

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]

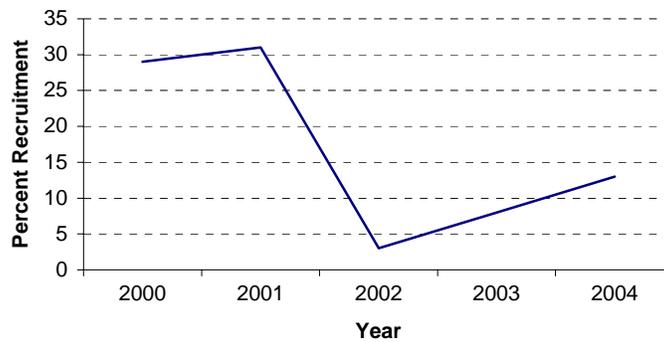
Sex Ratio

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	Year	Number
1912	1000	1971*	48
1913	750	1972	63
1914	500	1973	46
1915	150	1974	122
1916	200	1975	101
1917	200	1977	225 -11 adopted
1919	300	1978	242 - 9 adopted
1922	400	1979**	204 - 15 adopted
1923	420	1980	80 - 12 adopted
1924	420	1981	115 - 48 adopted
1925-46	No data	1982	60
1947	100	1983	?? – 14 adopted
1948	100	1985	80 - 15 adopted
1949	100	1986	?? – 9 adopted
1950	100	1987	144 – 20 adopted
1951	70	1988	?? – 33 adopted
1952	68	1989	94
1953	45	1990	53
1954	52	1991	?? – 39 adopted
1955	57	1992	??
1956	75	1993	?? – 7 adopted
1958	50	1994	87 – 42 adopted
1959	50	1995	??
1960	46	1996	??
1961	78	1997	140 – 70 adopted
1962	105	1998	?? – 30 adopted
1963	105	1999	93
1964	100	2000	119
1965	95	2001	157
1966	90	2002	161
1967	55	2003	182
1968	75	2004	197
1969	78		
1970	50		

Helicopter Gathering

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

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

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

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

Tranquilizer Darting

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

Walking Round Up

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

Baiting

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

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

Roping

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

Summary

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

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

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

Genetic Viability

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

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

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

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

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

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

Contraception

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

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

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

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

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

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

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

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

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

Management Options

Selective Criteria for Removals

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

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

Age Structure

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

Sex Ratio

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

Color

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

Conformation

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

Trap Site Locations

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

Contraception

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

Blood-Draws for Genetic and Health Studies

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

Management Options for Maintaining Genetic Diversity

Some examples for maintaining genetic diversity are:

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

- To continue to monitor genetic components within the herd.

Introduction of Horses

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

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

Adoption

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

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

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

Monitoring

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

Comparison of Alternatives

Past, Present, and Reasonably Foreseeable Activities

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

Alternative A

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

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

Cumulative Effects

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

Alternative B

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

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

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

Cumulative Effects

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

Alternative C

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

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

Cumulative Effects

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

Alternative D

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

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

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

Cumulative Effects

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