerations	Effects
Grace's Warbler	FWS PIF	• Ponderosa pine forest: sometimes with a scrub oak component, considered a mature pine obligate; preference given to robust, mature or old growth forest. • Feeds in the upper portions of robust pines on branches, nests found in trees from 20-60 feet (6-8 m) above the ground. • Removal of trees 40-70 ft (12-21 m) tall may have a detrimental effect on populations.	None of the alternatives would affect this species.
Williamson's sapsucker	FWS	• Specializes in sap and phloem; breeders switch to a diet of ants during the nestling season, especially carpenter and wood ants. • Wounded or scarred live conifers most frequently used for feeding. • Availability of suitable nesting sites critical component, preferring snags. • Prefers conifers infected with the fungus *Fomes igniarius*. • Prefers drainage bottoms to ridge top.	None of the alternative would affect this species

Mixed Conifer Forest

High priority species include Mexican spotted owl, Williamson's sapsucker, and olive-sided flycatcher. The BCR includes the flammulated owl. The olive-sided flycatcher was observed during breeding bird surveys in 2003.

Table 22. Priority Species for Mixed Conifer Forest

Species	FWS /PIF	Important Features and Life History Considerations	Effects
Northern goshawk	PIF	See Forest Service Sensitive Species	
Mexican spotted owl	PIF	See Threatened and Endangered Species	
Flammulated owl	FWS	See Ponderosa Pine table.	
Olive-sided flycatcher	PIF	• Nest in coniferous trees generally far out from the trunk • Needs forest edges for foraging and increases in density with a decrease in canopy cover. • Needs snags or tree tops near open areas or above canopy as diet consists mainly of larger flying insects, primarily bees.	Alternative A could potentially negative affect due to the fact the loss of grasses, there is no buildup of fine fuels to maintain fire, which is an integral part of this ecosystem. Alternatives B, C, and D would benefit the Virginia's warbler as the grass cover should improve over time. Due the present of gas well, the use of fire in the system will be limited.

Species	FWS /PIF	Important Features and Life History Considerations	Effects
Ducky fly-catcher	PIF	Uses mixed conifer or ponderosa pine forest with a shrubby understory; brushy areas and open areas with scattered trees, such as early disturbance, such as fire. Shrub component appears to be critical in New Mexico. Tends to choose shrubs with denser foliage for nesting. Nests built from 3-16 feet. Openings near shrubs needed for foraging.	None of the alternatives will affect this species.
Williamson's sapsucker	FWS PIF	See Ponderosa Pine table.	

Plains and Mesa Grassland

High priority species include the ferruginous hawk, prairie falcon, mountain plover, Bendire's sparrow, and lark bunting.

Table 23. Priority Species for Plains and Mesa Grassland

Species	FWS /PIF	Important Features and Life History Considerations	Effects
Ferruginous hawk	FWS PIF	See Piñon-Juniper table	
Prairie falcon	PIF	• Prefers open grasslands and shrub-grassland. • Ledges and cavities in cliffs or bluffs are common nest sites. • Nesting sites are highly limiting. • Ground squirrels are an important breeding food source. • Horned larks and meadowlarks are important non-breeding food sources.	Alternative A would impact the falcon by affecting the quality of the grassland the condition of the range. Alternative B, C, and D would benefit prey of the falcon as the range condition improves.
Mountain plover	PIF	• Prefer short-grass prairie and shrub steppe landscapes where nests typically occur on level terrain with sparse, short vegetation. • Positive habitat indicators include level terrain, prairie dogs, bare ground, cattle, widely spaced plants, and horned larks. • Negative habitat indicators grass taller than 4 inches, wet soils and killdeer.	Alternative A would benefit the mountain plover since it is needs bare to short grass. Alternatives B, C, and D would have a negative affect on the mountain plover as the grassland condition improve over time.
Bendire's thrasher	FWS PIF	See Great Basin Desert Shrub table	

Species	FWS /PIF	Important Features and Life History Considerations	Effects
Lark bunting	FWS PIF	Primarily found in short-grass grasslands, occasionally in sagebrush shrublands and weedy agricultural areas. Prefers dense grass approximately 13 cm in height. Less than 15% bare ground is optimal and >60% bare ground is not useable. Territory size is approximately 1-2 acres with a larger patch size due to species socialization. Nesting occurs on the ground in areas with 10-30% cover of shrubs and mid-grasses to protect from solar radiation. Grasshoppers are the stable diet.	Alternative A would have a negative affect on the lark bunting due to the following reasons: low grass height; potential increase in bare ground; removal of the grasshopper habitat; and reduction in shrubs. Alternatives B, C and D should improve habitat over time as the range condition improves.

Cave/Rock/Cliff

High priority species includes the prairie falcon.

Table 24. Priority Species for Cave/Rock/Cliff

Species	FWS /PIF	Important Features and Life History Considerations	Effects
Prairie falcon	PIF	See Plains and Mesa Grassland table	None of the alternative will affect this habitat type. See Plains and Mesa grassland table for other effects.

Cumulative Effects

The JWHT has historically been a grazing allotment. In addition, the area has have gas product since the 1940's. Currently cattle have not grazed in the JWHT since 2000, except for one allotment that had 12 cattle grazing on it in 2001.

It is expected that gas well development will double the number of wells on the district over the next 20 years. Analysis of the three allotments within the JWHT is scheduled to be completed by the end of 2004. Until range conditions improve on the allotments, it is unlikely that livestock will be authorized to graze them. When grazing is continued, utilization standards described in this document will be met.

The effects of increased gas well development are currently being described in an EIS for the Jicarilla Ranger District. Mexican spotted owl nest sites and known goshawk territories will continue to be protected under any of the alternatives. Once the designation is final, critical habitat for the MSO will be protected from removal. It is unlikely the bald eagle of will be affected by these activities with current standards that are being applied for both grazing and gas development. No additional cumulative effects for these species should occur when combined with the effects of the action alternatives.

If Ripley's milkvetch is found on the JWHT, it will continue to be affected by future grazing from wild horses, cattle, and wildlife. In addition, there is potential for gas wells to remove sites if the plant is not located before a pad or road is installed.

Effects to migratory birds depend on the species and their habitat requirements. Species that depend on grassland and shrubs could be affected by grazing activities and gas well developments.

Both of these activities can remove habitat. It is expected that the effects from grazing would be reduced in the future. While gas well development can remove habitat with the development of roads, pipelines, and pads, some of this would replaced by reclamation activities when successful. It is unknown how much the effects from these activities would balance each other out. For birds in conifer habitats, the grazing would likely have little impact on them. The gas development can cause fragmentation and removal of their habitat.

Gas Development

The Jicarilla Ranger District is almost entirely leased for gas development, and there are roughly 200 existing natural gas wells in the JWHT. Associated pipelines, compressor stations, injection wells, and an estimated 70 miles of roads built primarily for the purpose of drilling also exist for the extraction of natural gas within the territory. New construction and drilling operations are allowed between April 1st and October 31st annually. There are an estimated 800-1000 acres of land incorporated in well pads and roads in the JWHT.

Comparison of Alternatives

Past, Present, and Reasonably Foreseeable Activities

The past, present and reasonably foreseeable activities that will be used to analyze the cumulative effects on gas development are: Livestock and wild horse grazing and activities associated with natural gas development (roads, pipelines and well pads). Anticipated gas development over the next 18-20 years on the JWHT is forecast to be approximately 300 new wells with roughly 3 acres of disturbance for each well (900 acres) and an additional 500 acres in new roads for a total of 1400 acres of surface disturbance. If revegetation is possible, 2 out of 3 acres associated with new well locations will be reclaimed.

Alternative A

Heavy grazing use associated with high populations of horses would severely limit the ability of oil and gas producers to revegetate and control noxious weeds on well locations, pipeline right of ways, abandoned wells, and closed roads. When disturbed areas are not properly revegetated they are highly susceptible to noxious weed invasion. Producers are required to revegetate disturbed areas and control noxious weeds. There would be no other affects to the gas industry. The potential impacts would be high, with very limited success in revegetation efforts, increased invasion of noxious weeds, and increased dollars spent on attempted revegetation by gas producers.

Alternatives B, and C

These alternatives would improve revegetation and noxious weed control efforts by the gas industry, thus improving the effectiveness of mitigation measures applied to minimize surface disturbance.

Alternatives D

These alternatives would improve revegetation and noxious weed control efforts by the gas industry during years when moisture is favorable, thus improving the effectiveness of mitigation measures applied to minimize surface disturbance. During drought years, heavier grazing use could impact revegetation efforts thus decreasing the effectiveness of mitigation measures applied to minimize surface disturbance.

Cumulative Effects

Effects described above include the cumulative effects of livestock with the impacts of horses on gas development.

Recreation

The Jicarilla Ranger District is not heavily used for recreation, is far from any major city, and is extensively industrialized due to natural gas development. The major recreation use on the district is big game hunting. There are three small primitive campgrounds found on the district that are used primarily during big game hunting seasons in the fall. The district receives light use at other times of the year from non-consumptive users such as wildlife and bird viewing, family camping, scouting events, and wild horse observation. Personal use woodcutting occurs in moderate amounts.

Wild horses impact some recreational uses. The quality of non-consumptive viewing activities is increased by the presence of horses. Many people come to the district just to view the horses. On the other hand, some big game hunters feel their hunting experience is decreased because of horse competition with wildlife.

In 1997, Forest Service resource specialists conducted a study to determine which rivers on the Jicarilla Ranger District were eligible for designation as a "wild and scenic river" as part of the national Wild and Scenic Rivers system. [67] Carracas, Bancos, and Cabresto canyons are identified as eligible for consideration under the Wild and Scenic Rivers Act.

Carracas Canyon from the Jicarilla Apache Reservation boundary to the Colorado border is eligible for its outstandingly remarkable values:

- Wildlife - key winter migratory corridor and holding area for deer, significant security area for large bucks, wintering bald eagles.
- Historic - Boiler Springs and wagon road from Arboles to Dulce.

Bancos Canyon from the Jicarilla Apache Reservation boundary to the Forest boundary is determined to be eligible for its outstandingly remarkable values:

- Recreation - popular hunting and hiking area and visiting historic sites.
- Wildlife - key winter migratory corridor and holding area for deer, wintering bald eagles.
- Cultural - looking at proposing whole canyon as National Historic Site due to density of Anasazi and Navajo sites.

Cabresto Canyon from the Jicarilla Apache Reservation boundary to the Forest boundary is determined to be eligible for its outstandingly remarkable values:

- Wildlife - key wintering area at east end, wintering bald eagles at east end.
- Historic - old school house and several homesteads.
- Cultural - major petroglyph area up Lion Canyon.

Comparison of Alternatives

Past, Present, and Reasonably Foreseeable Activities

The past, present and reasonably foreseeable activities that will be used to analyze the cumulative effects on recreation are: Horses, livestock, and wildlife grazing and activities associated with natural gas development (roads, pipelines and well pads).

Alternative A

Impacts to some recreation activities could happen under this alternative. There would continue to be conflicts between big game hunters and horses. The amount of forage available to elk and deer would decrease due to the large number of wild horses. The Wild and Scenic River characteristics of the river segments that have potential for designation would not be affected, except for the riparian vegetation in Carracas Canyon. As the horse herd increases in size, key winter range within Carracas Canyon would be impacted. This may preclude Carracas Canyon from being eligible for Wild and Scenic River designation.

Alternatives B and C

Conflicts between wild horse and big game forage use would decrease, thus improving the quality of recreational hunting opportunities. Other recreational activities would remain the same. The Wild and Scenic River characteristics of the river segments that have potential for designation would not be affected.

Alternative D

During extended drought periods conflicts between wild horses and big game forage use would increase, thus decreasing the quality of recreational hunting opportunities. Horse viewing opportunities would essentially stay the same. Other recreational activities would remain the same. The Wild and Scenic River characteristics of the river segments that have potential for designation would not be affected.

Cumulative Effects

Effects described above include the cumulative effects of livestock with the impacts of horses on soils, specifically ground cover. Both wild horses and natural gas development and production would have cumulative effects on soils through reductions in ground cover and soil productivity. Natural gas related activities would tend to have more extensive effects than wild horses.

Social Effects

Wild horse management is of major concern for many people. Comments on the Jicarilla wild horse herd have been received from all over the United States, as well as locally. Some people want to adopt wild horses because they are a part "the West". Others just want to know that our history is still alive in the form of herds of wild horses roaming freely throughout the West.

Comparison of Alternatives

Past, Present, and Reasonably Foreseeable Activities

The past, present, and reasonably foreseeable activities that will be used to analyze the cumulative effects on the social setting are: Wild horse, livestock, and wildlife grazing, and activities associated with natural gas development (roads, pipelines and well pads).

Alternative A

This alternative would continue to support a wild horse herd in the JWHT. This would be acceptable to most of the people who commented about leaving the wild horses essentially untouched and who wanted more wild horses present in the JWHT. Considerable concern would likely arise during years when the horse population exceeds available forage and a large number of horses may die of starvation during severe winters. No horses would be available for adoption.

Alternative B

This alternative would continue to support a wild horse herd in the JWHT, however the number of horses would be managed according the amount of available forage, especially during periods of drought. Initially, this alternative would provide a large number of horses to people who want to adopt them, but over the long-term there could be fewer horses available for adoption, as well as for viewing.

Alternative C

This alternative would continue to support a wild horse herd in the JWHT, however the number of horses would be fewer than at present. Initially a large number of horses would be available for people to adopt. Over the long-term, horses would be offered for adoption every one to two years. People would continue to have the opportunity to view wild horse herds within the territory.

Alternative D

This alternative would continue to support a wild horse herd in the JWHT. Initially it would provide a large number of horses to the people who want to adopt them. Over the long-term, horses would be offered for adoption every one to two years. This alternative would maximize the number of horses for viewing and for adoption.

Livestock Grazing

Like the occurrence of wild horse herds, cattle grazing is a tradition in the area. The Jicarilla wild horse territory encompasses three grazing allotments (Cabresto, Bancos, and Carracas).

Cabresto Allotment

Thirty-five percent (27,079 acres) of the JWHT lies within the Cabresto Allotment. The allotment has a seasonal cow/calf operation with 101 head authorized through a 10-year term grazing permit. The Cabresto uses a one-pasture grazing system and grazing is permitted from June 1 to October 31. Prior to 1955, the Carracas, Cabresto, and Bancos allotments were one allotment, called the Carracas Allotment. The Cabresto Allotment has not been grazed since 2001 due to the climbing wild horse population and ongoing drought. The average grazing from 1991-2001 was 81 head of cattle. During the January 2004 horse survey flight, 80 head of horses were counted in the Cabresto Allotment.

Bancos Allotment

Twenty-one percent (15,399 acres) of the JWHT lies within the Bancos Allotment, excluding private land. The allotment is managed as a seasonal cow/calf operation with 80 head authorized through a 10-year term grazing permit. The Bancos uses a four-pasture rest/rotation grazing system and grazing is permitted from May 16 to October 31. The average grazing from 1991-2001 was 48 head of cattle. During the January 2004 horse survey flight, 58 head of horses were counted in the Bancos Allotment.

Carracas Allotment

Forty-four percent (31,918 acres) of the JWHT lies within the Carracas Allotment, however livestock use is limited to the Carracas Canyon area. The allotment is managed as a seasonal cow/calf operation authorized through a 10-year term grazing permit and a temporary use permit. Eight head are permitted under the term permit and another 4 head under a temporary permit. The Carracas uses a one-pasture grazing system and grazing is permitted from May 16 to October 15. Livestock graze approximately 5,000 acres (15%) of the 31,918 acres on the Carracas allotment. The average grazing from 1992-2002 was 11 head of cattle. During the January 2004 horse survey flight, 20 head of horses were counted in the Carracas Allotment.

Comparison of Alternatives

Past, Present, and Reasonably Foreseeable Activities

The past, present and reasonably foreseeable activities that will be used to analyze the cumulative effects on livestock are: wild horse and wildlife grazing.

Alternative A

Under this alternative the wild horse herd would continue to increase, reducing the amount of forage available for livestock grazing. It is unlikely that the number of permitted livestock would be able to graze under Alternative A. During drought conditions, permittees may be forced out of the livestock business by competition for forage from the wild horses.

Alternative B

Permitted livestock would receive preference over horses for allocating available forage under this alternative. This alternative would be most beneficial for grazing permittees.

Alternative C

Alternative C would allocate available forage first to wildlife and then balance the remaining forage between wild horses and permitted livestock. Range conditions would improve under this alternative, thus maintaining livestock grazing on the allotments involved.

Alternative D

Permits for livestock grazing would be issued, however opportunities for grazing livestock could be limited depending on available forage.

Cumulative Effects

Effects described above include the cumulative effects of wild horse grazing along with the impacts of wildlife on livestock grazing.

Heritage Resources

The Jicarilla Ranger District is located along the eastern portion of the San Juan Basin and the cultural chronology, especially of the Ancestral Pueblo Cultures and to a lesser degree the Historic Navajo, applied to the District has been adapted from the 1966 Navajo Reservoir Project conducted and written by Frank W. Eddy.

Currently no Paleo-Indian sites (15,000+/- to 5500+/- B.C) have been identified on the district. Also, Archaic sites, dating from approximately 5,500 B.C. to A.D.400, are extremely rare on the district. To date, only four lithic scatters with points diagnostic of the Archaic Period have been identified. The two sites located within the Jicarilla Wild Horse Territory comprise less than one-half of one percent of the known sites in the JWHT.

On the other hand, the Ancestral Pueblo Period is well documented in the JWHT. Using the chronology adapted by Eddy (1966) the period of identified predominant use begins at approximately A.D. 1 and continues through about A.D. 1050 with very slight utilization between A.D. 1050 and 1300.

Navajo Occupation Period

The early Navajo occupation of the area is referred to as the Dinetah Phase and extends from late prehistoric times (with a beginning date between A.D. 1300 to 1500) to A.D. 1680. Sites from this early phase would be forked-stick hogans and/or ramada-like structures and the presence of thin-walled gray ceramics identified as Dinetah Utility, but because of the lack of preservation of wooden structures over such a long time period there is still little firm archeological data for the district substantiating this phase, therefore, determination in the field has been extremely difficult (see Eddy 1966:505-508). It is thought that the Navajo were primarily hunter-gathers during this phase, although to lesser extent, they may have been cultivating corn as well. Currently seven sites within the JWHT have been identified with possible Dinetah phase components.

The Gobernador Phase, A.D. 1680 to 1775+/-, on the district is distinguished by the presence of Gobernador Polychrome, Dinetah Utility ceramics, sweat-lodges, forked stick-hogans, pueblitos, slab-lined features, ax-cut juniper, distinctive projectile points and the occasional occurrence of Pueblo ceramics or European goods. The pueblitos, found on mesa or bench points or boulder or cliff prominences, of this phase frequently have been described as defensive, although they may have also served as signaling or lookout locations. During this phase it is known from historic accounts, especially Roque Madrid's 1705 Campaign Journal, that the Navajo in the La Jara-Gobernador area were growing large tracts of corn in the drainage bottoms. Hunting and gather-

ing probably contributed substantially to their subsistence as well. By about A.D. 1750, the Navajo had essentially abandoned the area, perhaps as a consequence of increased raiding by the Ute who were being forced out of their territory to the north and east by the Comanche and Apache. Nineteen sites in the JWHT have components identified to the Gobernador Phase, however, an additional 21 sites were listed as Navajo (indeterminate) and many of these are likely to be Gobernador Phase.

Historic Hispanic and Anglo-American Utilization

Prior to the late nineteenth century, non-aboriginal use of the JWHT was limited to trails, especially the Old Spanish Trail established after 1830 that runs along the north eastern edge of the area. A small number of Hispanic and Anglo-American homesteaders began to move into the region after the 1870s and by the turn of the twentieth century a few ranches were established. It was also during the early part of the last century, that large numbers of sheep, goats, cattle and horses were grazed in the area resulting in severe degradation of the land that would become the Jicarilla Ranger District of the Carson National Forest. By the early 1950s oil and gas exploration began to dominate both the landscape and economy of the area.

Previous Research and Known Sites

On the Jicarilla Ranger District, 953 cultural resource surveys have been conducted. Subsequently, monitoring and associated activity reports -- mostly related to gas and oil extraction (well pads, access roads and pipelines), water developments, road closures, fuelwood areas and prescribed burns – were developed. These surveys have covered approximately 4,861 acres, or 6.5 percent of the Jicarilla Wild Horse Territory. The surveys located a total of 491 sites (as of the forest corrected ARMS update of Spring 2003) comprised of 85 percent Ancestral Pueblo, nine percent (9%) Historic Navajo and/or Apache, approximately one percent (1%) Historic Anglo, less than one-half of one percent (0.5%) tentatively identified Archaic, approximately three percent (3%) multi-component sites (Prehistoric and Historic components) and approximately one and one-half (1.5%) percent sites with insufficient data to make a determination of cultural affiliation or phase. There are no known sites listed on the National Register of Historic Places or Traditional Cultural Properties located in the project area.

At present, no monitoring of sites within the JWHT, nor comments in site reports have specifically addressed the impacts to sites by the presence of wild free-roaming horses. Sites that may be considered susceptible to grazing impacts are rock art and standing ruins or structures. Currently only one site containing rock art is located within the JWHT and it is situated in an area that would be relatively inaccessible to horses. There are a few prehistoric sites that were recorded with walls of only one, or at most two, intact courses and impacts from grazing are considered to be minimal on these sites. Of the Navajo sites, the pueblitos are located in areas not particularly accessible to horses or other large grazing animals, but the hogan sites composed primarily of decaying, burned or remnant wood members could continue to be impacted by the presence of large animals.

Tribal Consultation

A scoping letter was sent to the governors, chairpersons, and cultural specialists of the sixteen tribes, pueblos, and nations. [103] The Carson National Forest consults with tribes on cultural resource issues and traditional cultural properties, as well as access to resources on National Forest System lands. The Southern Ute Indian Tribe provided a response to the scoping letter, indicating that there are no sites sensitive to the Southern Ute Indian Tribe that would be impacted by the proposed action. The Southern Ute Indian Tribe does wish to be notified in the event of inadvertent discoveries of human remains.

The Jicarilla Apache Nation also responded to the scoping letter and did not indicate any cultural resource concerns. The issues raised by the Jicarilla Apache Nation indicated concern with the encroachment of wild horses onto the Jicarilla Apache Reservation, and the competition for resources with tribal livestock and native wildlife species. The Jicarilla Apache Nation supports a gathering of the wild horses on the Jicarilla Ranger District and would like to include gathering of trespass wild horses on the Jicarilla Apache Reservation.

A follow-up consultation letter was sent in August 2003 to the same mailing list as the scoping letter. [167] There were no responses.

Comparison of Alternatives

The JWHT is located within one of the highest cultural resource site density areas on the Carson National Forest. Project planning must consider the potential impacts to these sites. Currently there is simply no data on the potential impacts of wild horses on the cultural properties within the JWHT. Current levels are estimated to be over 200 head of wild horses and this number may need to be reduced in order to both maintain key wildlife habitat and to meet Forest Plan utilization guidelines.

Alternative A

Under this alternative, the wild horse population would be allowed to grow unhindered by Forest Service action. It is unlikely that livestock grazing could continue based on current utilization levels within the JWHT. This alternative would increase the likelihood of direct impacts to cultural properties from trampling by horses, especially in those areas of good forage and water. Herds would be allowed to increase without direct intervention and management beyond current levels.

Alternative B

This alternative would limit the possible number of horses to a level substantially lower than at present. Alternative B would potentially result in reducing the effects to cultural resources from wild horses. Additionally, during periods of drought, the number of permitted livestock would be reduced, further lessening the potential impacts to cultural resources.

Alternative C

As in Alternative B, this alternative would substantially reduce the number of horses from both the historic (since approximately 1976) and current levels, therefore, reducing any impacts to the cultural resources. This alternative also would balance the needs of wildlife and horses and reduce the number of permitted livestock, resulting in a net decrease in animals on the JWHT.

Alternative D

As in Alternatives B and C, this alternative would lower the maximum number of wild horses in the JWHT to no more than 75 percent of the current level and would therefore reduce the possible effects to the cultural resources. With this alternative, livestock numbers would remain at the current level and wildlife numbers might have to be adjusted downward, but there would still be an overall decrease in large animals in the JWHT.

Cumulative Effects

When considering the other activities that have or would occur in the JWHT (especially those related to gas exploration and development), the action alternatives would actually decrease the potential to impact cultural resources. Alternatives B, C and D all reduce, from current or historic

levels, the number of large animals within the JWHT, thus decreasing the potential of adversely affecting the cultural properties.