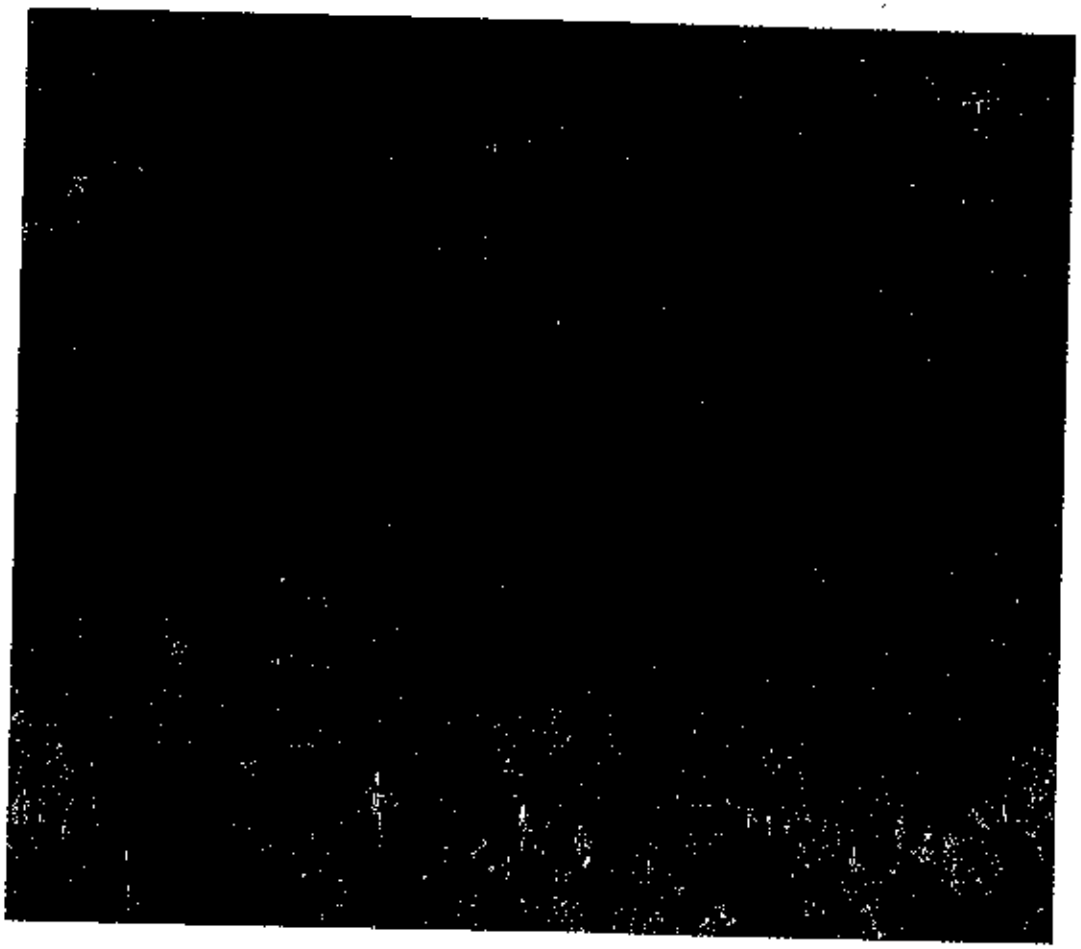
USDA United States Department of Agriculture

Forest Service

Southwestern Region

Environmental Assessment for Management of the Jicarilla Wild Horse Territory

Carson National Forest
Jicarilla Ranger District



Printed on recycled paper – June 2004

Content

List of Tables

List of Figures

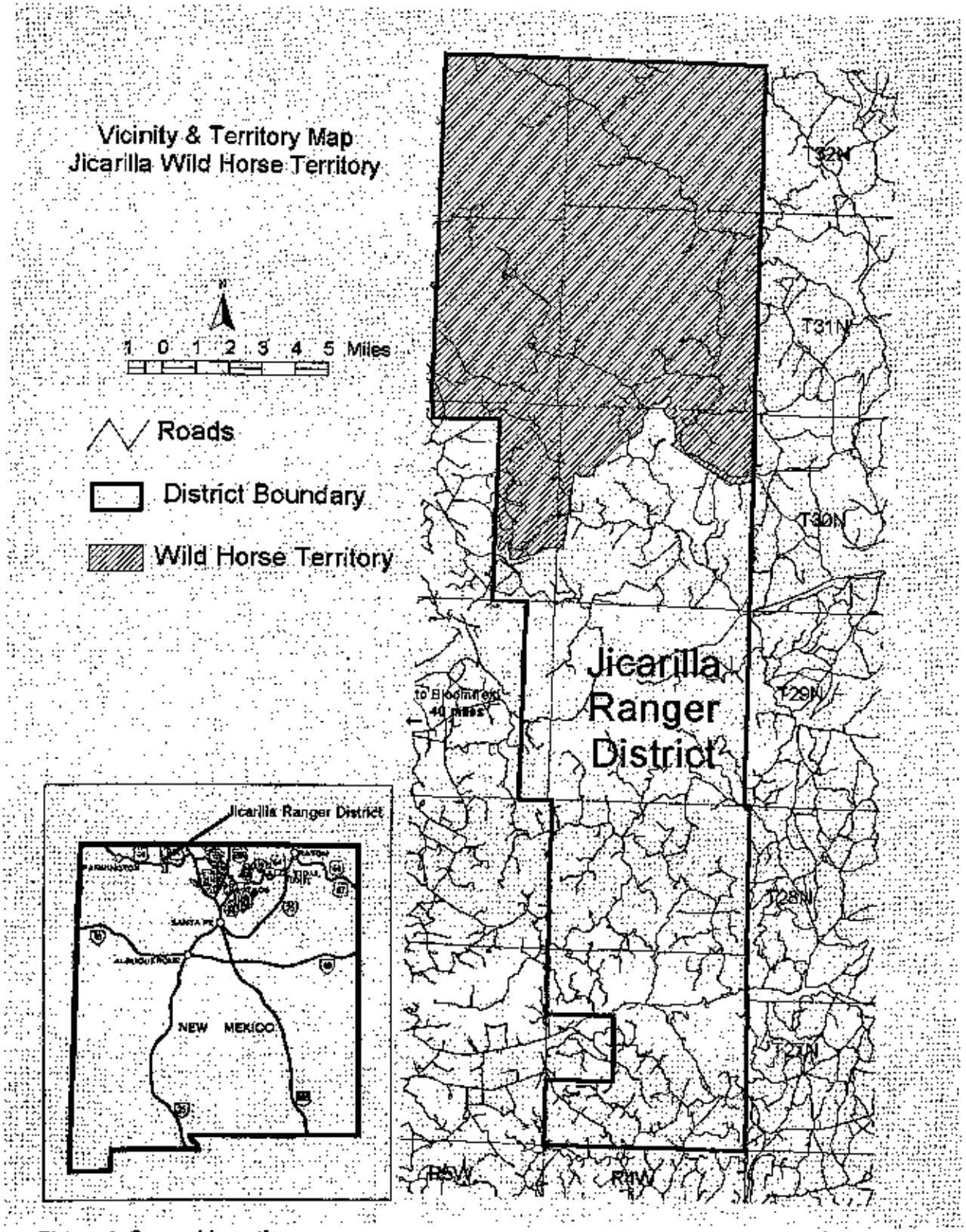


Figure 1. General Location

Chapter 1. Purpose of and Need for Action

This environmental assessment (EA) complies with the requirements of the National Environmental Policy Act (NEPA) of 1969. It summarizes the environmental effects of the Management of the Jicarilla Wild Horse Territory (JWHT) proposed on National Forest System lands within the Jicarilla Ranger District of the Carson National Forest (CNF). This EA also provides information needed for the Responsible Official to determine whether the decision may have significant effects requiring an environmental impact statement.

An interdisciplinary analysis on the proposed action is documented in a project record. An index of the project record is presented in Appendix A. Source documents from the project record are incorporated by reference throughout this environmental assessment by showing the document number in brackets [#]. This EA summarizes the project record to make the analysis results as clear as possible.

The Jicarilla wild horse herd is currently being managed as described in the 1977 Wild Horse Management Plan, Jicarilla Territory. [29] The planning process for this project started in the spring of 2000. An environmental assessment was prepared and made available for comment in September 2000. No decision was made. In April 2003, public scoping was reinitiated for the project.

Project Location

The JWHT is located in northwest New Mexico, approximately 60 miles northeast of Bloomfield and 72 miles northeast of Farmington, New Mexico (Figure 1). The northern territory boundary adjoins the Colorado border and lies west of the Jicarilla Apache Reservation. The JWHT is bound by Bureau of Land Management (BLM) lands on the west. The approximate legal description for the Forest Service portions of the JWHT is: Township 32 North, Range 4 West; Township 32 North, Range 5 West; Township 31 North, Range 4 West; Township 31 North, Range 5 West; small part of Township 30 North, Range 4 West; and part of Township 30 North, Range 5 West (Figure 2).

The Jicarilla Wild Horse Territory encompasses approximately 76,270 acres (of which 74,630 are federal lands) on the Jicarilla Ranger District, Carson National Forest. The JWHT encompasses the northern third of the Ranger District. The horse territory as designated by Congress, consists of only National Forest System lands. Although not considered part of the designated territory, there are six small parcels of private land (1,642 acres) within the boundaries of the JWHT.

Scope of Analysis

The Jicarilla Wild Horse Territory is the only designated wild horse territory on the Jicarilla Ranger District of the Carson National Forest. Wild horse management within designated wild horse territories is prescribed through Acts of Congress (laws) and their implementing regulations. These laws and documents include:

- Wild Horse Protection Act of 1959 [24]
- Wild Free-Roaming Horses and Burros Act of 1971, as amended by Federal Land Policy Management Act of 1976 and Public Rangelands Improvement Act of 1978 [25]
- Management of Wild Free-Roaming Horses and Burros - 36 CFR 222 Subpart B [40]
- Forest Service Manual (FSM) Chapter 2200 (Range Management) and Chapter 2260 (Wild Free-Roaming Horses and Burros) [37]
- Carson National Forest Land and Resource Management Plan (herein called Forest Plan) [13]

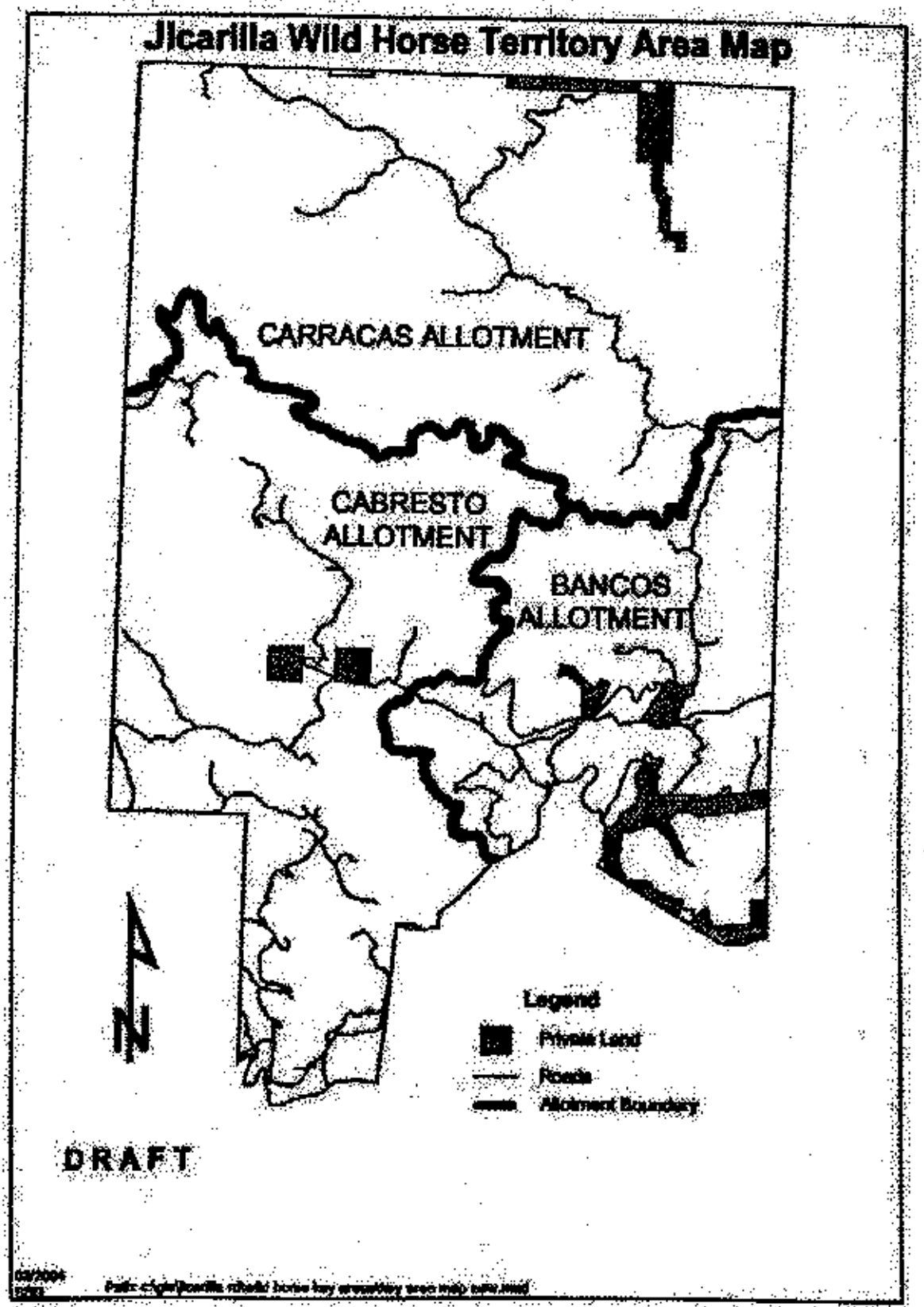


Figure 2. Jicarilla Wild Horse Territory

- Wild Horse Management Plan, Jicarilla Territory (3/16/1977) [28], based on the Environmental Assessment (12/28/1976) [28] and Excess Horse Removal Plan of 10/26/1978 [30]
- Wild horses may also be managed outside the designated JWHT as described in the 1971 Wild Free-Roaming Horses and Burros Act and under FSM 2264.3 (Appendix F).

At the time the Jicarilla Ranger District was formed in August 1910, there were wild free-roaming horses living on the open range. Records for 1912 estimated the population to be around 1,000 horses. When the Wild Free-Roaming Horses and Burros Act was signed in 1971, the first helicopter aerial survey was conducted and 48 horses were counted. The next count in 1978 was 242 horses. Annual aerial surveys have continued to the present with some missed years. Based on the 2004 aerial survey conducted in January, there are an estimated 236 wild horses within the Jicarilla Wild Horse Territory [260].

The ancestry of the Jicarilla herd is questionable. Most consider the herd to be a mixture of domestic horses that were released since the late 1800's. Others believe the horses are direct descendents of Spanish horses brought over during the early Spanish exploration. Based on the Wild Free Roaming Horses and Burros Act of 1971 and its implementing regulations, the Forest Service manages within the JWHT a herd of wild horses that are not a specific type of horse or a horse of specific ancestry or breed.

From the 1880's to the mid 1900's, year-round grazing by domestic sheep and cattle within the JWHT was heavy. According to some of the older residents, the area within the wild horse territory had become so overgrazed that the flood of 1911 started gullies that today are 20 to 30 feet deep. Up until 1923, sheep and goat use was also extremely heavy. Sheep and goat grazing was discontinued in 1941, but permitted cattle, trespass livestock and wild free-roaming horse use remained heavy until 1955. Over the last 20 years an average of 140 head of cattle have grazed from the middle of May to the end of October. [226, 227]

Purpose and Need for Action

The 1977 Wild Horse Management Plan [29] specified an average of 60 horses as an appropriate management level (AML) for the Jicarilla Territory. While the annual number of wild horses may vary from the average, over time the average of 60 horses would be maintained. The AML is recognized as being the balance of available habitat between wild horses, permitted livestock, wildlife and other resources. Periodic horse gathers conducted in the past have been very important in keeping this balance.

Wild horses are smart as well as tough. They know their territory and often show their intelligence by their ability to avoid capture. This is one of the reasons the wild horse is etched in the minds of the American public. Unfortunately, they are often times prolific reproducers. Occasionally a mountain lion will kill a foal, but there are no natural predators that are able to keep the population in check on the Jicarilla Wild Horse Territory. Annual recruitment rates of 15 to 22 percent are common in designated wild horse herds across the west. [221]. Consequently, gathering horses has been routine since 1977. There have been approximately 370 horses gathered off the JWHT. Numbers have varied from year to year, but range from 9 in 1978, to as many as 70 in 1997. The last gather was in 1998, when 30 horses were gathered and adopted out.

For the past several years, the wild horse population within JWHT and adjacent lands has exceeded the AML described in the 1977 Plan. Based on the aerial survey conducted in January 2004, there are estimated to be 236 wild horses within the Territory. [260] The current estimated population of horses is almost four times the number described in the 1977 Management Plan. A

gather was planned for 2000 under the existing Wild Horse Management Plan, but special interest groups expressed concern over the gather and requested that an EA be completed before any future actions. Preparation for an EA for management of the JWHT including gathers, began in 2000 and was initially completed in 2002, however no final decision was made. The process was begun again in 2003, culminating with this EA.

Current poor range conditions and soil stability, along with a 26-year-old management plan, indicate the need for reevaluating management of the Jicarilla Wild Horse Territory. This analysis focuses on determining the appropriate management level of wild horses on the JWHT in order to achieve and maintain sustainable rangelands and balance available habitat, particularly forage, between wildlife, permitted livestock and wild horses. How to maintain the appropriate management level and maintain the genetic health of the herd is also discussed in this document.

Proposed Action

The Forest Supervisor of the Carson National Forest proposes to set the appropriate management level for free-roaming wild horses on the Jicarilla Wild Horse Territory at a range between 50 and 105 horses. Wild horse populations are very dynamic and growth rates can range widely from year to year. This alternative calls for managing within a range that allows some measure of population fluctuation. The proposed action would allow grazing use levels and range conditions to dictate the number of horses allowed to remain on the Territory within the 50-105 population range. Forage will be available first to wildlife and then balanced between wild horses and permitted livestock. The horse herd would be managed within the designated wild free-roaming horse territory (JWHT). Management will comply with the Wild Horses and Burro Protection Act of 1971, as amended, and the Carson National Forest Land and Resource Management Plan, as amended. [25,13,23]

Range and Ecological Monitoring

Determining the number of horses on the JWHT requires an adaptive approach to management. The number of wild horses maintained on the Jicarilla Wild Horse Territory would depend on existing rangeland health, the predicted severity of droughts and forage utilization guidelines. Monitoring of range conditions, soil stability, predicted weather patterns, and annual forage production and utilization levels are incorporated as a part of this proposed action. The upper and lower limits of the AML insure sustainable rangelands and must be verified by vegetation/forage monitoring under actual field conditions.

Range/ecological conditions would be monitored every 3-5 years using established and accepted methods for assessing vegetation conditions. Such methods as Parker 3-step, line intercept and Daubenmire plots are examples of acceptable methods.

Range and soil stability conditions would be monitored annually to assess the current trends in vegetation and soil conditions. Methods such as that described in FS Region 3 Range Analysis Handbook or the Rapid Assessment Methodology (RAM) analysis procedure or other well-established methods would be used. [39, 276]

Forage production and utilization would be monitored annually in each pasture to assure that utilization standards are being met. Methods such as those described in FS Region 3 Range Analysis Handbook and/or the Rapid Assessment Methodology (RAM) analysis procedure or other well established methods would be used. [39,276] Paired caged plots combined with ocular estimates would be used for establishing production in key grazing areas. [39]

Population Monitoring

Monitoring would also be conducted so that the wild horse population would not fall below 50 horses or exceed 105 horses. The gathering of horses to meet the appropriate management level would be necessary. Several gathers would be initiated to bring the population within the range, with strong emphasis on horse health and safety as well as safety of contractors, Forest Service personnel, and the public. Contraception could be an important part of long term population control after the population is brought down to the AML (see Contraception, Wild Horse section, Chapter 3).

The following criteria would trigger the need for an adjustment in horse numbers and a subsequent gather and adoption and/or other population control measures:

- Drought conditions. The Standardized Precipitation Index (SPI) or its successor will be used to define drought conditions. SPI values are available monthly from the Western Regional Climate Center at www.wrcc.dri.edu. Conditions will be determined by the size of the negative number. The larger the negative number, the more severe the drought. SPI values of –0.70 or less for the past month signal drought conditions. SPI values of positive 1.0 or more for the past 12 months signal the end of drought.
- Utilization in key grazing areas exceeding 30 percent utilization standards for two consecutive years.
- Key grazing areas are sampled for range/ecological conditions and show that range and soil stability conditions are trending downward.
- Forage production, based on forage production samples in key areas, do not show sufficient forage to support the present population.
- The number of horses exceeds 105 (determined generally by aerial survey).

Gathering Timing and Methods

Considerable interest has been expressed concerning the timing for gathering excess wild horses. In April 2003 during a wild horse gather on the El Rito Ranger District of the Carson National Forest, two mares foaled after arriving in the holding facility -- one foaled 7 days after the gather and the other foaled 10 days after the gather. Both mares were in very poor physical condition and in spite of veterinarian intervention both foals died. Estimated ages on the mares were 9 years and 20 years old respectively. Had the foals been born in the wild, they could not have been expected to live because of the condition of the mares. However, to avoid foaling in the holding facilities again, no gather on the Jicarilla Wild Horse Territory would be conducted between the first of April and the end of June.

There has also been concern in methods for gathering horses. Some have commented that helicopters should not be used, while others have commented that horses should be gathered on foot by walking them into holding facilities or by baiting them into trapping facilities. Gathering horses on foot and baiting horses into trapping facilities are options that will be considered. While these and other methods may be used, helicopter gathering would not be ruled out as an option since it has been proven to be both humane and effective and is the primary method for gathering horses in the Wild Horse and Burro Program throughout the west. Roping may be used, but only as necessary. If other methods become available that are humane and reduce stress on the horses, they would also be evaluated (see Gathering, Wild Horse section, Chapter 3).

Selection of the gathering method to be used will be based on safety to the wild horses and people involved, season of the year, the area to be gathered, the number to be gathered, the location and

history of the band or bands to be gathered, and contractor availability. A contractor must prove that they are able to successfully capture wild horses in a safe and humane manner. Any helicopter capture and handling activities will be conducted in accordance with Bureau of Land Management's Standard Operating Procedures for Removal and Safety for Wild Horse Herds. [245] Wild horses that are captured and removed will be put up for adoption, in accordance with the Wild Free-Roaming Horses and Burros Act of 1971, as amended and 36 CFR 222.29. [25,40]

Forest Plan Consistency

The National Forest Management Act of 1976 (NFMA) requires the development of long-range land and resource management plans. The 1986 Carson Land and Resource Management Plan, as amended, (hereby called Forest Plan) sets forth broad, programmatic management direction for the Carson National Forest. [13] This EA is a project-level analysis, designed in conformance with the applicable Forest Service plan direction (goals and prescriptions). Where appropriate, this EA tiers to the environmental impact statement for the Carson Forest Plan, as encouraged by NEPA regulations.

The Carson Forest Plan provides guidance for all natural resource management activities on the Carson National Forest. NFMA requires all projects and activities to be consistent with the Forest Plan. The Forest Plan has been reviewed in consideration of this proposal. Forest-wide prescriptions that apply to the proposed action are primarily those related to protection and/or management of: range (Range 1-2), soils (Watershed 1-2) and wildlife habitat (Wildlife and Fish 1-14).

The Forest Supervisor of the Carson National Forest has the delegated authority to determine the appropriate management level for a wild horse territory designated by Congress on the Carson National Forest, and uses the Forest Plan for guidance. The Forest Plan states that,

- *Maintain wild horse populations to levels outlined in management plans for the area.* [13]
- *Provide forage to the extent benefits are commensurate with costs without impairing land productivity and within the constraints of social needs.* [13]

The proposed action as described would be consistent with the Forest Plan.

On the Carson National Forest, the proposed action would include lands within four different management areas, which have additional standards and guidelines. These management areas (MA) are: [13]

MA 4 – Ponderosa Pine Under 40%
MA 8 – Piñon Juniper
MA 11 –Reseeded
MA 12 – Sagebrush
MA 13 – Oak

The proposed action is consistent with the standards and guidelines for each of these management areas. [94]

Decision Framework

Given the purpose and need, the Responsible Official reviews the proposed action, the alternatives and the environmental consequences in order to make a decision. The Forest Supervisor for the Carson National Forest is the Responsible Official who will decide whether to revise the current Wild Horse Management Plan for the Jicarilla Wild Horse Territory (1977) and select the appropriate management level as proposed or choose an alternative, including taking no action.

[28] In addition, the Responsible Official may elect to require certain mitigation measures to minimize environmental impacts.

Public Involvement

Scoping

Public participation and the scoping process are used to identify issues related to the proposed action, develop alternatives to address issues and to obtain public comment at various stages of the environmental analysis process. The Jicarilla Wild Horse Management proposed action has been listed on the Carson National Forest Schedule of Proposed Actions since April 2000. [261, 263] The Schedule of Proposed Actions has also been posted on the Carson National Forest's website – www.fs.fed.us/r3/carson.

Tribal Contact and Consultation

Native American tribes that may be interested in the project were identified early in the process, and consistent with the 1999 requirements of the National Historic Preservation Act, Section 106, consultation with affiliated tribal officials was initiated. On April 15, 2003 and again on August 26, 2003, a letter describing the proposal on wild horse management on the Jicarilla Wild Horse Territory was sent to the Native American tribes and pueblos for Section 106 consultation. [103,167]

Public Individuals and Organizations

In August and again in June 2000, a scoping letter was sent out to 49 individuals, groups, agencies, tribes and pueblos. [45, 46] In November of 2000 a draft environmental assessment was sent out for comment to 52 interested individuals or organizations. [52,53]

In April 2003, scoping was reinitiated and a letter was sent out to 125 entities including all previously interested individuals, groups and tribes, along with parties that have more recently shown interest in the project. [103, 104] Thirteen individuals responded to the proposal. [106, 107, 109-111, 116-119, 122-125]

On June 13, 2003, a letter was sent to all affected and interested parties announcing a tour and opportunity for discussion of the Jicarilla Wild Horse Territory planned for June 28, 2003. [132, 133] Notices of the upcoming field trip were also placed in *The Taos News* and the *Farmington Daily Times*. [129] Fifteen individuals participated in the field trip, giving them the opportunity to see the Territory, as well as discuss challenges in its management. [145]

Over the years, there have been informal meetings with grazing permittees concerning wild horse management on allotments that overlap the Jicarilla Wild Horse Territory. Generally permittees see horses as competing with their livestock for forage, but are tolerant of their presence when the population is managed.

Notice of 30-day Comment Period

Consistent with the Forest Service Notice, Comment and Appeal Procedures (36 CFR 215, revised June 4, 2003), the proposed action for the Management of the Jicarilla Wild Horses was distributed to the public for a 30-day comment period in August 2003. [155, 156] A legal notice of the proposed action triggering the initiation of the 30-day period was published in *The Taos News* on August 7, 2003. [154] A notice was also published in the *Farmington Daily Times*. [157]

Issues and ideas that surfaced through all of these public involvement activities have contributed to the refinement of the proposed action and the action alternatives, and have played a significant role in the identification and analysis of the potential environmental and social effects of this project.

Issues

An issue is a point of concern, debate or dispute over the effects of implementing the proposed action. Issues also help define the scope of the analysis. Issue management can usually be broken down into several steps. During the initial introduction of the proposed action, people were asked to comment on the proposal. From the comments, issues are clarified and organized. Once this process is completed, significant issues are identified.

The Forest Service separated issues into two groups: significant and non-significant issues. Significant issues are defined as those directly or indirectly caused by implementing the proposed action. Significant issues are used to formulate alternatives, prescribe mitigation measures or analyze environmental effects. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality implementing regulations for the National Environmental Policy Act explain this delineation in 40 CFR Sec. 1501.7, "...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)..." [5]

Public comments on the proposed management of the Jicarilla Wild Horse Territory covered a variety of topics. A number of people were concerned over the methods used to gather horses. The proposed action is limited to reevaluating the Jicarilla Wild Horse Management Plan and establishing a population range that will sustain ecological health of the Territory. The issue of methods of gathering is outside the scope of the proposed action.

Significant issues were used to develop alternative management options and/or addressed in the analysis of environmental effects (*Chapter 3-Affected Environment and Environmental Consequences*). Evaluation criteria are used to measure the potential consequences of the alternatives as they relate to each issue. The following are the significant issues and corresponding evaluation criteria identified for the proposed action.

Significant Issue: Size of Herd and Impacts On Natural Resource Conditions

Over the last several years, drought conditions, the climbing wild horse population, and grazing livestock and wildlife use have combined to cause resource conditions on the JWHT to decline. Livestock grazing has been suspended, but the horse population has continued to increase. This increase has jeopardized wildlife habitat and livestock grazing on the allotments that overlap the Jicarilla Wild Horse Territory. In addition, overgrazing has reduced vegetation ground cover, thus increasing sheet and rill erosion – especially on deeper soils associated with canyon bottoms.

Evaluation criteria used for relating herd to forage availability:

- Annual forage utilization levels and range conditions and trend or ecological condition.

Significant Issue: Size of Horse Herd As It Relates to Genetic Health of the Population

The proposed action would manage for a wild horse population between 50 and 105. Comments submitted on this issue varied, with some stating that the horse population should not be allowed to drop below 70 animals and others commenting that the population should not be allowed to drop below 100. The overall concern is that a population below these numbers may not be enough to maintain the genetic health of the JWH herd to avoid genetic defects (inbreeding). Research in wild horse populations have shown that in a closed herd a total census size of 200 animals and/or an effective population (that portion of the population that is actively taking part in reproduction) of at least 50 horses is needed to maintain sufficient genetic diversity. [229]

Evaluation criteria used for relating herd size to horse health:

- A discussion of effective breeding herd size and genetic conservation strategies relating to wild horse herds, genetic viability and overall genetic health of the herd.

Other Issues: Addressed in Chapter 3 – Affected Environment and Environmental Consequences

A number of people requested that certain environmental impacts of the proposed action be addressed in the environmental assessment. These include the following, which will be analyzed as a part of Chapter 3 -- Affected Environment and Environmental Consequences:

Livestock impacts versus wild horse impacts

Some people are concerned that livestock grazing should not occur in a wild horse territory, or that wild horse use should have priority over livestock use. The scope of the analysis and decision to be made do not involve the determination of whether livestock grazing should take place in the Jicarilla Wild Horse Territory or how many head should be permitted. However, the cumulative impacts of livestock grazing, along with wild horses and other ungulates will be addressed in *Chapter 3 – Environmental Consequences, Vegetation and Livestock Grazing.*

Contraception to control herd size

Some people were concerned that contraception should be a viable alternative to gathering and adoption. The BLM is currently carrying out intensive studies using the immuno-contraceptive agent, *porcine zona pellucida* (PZP) on three small populations of wild horses. There are no wild horse populations in the 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 by the Humane Society of the United States. [221] Further discussion of contraception is addressed in *Chapter 3 – Environmental Consequences, Wild Horses* of this document.

Selection criteria for horses to be removed during gathers

Some people were concerned that no selection criteria are used to determine which horses are removed from the herd during gathers and which remain. Selection criteria are addressed in *Chapter 3 – Environmental Consequences, Wild Horses.*

Other Issues: Addressed in Chapter 2 – Alternatives, Including the Proposed Action

In addition to significant issues for which alternatives are developed, some respondents suggested alternatives of their own. These are discussed in *Chapter 2 – Alternatives* under *Alternatives Considered, but Eliminated From Detail.* Reasons why these alternatives were eliminated are provided in this section of the environmental assessment.

Chapter 2. Alternatives, Including the Proposed Action

Alternatives to the proposed action are developed to explore different ways to accomplish the purpose and need in response to the controversy or argument presented in the significant issues. The purpose and need for the proposed action, along with the significant issues (see Chapter 1) serve as the objectives and framework around which the alternatives are developed. A reasonable alternative is one that responds to an argument presented in a significant issue and substantially accomplishes the purpose and need. Each alternative is designed to address one or more issues that surfaced during the analysis process.

This chapter provides a detailed description of the proposed action and alternative methods for achieving the project's purpose and need. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public.

Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by the National Environmental Policy Act to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the proposed action provided suggestions for alternative methods for achieving the purpose and need. Some of these alternatives may have been outside the scope of the need for reevaluating the Wild Horse Management Plan for the Jicarilla Wild Horse Territory and determining the appropriate management level for the Territory. Therefore, a number of alternatives were considered, but dismissed from detailed consideration for reasons summarized below.

Manage For An Average of 60 Horses

The 1977 Wild Horse Management Plan [29] specified an average of 60 horses as an appropriate management level (AML) for the Jicarilla Territory. While the annual number of wild horses may vary from the average, over time the average of 60 horses was to be maintained. From 1977 to 1998 there were only three years when horses were not gathered on the JWHT. Even with this intensive gather schedule, the average number of horses was well above 60 animals. Wild horse populations fluctuate with annual total population increases usually falling within the 15-22 percent range. [221] Managing for an average of 60 horses, even with an intensive gather schedule would not be successful. Opportunity for success when managing within a range is much higher. This alternative would not meet the purpose and need of the proposed action; therefore it was eliminated from further study.

Remove All Wild Horses From the Territory

An alternative to reduce the population of wild horses to zero by removing all horses was considered, but eliminated. Although some people believe wild horses are not a part of the natural ecosystem, the animals have been present on the Jicarilla Ranger District for over 100 years. In 1971, the United States Congress established the Jicarilla Wild Horse Territory. Congress is the only government body that can abolish it. This alternative would not meet the purpose and need of the proposed action, nor Congressional intent; therefore it was eliminated from further study.

Manage for Over 150 Horses

In order to improve genetic diversity and maintain population viability, some people believe that the horse population size should to be over 150 horses. This issue is dealt with in the Vegetation - Grazing Capacity section and Wild Horses - Genetics section in *Chapter 3*. In addition, the no action alternative (Alternative A) allows for a population well over 150 horses.

Remove All Fences

There is a concern that fencing prevents wild horses from being "free-roaming." Some members of the public wanted an alternative that would remove all fences within the Territory. Fencing is very limited within the JWHT with permittees depending largely on natural boundaries to manage livestock. There are no internal or boundary fences between the Carracas or Cabresto grazing allotments, which leaves 79 percent of the JWHT unfenced. Where fences are present, gates are left open when cattle are not present. The wild horse herd continues to thrive under the current limited fencing situation, with population growth and herd band size well within the norm for wild horse herds. [221] In addition, these fences play an important part in managing livestock on the JWHT. There is no research that supports removal of fences as an important part of wild horse management. The removal of fences was dropped from further study since it does not meet the purpose and need.

No Helicopter Use In Gathering

Helicopter gathering consists of using a helicopter to herd wild horses into a holding pen that is usually set up along a normal travel route for the horses. Several different methods for gathering wild horses have been tried through the years on the Jicarilla Wild Horse Territory. These have included roping on horseback, baiting (using salt or water to lure horses into a trap), darting from helicopters, and using horseback riders to herd horses into holding pens. All of these have been marginally successful. However, helicopter gathering has proven to be very successful and humane. Since 1981 this has been the method that has been used on the JWHT.

Of the 370 horses gathered, 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 and three of these were related to loading horses into trailers at the trap site once horses were captured. This is the primary method that the Wild Horse and Burro Program uses to gather horses throughout the west and is considered their standard practice. [245] 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 and the Kigers in eastern Oregon, continue to utilize helicopters for gathering horses. [255, 257, 258]

Excluding helicopter use as a form of gathering was dropped from further study since it did not meet the purpose and need. Determining the method(s) used to gather horses will be made on a case-by-case basis. Different methods for gathering are discussed in more detail in the Wild Horse - Gathering section in *Chapter 3*.

Relocate Instead of Adopt

Relocation of horses from the Jicarilla Wild Horse Territory to other wild horse territories or herd management areas is an option provided that: "... sufficient suitable habitat is present and relocation of animals will not jeopardize vegetation conditions, and animals are requested by the appropriate land manager having jurisdiction." [40, 37] The 1971 Wild Horses and Burros Act does not authorize wild horses to be relocated to areas where they do not presently exist. [25]

Currently there are no known stocked wild horse territories or herd management areas that have sufficient forage available and are requesting additional horses. No further study is suggested since this does not meet the purpose and need.

Use Contraception To Control Herd Size

Several people suggested that the use of contraception on the wild horses would reduce reproduction, thus control herd size. No free ranging western horse herds have yet been managed at their

respective AML level with contraceptives alone. [221] Once the appropriate management level is determined, the size of the herd may need to be adjusted to that number through gathering and adoption – if the appropriate level is less than the existing herd size. Once the appropriate management level of the herd has been reached, contraception could be one method used for maintaining that herd size. A more detailed discussion on contraception is found in Wild Horses – Contraception section in *Chapter 3*.

Items Common to All Action Alternatives

This section describes several general design items common to all action alternatives.

Gather Timing and Methods

To avoid complications with pregnant mares during foaling and with their young foals, no gathers on the Jicarilla Wild Horse Territory would be conducted between the first of April and the end of June.

Walking gathers and baiting are methods that will be considered in future gathers. Helicopter gathering will 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 will 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. Selection of the method to be used will be based on season, history of the band or bands to be gathered, location of the bands to be gathered and the number that need to be removed. Any helicopter assisted capture and handling activities will be conducted in accordance with Bureau of Land Management's Standard Operating Procedures for Removal and Safety for Wild Horse Herds. [245]. Wild Horses – Gathering section in *Chapter 3* discusses gather history and methods in more detail.

Wild Horse Adoption Program

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 northern New Mexico. Once a horse is adopted, it retains its wild horse status and 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 loses its wild horse status and 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 when an individual has not taken care of an adopted horse and the horse has been removed to another home and the person's name is taken off the list of potential adopters.

Some comments were received 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 Protection Act of 1971, as amended and 36CFR 222.29. 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.

Herd Maintenance

After the appropriate management level has been reached using gathering and adoption, it would be maintained through gathers and other methods such as contraception. *Chapter 3- Environmental Consequences, Wild Horses* discusses how maintenance of herd size, selection for removal and maintenance of genetic diversity could be accomplished.

Alternatives Considered In Detail

The following section is organized so that a comparison of all alternatives can be readily made. Table 1 provides a quantitative comparison of alternatives. Table 1 is both a quantitative and narrative comparison of how well each alternative meets the purpose and need for action, as well as a summary comparison of effects for Alternatives A through D.

Table 1. Comparison of Alternatives

	Alternative A	Alternative B	Alternative C Proposed Action	Alternative D
Number of Wild Horses	Up to 300	15 to 118	50 to 105	100 to 150
Priority Forage Allocation	Horses	1) Wildlife 2) Livestock	1) Wildlife 2) Horses/Livestock	1) Horses 2) Wildlife 3) Livestock
Gathers and Adoption	No	Yes	Yes	Yes

Alternative A – No Action

Alternative A is the no action alternative. The no action alternative usually provides a point of Reference, enabling decision makers to compare the magnitude of environmental effects between the action alternatives. An alternative was considered to remove all wild horses from the Jicarilla Wild Horse Territory, however it was eliminated from further consideration (see previous section - *Alternatives Considered but Eliminated from Detailed Study*).

For this analysis, "no action" means that there would be no action taken (through gathering and adoption) to reduce the size of the Jicarilla wild horse herd. Alternative A would take a "hands off" approach to wild horse management, allowing the wild horse population to grow unhindered. Forage would be allocated first to wild horses and then to wildlife. Based on current utilization levels and drought conditions within the JWHT, it is unlikely that Alternative A would provide enough forage for continued livestock grazing on the allotments that overlap the Jicarilla Wild Horse Territory.

Alternative B

Alternative B addresses the significant issue related to the wild horse herd size and resource conditions – *resource conditions under the proposed herd size would continue to decline within the Jicarilla Wild Horse Territory*. This alternative would allocate available forage first to wildlife and then to permitted livestock. The remainder of available forage would be allocated to wild horses. Based on overall range conditions, forage availability and use from competing wildlife and livestock resources; the appropriate management level of wild horses for this alternative would vary from 118 to 15. Gathers would be completed within the territory to maintain the population at the appropriate management level. Alternative B would include *Items Common to All Action Alternatives*, described in the previous section of this chapter.

An example of this alternative during average forage production years: 33 percent of available forage would be used for wildlife and 34 percent would be available for permitted livestock, based on planned grazing use of 140 head (the historical average) over the three allotments in the JWHT. The remaining 33 percent of available forage would be allocated for wild horses and the AML would be 118 horses.

Another example during an extended drought: 66 percent of forage available for wildlife, 20 percent available for 40 head of livestock and the remaining 14 percent available for wild horses (26 horses).

Alternative C – Proposed Action

This alternative is the proposed action. Alternative C would allocate available forage first to wildlife and then balance the remaining forage between wild horses and permitted livestock. Based on overall range conditions, forage availability and balancing competing horse and livestock resources, the appropriate management level of wild horses for this alternative would be a range between 50 and 105 horses. The population would not be allowed to fall below 50 horses or exceed 105 horses. Gathers would be completed within the territory to maintain the population at the appropriate management level. Alternative C would include *Items Common to All Action Alternatives*, described in the previous section of this chapter.

An example during average forage production years: 33 percent of available forage would be used for wildlife and 29 percent of available forage would be allocated for wild horses, which would be equivalent to 105 head (the maximum number). The remaining 34 percent would be available for permitted livestock based on planned grazing use of 140 head for approximately 5.5 months (the historical average) over the three allotments in the JWHT.

Another example during extended drought: 66 percent available for wildlife, 27 percent for 50 head of wild horses (the minimum number) and the remaining 9 percent would be available for permitted livestock (18 cows). The wild horse population would not be managed for fewer than 50 horses.

Alternative D

Alternative D addresses the significant issue related to the wild horse herd size and the genetic health of the horses. This alternative would allocate available forage first to wildlife and then to wild horses. The remainder of available forage would be allocated to permitted livestock. Based on overall range conditions and forage availability; the appropriate management level of wild horses for this alternative would be a range between a 100 and 150 horses. The population would not be allowed to fall below 100 horses or exceed 150 horses. Gathers would be completed within the territory to maintain the population at the appropriate management level. Alternative D would include *Items Common to All Action Alternatives*, described in the previous section of this chapter.

An example during average forage production years: 33 percent of available forage would be used for wildlife, 41 percent would be available for wild horses, which would be equivalent to 150 head. The remaining 26 percent of available forage would be allocated for permitted livestock or 105 head over the three allotments in the JWHT.

An example during extended drought: 54 percent of forage would be available for wild horses (maintaining a minimum number of 100 head) and 46 percent for wildlife. This would be a 28 percent reduction in wildlife use within the JWHT. This alternative would have to be accomplished in coordination with New Mexico Department of Game and Fish. The other option would

be to allow utilization levels to exceed the 30 percent use level. No forage would be allocated to livestock.

Monitoring

Monitoring provides a quality control and adaptive management strategy. By monitoring the effects of wildlife, horses and livestock within the Jicarilla wild horse territory and evaluating the results, we are able to make appropriate modifications to the size of the herd, assess resource trends and apply new knowledge to similar situations in the future. Monitoring and evaluating informs the decision maker, specialists and interested public of progress toward the goals and objectives during the implementation of projects.

Range and Ecological Monitoring

Determining the number of horses on the JWHT requires an adaptive approach to management. The number of wild horses maintained on the Jicarilla Wild Horse Territory would depend on existing rangeland health, the predicted severity of droughts and forage utilization guidelines. Monitoring of range conditions, predicted weather patterns and annual forage utilization and productions levels are incorporated as a part of this proposed action. The upper and lower limits of the AML insure sustainable rangelands and must be verified by vegetation/forage monitoring under actual field conditions.

Range/ecological conditions would be monitored every 3-5 years using established and accepted methods for assessing vegetation conditions. Such methods as Parker 3-step, line intercept and Daubenmire plots are examples of acceptable methods.

Range and soil stability conditions would be monitored annually to assess the current trends in vegetation and soil conditions. Methods such as that described in FS Region 3 Range Analysis Handbook or the Rapid Assessment Methodology (RAM) analysis procedure or other well-established methods would be used. [39, 276]

Forage production and utilization would be monitored annually in each pasture to assure that utilization standards are being met Methods such as that described in FS Region 3 Range Analysis Handbook and or the RAM analysis procedure or other well established methods would be used. [39,276] Paired caged plots combined with ocular estimates would be used for establishing production in key grazing areas. [39]

Population Monitoring

Monitoring would also be conducted so that the wild horse population would not fall below the alternative's minimum number of horses or exceed its maximum. The primary population monitoring would be annual aerial surveys. Ground surveys and counts in connection with range inspections or other field duties will supplement aerial survey information. The gathering of horses to meet the appropriate management level would be necessary. Gathers would be initiated to maintain the population within the range, with strong emphasis on horse health and safety as well as public safety. The following criteria would trigger the need for an adjustment in horse numbers and a subsequent gather followed by an adoption:

- Drought conditions. The Standardized Precipitation Index (SPI) or its successor will be used to define drought conditions. SPI values are available monthly from the Western Regional Climate Center at www.wrcc.dri.edu. Conditions will be determined by the size of the negative number. The larger the negative number, the more severe the drought. SPI values of –0.70 or less for the past month signal drought conditions. SPI values of positive 1.0 or

more for the past 12 months signal the end of drought.

- Utilization in key grazing areas exceeding 30 percent utilization standards for two consecutive years.
- Key grazing areas are sampled for range/ecological conditions and show that range and soil stability conditions are trending downward.
- Forage production based on forage production samples in key areas do not show sufficient forage to support the present population.
- The number of horses exceeds 105 (determined generally by aerial survey).

Summary Comparison of Effects By Alternative

Table 2. Comparison of Effects[1]

	Alternative A	Alternative B	Alternative C	Alternative D
Soils	Declining soil stability.	Improving soil stability.	Improving soil stability.	Maintaining current soil stability conditions.
Vegetation	Declining range conditions.	Improving range conditions.	Improving range conditions.	Maintaining current range conditions.
Wild Horses	Wild horse numbers 300+, potential die off of wild horses from starvation.	Wild horse numbers 118-15, possible loss of horse population at low end of range.	Wild horse numbers 105-50, genetic conservation strategies would be implemented.	Wild horse numbers 100-150, genetic conservation strategies would be implemented.
Wildlife	Increasing conflicts with wildlife.	Decreasing conflicts with wildlife.	Decreasing conflicts with wildlife.	Conflicts with wildlife during drought.
Threatened, Endangered, and Sensitive Species	Degrading habitat for MSO, goshawk, and migratory birds.	Improving habitat for MSO, goshawk, and migratory birds.	Improving habitat for MSO, goshawk, and migratory birds.	Improving habitat for MSO, goshawk, and migratory birds - during some years.
Gas Development	Revegetation efforts unsuccessful due to heavy grazing use.	Revegetation efforts improve.	Revegetation efforts improve.	Revegetation efforts improve during favorable moisture years.
Recreation	Increasing conflicts with recreational hunters.	Decreasing conflicts with recreational hunters.	Decreasing conflicts with recreational hunters.	Continued conflicts with recreational hunters.
Social	Increased opportunity for wild horse viewing.	Limited opportunity for wild horse viewing during extended drought.	Continued opportunity for viewing.	Increased opportunity for viewing.
Livestock Grazing	Permits for livestock grazing would be issued, but it is unlikely that forage would be available for livestock grazing.	Permitted livestock would receive preference over horses for allocating available forage.	Available forage would be allocated between wild horses and permitted livestock.	Permits for livestock grazing would be issued, opportunities for grazing livestock could be limited depending on available forage.
Heritage Resources	Increase potential to impact cultural resources.	Decrease potential to impact cultural resources.	Decrease potential to impact cultural resources.	Decrease potential to impact cultural resources.

[1] This is only a summary of the effects that are described in detail in *Chapter 3* of this Environmental Assessment.

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:

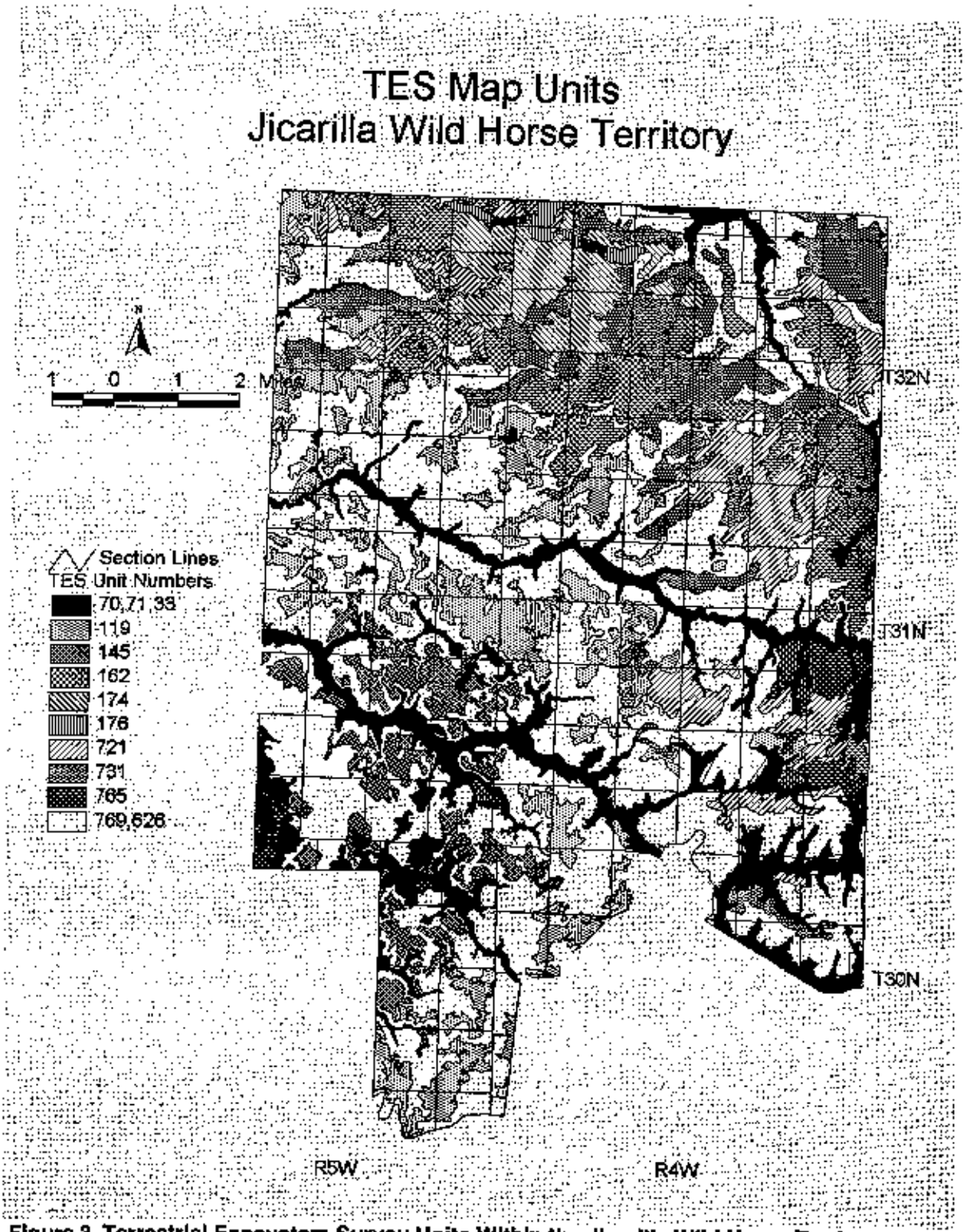


Figure 3. Terrestrial Ecosystem Survey Units Within the Jicarilla Wild Horse Territory

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.

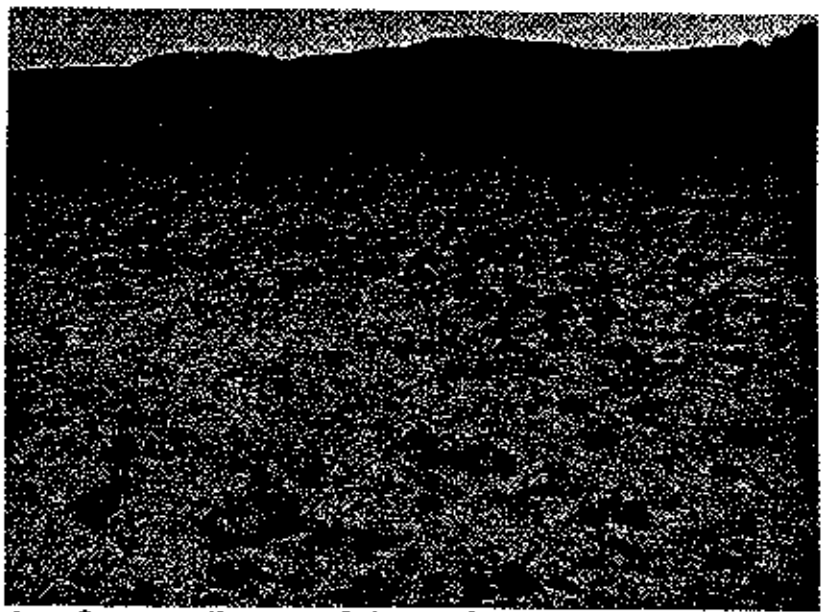


Figure 4. American Canyon adjacent to Cabresto Canyon on the Cabresto allotment taken in the fall of 2003. TES map unit 70/71, key grazing area ½ mile from water. Drought combined with heavy grazing use has left this previously reseeded flat with little protection from erosion. Herbaceous cover is primarily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

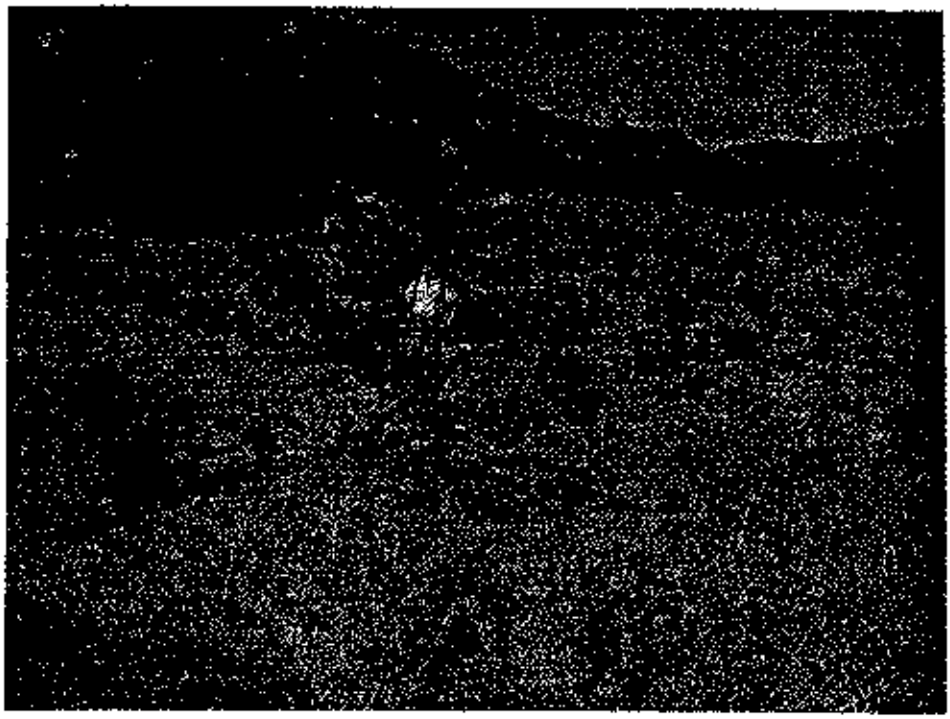


Figure 5. The Cabresto Allotment in Bancos Canyon taken in fall of 2003. Severe rill and gully erosion at the toe of the slope between TES map units 70/71 and 769. Erosion of this nature is common in Bancos Canyon.

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.

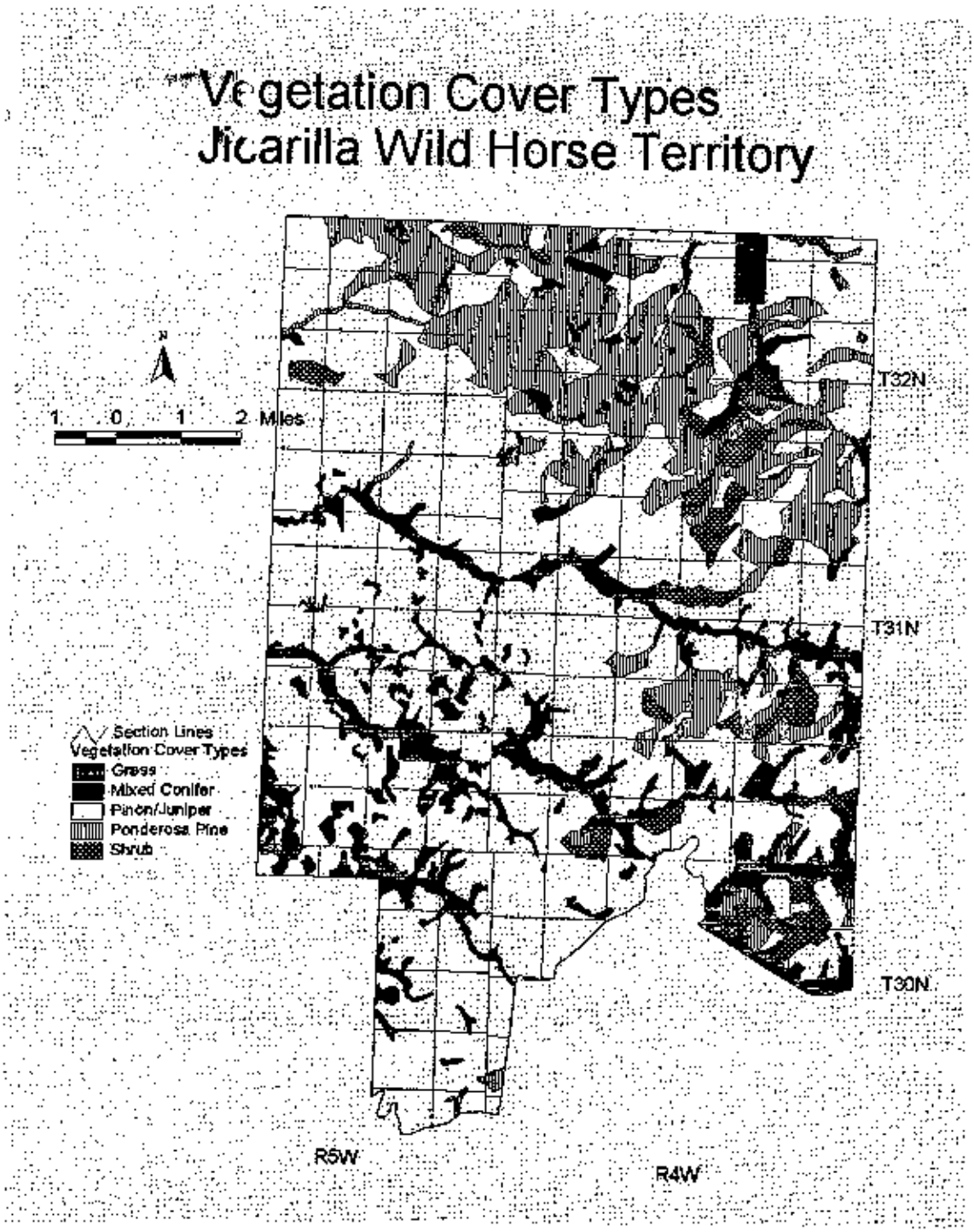


Figure 6. Vegetation Within Jicarilla the Wild Horse Territory

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 pifion-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.

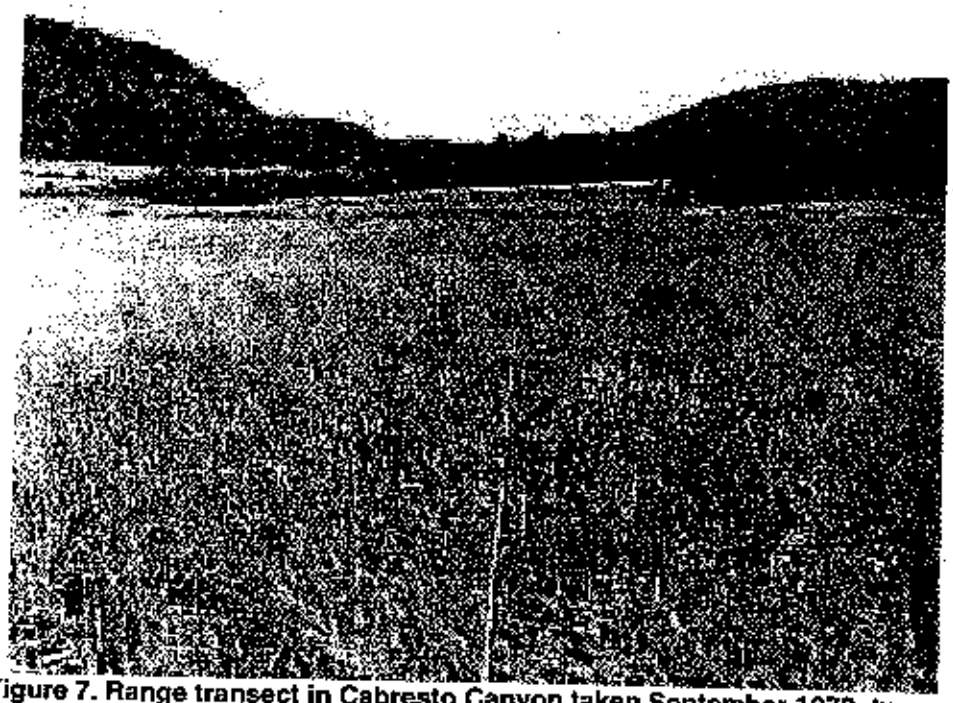


Figure 7. Range transect in Cabresto Canyon taken September 1973, two years after chaining and reseeding primarily with crested wheat.

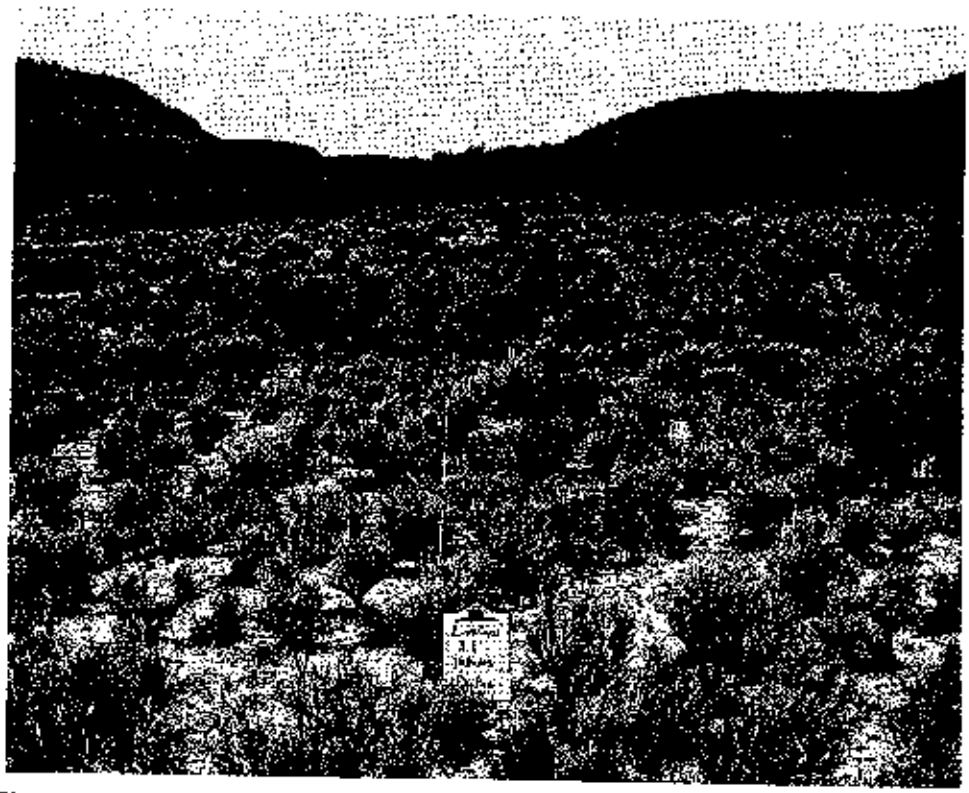


Figure 8. Range transect taken in same location as previous photo in fall 2003. The site is invaded with sagebrush and the seeded species are only a remnant.

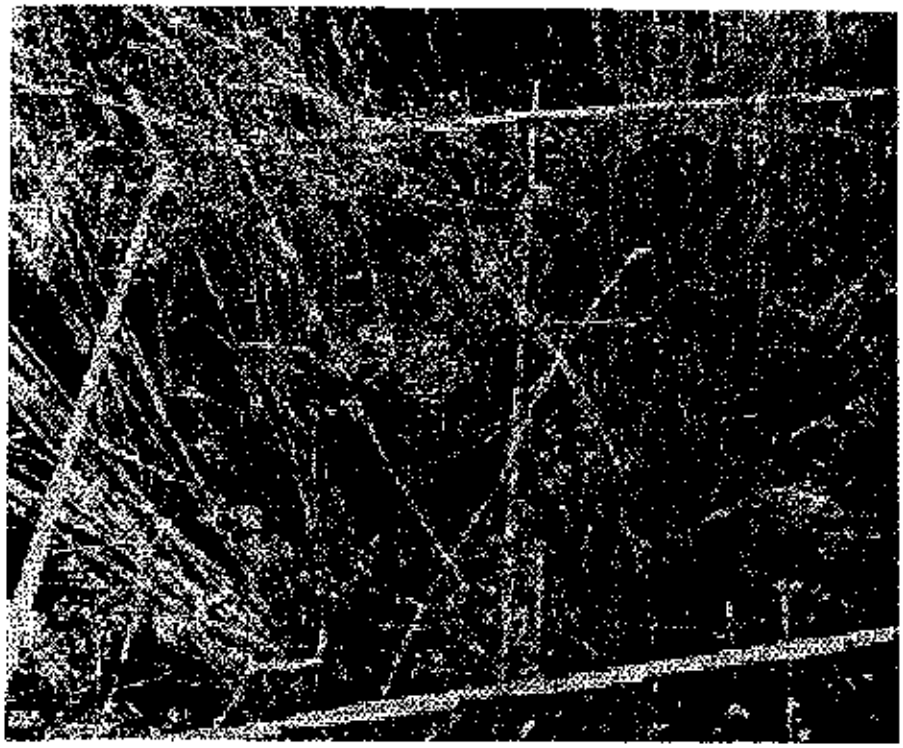


Figure 9. Plot photo in Cabresto Canyon on the Bancos Allotment taken in fall 1973.

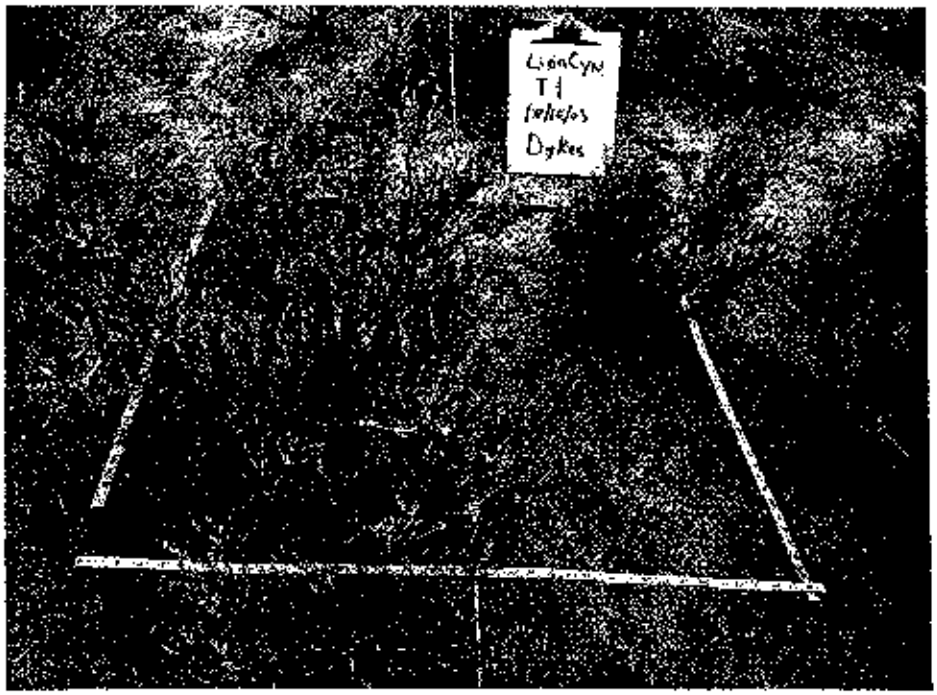


Figure 10. Same plot photo as previous figure taken in fall 2003.

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.

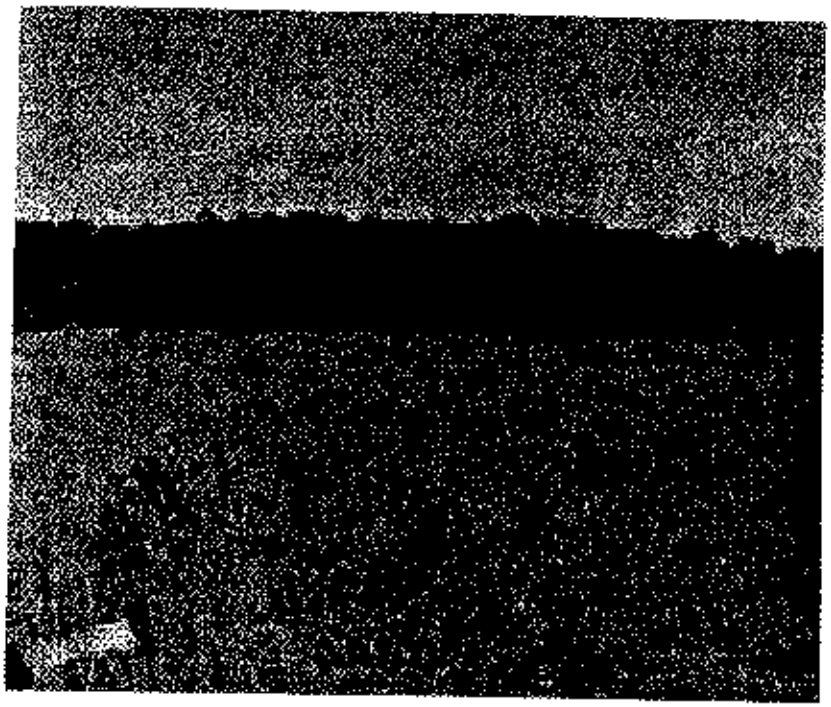


Figure 13. Range Transect Photo from fall 1973. Reseeding in the Lynch Ranch area on the Bancos Allotment.

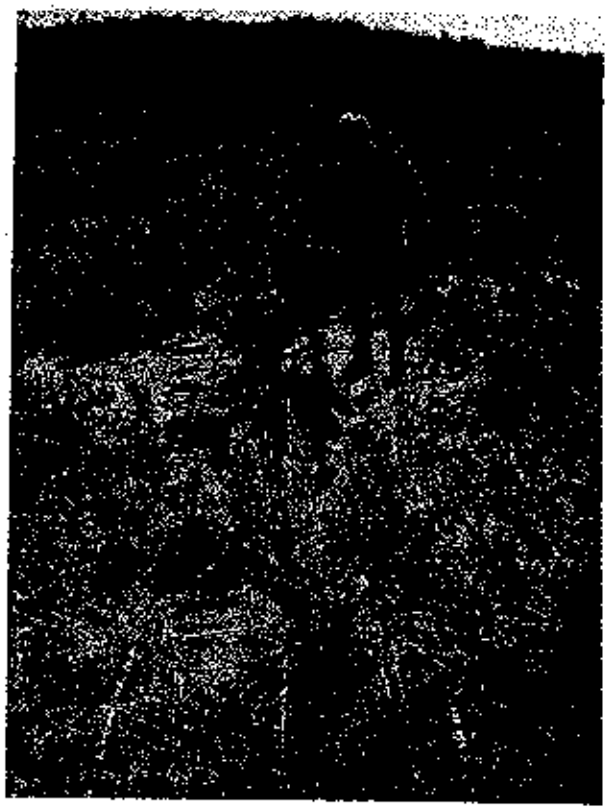


Figure 14. Photo taken in same location as previous figure in fall 2003. The site is invaded with sagebrush and the seeded species are only a remnant.

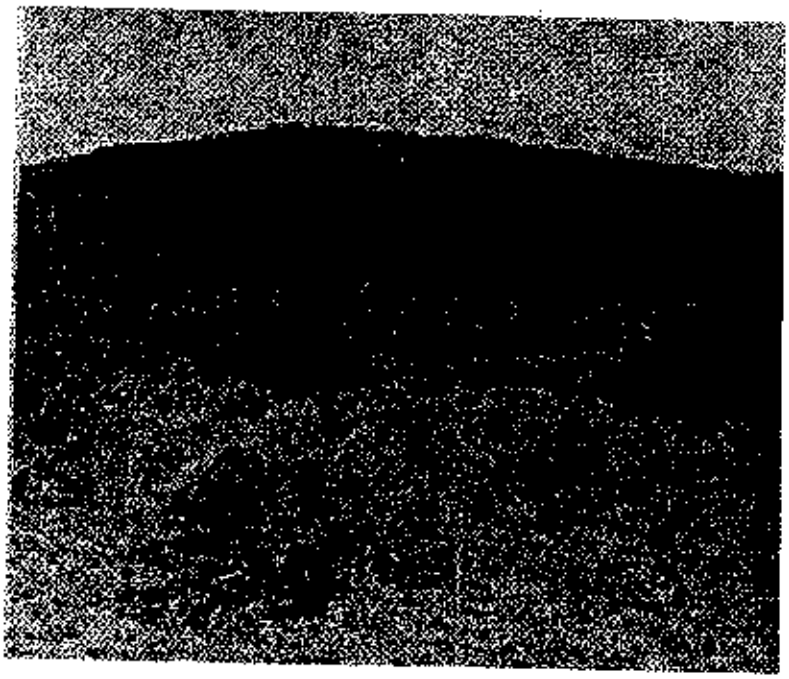


Figure 15. Range transect photo in fall 1973 in Bancos Canyon on the Cabresto Allotment.

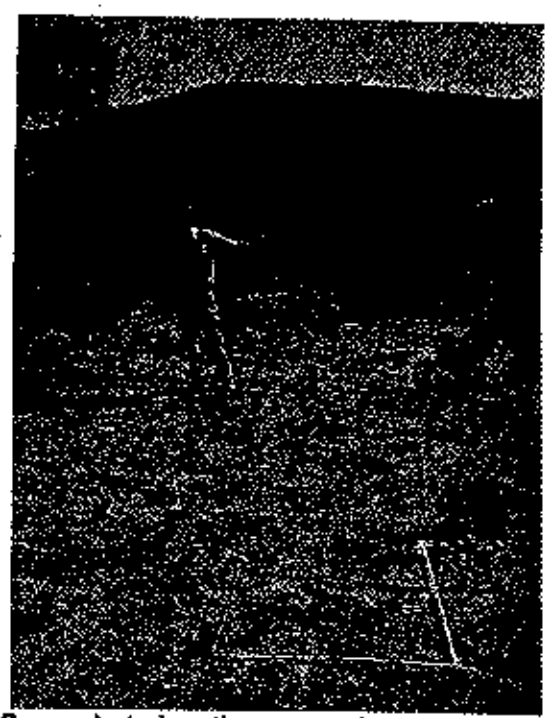


Figure 16. Same photo location as previous figure. Transect data indicates a decline in range condition from fair with and upward tend in 1973 to poor condition with a downward trend in 2003. Notice the difference in grazing use. This is an area currently being grazed hard by horses. Even the sagebrush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

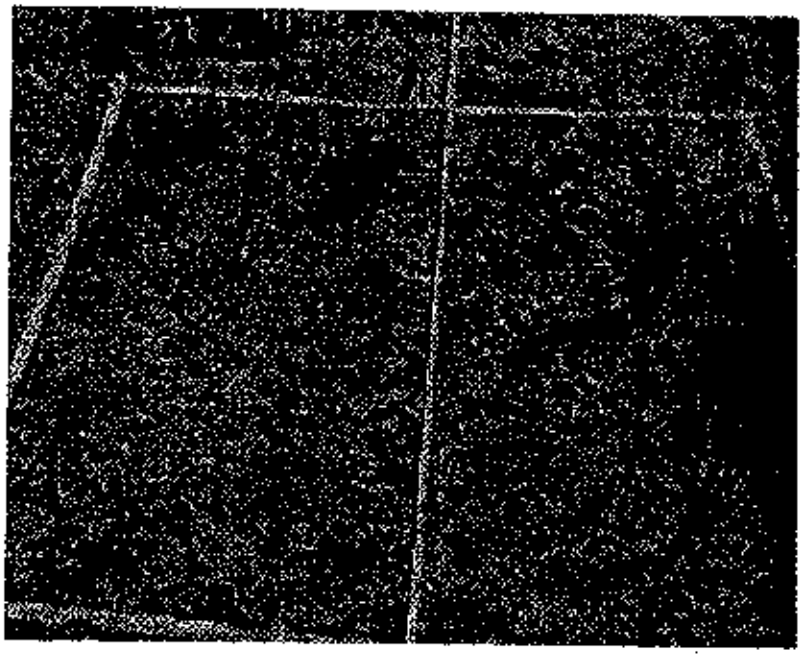


Figure 17. Range transect plot photo taken fall 1973 in Bancos Canyon on the Cabresto Allotment. Notice the western wheatgrass seedlings in the plot.

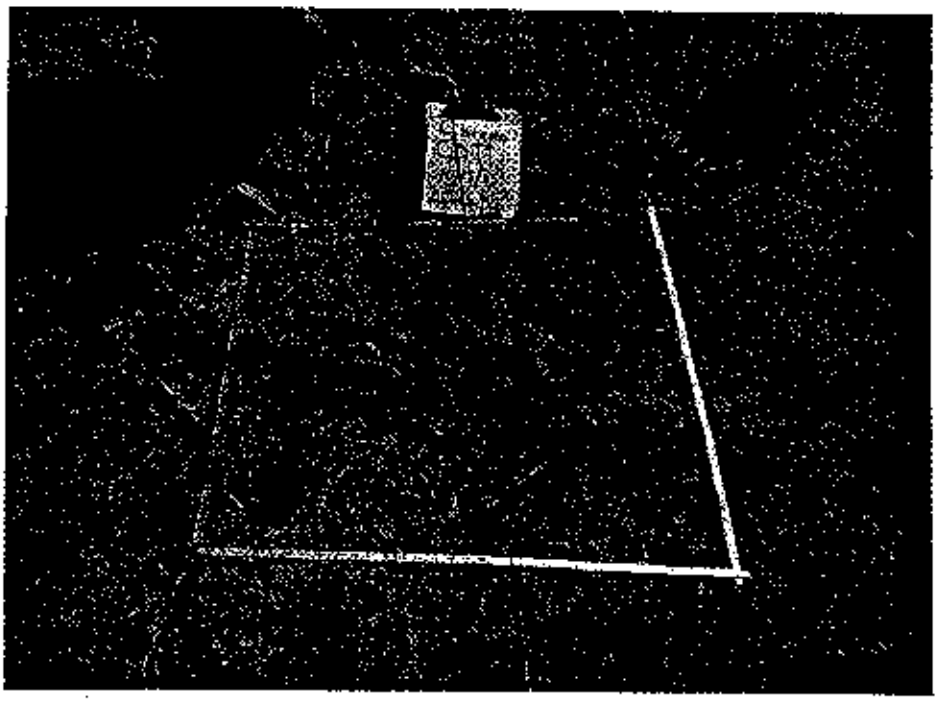


Figure 18 Same photo location as previous figure. The comparison of the two plots look similar, however the absence of the western wheatgrass in this photo is an important indicator of a downward trend.

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 [illegible]			
	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]

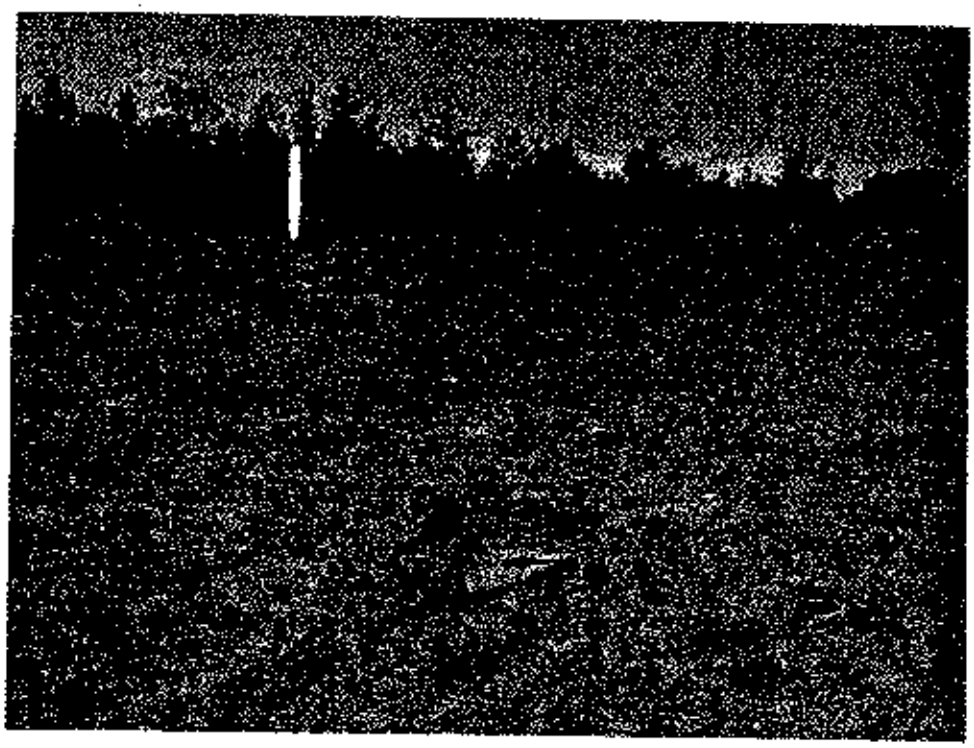


Figure 19. Typical opening on Carracas Mesa, which receives heavy grazing use from horses. The site is dominated by annuals. In the background is a large stand of sunflowers.

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.

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 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

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.

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]

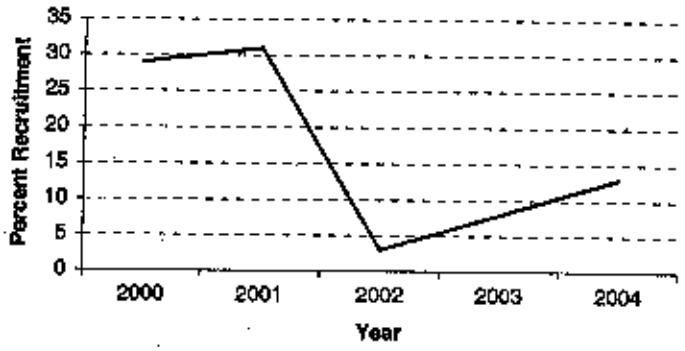
Sex Ratio

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	58
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] (but are not cost effective

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 pifion 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 arthropod 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, pifion-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.

Appendix A. Project Record Index

No.	Date	From	To	Subject	Type[1]	Category[2]
1	1948.6.30	Congress	Laws	Clean Water Act (as amended)	Document	Reference
2	1955.7.14	Congress	Laws	Clean Water Act (as amended)	Document	Reference
3	1960.6.12	Congress	Laws	Multiple Use Sustained-Yield Act	Document	Reference
4	1966.10.15	Congress	Laws	National Historic Preservation Act	Document	Reference
5	1970.1.1	Congress	Laws	National Environmental Policy Act of 1969	Document	Reference
6	1973.12.28	Congress	Laws	Endangered Species Act of 1973 (as amended)	Document	Reference
7	1974.8.17	Congress	Laws	Forest & Rangeland Renewable Resources Planning Act of 1974 (as amended)	Document	Reference
8	1976.10.21	Congress	Laws	Federal Land Policy and Management Act of 1976	Document	Reference
9	1976.10.22	Congress	Laws	National Forest Management Act of 1976	Document	Reference
10	1977.5.27	President	Federal Government	E011988 Floodplain Management	Document	Reference
11	1977.5.27	President	Federal Government	E011990 Protect Wetlands	Document	Reference
12	1982.10.30	USDA FS	USDA FS	36 CFR part 219	Document	Reference
13	1985.10.31	USDA FS	USDA FS	Carson National Forest Plan	Document	Reference
14	1986.9	SO	SO	EIS for Carson NF Plan	Document	Reference
15	1986.10.31	SO	SO	ROD for EIS for Carson NF Plan	Document	Reference
16	1987.8	USDA FS	USDA FS	Terrestrial Ecosystem System Book	Document	Reference
17	1992.8	Rocky Mtn Exp. Sta.	Public	Management Recommendations for Northern Goshawk - SW US	Document	Reference
18	1992.9.21	USDA Forest Ser	USDA FS	Extraordinary Circumstances & CE Categories - FSH 1909.15	Document	Reference
19	1993.11.4	USDA Forest Ser	USDA FS	36 CFR part 214 - portions - not all in	Document	Reference
20	1995.6.30	BLM	Jicarilla RD	Interagency Agreement between BLM & FS	Document	Reference
21	1995.10	RO	Region	EIS for Amendment to Forest Plans	Document	Reference
22	1995.12.00	USDI Fish and Wildlife Service	Public	Recovery Plan for the MSO	Document	Reference
23	1996.6.5	RO	Region	ROD for EIS for Amendment to Forest Plans	Document	Reference
24	1959.9.8	Congress	Laws	Wild Horse Protection Act	Document	Reference
25	1971.12.15	Congress	Laws	Wild Free-Roaming Horses and Burros Act	Document	Reference
26	1975	Stoddart, Laur.	Textbook	Range Management	Document	Reference
27	1950-present		District Files	2210 Range Analysis Files – Portions of: Bancos, Carracas, Cabresto	document	Reference
28	1976.12.28	Jicarilla RD	Project Record	EA Report – Mgmt of Wild Free-Roaming Horses	Document	Reference
29	1977.3.16	Jicarilla RD	Jicarilla RD	Wild Horse Management Plan	Document	Reference
30	1978.10.26	Jicarilla RD	Jicarilla RD	Excess Horse Removal Plan	Document	Reference
31	1979	Cullison, Arthur	Textbook	Feeds and Feeding - cattle forage/day	Document	Reference
32	1980.3	USDA FS	USDA FS	Private Maintenance Agreement - blank form FS-2200-4	Document	Reference
33	1988.2.0	Jerry L. Holechek	Public	An Approach for Setting the Stocking Rate	Document	Reference
34	1996		District Files	2230 Term Permit Files – Portions of: Bancos, Carracas, Cabresto	Document	Reference
35	1994.2	K.M. Havstad - USDA Ag Res Sta - Las Cruces	El Rito Ranger District	Animal Unit Equivalents	Document	Reference
36	1995	Holechcek,	Textbook	Range Management - Principles and Practices	Document	Reference

[1] Map, Table, Document, Letter, Telephone Documentation, or E-mail

[2] Map, Public Involvement, IDT/Analysis, Reference, Data

No.	Date	From	To	Subject	Type[1]	Category[2]
		Jerry				
37	1996.5.3	FS Manual		FSM 2200, Chap. 2260	Document	Reference
38		FS Handbook		FSH 2509.18, Soil Management Handbook	Document	Reference
39		FS Handbook		FSH 2209.21, Range Analysis & Management Handbook	Document	Reference
40	1998	Code of Federal Regulations		36 CFR 222.20 to 222.36 & Mgmt. of Wild Free-Roaming Horses & Burros	Document	Reference
41	1998.12.28	WY Co-op. Fish & Wildlife Research Unit	Project Record	Potential for Competitive Interactions Between Mule Deer and Elk	Document	Reference
42	1998.8		District Files	Bancos Range Inspection	Document	Reference
43	2000	Jicarilla RD	Jicarilla RD	WH Adoption Records	Document	Reference
44	2000	Jicarilla RD	Jicarilla RD	WH Adoption Records	Document	Reference
45	2000.6.28	Jicarilla RD	Public	6/00 Scoping Letter – Wild & Free-Roaming Horse Mgmt on the JRD	Document	Reference
46	2000.6.28	Jicarilla RD	Project Record	Mailing List for Scoping Letter	Document	Reference
47	2000.9.0	Journal of Range Management	Public	Effects of roundups on behavior and reproduction of feral horses	Document	Reference
48	2000.9.26	Jicarilla RD	Jicarilla RD	Map of range allotments	Map	Map
49	2000.9.26	Jicarilla RD	Jicarilla RD	Map of wild horse JWHT	Map	Map
50	2000.11.1	Canjilon RD	Canjilon RD	GIS Maps and acres	Map	Map
51	2000.11.21	Jicarilla RD	Canjilon RD	GIS Maps and acres	Map	Map
52	2000.11.29	Jicarilla RD	Public	11/00 Notice of the 30-day pre-decisional comment period	Document	Reference
53	2000.11.29	Jicarilla RD	Project Record	11/00 Mailing List for pre-decisional copies of EA	Document	Reference
54	2001.1	Jicarilla RD	Jicarilla RD	Map of allotments with cattle numbers	Map	Map
55	2001.1.17	Executive Order	Federal Register	Responsibilities of Federal Agencies To Protect Migratory Birds	Document	Reference
56	2001.1.24	Jicarilla RD	Jicarilla RD	Wild horse survey notes	Document	Reference
57	2001.3.5	Dean M. Anderson	El Rito RD	Daily consumption by ungulates Dr. M. Anderson	Document	Reference
58	2001.3.6	Ed Frederickson	El Rito RD	Daily consumption by cattle/sheep-Grazing Management	Document	Reference
59	2001.4.9-13		Project Record	Carson NF WH & Burro Functional Assistance Trip plus Addendum	Document	Reference
60	2001.3.28	SO	Tribes & Pueblos	03/01 Sec. 106 Consultation & Mailing List	Document	Reference
61	2001.4.10	Jicarilla RD	Jicarilla RD	FAT (Functional Assistance Trip)	E-mail	Public Inv
62	2001.4.13	SO	Jicarilla RD	Wild & Scenic River table	Document	Reference
63	2001.4.18	Jicarilla RD	Jicarilla RD	TES Units Acreage Table	Document	IDT/Anal
64	2001.4.19	Jicarilla RD	Jicarilla RD	Assumptions – 2nd rough draft	Document	IDT/Anal
65	2001.4.20	El Rito RD	Ralph Giffen	Questions from FAT	E-mail	IDT/Anal
66	2001.4.20	Jicarilla RD	Jicarilla RD	Former Appendix F - TES summary	Document	Reference
67	2001.6.14	Gene Onken	Jicarilla RD	Wild horse territories on Carson NF	E-mail	Reference
68	2001.7.27	USDA FS	Carson NF	Carson National Forest Migratory Birds Assessment	Document	Reference
69	2001.8.28	Jicarilla RD	Jicarilla RD	Details about wild horses	Document	Reference
70	2001.8.28	Jicarilla RD	Jicarilla RD	Details about Land and History	Document	IDT/Anal
71	Reference	Jicarilla RD	Project File	Vegetation / Forage information	Document	Reference
72	Reference	Jicarilla RD	Project File	Grazing recommendations outlined in Mexican Spotted Owl Recovery Plan	Document	Reference
73	Reference	Jicarilla RD	Project File	Winter Survey – Deer & Elk 1995-2003	Document	Reference
74	Reference	Jicarilla RD	Project File	Annual WH counts	Document	Reference
75	Reference	Jicarilla RD	Project File	1912-1924 Range use	Document	Reference
76	2001.1.24	Jicarilla RD	Project File	Grazing / Distribution Maps	Document	Map
77						

Like no real response Jicarilla

No.	Date	From	To	Subject	Type[1]	Category[2]
78	2001.10.4	Carson Forest Supervisor	Project File	EA for WH Management-El Rito Ranger District	Document	Reference
79	2001.10.4	Jicarilla District Ranger	Project File	10/01 Predecision Mailing List	Document	Public Inv.
80	2001.10.4	Leo Johnson	ID Team	Status of WH EA	Document	IDT/Anal
81	2001.12.2	Jicarilla District Ranger	Project File	Draft- Legal Notice	Document	Reference
82	2002.1.30	Jicarilla RD	Project File	Draft Purpose & Need 01/02	Document	Reference
83	2002.4.22	JRD-Range Con	Project File	Range Consultation / Updates	Document	Reference
84	2002.7.5	Philip J. Ross	Jicarilla RD	Landowner complaint about Wild Horses	Letter	Reference
85	2002.12.10	Jicarilla District Ranger	Public	Requested Additional Information	Document	Public Inv.
86	2003.1.17	Carson NF	Project File	TES Map Units- WH Territory	Document	Map
87	2003.1.17	Carson NF	Project File	Permanent & Intermittent Waters in WH Territory	Document	Map
88	2003.1.17	Jicarilla RD	Project File	11/00 Comments on Draft EA	Document	Reference
89	2003.1.17		Jicarilla RD	Comments on Case No. CV 00-612-TUC-RCC in Reference to the Endangered Species Act & Livestock grazing	Document	Reference
90	2003.1.29	Tom Watts	Stan Dykes	Email re: Jicarillas interest in our EA	Document	Reference
91	2003.1.31	Jayson Parks	John Merino	Email on gathering horses	Document	Reference
92	2003.2.00	Jicarilla District Ranger	Project File	Draft- Purpose and Need for Proposed Action	Document	Reference
93	2003.2.28	Jicarilla District Ranger	Carson Forest Supervisor	Purpose & Need for Proposed Action	Document	Reference
94	2003.3	Carson NF	Project Record	Review of Forest Plan Standards & Guidelines For Each Management Area	Document	Reference
95	2003.3.00	JRD District Wildlife Biologist	Jicarilla District Ranger	Wildlife Report- Jicarilla WH Territory	Document	Reference
96	2003.3.3	ID Team	ID Team	ID Team Meeting Minutes	Document	IDT/ Anal.
97	2003.3.3	ID Team	Project File	ID Team Meeting Notes	Document	IDT/Anal.
98	2003.3.14	ID Team	ID Team	Wild Horse EA Briefing	Document	IDT/ Anal.
99	2003.3.17	Supervisor's Office	Jicarilla RD	Meeting for the Jicarilla WH Territory Mgmt	Document	Reference
100	2003.4.15	Jicarilla District Ranger	Jicarilla RD- Nat. Resources Coord.	Update on EA Status / Mailing List	Document	Public Inv.
101	2003.4.11	NM Game & Fish	Jicarilla District Ranger	Affected State Land	Document	Reference
102		Jicarilla District Ranger	Forest Supervisor	Draft proposed action Jicarilla Wild Horse Territory	Document	Reference
103	2003.4.15	Jicarilla District Ranger	Navajo Nation Historic Preservation Program	Tribal scoping - Update on EA Status / Mailing List	Document	Public Inv.
104	2003.4.15	Jicarilla RD	Jicarilla RD	Mailing List for WH EA status	Document	Public Inv.
105	2003.4.22	Daily Times	Jicarilla District Ranger	Legal Notice	Document	Reference
106	2003.4.22	Jicarilla Apache Nation	JRD District Ranger	Jicarilla Apache Response to EA Status Letter	Document	Reference
107	2003.4.22	Carol Stone	Jicarilla RD	Management Suggestion	Document	Public Inv.
108	2003.4.22	Jicarilla District Ranger	Jicarilla RD	Return to Sender – Update on EA Status	Document	Public Inv.
109	2003.4.24	Joan Heaps	Jicarilla District Ranger	Can I Respond Via Email	Document	Public Inv.
110	2003.4.24	Mike Hamilton	Jicarilla District Ranger	Comment	Document	Public Inv.
111	2003.4.23	Mike Hamilton	Jicarilla District	Request to be Added to Mailing List	Document	Public Inv.

No.	Date	From	To	Subject	Type[1]	Category[2]
			Ranger			
112	2003.4.25	Jicarilla RD	Project File	Return to Sender – Status of EA	Document	Public Inv.
113	2003.4.28	Jicarilla District Ranger	Jicarilla RD	Return to Sender- Update on EA Status	Document	Public Inv.
114	2003.4.28	Jicarilla District Ranger	Jicarilla RD	Return to Sender- Update on EA Status	Document	Public Inv.
115	2003.4.28	Jicarilla District Ranger	Jicarilla RD	Return to Sender- Update on EA Status	Document	Public Inv.
116	2003.4.29	Jicarilla RD– NR Coordinator	Project File	Request for Information	Document	Public Inv.
116a	2003.5	Carson NF	Project File	Forest-wide Management Indicator Species Assessment, Carson NF	Document	Data
117	2003.5.1	Patience O'Dowd	JRD- District Ranger	Request for Information / Added to Mailing List	Document	Public Inv.
118	2003.5.1	Patricia Hatle	JRD- District Ranger	Request to be Added to Mailing List	Document	Public Inv.
119	2003.5.1	Southern Ute Tribe	JRD- District Ranger	Impacts to Cultural Resources	Document	Reference
120	2003.5.1	Jicarilla District Ranger	JRD Range Con	Possible responses to M. Hamilton's letter	Document	Reference
121	2003.5.12	Jicarilla District Ranger	Congressman Tom Udall	Return to Sender – Update on EA Status	Document	Reference
122	2003.5.16	Carson NF-C. Dykes	JRD- Natural Resources Co-ord.	Fund for Animals Solicitation	Document	Public Inv.
123	2003.5.16	L. Fulkerson	JRD-District Ranger	Request for Information	Document	Reference
124	2003.5.16	N. Gardner	JRD- District Ranger	Management Concern / Offer of Land Donation	Document	Public Inv.
125	2003.5.19	Jicarilla District Ranger	JRD	Request to Be Added to Mailing List	Document	Public Inv.
126	2003.6.3	JRD- Range Con.	Project File	Daily Notes	Document	Reference
127	2003.6.3	JRD – Range Con	Project File	Daily Notes	Document	Reference
128				Discussion with Phil Settles		
129	2003.6.5	USFS PAO	USFS - S. Dykes	Wild Horse Field Day	Document	Reference
130	2003.6.13	Star Gonzales	Jicarilla District Ranger	Request to be Added to Mailing List	Document	Reference
131	2003.6.13	Jicarilla District Ranger	JRD- Natural Resources Co-ord.	Update on EA Status / Mailing List	Document	Reference
132	2003.6.13	Jicarilla District Ranger	Public	Invitation for a tour of Jicarilla WH territory / mailing list	Document	Reference
133	2003.6.13	Jicarilla District Ranger	Public	Field trip to Wild Horse territory	Document	Reference
134	2003.6.17	ID Team	Project File	ID Team Meeting Notes	Document	Reference
135	2003.6.18	NM Game & Fish	Project File	Deer/Elk #'s – Deer and Elk Survey flights for '94 – present (03)	Document	Reference
136	2003.6.18	Patience O'Dowd	JRD – Range Con	Upcoming Field Trip	Document	Public Inv.
137	2003.6.18	Jicarilla RD	Project File	Return to Sender – Public comment/Field day letters – Thomas Sanchez	Document	Public Inv.
138	2003.6.18	Jicarilla RD	Project File	Return to Sender – Public comment/Field day letters – Toni Moore	Document	Public Inv.
139	2003.6.18	Jicarilla RD	Project File	Return to Sender – Public comment/Field day letters – Nancy Gardner	Document	Public Inv.
140	2003.6.18	Jicarilla RD	Project File	Return to Sender – Public comment/Field day letters – Carl and Reda Powers	Document	Public Inv.
141	2003.6.18	Jicarilla RD	Project File	Return to Sender – Public comment/Field day	Document	Public Inv.

No.	Date	From	To	Subject	Type[1]	Category[2]
				letters -- Ms. Staci Matlock		
142	2003.6.18	Jicarilla RD	Project File	Return to Sender – Public comment/Field day letters – Congressman Tom Udall	Document	Public Inv.
143	2003.6.18	Jicarilla RD	Project File	Return to Sender – Public comment/Field day letters – Forest Conservation Council	Document	Public Inv.
144	2003.6.23	JRD- Range Con.	Project File	Wild Horse Stocking Levels	Document	Reference
145	2003.6.28	Jicarilla RD	Project File	WH Territory Tour Sign Up list	Document	Public Inv.
146	2003.6.28	ID Team	Project File	WH Territory Tour Meeting Notes	Document	Reference:
147		S.O. – Ben Kuykendall	Project File	04/02 Allotment Inspection Report	Document	Reference
148	2003.7.28	BLM- Cedar City Field Office	Project File	North Hills WH Management Plan	Document	Reference
149	2003.8	USDA FS	USDA FS	List of Subjects in 36 CFR Part 215	Document	Reference
150	2003.8.00	Jicarilla District Ranger	Project File	Draft- Notice for Comment	Document	Reference
151	2003.8.00	Univ. of AZ	Project File	Range Management Before, During & After Drought	Document	Reference
152		JRD Range	Project Record	Notes	Document	Reference
153	2003.8.1	JRD Range	Project File	Misc. Notes	Document	Reference
154	2003.8.1	David N. Seesholtz	Taos News	Legal Notice For Comment	Document	Reference
155	2003.8.6	Jicarilla District Ranger	Project File	08/03 Information Sent to Public – Action and Supporting Documents	Document	Reference
156	2003.8.6	Jicarilla District Ranger	Public	Notice of Comment / Mailing List	Document	Reference
157	2003.8.7	Daily Times	Project File	Notice for Comment – legal record	Document	Reference
158		Greg Miller	Jicarilla RD	Soil/Watershed Report	Document	Reference
159	2003.8.20	WHOA	JRD- Range Con	Comments on Scoping Notice	Document	Reference
160	2003.8.20	WHOA	JRD- Range Con	Request	Document	Reference
161	2003.8.20	WHOA	JRD- Range Con	Need Clarification – Request	Document	Reference
162	2003.8.20	WHOA	JRD-Range Con	Need Additional Information - Request	Document	Reference
163	2003.8.25	M. Hamilton	Jicarilla District Ranger	Duplicate comment	Document	Reference
164	2003.8.25	Mike Hamilton	Jicarilla District Ranger	Duplicate comment	Document	Public Inv.
165	2003.8.25	Robert Daily	Jicarilla District Ranger	Comment	Document	Public Inv.
166	2003.8.26	G. Price	Jicarilla District Ranger	Comment	Document	Reference
167	2003.8.26	JRD- District Archaeologist	Project File	Tribal Consultation Packet	Document	Reference
168	2003.8.26	Gregg Price	Jicarilla District Ranger	Mgmt Suggestion	Document	Public Inv.
169	2003.8.26	Gregg Price	Jicarilla District Ranger	Comment - Duplicate	Document	Public Inv.
170	2003.8.27	Mike Hamilton	Jicarilla District Ranger	Comment - Duplicate	Document	Public Inv.
171	2003.8.27	Patience O'Dowd	JRD Range Con	Reply	Document	Reference
172	2003.8.27	Jicarilla RD	Patience O'Dowd	Jicarilla round-up proposed action/EA – Reply	E-mail	Reference
173	2003.8.28	Robert L. Daily	Jicarilla District Ranger	Comment -Duplicate	Document	Public Inv.
174	2003.9.3	JRD Range Con	Patience O'Dowd	Reply	Document	Reference
175	2003.9.3	R3RO	Patience O'Dowd	Reply	Document	Reference

No.	Date	From	To	Subject	Type[1]	Category[2]
176	2003.9.4	NM Game & Fish	Jicarilla District Ranger	Jicarilla WH Territory	Document	Reference
177	2003.9.4	Patience O'Dowd	Stan Dykes	Email Request	Document	Reference
178	2003.9.4	Patience O'Dowd	Stan Dykes	Email Request	Document	Reference
179	2003.9.5	Joan E. Heaps	Jicarilla District Ranger	Comment	Document	Public Inv.
180	2003.9.5	J. Heaps	Jicarilla District Ranger	Comment - Duplicate	Document	Reference
181	2003.9.5	Jicarilla District Ranger	Carson SO & JRD Staff	Public Comments - Request	Document	Public Inv.
182	2003.9.5	Jicarilla District Ranger	Patience O'Dowd	Request	Document	Public Inv.
183	2003.9.5	Joan Heaps	Jicarilla District Ranger	Address	Document	Public Inv.
184	2003.9.6	Wilda Portner	Jicarilla District Ranger	Comment	Document	Public Inv.
185	2003.9.6	Nichole Engblom	Jicarilla District Ranger	Comment	Document	Public Inv.
186	2003.9.6	Wilda Portner	Jicarilla District Ranger	Comment - Duplicate	Document	Public Inv.
187	2003.9.7	Myra Gadson	Jicarilla District Ranger	Comment	Document	Public Inv.
188	2003.9.7	Louis Gross	Jicarilla District Ranger	Comment	Document	Public Inv.
189	2003.9.7	Cindy King	Jicarilla District Ranger	Comment	Document	Public Inv.
190	2003.9.7	Reggie Nopomuceno	Jicarilla District Ranger	Comment	Document	Public Inv.
191	2003.9.7	Heather S. Preston	Jicarilla District Ranger	Comment	Document	Public Inv.
192	2003.9.7	Ted Krings	Jicarilla District Ranger	Comment	Document	Public Inv.
193	2003.9.7	June Salazar	Jicarilla District Ranger	Comments	Document	Public Inv.
194	2003.9.7	Cindy King	Jicarilla District Ranger	Comment	Document	Public Inv.
195	2003.9.8	Hope Dowd-List	Jicarilla District Ranger	Comment	Document	Public Inv.
196	2003.9.8	Gary Miles – Sandoval Co. Watchdog Inc.	Jicarilla District Ranger	Comment	Document	Public Inv.
197	2003.9.8	Jennifer Chadwell	Jicarilla District Ranger	Comment	Document	Public Inv.
198	2003.9.8	Dennis Feld	Jicarilla District Ranger	Comment	Document	Public Inv.
199	2003.9.8	John Colang	Jicarilla District Ranger	Comment	Document	Public Inv.
200	2003.9.8	Marianne Nordstrom	Jicarilla District Ranger	Comment	Document	Public Inv.
201	2003.9.8	Emily Frappier	Jicarilla District Ranger	Comment	Document	Public Inv.
202	2003.9.8	Nichole Engblom	Jicarilla District Ranger	Comment - Duplicate	Document	Public Inv.
203	2003.9.8	Charles & Linda Mellon	Jicarilla District Ranger	Comment	Document	Public Inv.
204	2003.9.8	Cathy Hanson	Jicarilla District Ranger	Comment	Document	Public Inv.
205	2003.9.8	Janie Nobles	Jicarilla District Ranger	Comment	Document	Public Inv.

No.	Date	From	To	Subject	Type[1]	Category[2]
206	2003.9.8	Betty Pritchard	Jicarilla District Ranger	Comment	Document	Public Inv.
207	2003.9.8	Charlotte Jewitt	Jicarilla District Ranger	Public Comment	Document	Public Inv.
208	2003.9.8	Forest Guardi-ans	Jicarilla District Ranger	Mgmt Comments	Document	Public Inv.
209	2003.9.8	Myra Gadson	Jicarilla District Ranger	Comment - Duplicate	Document	Public Inv.
210	2003.9.8	Gregory J. Dowd-List	Jicarilla District Ranger	Comment	Document	Public Inv.
211	2003.9.8	Ahsanul Haq	Jicarilla District Ranger	Comment	Document	Public Inv.
212	2003.9.8	The Horse Shelter	Jicarilla District Ranger	Comment	Document	Public Inv.
213	2003.9.8	Patience O'Dowd – WH Observers Assoc.	Jicarilla District Ranger	Comment	Document	Public Inv.
214	2003.9.8	Lee Thomas	Jicarilla District Ranger	Comment	Document	Public Inv.
215	2003.9.9	Lisa Kirkpatrick	Jicarilla District Ranger	Comment	Document	Public Inv.
216	2003.9.11	El Rito	JRD- Natural Resources Co-ord.	WH Scoping	Document	Reference
217	2003.9.15	Audrey Nes Kuykendall	Jicarilla District Ranger	Correspondence	Document	Reference
218		Stan Dykes	Project File	Notes	Document	Reference
219	2003.9.23	Jicarilla RD	Project File	09/03 Mailing List	Document	Reference
220	2003.9.25	Jicarilla RD	Project File	JWHT Field trip for Patience O'Dowd	Document	Reference
221		BLM	Project File	BLM Wild Horse & Burro Strategic Manage-ment Plan	Document	Reference
222		BLM – NSTC	Project File	BLM Resource Notes	Document	Reference
223			Project Record	Reversibility & Safety of PZP	Document	Reference
224			Project File	Wildlife fertility control	Document	Reference
225		BLM	Project File	BLM Field Trial Plan for WH Fertility Control	Document	
226	2003.9	Jicarilla RD	Project Record	Watershed Condition Assessment, JRD	Document	Reference
227		Jicarilla RD	Project Record	Jicarilla Ranger District – 1918 to 1923 – a Table Showing the Number of Stock Permitted & Stock Grazed Without Permit	Document	Reference
228		BLM	Project File	BLM Fertility Control on Selected Mares Pryor Mountain WH	Document	Reference
229		BLM	Project File	Recommendations BLM Pop. Viability Forum	Document	Reference
230		BLM	Project File	Effects of Treatments or PryorMountain WH – Pop, Demo, & Genetics	Document	Reference
231	2003.9.25	University of Kentucky	Project File	Procedures for Collecting Blood Samples from WH & Burros for Genetic Analysis	Document	Reference
232	2003.10.1		Project File	Daily Diary	Document	Reference
233	2003.10.7	USDA FS	Jicarilla RD	WO Briefing Paper – Jicarilla WH Mgmt/EA	Document	Reference
234	2003.10.16	FS SW Region	Jicarilla RD	Protest Briefing Paper	Document	Reference
235	2003.10.29	US District Court – District of Arizona	Project File	Forest Guardians, et al vs USFS	Document	Reference
236	2003.10.29	Patience O'Dowd	JRD Range	Jicarilla RD Gas/Oil EIS	E-mail	Reference
237	2003.10.29	Patience O'Dowd	JRD Range	WH Territories	E-mail	Reference
238	2003.10.29	JRD Range	Patience O'Dowd	WH Territories	E-mail	Reference

No.	Date	From	To	Subject	Type[1]	Category[2]
239	2003.11.7	John Colang	Jicarilla District Ranger	Comment	Document	Public Inv.
240	2003	Jicarilla District Ranger	Forest Supervisor	Proposed Action & Decisions to be made as described in initial EA	Document	Reference
241	2003			Description of the Proposed Action	Document	Reference
242	2003 Fall	Jicarilla RD	Project File	Producing Leases	Document	Data
243	2003.11	BLM	Project File	EA – Riddle Mt. & Kiger Herd Mgmt Areas WH Gathering	Document	Reference
244	2003	JRD Range	Range Files	2003 Range Transect Information	Document	Reference
245	2003.11	BLM	Jicarilla RD	Standard BLM Procedures for WH capture, removal, handling and safety 2003	Document	Reference
246	2003.11.10	Patience O'Dowd	JRD Range	Relocation of Wild Horses has been done in the past by FS & BLM	E-mail	Reference
247	2003.11.17	Gene Onken	JRD Range	WH Territories	E-mail	Reference
248	2003.11.17	Patrick L. Jackson	JRD Range	Response to Wild Horse EA comments on FS case No. CV 00-612-TUC-RCC	E-mail	Reference
249	2003.11.17	JRD Range	Patience O'Dowd	Relocation of Wild Horses has been done in the past by FS & BLM	E-mail	Reference
250	2003.11.21	JRD Range	Patience O'Dowd	Relocation of Wild Horses has been done in the past by FS & BLM	E-mail	Reference
251	2003.12	Grand Junction Field Office	Project File	EA Record & Gather Plan – Little Book Cliffs WH Gather	Document	Reference
252	2003.12	BLM	Project File	EA & Gather Plan – Pryor Mt. WH Range – FY2001 WH Pop. Gather & Selected Removal	Document	Reference
253	2003.12	Jicarilla RD	Project File	JWHT Congressional Brief 11/03	Document	Reference
254	2003.12.18	USGS	Project File	An Economic Analysis of Alternative Fertility Control & Associated Mgmt Techniques for 3 BLM WH Herds	Document	Reference
255	2003.12.19	Patience O'Dowd	JRD Range	Public Comment – Email	Document	Reference
255a	2003.12.31	Jennifer K. Frey, PhD & NM State University	Carson NF	Initiation of Abert's Squirrel (Sciurus aberti) Monitoring on Carson NF, NM	Document	Reference
255b	2003.12.31	Jennifer K. Frey, PhD & NM State University	Carson NF	Initiation of Red Squirrel (Tamiasciurus hudsonicus) Monitoring on Carson NF, NM	Document	Reference
256	2004.1	Jicarilla RD	Project File	Jicarilla WH Forage Capacity Estimate	Document	Reference
256a	2004.1	District Archeologist	Project File	Cultural Resources Report	Document	Reference
257	2004.1		Project File	Map of Proposed Critical Habitat Units for MSO	Document	Reference
257a	2004.1	Rocky Mt. Bird Observatory	Carson NF	Monitoring the Birds of Carson NF	Document	Reference
258	2004.1	D. Phillip Sponenberg, DVM, PhD	Project File	N. American Colonial Spanish Horse Update, 7/03	Document	Reference
259	2004.1.20	Dr. E. Gus Cothran	JRD Range	Jicarilla WH Herd NM – Genetic Testing - Email	Document	Reference
260	2004.1.28	Jicarilla RD	Project File	2004 Aerial Survey	Document	Reference
261	2004.1.30	FWS-NM Ecological Services Field Office	Jicarilla District Ranger	USFWS Letter of Concurrence	Document	Reference
262	2004.2.01	JRD Range	Project File	Range Analysis/Veg Report	Document	Reference
263	2004.2.13	SO – Jack Carpenter	Project File	NEPA Calendar – Carson NF 4/00-1/04	Document	Reference
264	2004.2.13	JRD Range	Project File	Jicarilla WHT Area Map	Map	Reference
265	2004.2.13	JRD Range	Project File	Jicarilla WHT Key Area Map	Map	Reference
266	2004.2.13	JRD Range	Project File	Private Land TES Inside Jicarilla WHT	Document	Reference

No.	Date	From	To	Subject	Type[1]	Category[2]
267	2004.3.30	Patience O'Dowd	JRD Range	Horses	E-mail	Reference
268	2004.3.30	Patience O'Dowd	JRD Range	More info	E-mail	Reference
269	2004.4.14	Patience O'Dowd	JRD Range	Hi	E-mail	Reference
270	2004.4.20	Cipie Maez, Acting DR, Canjilon RD	Dan Rael, Natural Resources Staff Officer, Carson NF	Wild Horse Territories on the Canjilon Ranger District	Document	Reference
271	2004	BLM		Aerial population techniques for WH and Burros BLM-Work Plan	Document	Reference
272	2004.5.4	Stan Dykes	Jicarilla RD	Presentation to Forest Supervisor	Document	Reference
272a	2004.5.13	JRD Biologist	Jicarilla RD Files	BAE/Wild Life Report	Document	Reference
272b	2004.5.15	JRD Range	Project File	Permittee Meetings	Document	Reference
273	2004.5.20	Stan Dykes	Patience O'Dowd	Questions (Finally getting back to them)	E-mail	Reference
274	2004.5.22	Patience O'Dowd	JRD Range	WH&B Health & Research Activities	E-mail	Reference
275	2004.5.24	State of NM	Carson NF	2002-2004 State of NM 303(d) List for Assessed River/Stream Reaches Requiring Total Maximum Daily Loads (TMDL's)	Document	Reference
276	2004.5.25	Barry Imler	Jicarilla RD	Rapid Assessment Methodology Analysis Procedures	Document	Reference
277	2004.6.1	Carson SO	Jicarilla RD	Cultural Resources	Document	Reference
278	2003.11.18	USFWS	Federal Register	68 FR 65020 Proposed Rule: Designation of MSO critical habitat on National Forest System & tribal lands	Proposed Rule	
279	2004.6.2	JRD	Project File	JWHT EA	Document	Reference
280	2004.6.4	Forest Supervisor	Project File	Decision Notice and FONSI	Document	Reference
281	2004.6.10	Taos News	Project File	Published Legal Notice/Taos News	Document	Reference

Appendix B. Wild Free-Roaming Horses and Burros Act

Wild Horses and Burros Protection Act

Act of December 15, 1971 (P.L. 92-195, 85 Stat. 649, as amended; 16 U.S.C. 1331-1338, 1338a, 1339, 1340)

Purpose and Declaration

Sec. 1. Congress finds and declares that wild free-roaming horses and burros are living symbols of the historic and pioneer spirit of the West, that they contribute to the diversity of life forms within the Nation and enrich the lives of the American people, and that these horses and burros are fast disappearing from the American scene. It is the policy of Congress that wild free-roaming horses and burros will be protected from capture, branding, harassment, or death, and to accomplish this they are to be considered in the area where presently found, as an integral part of the natural system of the public lands. (16 U.S.C. 1331)

Definitions

Sec. 2. As used in this Act—

(a) "Secretary" means the Secretary of the Interior when used in connection with public lands administered by him through the Bureau of Land Management and the Secretary of Agriculture in connection with the public lands administered by him through the Forest Service.

(b) "wild free-roaming horses and burros" means all unbranded and unclaimed horses and burros on public lands of the United States.

(c) "range" means the amount of land necessary to sustain an existing herd or herds of wild free-roaming horses and burros, which does not exceed their known territorial limits, and which is devoted principally but not necessarily exclusively to their welfare in keeping with the multiple-use management concept for the public lands.

(d) "herd" means one or more stallions and his mares; and

(e) "public lands" means any lands administered by the Secretary of the Interior through the Bureau of Land Management or by the Secretary of Agriculture through the Forest Service.

(f) "excess animals" means wild free-roaming horses or burros—(1) which have been removed from an area by the Secretary pursuant to applicable law; or, (2) which must be removed from an area in order to preserve and maintain a thriving natural ecological balance and multiple-use relationship in that area. (16 U.S.C. 1332)

Powers and Duties of the Secretary

Sec. 3. (a) All wild free-roaming horses and burros are hereby declared to be under the jurisdiction of the Secretary for the purpose of management and protection in accordance with the provisions of this Act. The Secretary is authorized and directed to protect and manage wild free-roaming horses and burros as components of the public lands, and he may designate and maintain specific ranges on public lands as sanctuaries for their protection and preservation, where the Secretary after consultation with the wildlife agency of the State wherein any such range is proposed and with the Advisory Board established in section 7 of this Act deems such

action desirable. The Secretary shall manage wild free-roaming horses and burros in a manner that is designed to achieve and maintain a thriving natural ecological balance on the public lands. He shall consider the recommendations of qualified scientists in the field of biology and ecology, some of whom shall be independent of both Federal and State agencies and may include members of the Advisory Board established in section 7 of this Act. All management activities shall be at the minimal feasible level and shall be carried out in consultation with the wildlife agency of the State wherein such lands are located in order to protect the natural ecological balance of all wildlife species which inhabit such lands, particularly endangered wildlife species. Any adjustments in forage allocations on any such lands shall take into consideration the needs of other wildlife species which inhabit such lands.

(b)(1) The Secretary shall maintain a current inventory of wild free-roaming horses and burros on given areas of the public lands. The purpose of such inventory shall be to: make determinations as to whether and where an overpopulation exists and whether action should be taken to remove excess animals; determine appropriate management levels of wild free-roaming horses and burros on these areas of the public lands; and determine whether appropriate management levels should be achieved by the removal or destruction of excess animals, or other options (such as sterilization, or natural controls on population levels). In making such determinations the Secretary shall consult with the United States Fish and Wildlife Service, wildlife agencies of the State or States wherein wild free-roaming horses and burros are located, such individuals independent of Federal and State government as have been recommended by the National Academy of Sciences, and such other individuals whom he determines have scientific expertise and special knowledge of wild horse and burro protection, wildlife management and animal husbandry as related to rangeland management.

(2) Where the Secretary determines on the basis of (i) the current inventory of lands within his jurisdiction; (ii) information contained in any land use planning completed pursuant to section 202 of the Federal Land Policy and Management Act of 1976; (iii) information contained in court ordered environmental impact statements as defined in section 2 of the Public Range Lands Improvement Act of 1978; and (iv) such additional information as becomes available to him from time to time, including that information developed in the research study mandated by this section, or in the absence of the information contained in (i-iv) above on the basis of all information currently available to him, that an overpopulation exists on a given area of the public lands and that action is necessary to remove excess animals, he shall immediately remove excess animals from the range so as to achieve appropriate management levels. Such action shall be taken, in the following order and priority, until all excess animals have been removed so as to restore a thriving natural ecological balance to the range, and protect the range from the deterioration associated with overpopulation.

(A) The Secretary shall order old, sick, or lame animals to be destroyed in the most humane manner possible.

(B) The Secretary shall cause such number of additional excess wild free-roaming horses and burros to be humanely captured and

removed for private maintenance and care for which he determines an adoption demand exists by qualified individuals, and for which he determines he can assure humane treatment and care (including proper transportation, feeding, and handling): *Provided*, That not more than four animals may be adopted per year by any individual unless the Secretary determines in writing that such individual is capable of humanely caring for more than four animals, including the transportation of such animals by the adopting party; and

(C) The Secretary shall cause additional excess wild free-roaming horses and burros for which an adoption demand by qualified individuals does not exist to be destroyed in the most humane and cost efficient manner possible.

(3) For the purpose of furthering knowledge of wild horse and burro population dynamics and their interrelationship with wildlife, forage and water resources, and assisting him in making his determination as to what constitutes excess animals, the Secretary shall contract for a research study of such animals with such individuals independent of Federal and State government as may be recommended by the National Academy of Sciences for having scientific expertise and special knowledge of wild horse and burro protection, wildlife management and animal husbandry as related to rangeland management. The terms and outline of such research study shall be determined by a research design panel to be appointed by the President of the National Academy of Sciences. Such study shall be completed and submitted by the Secretary to the Senate and House of Representatives on or before January 1, 1983.

(c) Where excess animals have been transferred to a qualified individual for adoption and private maintenance pursuant to this Act and the Secretary determines that such individual has provided humane conditions, treatment and care for such animal or animals for a period of one year, the Secretary is authorized upon application by the transferee to grant title to not more than four animals to the transferee at the end of the one-year period.

(d) Wild free roaming horses and burros or their remains shall lose their status as wild free-roaming horses or burros and shall no longer be considered as falling within the purview of this Act—

(1) upon passage of title pursuant to subsection (c) except for the limitation of subsection (c)(1) of this section; or

(2) if they have been transferred for private maintenance or adoption pursuant to this Act and die of natural causes before passage of title; or

(3) upon destruction by the Secretary or his designee pursuant to subsection (b) of this section; or

(4) if they die of natural causes on the public lands or on private lands where maintained thereon pursuant to section 4 and disposal is authorized by the Secretary or his designee; or

(5) upon destruction or death for purposes of or incident to the program authorized in section 3 of this Act: *Provided*, That no wild free-roaming horse or burro or its remains may be sold or transferred for consideration for processing into commercial products. (16 U.S.C. 1333).

Private Lands

Sec. 4. If wild free-roaming horses or burros stray from public lands onto privately owned land, the owners of such land may inform the nearest Federal marshal or agent of

the Secretary, who shall arrange to have the animals removed. In no event shall wild free-roaming horses and burros be destroyed except by the agents of the Secretary. Nothing in this section shall be construed to prohibit a private landowner from maintaining wild free-roaming horses or burros on his private lands, or lands leased from the Government, if he does so in a manner that protects them from harassment, and if the animals were not willfully removed or enticed from the public lands. Any individuals who maintain such wild free-roaming horses or burros on their private lands or lands leased from the Government shall notify the appropriate agent of the Secretary and supply him with a reasonable approximation of the number of animals so maintained. (16 U.S.C. 1334)

Recovery Rights

Sec. 5. A person claiming ownership of a horse or burro on the public lands shall be entitled to recover it only if recovery is permissible under the branding and estray laws of the State in which the animal is found. (16 U.S.C. 1335)

Cooperative Agreements and Regulations

Sec. 6. The Secretary is authorized to enter into cooperative agreements with other landowners and with the State and local governmental agencies and may issue such regulations as he deems necessary for the furtherance of the purposes of this Act. (16 U.S.C. 1336)

Joint Advisory Board

Sec. 7. The Secretary of the Interior and the Secretary of Agriculture are authorized and directed to appoint a joint advisory board of not more than nine members to advise them on any matter relating to wild free-roaming horses and burros and their management and protection. They shall select as advisers persons who are not employees of the Federal or State Governments and whom they deem to have special knowledge about protection of horses and burros, management of wildlife, animal husbandry, or natural resources management. Members of the board shall not receive reimbursement except for travel and other expenditures necessary in connection with their services. (16 U.S.C. 1337)

Provisions for the Protection of Animals on Public Lands

Sec. 8. (a) Any person who—

(1) willfully removes or attempts to remove a wild free-roaming horse or burro from the public lands, without authority from the Secretary, or

(2) converts a wild free-roaming horse or burro to private use, without authority from the Secretary, or

(3) maliciously causes the death or harassment of any wild free-roaming horse or burro, or

(4) processes or permits to be processed into commercial products the remains of a wild free-roaming horse or burro, or

(5) sells, directly or indirectly, a wild free-roaming horse or burro maintained on private or leased land pursuant to section 4 of this Act, or the remains thereof, or

(6) willfully violates a regulation issued pursuant to this Act, shall be subject to a fine of not more than $2,000 or imprisonment for not more than one year, or both. Any person so charged with such violation by the Secretary may be tried and sentenced by any United States commissioner or magistrate

designated for that purpose by the court by which he was appointed, in the same manner and subject to the same conditions as provided for in section 3401, title 18, United States Code.

(b) Any employee designated by the Secretary of the Interior or the Secretary of Agriculture shall have power, without warrant, to arrest any person committing in the presence of such employee a violation of this Act or any regulation made pursuant thereto, and to take such person immediately for examination or trial before an officer or court of competent jurisdiction, and shall have power to execute any warrant or other process issued by an officer or court of competent jurisdiction to enforce the provisions of this Act or regulations made pursuant thereto. Any judge of a court established under the laws of the United States, or any United States magistrate may, within his respective jurisdiction, upon proper oath or affirmation showing probable cause, issue warrants in all such cases. (16 U.S.C. 1338)

Transportation of Captured Animals

Sec. 9. In administering this Act, the Secretary may use or contract for the use of helicopters or, for the purpose of transporting captured animals, motor vehicles. Such use shall be undertaken only after a public hearing and under the direct supervision of the Secretary or of a duly authorized official or employee of the Department. The provisions of subsection (a) of the Act of September 8, 1959 (73 Stat. 470; 18 U.S.C. 47(a)) shall not be applicable to such use. Such use shall be in accordance with humane procedures prescribed by the Secretary. (16 U.S.C. 1338a)

Limitation of Authority

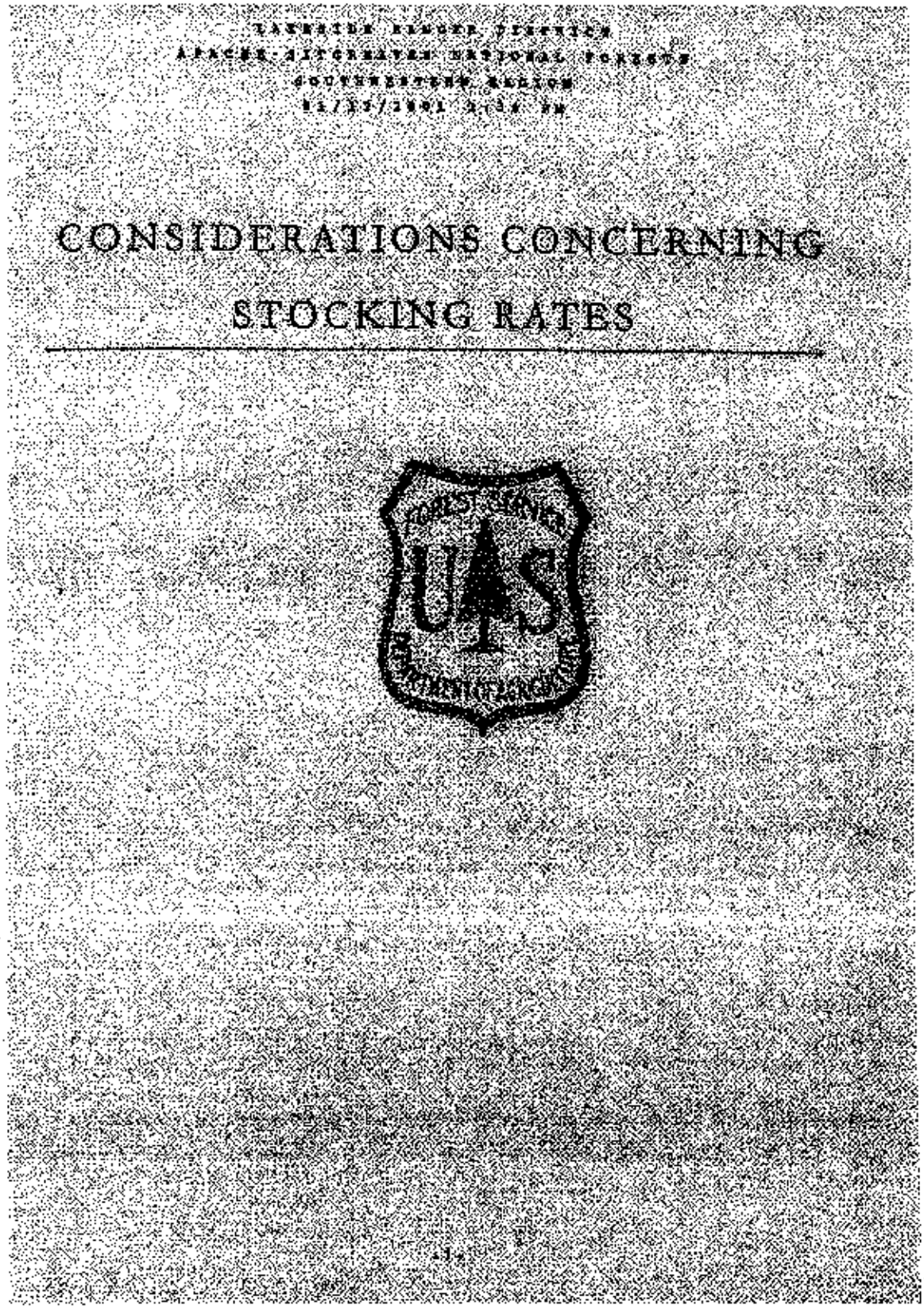
Sec. 10. Nothing in this Act shall be construed to authorize the Secretary to relocate wild free-roaming horses or burros to areas of the public lands where they do not presently exist. (16 U.S.C. 1339)

Joint Report to Congress

Sec. 11. After the expiration of thirty calendar months following the date of enactment of this Act, and every twenty-four calendar months thereafter, the Secretaries of the Interior and Agriculture will submit to Congress a joint report on the administration of this Act, including a summary of enforcement and/or other actions taken thereunder, costs, and such recommendations for legislative or other actions as he might deem appropriate.

The Secretary of the Interior and the Secretary of Agriculture shall consult with respect to the implementation and enforcement of this Act and to the maximum feasible extent coordinate the activities of their respective departments under the implementation and enforcement of this Act. The Secretaries are authorized and directed to undertake those studies of the habits of wild free-roaming horses and burros they may deem necessary in order to carry out the provisions of this Act. (16 U.S.C. 1340)

Appendix C. Considerations Concerning Stocking Rates



CONSIDERATIONS CONCERNING

STOCKING RATES

INTRODUCTION

Stocking is the placement of livestock on rangeland. A *stocking rate* is the number of specific kinds and classes of animals grazing a unit of land for a specified time. The total number of animals which can be sustained on a given area based on the proper use of the total forage resources available is referred to as *grazing capacity*. This report presents various methodological factors and considerations used to determine grazing capacities for allotments scheduled for new or revised allotment management plans [AMPs] in 1999.

Capacity is based on a determination of total herbage production and of that portion which could be utilized by livestock and wildlife while achieving the Desired Future Condition (DFC) established for the allotment. Other factors affecting the capacity of an allotment include: availability of water, management techniques, allowable use levels, and class of livestock. An estimated grazing capacity for livestock will be determined for each pasture within an allotment to determine the length of time livestock may graze in that pasture. This will help the Forest evaluate whether permitted use is in balance with capacity, as directed by the Forest Plan standards and guidelines (p. 77-1). In development of an individual AMP, information presented will be used to evaluate the current management situation and differing management alternatives, including no livestock grazing.

It is important to recognize that stocking rates are but an estimate based on certain assumptions, such as an even distribution of animals or average climatic conditions. Estimation methods are designed to yield stocking levels close to what the land can appropriately carry. These levels may need to be modified after an AMP is implemented. Monitoring forage use in key areas must be done to ensure compliance with allowable use standards. Monitoring will help determine needed adjustments in stocking rates. Drought, which is fairly common in Arizona, will often necessitate temporary livestock reductions.

GRAZING CAPABILITY

Vegetation is produced on most acres of an allotment. Forage produced on every acre, however, may not be available for grazing use. In order to estimate forage available for grazing, a determination of which acreage can be grazed and of the amount of available forage will be made considering a combination of four factors: forage production, soil stability, distance from water, and steepness of slope.

A. Forage Production. Methods for estimating forage production are detailed in the following section. It should be noted here that range which produces 20 air-dried pounds or less of herbaceous forage (grass and forbs) per acre is not considered suitable for grazing. Such areas generally lack sufficient ground cover to protect the soil, or have a dense overstory canopy. This acreage is not included in the livestock capacity estimate (FSH 2209.21, Sec. 21).

B. Soil Stability. There are three classes of soil stability based on the status of current soil loss. Soil loss is expressed in tons/hectare/year (TES 1989 -- a hectare is about 2.5 acres) which can be equated to grazing capability classifications found in FSH 2209.21, Sec. 23.

Stable soils: Where the current soil loss is less than tolerance soil loss, the rangeland is considered stable and classed as full capacity [FC] range. Such areas are included in estimations of grazing capacity. These areas will be used by most animals in most situations. With proper allowable forage use, stable soils can be used without long term damage to the soil resource or plant community (FSH 2209.21, Secs. 21 and 23.1).

Impaired soils: Where current soil loss exceeds the tolerance soil loss, the rangeland has impaired soil stability and is classified as potential capacity [PC] range. Such areas usually are not included in the grazing capacity estimate. However, they may be included when the allotment is under intensive management with proper stocking and conservative allowable forage use (FSH 2209.21, Secs. 21, 23, and 55.3). For proposed actions on PC areas, the allowable forage utilization will be set at 10%, a level which will help reduce the possibility of overutilizing forage on PC sites.

Unstable soils: Where natural soil loss exceeds the tolerance soil loss, the rangeland has unstable soil conditions and is classified as no capacity [NC] range. It cannot be used by livestock without long term damage to the soil resource or plant community. These areas are not included in an estimated grazing capacity even though livestock use may occur (FSH 2209.21, Secs. 21 and 23.3).

C. Distance from Water. Holechek (1988 Table 4) cites the failure to adjust stocking rates for travel distance to water as being the cause of considerable range degradation in hot, arid rangelands such as the southwestern United States. Other authors have also identified the need to adjust stocking based on availability of water (Glendening 1944, Phillips 1965, Clary 1975, Pinchak et al. 1991, Hart et al. 1991). Based on this information, adjustments to capacity were made by reducing the allowable forage use on stable, forage producing sites as shown in Table 1.

Table 1. Reduction in Cattle Grazing Capacity Based on Distance from Water

[illegible]	Acres
1-2	50%
>2	100% [illegible] grazed

Unlike cattle, sheep do not require water every day and, because of herding, will use areas up to two miles from waters. Adjustments for distance from water are normally not considered for sheep (Holechek 1988:11), however site specific information may indicate the need to do so.

D. Steepness of Slope. Holechek (1988 Table 3) provides guidelines for grazing capacity adjustments for terrain. Other authors have also identified the need to adjust stocking based on slope (Cook 1966, Mueggler 1965, Goodwin 1962, Glendening 1944, Phillips 1966, Clary 1975, Pinchak et al. 1991, Ganskopp and Vavra 1989). Based on this

information, adjustments were made for cattle by reducing the allowable forage use on stable, forage producing sites as shown in Table 2.

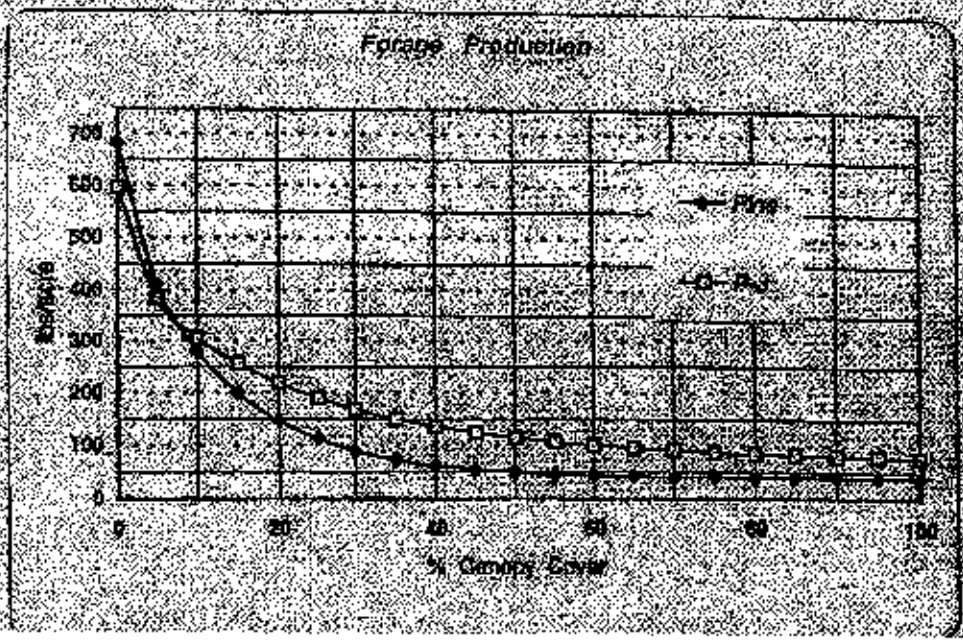
Table 2. Reduction in Cattle Grazing Capacity Based on Slope

Percent Slope	Reduction in Capacity
< 11	None
11 - 30	30%
31 - 50	60%
> 50	100% (considered ungrazable)

Citing a study by McDaniel and Tiedeman (1981), Holechek *et al.* (1995:198) find that "slopes greater than 45% should be considered unusable by sheep, but little or no adjustment appears necessary for slopes under 45%."

FORAGE PRODUCTION

Herbaceous forage production records for some allotments are more than 10 years old; such data are not considered usable for the present analyses. The scientific literature was reviewed to determine if methods exist to estimate forage production using vegetation data such as basal area or canopy cover. A number of studies were evaluated but not used because trial results in Forest study areas proved inconsistent with observed production (Pfollioit 1983, Bojorquez 1987, Ureta and Severson 1989, Pieper 1990, 1994, Tapia *et al.* 1990, Covington and Fox 1991, Mitchell and Bartling 1991). The studies by Jameson (1967) and Thill *et al.* (1983) did prove useful, however. Jameson's (1967) studies were conducted in northern and central Arizona and included grass and forbs. His regression curves are used for the ponderosa pine forest and pinyon-juniper woodland. The formulas yield production data which are consistent with Forest observations; exceptions are found on volcanic soils at higher elevations (>8,000 feet), where production is generally somewhat higher.



Thill *et al.*'s (1983) studies were conducted in east-central Arizona, on the Alpine and Springerville Ranger Districts, and included browse, grass, and forbs. Their regression curves are used for the mixed conifer type. Most mixed conifer stands produce less than 50 pounds per acre.

The above formulas are used to calculate the initial production for the analysis area. This preliminary information is then incorporated into GIS and used to generate map of forage production for the allotment using the classes shown in Table 3 below. This table summarizes the regression estimations, and shows the forage production classes which are used in an initial categorization. (It should be noted that, since all the above-referenced equations are curvilinear functions, adjustments needed to be made at the upper and lower extremes; these adjustments were made based on available data.)

Table 3. Forage Production Classes (air-dried pounds per acre).

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Ponderosa	0-1	--	--	2-8	10-14	15-19	20-40	> 40
PJ/Oak	--	0	--	1-9	10-14	15-20	25-65	> 65
MC/Aspen	< 1	--	--	--	1-18	17-21	22-40	> 4[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Ponderosa	--	--	1-10	--	15-24	25-35	36-65	> 65
MC/Aspen	≤15	--	--	--	15-25	26-30	31-60	> 60

The initial forage production map will be verified and/or modified through field observations. Corrections to the production information will be made where needed, based on field estimates of production to be conducted by Clay Bryder, Rangeland Management Specialist, and Chris Nelson, Soil Scientist. Both these individuals have extensive experience and considered factors such as weather when estimating production.

PROPER FORAGE UTILIZATION

Proper forage use refers to the degree of grazing use plus trampling damage that individual species can sustain while maintaining vigor, forage production, and reproductive capacity. ***Allowable use*** is determined from proper use, and is the level of grazing use that can be permitted on an area when all influencing factors are considered. Allowable use values are a tool to improve range health and plant vigor. Current range conditions are based on a professional determination of the range condition for each allotment as verified during field reviews.

Deferment means that livestock grazing is not allowed in a pasture until grass seed set occurs. Typically, this is mid to late August on ranges where warm season species dominate, or late May where cool season species dominate. ***Rest*** means that livestock grazing does not occur in a pasture during a calendar year.

The level of allowable use is based on existing conditions, management strategy and the desired conditions. Allowable utilization levels will be 0 to 10% would improve conditions the fastest, utilization levels of 10 to 30% would also improve conditions, 30

to 35% would tend to stabilize conditions, 35 to 45% would also tend to stabilize conditions, but with a higher risk of causing a downward trend and 45%+ would not improve or maintain conditions and could cause a decline in conditions.

Allowable use will consider existing and desired conditions resource conditions, such as soils, watershed, range, wildlife, etc. If range conditions are expected to reach fair or better condition in a timely manner, a conservative allowable use should be employed.

Consideration is not provided for use levels that exceed 50%. Holechek's (1988) literature review indicates that 50% use levels appear applicable only to humid and to annual grasslands, situations not found on the Forest.

The allowable use figures are for FC range. If grazing capacity is assigned to PC range sites for analysis of alternatives, the allowable use factor will be 10% in order to assure FC range is not overused (FSH 2209.21, Sec 53.3). Some alternatives may be developed that would provide for a different allowable use because of issues brought up during scoping. In these cases, the allowable use on PC range should remain at the lesser, more conservative figure in an attempt to change the impaired sites to stable sites.

WILDLIFE FORAGE CONSUMPTION

Wildlife, particularly large ungulates, are notable consumers of herbaceous forage. Such utilization needs to be taken into account. Estimated wildlife density data were provided by the Arizona Game and Fish Department [AGFD] in the form of seasonal density maps for deer, elk, antelope, and bighorn sheep. These maps were digitized, entered into the Forest's GIS system, and then overlain by allotment boundaries so wildlife populations for each allotment could be estimated.

Holechek (1988) notes that a wide range of studies are consistent in showing that various wildlife ruminants consume about 2% of body weight per day in dry matter when forage availability is not restricted. The average body weight for wildlife species was furnished by AGFD. The average elk weighs some 535 pounds, mule deer about 155 pounds, white tail deer about 85 pounds, and antelope about 100 pounds (figures will vary by hunt unit).

Wild ungulates' diets are not solely herbaceous forage, both shrubs and trees comprising a varying proportion. The percentage of browse use varies by season for different species. In the AMP analyses a reduction of total herbaceous forage needed by wild ungulates will be made to reflect the browse consumption. Herbaceous forage for elk was estimated at 80% of their total intake need for summer and 60% for winter. For deer, the estimates are 50% for summer and 30% for winter (see Brown 1990; Leege 1984; Miller *et al.* n.d.; Rowland *et al.* 1983; Severson and Medina 1983; Wallace 1984). Forage requirements for antelope were not adjusted because they utilize little browse in their diets. Table 5 shows average annual forage consumption for the "typical" animal of a species; no consideration is made for gender or seasonal variations due to reproductive status or other factors. Further adjustments could be made for a specific allotment to account for local conditions.

Table 5. Average Annual Forage Consumption for Wild Ungulates
(Dry Matter Equivalent in Forage)

[redacted]

[illegible]	[illegible]	[illegible]	[illegible]
Elk	1558	2176	2755
Mule deer	225	137	356
White-tail deer	185	91	276
Antelope	361	358	730

LIVESTOCK FORAGE CONSUMPTION

Cattle: Information provided by Rice (1995) was used to determine forage requirements for cattle. His data were derived from the National Research Council Publication for estimating feed intake of food producing animals and adjusted "*for typical beef cows in Arizona*". This information may be used for livestock of various weights and for varying forage quality. For example, with medium forage quality and with a calf weighing 200 pounds, consumption of dry forage by a dry cow and cow-calf pairs of varying weight is shown in Table 6.

These figures equate to a forage requirement of 1.7% of body weight during the period calves are not with their mothers (normally the dormant plant period). This also equates to 2.9% of body weight when calves are present (normally during the plant growth period). Sprinkle (1998) indicated that an adequate estimate of forage needs for an [illegible] pound cow and calf would be 30 pounds of forage per month, or 3% of body weight, for North Central Arizona. Holechek (1988) provides comparable figures, stating that the daily forage demand is 1.5% of body weight during dormancy, while during the active growth period it is 2.5%. Utilizing this information, forage requirements for livestock will be calculated using 2.9% and 1.7% of live body weight for summer and winter respectively for all allotments analyzed.

Table 6. Seasonal Forage Intake Needs of a Dry Cow and a Cow-Calf Pair (Dry Matter Equivalent in Pounds)

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]			
Light (800 lbs)	2410	2052	4462
Medium (1000 lbs)	2830	2565	5395
Heavy (1200 lbs)	4365	3080	7445
[illegible]			
Light cow/200 lb calf	3278	2654	5932
Medium cow/200 lb calf	5706	2567	8273
Heavy cow/200 lb calf	6045	3080	9125

Cattle may forage on browse species during the summer months. In most cases this use would be incidental except, perhaps, in the case of aspen. Thill *et al.*'s (1983) study includes aspen in the production data so further consideration for browse use is not considered necessary.

Sheep: Forage requirements for sheep were derived from Ensminger (1978, Table 4-53). Daily forage demand for a ewe varies by size and reproductive status, ranging from as little as 1.6% of body weight (heavy ewe, maintenance) to as much as 4.2% (light ewe,

9

first eight weeks of lactation). Table 7 summarizes data for ewes of different weights by reproductive period.

Table 7. Forage Intake Needs of a Ewe (Dry Matter Equivalent, in Pounds)

Ewe	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Light (110 lbs)	232	165	206	207	231	[illegible]
Medium (143 lbs)	315	185	247	246	268	[illegible]
Heavy (176 lbs)	347	202	316	258	306	[illegible]

Equivalents. An animal use month [AUM] is defined as one month's grazing by a dry cow. A permittee may prefer to graze cow-calf pairs, yearling cattle, or sheep, so there is a need to convert different kinds of livestock to equivalent AUMs. Table 8 provides the conversion factors (FSM 2200, R-3 Supp. 2200-91-1).

Table 8. Conversion Factors for Yearling Cattle and Sheep

Class	AUM Value	No. of Animals/AUM
Cow-calf Pair	0.76	1.32
Yearling Cattle		
Light (300 - 450 lbs)	0.55	1.82
Medium (450 - 650 lbs)	0.70	1.43
Heavy (650 - 800 lbs)	0.75	1.33
Sheep	0.20	5.00

LIVESTOCK CAPACITY

Livestock capacity for each alternative will be determined as follows:

1. Estimated forage production, as field verified, will be multiplied by acres and by the allowable use factor to determine the pounds of forage available for use. This will be done on FC and PC range by pasture. Further adjustments for soil stability, distance from water and/or slope may be made as described in Section II.

2. Livestock and wildlife forage requirements will be determined.

3. The available forage may be distributed for both wildlife and livestock. Alternatives may be developed to evaluate effects of forage distribution at varying ratios.

4. A capacity will be established for each pasture based on the amount of forage available for use and the forage requirements of both livestock and wildlife. The pasture capacity (excluding holding traps) will be summed to establish a capacity for the allotment.

ACQUIRED LANDS

Since the Forest Plan was implemented (1987), a number of formerly private parcels have been acquired. Wildlife surveys indicate that some of these lands may be within big game critical winter range in some years, depending on snow level. In accordance with Forest Plan standards and guidelines (pg. 75-1), special consideration will be given to critical big game winter ranges in areas where winter range has been determined to be a limiting factor to achieving game management objectives. New land acquisitions in critical winter range areas will not be used for domestic livestock grazing unless their inclusion in a grazing system better meets big game objectives. The AMP analyses will evaluate the situation, as appropriate, and develop appropriate alternatives.

LITERATURE CITED

Apache-Sitgreaves National Forests. 1998. Considerations concerning stocking rates 1998 allotment management plans for allotments on Chevelon/Heber Ranger Districts, Lakeside Ranger District. Draft. Mk.

Bojorquez, L.A. 1987. Multiple Resource Modelling in the Forest and Woodland Ecosystems of Arizona. Unpublished thesis. School of Renewable Natural Resources, University of Arizona, Tucson.

Brown, Richard L. 1990. Effects of a Savory Grazing Method on Big Game: A Final Report. Arizona Game and Fish Department, Research Branch. *Technical Report* No. 8.

Clary, Warren P. 1975. Range Management and its ecological basis in the Ponderosa Pine Type of Arizona: the status of our knowledge. USDA FS Research paper RM-158. Ft Collins, Colo.

Cook, C.W. 1966. Factors affecting utilization of mountain slopes by cattle. J. Range Manage. 19:200-204.

Covington, W.W. and R.R. Fox. 1991. Overstory-Understory Relationships in Southwestern Ponderosa Pine. In A. Tecle and W.W. Covington, eds. *Multiresource Management of Southwestern Pine Forests: The Status of Our Knowledge*, pp. 121-161. USDA Forest Service, Southwestern Region, Albuquerque.

Ensminger, M.E. 1978. *The Stockman's Handbook*. Fifth Edition. The Interstate Printers & Publishers, Inc., Danville, Ill.

Ffolliott, Peter F. 1983. Overstory-Understory Relationships: Southwestern Ponderosa Pine Forests. In E.H. Bartlett and David R. Betters, eds. *Overstory-Understory Relationships in Western Forests*, pp. 13-15. *Western Regional Research Publication* No. 1. Colorado State University Experiment Station, Fort Collins.

Forest Plan. 1987. *Apache-Sitgreaves National Forests Plan.* US Government Printing Office, Washington, D.C.

FSM 2209.21, *Range Analysis and Management Handbook.* USDA Forest Service, Region 3, Albuquerque.

FSM 2200, R-3 Supplement 2200-91-1. *Range Management Manual.* USDA Forest Service, Region 3, Albuquerque.

Ganskopp, David and Martin Vavra. 1987. Slope use by Cattle, Feral Horses, Deer, and Bighorn Sheep. Northwest Science, Vol. 61, No. 2.

Glendening, George E. 1944. Some Factors affecting cattle use of northern Arizona pine bunchgrass ranges. U.S. Forest Service, Southwest Forest and Range Expt. Sta. Res. Rpt. 6, 9 pp., illus.

Goodwin, DuWayne L. 1962. Grazing Steep Mountain Slopes. Range Improvement Notes Vol. 7, No. 3, Forest Service Intermountain Region.

Holechek, Jerry L. 1988. An Approach for Setting the Stocking Rate. *Rangelands* 10:10-14.

Holechek, Jerry L., Rex D. Pieper and Carlton H. Herbel. 1995. *Range Management: Principles and Practices.* 2nd edition. Prentice Hall, Saddle River, NJ.

Jameson, Donald A. 1967. The Relationship of Tree Overstory and Herbaceous Understory Vegetation. *Journal of Range Management* 20:247-249.

Leege, Thomas A. 1984. Guidelines for Evaluating and Managing Summer Elk Habitat in Northern Idaho. Idaho Department of Fish and Game, *Wildlife Bulletin* No. 13.

McDaniel, K.C. and J. Tiedeman. 1981. Sheep Use on Mountain Winter Range in New Mexico. *Journal of Range Management* 26:94-97.

Miller, William H., John H. Brock, and James Horsley. No date. Elk-Cattle Interaction in Central Arizona. Unpublished ms., School of Planning and Landscape Architecture, Arizona State University, Tempe.

Mitchell, J.E. and P.N.S. Bartling. 1991. Comparison of Linear and Nonlinear Overstory-Understory Models for Ponderosa Pine. *Forest Ecology and Management* 42:195-204.

Mueggler, Walter F. 1965. Cattle Distribution on Steep Slopes. J. Range Manage. 18:255-257.

Pinchak, William E., Michael A. Smith, Richard H. Hart, and James W. Waggoner, Jr. 1991. Beef cattle distribution patterns on foothill range. Journal of Range Management 44(3):267-275.

Phillips, Thomas A. 1965. The influence of slope gradient, distance from water, and other factors on livestock distribution on national forest cattle allotments of the Intermountain Region. Range Improvement notes. Vol. 10, No.3 Forest Service Intermountain Region.

Pieper, Rex D. 1990. Overstory-Understory Relations in Pinyon-Juniper Woodlands in New Mexico. *Journal of Range Management* 43:413-415.

Pieper, Rex D. 1994. Understory Production and Composition in Pinyon-Juniper Woodlands in New Mexico. In D.W. Shaw et al., tech. coords. *Desired Future Conditions for Pinyon-Juniper Ecosystems: Proceedings of the Symposium*, pp. 120-124. USDA Forest Service, Rocky Mountain Research Station, *General Technical Report* RM-258.

Rice, R.W. 1995. Letter report regarding forage requirements of range cattle. Department of Animal Sciences, College of Agriculture, University of Arizona. Unpublished ms. on file, 1999 AMP Project Record, Lakeside Ranger District.

Rowland, M.M., A.W. Alldredge, J.E. Ellis, B.J. Weber and G.C. White. 1983. Comparative Winter Diets of Elk in New Mexico. *Journal of Wildlife Management* 47(4):924-932.

Sprinkle, J. 1998. Response to herbaceous forage distribution for livestock and wild ungulates. Game Management Unit 4A. 1998 AMP analysis. Department of Animal Sciences, College of Agriculture, University of Arizona. Letter to Black Mesa Ranger District.

Severson, Keith E. and Alvia L. Medina. 1983. Elk and Deer Habitat Management in the Southwest. *Journal of Range Management Monograph No 2*.

Tapia, L.A.B., P.F. Folliott and D.P. Guertin. 1990. Herbage Production-Forest Overstory Relationships in Two Arizona Ponderosa Pine Forests. *Journal of Range Management* 43:28-28.

TES. 1989. *Terrestrial Ecosystem Survey of the Apache-Sitgreaves National Forests*. USDA Forest Service, Southwestern Region, Albuquerque.

Thill, Ronald E., Peter F. Folliott and David P. Patton. 1985. *Deer and Elk Forage Production in Arizona Mixed Conifer Forests*. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, *Research Paper* RM-268.

Uresk, D.W. and K.E. Severson. 1989. Understory-Overstory Relationships in Ponderosa Pine Forests, Black Hills, South Dakota. *Journal of Range Management* 42:203-208.

Wallace, Mark Christopher. 1984. Habitat Use by Elk, Mule Deer, and Cattle in Arizona. Unpublished thesis, School of Renewable Natural Resources, University of Arizona, Tucson.

Editor's note. This original version of this report was prepared by Clay Baxter (Forester/Range Conservationist, Likeside RD), Chris Nelson (Soil Scientist, Supervisor's Office) and Linda White Trefaro (Wildlife Biologist, Alpine RD). The present version includes contributions on sheep grazing capacity, forage production classes, and AUM equivalents by Kendall Hughes (Range Conservationist, Chevelon/Heber RD).
—*Bruce K. Donaldson, Writer/Editor, Shoreacres Interdisciplinary Analysis Team.*

Appendix D. Contraception As An Option on The Jicarilla Wild Horse Territory

Research into the use of contraceptives 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 of these 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]

During the late 1980s, the National Park Service (NPS) research team on Assateague Island National Seashore turned to an immunocontraceptive agent, porcine zona pellucida (PZP), for the wild horses on the island, which had been reported to block fertilization in dogs, rabbits, and primates. In order for sperm to attach to the ovum and fertilize the egg, there must be complementary proteins on both the surface of the sperm and the zona pellucida (ZP) of the ovum. PZP is a foreign protein against which the treated mare produces anti-PZP antibodies. These antibodies attach to the mare's zonae sperm receptors on the ovum and block fertilization. Zona pellucida from domestic pig ovaries (obtained from slaughter houses) is minced and the PZP is obtained from screening filtration. Freund's Complete Adjuvant (FCA) is mixed with the PZP in order to enhance its effects when it is initially injected into mares intramuscularly.

Experimental PZP application on the wild horses of Assateague Island began in 1988. Following promising reductions in the pregnancy rates in mares, the NPS in 1994 began to stabilize the growth of the population solely using PZP immunocontraception. The Assateague research team also developed non-invasive methods to assess the pregnancy rates of, and detect ovulation in, free-ranging treated and non-treated mares by analyzing reproductive steroid metabolites in feces and urine. These methods require the sample be taken in the field from individually recognizable mares, but no captures are necessary.

While PZP is considered an experimental agent by the federal Food and Drug Administration (FDA), it does appears to meet most of the safety concerns of the BLM who currently has several research studies ongoing 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 carry foals to term. Initial research suggests native PZP does not affect ovarian function, hormonal health, or safety in pregnant animals. Life span and health of treated mares may be increased, apparently due to the absence of stresses from pregnancy and lactation. Treated mares apparently live about five to ten years longer than do untreated mares that continue to get pregnant and produce young. One initial study suggested harem behaviors are not influenced. There appear to be no generational effects — offspring of treated mares are able to reproduce normally. The agent is about 90% effective in blocking fertility in mares. [221] [223] [224]

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. Alternatively, in those populations where the individual mare can be both recognized and approached on foot for darting, the injection may also be administered remotely by means of a 1.0cc dart with a Pneu-bait or Dan-Inject dart gun. A second booster shot is then required for each year of immunocontraception. Following the second or third year of treatments, only an every-other or every-third year booster is needed. 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 two years (actually ~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 two year vaccine cannot be remotely administered. [221]

Two major drawbacks of conventional PZP and Time-Release PZP have been identified by BLM managers: (a) the brief duration – managers prefer a one-shot, three to five-year duration, and (b) the fact that the most effective known adjuvant, FCA, present some health concerns in both humans and horses. While the one-year or two-year durations of these forms may be adequate, and even preferred for small populations of wild horses, managers of the larger herds, such as herds in Nevada and Wyoming, have a critical need for a single application agent that lasts longer. If a gather is held during the summer or early fall, and the Time-Release PZP is injected, only one effective season of contraception may be achieved. Some mares could become pregnant late during the second subsequent summer. There are some concerns about lower survival of late born foals.

BLM is also seeking an alternative adjuvant to FCA. FCA causes a false positive TB test in humans following accidental injection or needle stick, and can cause granulomas at injection sites in treated mares. The granulomas are generally small and shrink over time when the injection is into the buttock area of the horse. Presently, these risks are mitigated by only allowing persons trained and certified to administer the PZP and FCA mixture. However, a safer alternative adjuvant is desired. Modified Freund's Adjuvant (MFA) and other adjuvants may be potential replacements, but the efficacy and duration of these replacements needs to be evaluated under controlled conditions. In particular, there has been no direct comparison of the relative effectiveness of fertility control with the less objectionable MFA compared to FCA under controlled conditions. BLM will substitute a new adjuvant as soon as an effective replacement can be found for FCA.

Sufficient prior work with PZP has been conducted on wild horses in Nevada and on Assateague Island to justify BLM field trails at this time. However, significant unanswered questions remain concerning population and behavioral effects of the treatments that must be addressed before BLM proceeds with broad-scale management applications of fertility control. [221]

For most wild horse populations 70% of all reproductively active females would need to be maintained in an infertile state to achieve a stable population. Regardless of control strategym, genetic variation is lost much more slowly if young animals are treated (e.g. 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% of breeding mares to treat with the two year contraceptive every two years could render contracepting 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 the 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 ap-

proved 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 [224]. The BLM is currently working with HSUS and a Field Trial Plan for Wild Horse Fertility Control is in place for the use of PZP under the stated guidelines.

The Forest Service has not to date 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 along with the Science and Conservation Center (SCC), Zoo Montana, the maker of the vaccine. The actual research plan would require the approval of HSUS.

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