9-13-02

United States Department of the Interior

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In Reply Refer To:
4720
(NV-022.42)

SEP 13 2002

Dear Reader:

Enclosed is the Jackson Mountains Herd Management Area Gather Plan and Environmental Assessment (EA) prepared by the Bureau of Land Management, Winnemucca Field Office. The EA analyzes the impacts of gathering excess wild horses from the Jackson Mountains Herd Management Area for the proposed action and alternatives, including the No Action alternative.

Comments to this EA must be received by the Winnemucca Field Office by October 11, 2002. All comments received will be considered during the preparation of the Decision Record and Finding of No Significant Impacts. If you have any questions, please contact Tom Seley or Rodger Bryan at (775) 623-1500.

Sincerely,

Colin P. Christensen
Assistant Field Manger,
Renewable Resources

Enclosure: Jackson Mountains Herd Management Area
Gather Plan and Environmental Assessment (68pp)

Jackson Mountains Herd Management Area
Gather Plan
and
Environmental Assessment

NV-020-02-31

September 12, 2002

Winnemucca Field Office

I. Background Information

A. Introduction

With passage of the Wild Free-Roaming Horse and Burro Act of 1971 (Public Law 92-195), Congress found that: "Wild free-roaming horses and burros are living symbols of the historic and pioneer spirit of the West". The Act states that wild free-roaming horses are to be considered in the area where presently found, as an integral part of the natural ecosystem of the public lands. The Secretary was ordered to "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". From the passage of the Act, through present day, the Bureau of Land Management (BLM), Winnemucca Field Office (WFO) has endeavored to meet the requirements of the Act. The procedures and policies implemented to accomplish this mandate have been constantly evolving over the years.

Throughout this period, BLM experience has grown, and the knowledge of the effects of current and past management on wild horses and burros has increased. For example, wild horses have been shown to be capable of 18 to 25% increases in numbers annually, while wild burros increase at a slower rate, 11 to 15%. This can result in a doubling of the wild horse population about every 3 years. Field Offices have learned more about individual herds through vegetation studies, census, seasonal distribution flights, and gather activities. At the same time, nationwide awareness and attention has grown. As these factors have come together, the emphasis of the wild horse and burro program has shifted. Program goals have expanded beyond simply establishing a "thriving natural ecological balance" by setting an appropriate management level (AML) for individual herds, to include achieving and maintaining viable, vigorous, and stable populations.

The National Wild Horse and Burro Strategy involves establishing and achieving AML on all herd management areas (HMA's) managed by the BLM, and to achieve and maintain AML on all HMA's following a four-year gather cycle. The numbers of animals projected to be removed, based on this four year rotation, were estimated based on the use of the wild horse population model developed by Dr. Stephen Jenkins of the University of Nevada Reno. Those numbers by state and year, were first proposed through the Presidents 2001 budget request as the "Strategy to Achieve Healthy Lands and Viable Herds, The Restoration of Threatened Watersheds Initiative" which was later funded by Congress.

This Environmental Assessment and Gather Plan for the Jackson Mountains HMA will analyze the impacts associated with the Proposed Action and the Alternatives, including the No Action Alternative. A Population Management Plan (PMP) or Herd Management Area Plan (HMAP) has not been completed for the Jackson Mountains HMA. A PMP, which will incorporate additional data, current knowledge, and management objectives for the Jackson Mountains HMA wild horse population, will be completed within two years of the completion of the gather.

B. Purpose of and Need for Action

The purpose of the action is to achieve and maintain the AML for wild horses in the Jackson Mountains HMA, collect information on herd characteristics, determine herd health, and implement a fertility control research project. By achieving and maintaining AML in the Jackson Mountains HMA, BLM will also meet it's objectives in the HMA. These objectives include:

- *Manage the Jackson Mountains HMA to achieve and maintain a thriving natural ecological balance, and multiple-use relationship.*
- *Manage the Jackson Mountains HMA population to preserve and enhance the historic physical and biological characteristics of the herd.*
- *Maintain sex ratios and age structures, which will allow for the continued physical, reproductive and genetic health of the Jackson Mountains HMA.*
- *Preserve and maintain a healthy and viable wild horse population that will survive and be successful within the HMA during poor years when elements of the habitat are limiting due to severe winter conditions, drought, or other uncontrollable and unforeseeable environmental influences to the herd.*
- *Manage the Jackson Mountains HMA wild horse herd as a self-sustaining population of healthy animals in balance with other uses and the productive capacity of their habitat.*

Wild horses were last gathered in the Jackson Mountains HMA in 1997. At completion of the gather, the population was estimated to be 265 wild horses. Since that time the population has grown to an estimated 672 wild horses, which exceeds the AML by 210 % (455 head). The action is needed to reduce the wild horse population to the AML of 217 head established by the Final Multiple Use Decision's (FMUD) for the Bottle Creek, Deer Creek, Happy Creek, Jackson Mountains, and the Wilder-Quinn Allotment's (see Table 1.). Removal of excess wild horses would lead to achieving and maintaining a thriving natural ecological balance and multiple-use relationship in the Jackson Mountains HMA.

In addition, northern Nevada is experiencing hot dry weather conditions. The latest National Oceanic and Atmospheric Administrations (NOAA) Drought Monitor seasonal assessment states that the July-September forecast of below normal rainfall means the current dry conditions may worsen in northern Nevada. NOAA's Climate Prediction Centers (CPC) experimental Palmers Drought Severity Index for July 6, 2002 indicates the Jackson Mountains area is experiencing extreme drought. The CPC's May 2002 Forecast Forum indicates that further development towards El Nino will continue, with weak-to-moderate El Nino conditions through early 2003. A weak or moderate El Nino would feature much weaker global impacts than were experienced in the very strong 1997-1998 El Nino. The climatic forecasts indicate that the action should be implemented as scheduled, to protect the health and welfare of wild horses, habitat, and to ensure that there is adequate forage available this winter.

C. Conformance with Existing Land Use Plans

The Paradise-Denio Resource Area Management Framework Plan (MFP) Record of Decision (ROD), which directs management in the project area, approved on July 9, 1982 has been reviewed. The Proposed Action is in conformance with this Plan, and is consistent with federal and state laws and regulations, and plans to the maximum extent possible.

D. Relationship to Statutes, Regulations, Policies, Plans, or Other Environmental Analyses

The proposed action and alternatives are in conformance with the Wild Free-Roaming Horse and Burro Act of 1971 (PL 92-195 as amended); all applicable regulations at 43 CFR 4700 and policies; the Strategic Plan for the Management of Wild Horses and Burros on the Public Lands; and the Nevada BLM Revised Tactical Plan – Wild Free-Roaming Horses and Burros, Ensuring the Legend Lives Free.

The proposed action and alternatives also conform with objectives from the Paradise-Denio MFP (Land Use Plan) Grazing Decision for Livestock, Wild Horses and Burros, and Wildlife which states in part; "Existing/current wild horse and burro numbers (as of July 1, 1982) will be used as a starting point for monitoring purposes. At the end of the third and fifth year of grazing following issuance of the grazing decision, make necessary adjustments based on monitoring results. If adjustments in addition to the fifth year adjustment are required, adjust livestock, wild horses and wildlife proportionately based on forage availability."

The carrying capacity for livestock and wild horses, multiple use management objectives, and the Terms and Conditions for livestock grazing for the Bottle Creek, Deer Creek, Happy Creek, Jackson Mountains, and Wilder-Quinn Allotment's were established in conformance with the Land Use Plan, BLM policy, and the Sierra Front/Northwest Great Basin Resource Advisory Council Area Standards and Guidelines. The attached map, Grazing Allotments within the Jackson Mountains HMA, displays the location of the Allotments in the HMA.

The AML for the Jackson Mountains HMA was established through allotment evaluations and FMUD's for the Bottle Creek, Deer Creek, Happy Creek, Jackson Mountains, and Wilder-Quinn Allotment's. The Land Use Plan established an AML of 0 in the Desert Valley Allotment, since there have been no wild horses in the allotment from passage of the Act on December 15, 1971 to the present. Table 1. lists the AML for wild horses in the Jackson Mountains HMA by allotment.

Table 1. AML by Allotment and FMUD Date

Allotment	AML	FMUD - Date
Bottle Creek	20 head	September 14, 2000
Deer Creek	10 head	October 16, 1998
Desert Valley	0 head	MFP July 9, 1982
Happy Creek	60 head	February 14, 1997
Jackson Mountains	117 head	May 27, 1994
Wilder-Quinn	10 head	November 19, 1998
Total	217 head	

AML is the maximum number of wild horses to be managed in the HMA. The Happy Creek Allotment FMUD states that wild horses; "will be managed in a range from 36 to 60 wild horses". The Bottle Creek Allotment FMUD states; "with establishment of AML for the Bottle Creek Allotment, the wild horse population within the northern portion of the Jackson Mountains HMA will be managed in a range of 60 to 100 wild horses". The northern portion of the Jackson Mountains HMA includes the Bottle Creek, Deer Creek, Happy Creek and Wilder-Quinn Allotments.

Environmental analysis (EA) have been conducted in past years which analyzed the impacts of various gather methods on wild horses, and other critical elements of the human environment, to achieve AML. These documents include:

1. Programmatic Environmental Assessment, Wild Horse Fertility Control Research, EA No. NV-020-00-02, November 1999.
2. Gather and Selective Removal of Wild Horses from the North Jackson Mountains HMA, EA No. NV-020-07-16, June 1997.
3. Gather and Selective Removal of Wild Horses from the Jackson Mountains HMA, EA No. NV-0200-04-16, August 1994.
4. Winnemucca District Wild Horse/Burro Removal Programmatic Environmental Assessment, EA No. NV-020-7-24, August 1987.

These documents are available for public review at the Winnemucca Field Office.

II. Alternatives Including the Proposed Action

Five alternatives including the Proposed Action and the No Action Alternative will be analyzed within this document, and impacts identified. The description of all of the alternatives is given below.

Actions common to all alternatives except the No Action Alternative

The proposed gather would be scheduled to start no earlier than November 15, 2002. Regardless of which alternative is selected, the WFO Wild Horse and Burro (WH&B) Specialists would determine sex, age and color, assess herd health (pregnancy/parasite loading/physical condition/etc), sort individuals as to age, size, sex, temperament and/or physical condition, and select animals to be returned the range. Data would be collected, including biological samples, for analysis and inclusion into future planning documents. Excess wild horses would be transported to a BLM adoption preparation/holding facility.

A. HMA Objectives

The following HMA objectives would be common to all alternatives, except the No Action Alternative.

1. Establish a management range in the Jackson Mountains HMA of 130 to 217 wild horses, as shown in Table 2.

Table 2. Management Range for Wild Horses

Allotment	Management Range
Bottle Creek	12 to 20 head
Deer Creek	6 to 10 head
Desert Valley	0 head
Happy Creek	36 to 60 head
Jackson Mountains	70 to 117 head
Wilder-Quinn	6 to 10 head
Total	130 to 217 head

Wild horse movement among allotments in the northern end of the Jackson Mountains HMA is apparent through trails and seasonal variation in distribution. It is recognized that individually, the management range for wild horses in each allotment (Bottle Creek, Deer Creek, Happy Creek, and Wilder-Quinn) is not a genetically viable population. However, as indicated, these horses interact with each other, and the interaction should ensure genetic viability. The sum total of the management range of all four allotments in the northern portion of the Jackson Mountains HMA will be the management level. Management will not be fragmented by allotment.

2. Selective Removal Criteria

Determination of which horses would be returned to the range would be based on an analysis of existing population characteristics and HMA objectives. Wild horses would be selected and released back into the HMA, based on the historic characteristics (color pattern, sex ratio) of the Jackson Mountains HMA. Objectives for the herd were detailed previously under the Purpose of and Need for Action section, and historic population characteristics are described in Chapter III, Affected Environment. Wild horses selected for release back into the HMA would adhere to the National Selective Removal Policy to the extent possible, in accordance with the *Gather Policy and Selective Removal Criteria for Wild Horses, Washington Office IM 2002-095*, which details the priorities to be followed as:

a. Age Class Five Years and Younger: Wild horses five years of age and younger may be removed and placed into the national adoption program.

b. Age Class Ten Years and Older: Wild horses ten years of age and older may be removed and placed into long-term holding.

Any animals within this age class that are in the Henneke category of 2 or less and have no chance of timely improvement would be evaluated for euthanasia. Any euthanasia would be in accordance with Washington Office Instruction Memorandum 2001-165. Older horses that, in the opinion of the Authorized Officer, may survive if released but probably would not tolerate the stress of removal, preparation, and holding would be evaluated for return to the HMA.

c. **Age Class Six to Nine Years**: Wild horses aged six to nine years old should be removed last and only if the HMA cannot achieve AML without their removal.

The National selective removal criteria would be followed to the extent possible, however population modeling estimated that only 31 wild horses (20 mares and 11 studs) would fall into the of 6-9 year old age categories (Appendix C, Population Modeling). Therefore, it is anticipated that additional animals from the younger and/or older categories would need to be released to meet the objective of the proposed action or alternatives. Animals older than 9 years of age would be preferred for several reasons that include decreased adoption demand for older animals, and horses older than 9 years old are currently placed in long-term holding facilities. Exceptional animals that represent historic colors, size and/or confirmation may be chosen for release outside of the selective removal priorities. Weak, unhealthy and unthrifty animals would not be selected for release back onto the HMA.

To enhance the selection process, more animals than required by the proposed action or alternatives would initially be separated for release, and then a final sorting completed to select the exact animals for release, based on traits and ages of all of the animals initially selected for release. Additionally, in the case that a certain number of wild horses evade gather, and have been confirmed by the WFO WH&B Specialist, the total number of animals released may be reduced by this number.

B. Gather Operations

The gather would be conducted through use of the Great Basin Wild Horse and Burro Gather Contract. Multiple gather sites (traps) may be used to gather wild horses from the HMA. To the maximum extent possible, gather sites would be located in previously disturbed areas. All gather and handling activities (including gather site selections) would be conducted in accordance with the Standard Operating Procedures (SOPs) described in Attachment 1. The helicopter drive trap gather technique would be utilized for this gather. It is estimated that three or four trap sites would be required to complete the gather. When animals are released, every effort would be made to release them back into the same general area from which they were gathered.

As needed, an APHIS Veterinarian may be on-site during gather operations to examine animals and make recommendations to the WFO WH&B Specialists for care and treatment of the wild horses. Consultation with a veterinarian would take place prior to euthanasia in accordance with Washington Office Instruction Memorandum 2001-165.

C. Data Collection

The following data would be collected during the gather, to assure an adequate database to prepare a PMP:

1. **Blood Samples.** Blood samples would be collected from release animals and analyzed to establish genetic baseline data (genetic diversity, historical origins of the herd, unique markers, plus norms for the herd) for the HMA in accordance with the *Gather Policy and Selective Removal Criteria for Wild Horses, Washington Office IM 2002-095.* The minimum sample size is 25 per cent of the upper end of the management range (54 samples for the Jackson Mountains HMA) or a minimum of 25 samples and not more than 100 per population. Blood would be drawn from both mares and studs in a ratio similar to the sex ratio released. The blood sample analysis would provide a comparison with domestic breeds and other wild populations that have been tested. A Veterinarian or other trained personnel would collect the blood samples.

2. **Sex ratio/Age Structure.** The sex, age, and disposition (remove or release) for each animal gathered would be recorded. This data would be used to develop a pre-gather and release sex ratio/age structure summary for the HMA. The pre-gather sex ratio/age structure would be developed by combining the release sex ratio/age structure data collected at the gather, with sex ratio/age structure data collected at the adoption preparation/holding facility receiving the removed animals.

3. **Reproduction and Survival.** Information on reproduction and survival would be collected to the extent possible, through documentation of the wild horses gathered, and the age of those released following the gather.

4. **Characteristics.** Color and size of the animals would be recorded. The type of horse would be noted if it can be determined, or a general impression of the type of horses gathered within the HMA. Incidence of albinism, parrot mouth, club feet, severely crooked legs or any other negative trait believed to be genetic, would be recorded along with the disposition of that animal.

5. **Condition Class.** Condition class would be recorded using the Henneke System for those animals that are exceptions to average, such as noticeably thin, or fat wild horses.

6. **Other data.** All other data believed to be essential to the Population Management Planning effort would be collected during the gather. This may include parasite load, disease (from blood samples), percentage and age of pregnant mares, or other data.

D. Strangles Research Data Collection

As part of the ongoing strangles research conducted by Colorado State University (CSU), biological samples may be collected from wild horses captured during gather operations. BLM field personnel would be responsible for identifying animals showing clinical signs of *Streptococcus equi* and/or *Streptococcus zoo* infection, and for collecting and forwarding a

nasal swab sample for each animal showing signs of respiratory disease to CSU-Center of Veterinary Epidemiology and Animal Disease Surveillance Systems. Animals would be sampled if they meet the following criteria:

1. Nasal discharge from one or both nostrils that is white/green or cloudy white.

2. Abscesses under or behind the jaw, whether they are broken open or not.

PROPOSED ACTION

Removal to the Lower Limit of the Management Range with Fertility Control

The Proposed Action is to gather approximately 672 wild horses and remove approximately 542 wild horses from the Jackson Mountains HMA, and to implement an immunocontraceptive research project on 100% of the mares released, approximately 78 head (60% of the release animals), monitoring results as appropriate. Approximately 130 wild horses (78 mares and 52 studs) would be returned to the HMA, which represents the lower limit of the management range.

All of the mares to be released back to the HMA would be treated with an immunocontraceptive vaccine, Porcine zona pellucidae (PZP), administered by researchers connected with the National Fertility Control Field Trial Plan, or trained BLM personnel. The inoculation of mares would consist of a liquid dose of PZP vaccine and a time released portion of the drug in the form of pellets. The approach incorporates the PZP into a non-toxic, bio-degradable material which can be formed into small pellets. The pellets are injected with the liquid and are designed to release PZP at several points in time much the way time-release cold pills work. This formulation would be delivered as an intramuscular injection by a jabstick syringe, while mares are restrained in the working chute. Upon impact the liquid in the chamber would be propelled into the muscle along with the pellets. This delivery method has been used previously to deliver inmmunocontraception vaccine with acceptable results. Such a vaccine would permit a single injection to cause up to two years of contraception at approximately 95% effectiveness in year one, and 85% effectiveness in year two.

Delivery of the vaccine would be by means of syringe or dart with a 12 gauge needle or 1.5" barbless needle respectfully. 0.5 cc of the PZP vaccine would be emulsified with 0.5 cc of adjuvant (a compound that stimulates antibody production) and loaded into the delivery system. The pellets would be placed in the barrel of the syringe or dart needle and would be injected with the liquid.

All treated mares would be identified and freezemarked with a Nevada State approved identification (such as a letter or a number) on the left hip to enable positive identification for future tracking and data collection. Researchers associated with the National Fertility Control Field Trial Plan would collect data over the next three years to determine the effectiveness of the vaccine.

ALTERNATIVE I:

Removal to the Lower Limit of the Management Range without Fertility Control

Alternative I is to gather approximately 672 wild horses and remove approximately 542 wild horses from the Jackson Mountains HMA. Approximately 130 wild horses (78 mares and 52 studs) would be returned to the HMA, which represents the lower limit of the management range. A fertility control research project would not be implemented.

ALTERNATIVE II:

Removal to the Upper Limit of the Management Range with Fertility Control

Alternative II is to gather approximately 672 wild horses and remove approximately 455 wild horses from the Jackson Mountains HMA, and to implement an immunocontraceptive research project on 100% of the mares released, approximately 130 head (60% of the release animals), monitoring results as appropriate. Approximately 217 wild horses (130 mares and 87 studs) would be returned to the HMA, which represents the upper limit of the management range. Delivery of the immunocontraceptive vaccine would be as described under the Proposed Action.

ALTERNATIVE III:

Removal to Upper Level of the Management Range without Fertility Control

Alternative III is to gather approximately 672 wild horses and remove approximately 455 wild horses from the Jackson Mountains HMA. Approximately 217 wild horses (130 mares and 87 studs) would be returned to the HMA, which represents the upper level of the management range (AML). A fertility control research project would not be implemented.

ALTERNATIVE IV - No Action:

This alternative consists of no direct (i.e. passive) management of the wild horse population in the Jackson Mountains HMA. The wild horse population would be allowed to reach equilibrium by regulating their numbers through periodic elevated mortality rates caused by drought, insufficent forage, water and/or space availability, disease, predation, or a combination of these factors.

III. Affected Environment

Table 3 lists the critical elements of the human environment whose review is mandated by law, regulation, or executive order. Those marked as not affected will not be impacted by the proposed action or alternatives, or are not present in the area.

Table 3. Critical Elements Checklist

Critical Element	Present	Affected
Air Quality	Yes	No
Areas of Environmental Concern (ACECs)	No	No
Cultural Resources	Yes	Yes
Environmental Justice	No	No
Floodplains	No	No
Invasive, Non-native Species	Yes	Yes
Migratory Birds	Yes	No
Native American Religious Concerns	No	No
Prime or Unique Farmlands	No	No
Special Status Species	Yes	No
Waste, Hazardous or Solid	No	No
Water Quality (Surface and Ground)	Yes	No
Wetlands and Riparian Zones	Yes	Yes
Wild and Scenic Rivers	No	No
Wilderness	Yes	Yes

A. Wild Horses

1. HMA Description

The Jackson Mountains HMA is located approximately 60 miles west northwest of Winnemucca, Nevada. The area is approximately 283,000 acres in size, with 274,510 acres of public lands and 8,490 acres of private land. Terrain varies from level valleys to steep, rugged mountains, with elevations ranging from 4,000 feet at the valley floor to 8,923 feet at King Lear Peak. The area is bordered on the west by the Black Rock Desert, on the east by Desert Valley, on the north by State Highway 140 and the Quinn River, and on the south by the Union Pacific Railroad. Refer to the attached Jackson Mountains HMA maps, which display the associated allotments and wilderness areas.

2. Gather History and Population Characteristics

Gathers were conducted in the Jackson Mountains HMA in 1989, 1994 and 1997. In 1989 the gather was a gate cut (all gathered horses removed), while the 1994 and 1997 gathers were age selective. The 1994 gather was only conducted on the Jackson Mountains Allotment portion of the HMA. Removal criteria during this gather dictated that only horses 5 years old and younger could be removed. Removal criteria for the 1997 gather allowed the removal of all horses 9 years old and younger. This gather was conducted on the entire HMA. Table 4 shows the number of wild horses that were gathered and the number removed during the 1989, 1994 and 1997 gathers.

Table 4. Number of Wild Horses Gathered and Removed

Year	Number Gathered	Number Removed
1989	225	225
1994	447	313
1997	671	511

As a result of the age selective removal in 1997, the current wild horse population is anticipated to be made up primarily of younger horses (foals to 5 years of age) and older horses (14 years old and older).

Sex ratios for the gathered population in 1997 was 56.4% females and 43.6% males. At the completion of the 1997 gather there were 160 wild horses released, with a sex ratio of 47.1% females and 52.9% males. The sex ratio of the current population is expected to be approximately 50% females and 50% males.

Past gather data (1997) was used to determine animal colors and the approximate frequency of the color within the herd. The frequency of colors found during the 1997 gather were; bay (52.6%), sorrel (24.6%), black (12.6%), brown (7.5%), gray (2.3%) and, buckskin and palomino (.2% each).

Table 5 shows the estimated July 2002 population by allotment within the HMA. The population estimate is base on an August 2001 helicopter census, using a 15.0% rate of annual increase.

Table 5. Estimated July 2002Population

Allotment	Estimated July 2002 Population
Bottle Creek	13
Deer Creek	28
Desert Valley	0
Happy Creek	264
Jackson Mountain	367
Wilder-Quinn	0
Total	672

3. Genetic Diversity and Viability

Blood samples were collected from release animals during the 1994 and 1997 gathers to develop genetic baseline data (e.g. genetic diversity, historical origins of the herd, unique markers). The samples were analyzed by a geneticist to develop a genetic frequency for the herd, however there were no other interpretations made from the data. Additional blood samples will be drawn during the proposed gather to establish the current level of genetic diversity for the Jackson Mountains HMA. This data will be incorporated into a Population Management Plan. At this time, there is no evidence to indicate that the Jackson Mountains HMA suffers from reduced genetic fitness. The following summarizes current knowledge of genetic diversity as it pertains to wild horses. To

supplement this discussion, please refer to Appendix D, for more information about current knowledge of genetic diversity in wild horse herds.

- Smaller, isolated populations (<200 total census size) are particularly vulnerable when the number of animals participating in breeding drops below a minimum needed level (Coates-Markle, 2000).
- It is possible that small populations will be unable to maintain self-sustaining reproductive ability over the long term, unless there is a natural or management-induced influx of genetic information from neighboring herds. An exchange of only 1-2 breeding age animals per generation would maintain the genetic resources in small populations of about 100 animals, thus obviating the need for larger populations in all cases (Singer, 2000).
- There is little imminent risk of inbreeding since most wild horse herds sampled to date have large amounts of genetic heterozygosity, genetic resources are lost slowly over periods of many generations, wild horses are long-lived with long generation intervals, and there is little imminent risk of in breeding or population extinction (Singer, 2000).
- Genetic effective population size (Ne) is a difficult number to calculate for wild horses, since the calculation is complicated by many factors inherent in wild horse herds. No single universally acceptable formula exists to deal with these complexities, and no standard goal for Ne or loss of genetic resources currently exists for wild horse herds. A goal of Ne=50 is currently being applied as an estimate for Ne in wild horse herds (Singer, 2000).
- Current efforts with wild horses suggest management should allow for a 90% probability of maintaining at least 90% of the existing population diversity over the next 200 years (Coates-Markle, 2000).

The following summarizes what is known about the Jackson Mountains HMA as it pertains to genetic diversity:

- The current estimated population for the northern portion of the HMA (Bottle Creek, Deer Creek and Happy Creek Allotments) is 305 head, and 367 head in the southern portion (Jackson Mountain Allotment)
- Analysis of the 1994 and 1997 genetic frequency data indicated that there are two distinct breeding populations, one in the northern area and one in the southern area.
- The HMA is predominately isolated from other herds.
- Ne (genetic effective population size) for Jackson Mountains HMA has not been established.
- Current knowledge is limiting for application of these concepts to wild horse herds managed by the BLM. As more research is completed, and knowledge becomes available, it will be applied to the HMAs managed by the WFO.

B. Air Quality

Air quality within the Jackson Mountains HMA is considered good, and is typical of rural areas within the northern Great Basin,

C. Cultural Resources

A complete inventory of archeological sites in the Jackson Mountains HMA has not been completed. Previous inventories have identified pre-historic sites (lithic scatters, isolated projectile points, etc.) in the Jackson Mountains HMA. Historic sites associated with ranching and mining are known to occur in the Jackson Mountains HMA.

D. Invasive, Non-Native Species

Noxious weed surveys, including invasive and non-native species, have been completed in the wilderness areas contained within the Jackson Mountains HMA, and along roadways in and adjacent to the HMA. These surveys indicate that the following state listed noxious weeds occur:

Scientific Name	Common Name	Plant Symbol
Cardaria draba	White Top	CARDRA
Acroptilon repens	Russian Knapweed	ACRREP
Cirsium vulgare	Bull Thistle	CIRVUL
Lepidium latifolium	Tall White Top	LEPLAT
Onopordum acauthium	Scotch Thistle	ONOACA
Tamarix ramosissima	Salt Cedar	TAMRAM

These weeds occur in a variety of habitats including road side areas, rights-of-way, wetland meadows, riparian areas, as well as undisturbed upland range sites.

E. Migratory Birds

A migratory bird inventory has not been completed for the Jackson Mountains. Common migratory birds which may use the area as habitat include; various song birds, blue birds, nighthawks, swallows, swifts, fly catchers, kingbirds, dippers, blackbirds, crows, raptors, various waterfowl and shorebirds, snipe, sandpipers, phalaropes, wading birds, hummingbirds, warblers, finches, doves, juncos, wrens, sparrows, killdeer, robins, and meadowlarks.

F. Special Status Species

There has not been an inventory for candidate or species of concern conducted in the Jackson Mountains. Threatened species and species of concern that may occur in the Jackson Mountains HMA (Humboldt County, Nevada, File No. 1-5-02-SP-096, January 16, 2002) are listed below:

Threatened Species

	Common Name	Scientific Name
Fish:	Lahontan cutthroat trout	*Oncorhynchus clarki henshawi*

Candidate Species

	Common Name	Scientific Name
Birds:	Western yellow-billed cuckoo	*Coccyzus americanus*

Species of Concern

	Common Name	Scientific Name
Mammals:	Pygmy rabbit	*Brachylagus idahoensis*
	Pale Townsend's big-eared bat	*Corynorhinus townsendii pallescens*
	Pacific Townsend's big-eared bat	*Corynorhinus townsendii townsendii*
	Spotted bat	*Euderma maculatum*
	Small-footed myotis	*Myotis cilioabrum*
	Long-eared myotis	*Myotis evotis*
	Fringed myotis	*Myotis thydsanodes*
	Long-legged myotis	*Myotis volans*
	Yuma myotis	*Myotis yumanensis*
	California bighorn sheep	*Ovis Canadensis California*
	Preble's shrew	*Sorex preblei*
Birds:	Northern goshawk	*Accipiter gentiles*
	Western burrowing owl	*Athene cunicularia hypugea*
	Sage Grouse	*Centrocercus urophasianus*
	Black tern	*Chidonias niger*
	Least bitten	*Ixobryychus exilis hesperis*
	White-faced ibis	*Plegadis chichi*
Invertebrate:	Nevada viceroy	*Limenitus archippus lahontani*
Plants:	Tiehm's milkvetch	*Astraglus tiehmii*
	Schoolcraft's cryptantha	*Cryptantha schoolcraftii*
	Windloving buckwheat	*Eriogonum anemopilm*
	Crosby's buckwheat	*Eriogonum crosbyae*
	Grimy ivesia	*Ivesia rhypara var. rhypara*
	Smooth stickleak	*Mentzelia mollis*
	Cordelia beardtongue	*Penstemon floribundus*

No on-the-ground field investigations have been conducted for sensitive/protected plant and animal species. However, according to the Nevada Natural Heritage's program data (March 2000, and 2001), no endangered, threatened, candidate, sensitive plants have been reported in the project area.

G. Water Quality, Wetlands and Riparian Zones

Riparian areas are scattered throughout the Jackson Mountains and are generally associated with perennial streams that include; Bottle Creek, Deer Creek, Happy Creek, Jackson Creek, and Trout Creek. There are numerous springs and seeps found throughout the area. Severe resource degradation caused by wild horses is currently occurring at some springs within the HMA.

H. Wilderness

The Black Rock Desert-High Rock Canyon-Emigrant Trails National Conservation Act of 2000 designated the North Jackson Mountains, South Jackson Mountains, and the Black Rock Desert Wilderness Area's, which are contained partially or wholly in the Jackson Mountains HMA. The attached Jackson Mountains HMA map shows the location of the wilderness areas in relation to the HMA.

I. Wildlife

Wildlife habitat is comprised largely of three generalized plant communities: the salt desert shrub community, found at lower elevations, the Wyoming sagebrush community that occupies middle elevations, and a mountain brush community at higher elevations. Wildlife species found in these habitats vary in abundance and diversity depending on the type and condition of the vegetation. Approximately 300 species of wildlife, including mammals, birds, amphibians, reptiles, and fish are seasonal or yearlong residents.

Within the proposed project area, numerous species of wildlife occur. Mule deer (*Odocoileus hemionus)*, pronghorn antelope *(Antilocapra americana)*, California bighorn sheep (*Ovis canadensis California),* mountain lions *(Felis concolor)*, coyotes *(Canis latrans)*, and bobcats *(Lynx rufus)* are the main game and fur bearing species present. Sage grouse (*Centrocercus urophasianus*), chukar *(Alectoris chukar)*, morning doves *(Zenaida macroura)*, and cottontail rabbits *(Sylvilagus sp)* constitute the major upland game species. In addition, a variety of non-game mammals, birds, and reptiles occur in the project area.

J. Vegetation and Soils

Vegetation varies from salt desert shrub communities at lower elevations, to low and big sagebrush/grass communities at higher elevations. The lower elevations are comprised of salt tolerant plants such as bud sagebrush (*Artemisia spinescens*), shadscale (*Atriplex confertifolia*) and, baileys and black greasewood (*Sarcobatus spp.*). Mid-elevations and alluvial fans consist of Wyoming big sagebrush (*Artemisia tridentate wyomingensis*) or low sagebrush (*Artemisia arbuscula*), with an understory of Sandberg's bluegrass (*Poa secunda*), bottlebrush squirreltail (*Sitanion hystrix*), and Thurber's needlegrass (*Stipa thurberiana*). Within the mid and higher elevations, there is an occurrence of Utah juniper (*Juniperus osteosperma*). The higher elevation sites are comprised of mountain big sagebrush (*Artemisia tridentate vaseyana*), bluebunch wheatgrass (*Agropyron spicatum),* Idaho fescue *(Festuca idahoensis),* and also support mountain browse species that include serviceberry *(Amelanchier alnifolia)*, snowberry (*Symphoriocarpos spp.*), and currant *(Ribes spp.)*. Riparian areas at mid to higher elevations support quaking aspen (*Populus tremuloides*), cottonwood (*Populus sp.*), and willows (*Salix spp)*.

In August 2002 areas of heavy use were observed on upland and riparian vegetation in the HMA.

IV. Environmental Consequences

The following elements of the human environment are present and may be affected by the Proposed Action.

A. Wild Horses

Actions common to all alternatives except the No Action Alternative

1. HMA Objectives

a. Establish a Management Range in the Jackson Mountains HMA of 130 to 217 wild horses.

The Wild Free-Roaming Horse and Burro Act of 1971 (Public Law 92-195 as amended) states that, all management activities shall be at the minimum feasible level. The minimum feasible level of management would require that removals and other management actions that directly impact the population, such as helicopter census, occur as infrequently as possible (3 to 5 years). To the extent practical, the lower limit of the management range should allow maintenance of a self sustaining population, and the upper limit of the management range must be consistent with the objective of maintaining a thriving natural ecological balance. Population modeling (Appendix C.) conducted for the Proposed Action and Alternative I (Removal to the lower limit of the management range, with and without fertility control) indicate that the lower level of the management range should allow for maintenance of a self sustaining population. For the Proposed Action, the minimum population size in 5 years found that the lowest number of 0-20+ year old horses ever obtained was 86 head, with a median trial population of 168 head. The average population size in 5 years found that the lowest trail had 223 head, with a median trial population of 302 head. For Alternative I, the minimum population size in 5 years found that the lowest number of 0-20+ year old horses ever obtained was 127 head, with a median trial population of 168 head. The average population size in 5 years found that the lowest trial had 273 head, with a median trial population of 326 head.

The allotment evaluation and multiple use decision process for the allotments contained within the Jackson Mountains HMA established the level of horses that would result in maintaining a thriving natural ecological balance, which is the upper limit of the management range. The Bottle Creek Allotment FMUD established a management range of 60 to 100 wild horses for the northern portion of the Jackson Mountains HMA, which includes the Bottle Creek, Deer Creek, Happy Creek and Wilder-Quinn Allotments.

Establishment of a management range in the entire Jackson Mountains HMA would meet the intent of the Wild Free Roaming Horse and Burro Act, that all management actions shall be at the minimum feasible level. The following positive impacts for wild horses and their habitat would occur:

- A thriving natural ecological balance would be achieved and maintained by reducing

the population to the lower limit of the management range, following a standardized gather cycle.

- Ensure a viable population of wild horses that will survive, and be successful during poor years when elements of the habitat are limiting due to severe winter conditions, drought or other uncontrollable and unforeseeable environmental influences to the herd.
- Annual gathers would not be required which would allow for a greater level of herd stability and band integrity.
- Gathers would only occur when the population approaches or exceeds the upper limit of the management range.
- The wild horse population would be subjected to the stresses associated with gathering and handling as infrequently as possible.

If a management range is not established in the Jackson Mountains HMA, the intent of the Wild Free Roaming Horse and Burro Act, that all management actions shall be at the minimum feasible level, would not be met. The following negative impacts would occur:

- Annual gathers would be required to remove the annual increase in population each year, approximately 30 to 35 horses.
- A thriving natural ecological balance would not be maintained if yearly gathers to remove the annual increase do not take place. Resource degradation would begin occurring the year following the last gather and increase for each year that a gather is postponed.
- Annual gathers would have more severe impacts to herd stability and band integrity.
- The wild horse population would be subjected to the stress associated with gathering and handling annually. There would be a greater likelihood that more horses would be injured or killed.

b. Selective Removal Criteria

Direct impacts associated with the Proposed Action and Alternatives I, II, or III, would consist of selecting wild horses for release that possess the historic characteristics (color pattern, sex ratio), and age structure that are typical of the herd demographics of the Jackson Mountain HMA. The National Selective Removal Policy (described in Section II.A.2.) would be followed to the extent possible. Animals selected for release would be the most capable of surviving environmental extremes, thus ensuring a viable population is present in the HMA. As a result of the age selective removal in 1997, there will be horses in the five years and younger age class and the age class ten years and older, selected for release which will ensure a more normal age structure population, than may result from strict adherence to the National Selective Removal Policy. Utilizing the selective removal criteria would result in a positive impact for the long term health and stability of the population.

The effect of removal of horses from the population is not expected to have significant impact on herd population dynamics, age structure or sex ratio, as long as the selection criteria for the removal maintains the social structure and breeding integrity of the herd.

The selective removal strategy for the Jackson Mountains HMA would maintain the age structure (of critical breeding age animals), the sex ratio and the historic range of characteristics currently within the herd. This flexible procedure would allow for the correction of any existing discrepancies in herd dynamics, which could predispose a population to increased chances for catastrophic impacts.

Potential negative impacts to the long term health and stability of the population could occur from exercising poor selection criteria not based on herd demographics and age structure. These negative impacts would include modification of age or sex ratios to favor a particular class of animal. Effects resulting from successive removals causing shifts in sex ratios away from normal ranges are fairly self evident. If selection criteria favors studs over mares, band size would be expected to decrease, competition for mares would be expected to increase and, the size and number of bachelor bands would be expected to increase. On the other hand, a selection criteria which favors mares over studs would be expected to result in fewer and smaller bachelor bands, competition for mares may decrease, and there is a likelihood for larger band sizes.

The effects of successive removals on populations causing shifts in herd demographics favoring younger horses (under 15 years) would also have direct consequences on the population. These impacts are not thought of typically as adverse to a population. They include development of a population, which is expected to be more biologically fit, more reproductively viable, and more capable of enduring stresses associated with traumatic natural and artificial events.

2. Gather Operations

These direct impacts include: handling stress associated with the gathering, processing, and transportation of animals from gather sites to temporary holding facilities, and from the temporary holding facilities to an adoption preparation facility. The intensity of these impacts varies by individual, and is indicated by behaviors ranging from nervous agitation to physical distress. Mortality does occur during a gather, however it is infrequent and typically is no more than one half to one percent of the total animals gathered.

Impacts which may occur after the initial stress of herding and capture include; spontaneous abortion in mares, and increased social displacement and conflict in studs. Spontaneous abortion following capture is rare, depending on the time of year gathered. Traumatic injuries that may occur typically involve biting and/or kicking that results in bruises and minor swelling, which normally does not break the skin. These impacts occur intermittently, and the frequency of occurance varies with the individual.

Population wide impacts can occur during or immediately following implementation of the Proposed Action or Alternatives I, II, or III. They include the displacement of bands during capture and the associated re-dispersal, temporary separation of members from individual bands of horses, re-establishment of bands following release, and the removal of animals from the population. With the exception of the changes to herd demographics, direct wide population impacts have proven to be temporary in nature with most if not all impacts disappearing within hours to several days of release. No observable effects associated with

these impacts would be expected within one month of release except for a heightened shyness toward human contact. Observations of animals following release have shown horses relocate themselves back to their home ranges within 12 to 24 hours of release.

All activities would be carried out in accordance with current BLM policy, with the intent of conducting as safe and humane a gather as possible. Recommended actions incorporate proven Standard Operation Procedures (SOPs, Attachment 1) which have been developed over time. These SOPs represent the best methods for reducing impacts associated with gathering, handling, transporting and collecting herd data.

3. Data Collection

Direct impacts associated with data collection involve increased stress levels to the animals as they are restrained in the portable aging chute. Those animals selected for blood sampling may become very agitated as the samples are drawn. Once the animal is released from the chute, stress levels decrease rapidly. The collection of data is a positive impact to the long term management of the population. This data will be used to develop population specific objectives that will help to ensure the long term viability of the population. This procedure is within the intent of Public Law 92-195, as amended, as it relates to managing populations at the minimum feasible level.

4. Strangles Research Data Collection

Direct impacts would be the same as described above in Data Collection.

PROPOSED ACTION AND ALTERNATIVES

Population modeling was completed for the Proposed Action and Alternatives. One of the objectives of the modeling was to identify if any of the alternatives "crash" the population or cause extremely low population numbers or growth rates. Population modeling does not indicate that a crash is likely to occur to the population under the Proposed Action or Alternatives. Minimum population levels and growth rates were found to be within reasonable levels, and adverse impacts to the population are not likely. It is expected that implementation of the Proposed Action or Alternatives would not significantly impact the genetic viability or genetic health of the Jackson Mountains HMA. At this time, there is no evidence to indicate that the Jackson Mountains HMA suffers from reduced genetic fitness in any way. Please refer to the discussions pertaining to genetic diversity and viability found in the Affected Environment Chapter III and Appendix D, for more detail.

Table 6 displays the basic differences between the Proposed Action and Alternatives I, II, III, and IV identified through population modeling. This table shows the average population size for the median trial in five years, and average growth rate for the median trial in four years, following a gather, under the different alternatives. Refer to Appendix C, Population Modeling, for a complete summary of data and accompanying tables obtained from the Population Modeling.

Table 6. Population Modeling: Average Population and Growth Rates

Alternative	Average Population Size	Average Growth Rate - %
Proposed Action (Lower Limit of the management range with fertility control)	302	16.9
Alternative I (Lower Limit of the management range without fertility control)	326	20.5
Alternative II (Upper limit of the management range with fertility control)	393	14.3
Alternative III (Upper limit of the management range without fertility control)	433	19.4
Alternative IV – No Action	1049	17.5

Proposed Action

Direct impacts associated with the proposed action include potential changes to herd demographics, stress associated with gathering, and the effects from implementing an immunocontraceptive fertility control research project. The effect on herd demographics was discussed in the Selective Removal Criteria section (refer to Section IV.I.A.2), and the stress associated with gathering would be the same as those discussed under Gather Operations (refer to Section IV.I.B).

Each mare to be released would receive a single-dose of the two-year PZP contraceptive vaccine, as described in Section II. When injected, PZP (antigen) causes the mare's immune system to produce antibodies that bind to her eggs, effectively blocking sperm penetration and fertilization (ZooMontana, 2000). PZP is relatively inexpensive, meets BLM requirements for safety to mares and the environment, and can easily be administered in the field. Also, among mares, PZP contraception appears to be completely reversible, and to have no ill effects on ovarian function if the mare is not contracepted for more than 3 consecutive years. PZP will not affect normal development of the fetus, hormone health of the mare or behavioral responses to stallions, should the mare already be pregnant when vaccinated (Kirkpatrick, 1995). Turner (1997) also found that the vaccine has proven to have no apparent affects on pregnancies in progress, the health of offspring, or the behavior of treated mares. The PZP two-year vaccine has proven 90% effectiveness for up to two years if mares are inoculated during the winter months. Inoculated mares would foal normally in 2003, and the contraceptive would limit foal production in 2004 and 2005. Near normal foaling rates would be expected to resume in 2006.

Mares receiving the vaccine would experience slightly increased stress levels from additional handling while being inoculated and freeze marked. There may be some swelling at the injection site following the administration of the fertility control vaccine, but this would be a temporary, short term impact. Injection site injury associated with fertility control treatments is extremely

rare in treated mares, and may be related to experience of the person administering the vaccine. Injection of the vaccine would be controlled, handled and administered by a trained BLM employee, researcher or veterinarian. Any direct impacts associated with fertility control are expected to be minor in nature and of short duration. The mares would quickly recover once released back to the HMA.

Population wide indirect impacts would not appear immediately as a tangible effect and are more difficult to quantify. Impacts involve reductions in short term fecundity of initially a large percentage of mares in a population, increasing herd health as AMLs are achieved, and potential genetic issues regarding controlling contributions of mares to the gene pool, especially in small populations. The implementation of fertility control would result in an opportunity to allow increased fitness and condition of the mares released following the gather. The potential reprieve from foaling would greatly increase the overall health and fitness of mares.

Population modeling found that the Proposed Action resulted in the lowest average population size. The average population size for Alternatives I, II, III, and IV were 7.9%, 30.1%, 43.4%, and 247.4% greater than the Proposed Action. The average growth rate for Alternative II was 15.4% less than the Proposed Action, but the average growth rate for Alternatives I, III, and IV were 21.3%, 14.8%, and 3.6% greater than the Proposed Action.

Implementation of the Proposed Action would prevent the population from increasing beyond the upper limit of the management range (217 animals) until the fourth year, 2006. Gathering to the lower limit of the management range (130 head) would allow the wild horse population to increase over time to the upper limit of the management range (217 head). When this level is exceeded, a gather would be scheduled. Because the HMA would be gathered again when the upper limit of the management range is exceeded, resource degradation associated with wild horses would be minimized. More forage would be available to the wild horses during drought or extreme winters than would be under the Alternatives that gather to the upper limit of the management range. This would ensure a vigorous and viable breeding population, reduce stress on vegetative communities and wildlife, and be in compliance with the Wild Free Roaming Horse and Burro Act, the Land Use Plan, and the multiple use management objectives established through the Allotment Evaluation and Multiple Use Decision process for the Bottle Creek, Deer Creek, Happy Creek, Jackson Mountains, and Wilder-Quinn Allotment's.

The use of fertility control is not expected to have any long term significant impacts (direct, or indirect) to the Jackson Mountains HMA genetic health, long term viability or future reproductive success of mares within the herd. Implementation of fertility control is expected to improve the health of the mares within the HMA, and improved health of the foals born to those mares in the future. Improved condition of the mares and foals would aid in the long-term health and viability of the Jackson Mountains HMA wild horse population. Reduced growth rates that would occur with the implementation of fertility control would influence herd size at any one point in time, reducing competition for resources and utilization levels of those resources. Reduced growth rates would increase the interval between gathers, having overall beneficial impacts to the entire wild horse population, wildlife, and domestic livestock, while contributing to the achievement and maintenance of a thriving natural ecological balance.

Alternative I

Direct impacts associated with Alternative I include potential changes to herd demographics, and stress associated with gathering. The effect on herd demographics was discussed in the Selective Removal Criteria section (refer to Section IV.I.A.2), and the stress associated with gathering would be the same as those discussed under Gather Operations (refer to Section IV.I.B).

Population modeling found that the average population size for Alternative I was less than Alternatives II, III, and IV, but higher than the Proposed Action. The average population size for Alternatives II, III, and IV were 7.4%, 20.4%, and 32.8% greater than Alternative I, but the Proposed Action was 7.4% less. The average growth rate for Alternative I is higher than the Proposed Action or Alternatives II, III, and IV.

Implementation of Alternative I would prevent the population from increasing beyond the upper limit of the management range (217 animals) until the third year, 2005. Gathering to the lower limit of the management range (130 head) would allow the wild horse population to increase over time to the upper limit of the management range (217 head). When this level is exceeded, a gather would be scheduled. Because the HMA would be gathered again when the upper limit of the management range is exceeded, resource degradation associated with wild horses would be minimized. More forage would be available to wild horses during drought or extreme winters than would be under Alternatives that gather to the upper limit of the management range. This would ensure a vigorous and viable breeding population, reduce stress on vegetative communities and wildlife, and be in compliance with the Wild Free Roaming Horse and Burro Act, the Land Use Plan, and the multiple use management objectives established through the Allotment Evaluation and Multiple Use Decision process for the Bottle Creek, Deer Creek, Happy Creek, Jackson Mountains, and Wilder-Quinn Allotment's.

Alternative II

Direct impacts associated with Alternative II include potential changes to herd demographics, stress associated with gathering, and the effects from implementing an immunocontraceptive fertility control research project. The effect on herd demographics was discussed in the Selective Removal Criteria section (refer to Section IV.I.A.2), the stress associated with gathering would be the same as those discussed under Gather Operations (refer to Section IV.I.B), and the impacts associated with implementing an immunocontraceptive fertility control research project were discussed in the Proposed Action.

Alternative II does reflect the lowest average growth rate, as compared to the Proposed Action or Alternatives I, III, and IV, but it does have the third highest average population sizes in 5 years.

Because Alternative II involves gathering only to the upper limit of the management range (217 head), as soon as the gather is completed, and mares foal, the upper limit of the management range will be exceeded and resource degradation will once again resume. Inoculated mares would foal normally in 2003, and the contraceptive would limit foal production in 2004 and 2005. Near normal foaling rates would be expected to resume in 2006. The population will increase each year (Alternative II to a lesser degree due to fertility control), until the next gather is scheduled in approximately four years. A thriving natural ecological balance would not be

maintained. Resource degradation would first be in the form of over utilization of the forage resources – both upland and riparian. Wild horses would also contribute to degradation of upland mule deer forage species. Degradation to resources would increase as wild horse numbers increase. This degradation would be worsened during years affected by drought or other environmental extremes that cause additional stress to resources or shortages of resources to rangeland users.

The outcome of Alternative II would not ensure the Jackson Mountains HMA would be a successfull self-sustaining population of healthy animals in balance with other uses and the productive capacity of the habitat. The herd would be at a higher risk of ill fitness and disease should elements of the habitat become limiting due to drought or winter extremes.

Alternative III

Direct impacts associated with Alternative III include potential changes to herd demographics, and stress associated with gathering. The effect on herd demographics was discussed in the Selective Removal Criteria section (refer to Section IV.I.A.2), and the stress associated with gathering would be the same as those discussed under Gather Operations (refer to Section IV.I.B).

Alternative III has the fourth highest average population sizes in 5 years, and the second highest average growth rate as compared to the Proposed Action or Alternatives I, II, and IV.

Because Alternative III involves gathering only to the upper limit of the management range (217 head), as soon as the gather is completed, and mares foal, the upper limit of the management range will be exceeded and resource degradation will once again resume. The population will increase each year until the next gather is scheduled in approximately four years. A thriving natural ecological balance would not be maintained. Resource degradation would first be in the form of over utilization of the forage resources – both upland and riparian. Wild horses would also contribute to degradation of upland mule deer, pronghorn antelope, California bighorn sheep, and sage grouse forage species. Degradation to resources would increase as wild horse numbers increase. This degradation would be worsened during years affected by drought or other environmental extremes that cause additional stress to resources or shortages of resources to rangeland uses.

The outcome of Alternative III would not ensure the Jackson Mountains HMA would be a successfull self-sustaining population of healthy animals in balance with other uses and the productive capacity of the habitat. The herd would be at a higher risk of ill fitness and disease should elements of the habitat become limiting due to drought or winter extremes.

Alternative IV – No Action

The current population of 672 wild horses would continue to increase, and exceed the carrying capacity of the range. Though it may require many years for the population to reach catastrophic levels, by exceeding the upper limit of the management range, Alternative IV poses the greatest risk to the long-term health and viability of the Jackson Mountains HMA wild horse population, wildlife populations, and the vegetative resource.

The population of wild horses would compete for the available water and forage resources. The areas closest to water would experience severe utilization and degradation of the range resource. Over the course of time, the animals would deteriorate in condition as a result of declining forage availability and the increasing distance traveled between forage and water sources. The mares and foals would be affected most severely. The continued increase in population would eventually lead to catastrophic losses to the herd, which would be a function of the available forage and water and the degradation of the habitat. A point would be reached where the herd reaches the ecological carrying capacity and both the habitat and the wild horse population would be critically unhealthy.

Ecological carrying capacity of a population is a scientific term, which refers to the level at which density-dependant population regulatory mechanisms would take effect within the herd. At this level, the herd would show obvious signs of ill fitness, including poor individual animal condition, low birth rates, and high mortality rates in all age classes due to disease and/or increased vulnerability to predation (Coates-Markle, 2000). In addition, irreparable damage would occur to the habitat through overgrazing, which is not only depended upon by wild horses but by wildlife (which include sensitive species), and permitted livestock. All multiple uses of the area would be impacted. Significant loss of wild horses in the Jackson Mountains HMA due to starvation and disease would have obvious consequences to the long-term viability of the herd. Irreparable damage to the resources, which would include primarily vegetative, soil and riparian resources, would have obvious impacts to the future of the Jackson Mountains HMA and all other uses of the resources, which depend upon them for survival.

This alternative would not be acceptable to the BLM nor most members of the public. The BLM realizes that some members of the public advocate "letting nature take its course", however allowing horses to die of dehydration and starvation would be inhumane treatment and would clearly indicate that an overpopulation of wild horses existed in the HMA. The Wild Free-Roaming Horse and Burro Act of 1971, as amended, mandates the Bureau to "*prevent the range from deterioration associated with overpopulation*", and "*remove excess horses in order to preserve and maintain a thriving natural ecological balance and multiple use relationships in that area*". Additionally, Promulgated Federal Regulations at Title 43 CFR 4700.0-6 (a) state "*Wild horses shall be managed as self- sustaining populations of healthy animals in balance with other uses and the productive capacity of their habitat*". (emphasis added).

B. Air Quality

Direct impacts associated with the Proposed Action and Alternatives I, II, or III would consist of an increase in dust as wild horses are herded to temporary gather site(s), and transported by stock trailer(s) to a temporary holding facility. Dust caused by a concentration of wild horses at the temporary gather site(s) and at the temporary holding facility would be controlled by watering the areas as needed, to keep dust to a minimum. In addition, there would be an increase in vehicle traffic as excess wild horses are transported from the temporary holding site to a BLM adoption preparation/holding facility. These impacts would be temporary, with a short duration, and minimal.

C. Cultural Resources

Direct or indirect impacts to cultural resources are not anticipated to occur from implementation of the Proposed Action or Alternatives. All gather sites and temporary holding facilities would be inventoried for cultural resources prior to construction. The WFO archeologist would review all proposed and previously used gather sites and temporary holding facility locations to determine if these have had a cultural resources inventory, and/or if a new inventory is required. If cultural resources are encountered at proposed gather sites or temporary holding facilities, those locations would not be utilized unless they could be modified to avoid impacts.

D. Invasive Non-Native Species

Direct impacts associated with the Proposed Action and Alternatives I, II, or III include potential importation or transportation of new non-native species (noxious weeds), spread of existing noxious weed seeds and plant parts to new areas in the HMA, and increases in the size of existing noxious weed infestations. These impacts would potentially occur if contractor vehicles are carrying noxious weed seeds and plant parts when they arrive on site, or drive through existing infestations and spread seed into previously weed free areas, or if their livestock had been fed contaminated hay before arriving on site and the seeds pass through their digestive system. Feeding contaminated hay to gathered wild horses, which are released before the seeds pass through their digestive system could also spread noxious weeds. The contractor together with the on site BLM representative would examine vehicles and hay for noxious weed seeds or plant parts, prior to initiating the gather. If noxious weed seeds or plant parts are found in hay or on vehicles, the hay would be removed from the area and the vehicles cleaned. Proposed trap sites and holding sites would be examined for the presence of noxious weeds prior to construction. If noxious weeds were found, the location of the facilities would be moved.

Potential indirect impacts would be related to population size. The average population size for the median trial, projected by the population model (Appendix C, Population Modeling), shows that the Proposed Action results in the lowest number of wild horses in 5 years. The model also shows that the projected population size in 5 years is increasingly higher for each Alternative, I thru IV (No Action). The action that results in the lowest population size would have the lowest potential for increasing the incidence of noxious weeds, while the largest population size would have the highest potential for increasing the incidence of noxious weeds. The potential increase in noxious weeds would be from increasing utilization levels and ground disturbance, from the Proposed Action thru Alternative IV (No Action). Noxious weeds can increase with overuse of the range by grazing animals, or surface disturbance. Maintenance of healthy populations of native perennial plant species minimizes the establishment of invasive, non-native weeds.

Implementation of Alternative IV (No Action) would allow impacts to vegetation and soils to increase each year that a gather is postponed, and utilization levels would continue to be in excess of objectives. Noxious weeds can increase with overuse of the range by grazing animals or surface disturbance, which would be a negative impact to the environment.

E. Migratory Birds

The proposed action or alternatives would not directly impact migratory bird populations, with the exception of possible displacement from small areas of their habitat. This impact would be minimal, temporary, and short term in nature.

Indirect impacts would be related to the wild horse population size. Reduction of the current wild horse population provides the opportunity for vegetative communities to progress toward achieving a thriving natural ecological balance. Implementation of the Proposed Action or Alternatives I, II, or III would result in a positive impact to migratory birds by creating a diverse vegetative structure through improvement and maintenance of healthy populations of native perennial plants. Implementation of the Proposed Action would provide the greatest opportunity for the improvement of vegetative communities. The opportunity for improvement decreases for each successive alternative. Implementation of Alternative IV (No Action) would allow impacts to vegetative communities to increase each year that a gather is postponed, which would be a potential negative impact to migratory birds.

F. Special Status Species

Direct impacts associated with the Proposed Action and Alternatives I, II, or III would consist primarily of disturbance by the low-flying helicopter. The Proposed Action or Alternatives I, II, or III, would not occur during the strutting, nesting or brooding period for sage grouse. Sage grouse may be displaced in their winter use area as wild horses are herded to temporary traps located outside of identified sage grouse habitat. These impacts would be temporary, with a short duration, and minimal. Temporary gather site(s) and temporary holding facilities will be located appropriate distances from key sage grouse habitat, to avoid adverse impacts to habitat, in conformance with the Draft Management Guidelines for Sage Grouse and Sagebrush Ecosystems in Nevada (2001).

Indirect impacts would be related to wild horse population size. Reduction of the current wild horse population provides the opportunity for vegetative communities to progress toward achieving a thriving natural ecological balance. Implementation of the Proposed Action or Alternatives I, II, or III would result in a positive impact to special status species by creating a diverse vegetative structure through improvement and maintenance of healthy populations of native perennial plants. Implementation of the Proposed Action would provide the greatest opportunity for the improvement of vegetative communities. The opportunity for improvement decreases for each successive alternative. Implementation of Alternative IV (No Action) would allow impacts to vegetative communities to increase each year that a gather is postponed, which would be a potential negative impact to special status species.

G. Water Quality, Wetlands and Riparian Zones

The proposed action or alternatives would not directly impact water quality, wetlands or riparian zones within the project area, with the exception of some wild horses crossing streams or springs as they are herded to temporary gather sites. This impact would be temporary and relatively short term in nature. Gather sites and temporary holding facilities would not constructed on wetlands or riparian zones.

Indirect impacts would be related to population size. Population modeling completed for the Proposed Action and Alternatives found that the average median population size increased from the Proposed Action (lowest number) thru Alternative IV (highest number). Reduction of the population from current levels would decrease competition for available water sources, which should lead to a reduction in hoof action around unimproved springs, improvement in stream bank stability, and improved riparian habitat condition. Implementation of the Proposed Action would provide the opportunity for the greatest improvement of riparian habitats and water quality. The opportunity for improvement decreases for each successive alternative. Implementation of Alternative IV (No Action) would allow impacts to riparian habitats and water quality to increase each year that a gather is postponed.

H. Wilderness

The proposed action or alternatives would not directly impact wilderness values within the project area, with the exception of the sight and noise of the helicopter used to herd wild horses to gather sites located outside of wilderness. During the time frame of the proposed gather, solitude and primitive recreation may be negatively impacted for recreationists who may be subjected to the sight and sound of the helicopter. This impact would be temporary and relatively short term in nature.

Indirect impacts would be related to population size. Population modeling completed for the Proposed Action and Alternatives found that the average median population size progressively increased from the Proposed Action (lowest number) thru Alternative IV, No Action (highest number). Reduction of the population from current levels would decrease competition for available forage and water sources, which should lead to a reduction in utilization levels and a reduction in hoof action around unimproved springs, improvement in stream bank stability, and improved riparian habitat condition. Implementation of the Proposed Action would provide the opportunity for the greatest improvement of habitats and water quality, which would positively affect wilderness values. The opportunity for improvement decreases for each successive alternative. Implementation of Alternative IV (No Action) would allow impacts to habitats and water quality to increase each year that a gather is postponed, which would negatively impact wilderness values.

A Minimum Requirement/Minimum Tool Analysis (Appendix B) was completed for the proposed gather as required by the Wilderness Act of 1964. The Minimum Requirement Analysis determines if the action is truly necessary for the administration of the area as wilderness, and if it is determined to be necessary, then a Minimum Tool Analysis is conducted to analyze which method of accomplishing the proposed action would be the least impacting to the wilderness values of naturalness, solitude, primitive/unconfined recreation, and any special features found in the wilderness area. The analysis recommended the Proposed Action as the preferred alternative. The Minimum Tool Analysis listed the following measures to minimize impacts to Wilderness:

- All trap sites will be located outside of wilderness. No motorized vehicles will be used in wilderness. No landing of aircraft will occur except in the case of an emergency.
- Standard Operating Procedures outlined in Appendix A will be used.

- Gather activities will avoid weekends or holidays to minimize the likelihood of impacting wilderness visitors.
- A diary detailing all activities related to the gather will be completed daily.

I. Wildlife

Direct impacts associated with the Proposed Action and Alternatives I, II, or III would consist primarily of disturbance to wildlife by the low-flying helicopter. Typically, the natural survival instinct to this type of disturbance results in fleeing from the perceived danger. Some mammals, reptiles, and birds may be temporarily displaced by the construction and use of the temporary gather site(s) and holding facilities. These impacts would be temporary, with a short duration, and minimal. A slight possibility exists that non-mobile or site-specific animals would be trampled.

Indirect impacts would be related to population size. Population modeling completed for the Proposed Action and Alternatives found that the average median population size in 5 years progressively increased from the Proposed Action (lowest number) thru Alternative IV, No Action (highest number). A reduction in the number of wild horse from current levels would decrease competition for available cover, space, forage, and water sources, which should lead to a reduction in utilization levels and a reduction in hoof action around unimproved springs, improvement in stream bank stability, and improved riparian habitat condition. Reduced utilization levels should allow for increased plant vigor, seed production, and seedling establishment thereby improving the ecological health of the habitat. Implementation of the Proposed Action would provide the opportunity for the greatest improvement of habitat, and reduced competition for cover, space, forage, and water, which would positively affect wildlife. The opportunity for habitat improvement and reduced competition for cover, space, forage and water decreases for each successive alternative. Implementation of Alternative IV (No Action) would allow impacts to habitat and, competition for cover, space, forage, and water to increase each year that a gather is postponed, which would negatively impact wildlife.

J. Vegetation and Soils

Direct impacts associated with the Proposed Action and Alternatives I, II, or III, would consist of disturbance to vegetation and soils immediately in and around the temporary gather site(s) and holding facilities. Impacts would be created by vehicle traffic; hoof action as a result of concentrating horses, and could be locally severe in the immediate vicinity of the gather site(s) and holding facilities. Generally, these sites would be small (less than one half acre) in size. Any impacts would remain site specific and isolated in nature. In addition, most gather sites and holding facilities would be selected to enable easy access by transportation vehicles and logistical support equipment. Normally, they are located near or on roads, pullouts, water haul sites or other flat areas, which have been previously disturbed. These common practices would minimize the cumulative effects of these impacts.

Indirect impacts would differ among the alternatives. Implementation of the Proposed Action or Alternatives I, II, or III would reduce the current wild horse population and provide the opportunity for the vegetative communities to progress toward achieving a thriving natural ecological balance. Reduced concentrations of wild horses would contribute to the recovery of

the vegetative resource. Utilization levels by wild horses would be reduced, which would result in improved forage availability, vegetation density, increased plant vigor, seed production, seedling establishment, and forage production over current conditions. Population modeling (Appendix C) completed for the Proposed Action and Alternative I (lower limit of the management range, with and without fertility control) found that the average median population size in 5 years is predicted to be 302 and 326 wild horses, respectively. This indicates that the population of wild horses would not exceed their carrying capacity until the fourth year (2006) following the proposed gather. The greatest opportunity for a positive impact to vegetation and soils would be provided by implementing the Proposed Action or Alternative I.

Population modeling completed for Alternative II and Alternative III found that the average median population size in 5 years is predicted to be 393 and 433 wild horses, respectively. Implementation of either of these two alternatives would initially provide the opportunity for the vegetative communities to progress toward achieving a thriving natural ecological balance. However, wild horses would exceed their carrying capacity the year following the proposed gather. Implementation of Alternative II (upper limit of the management range, with fertility control) would provide a greater opportunity for a positive impact to vegetation and soils than Alternative III (upper limit of the management range, without fertility control) because fertility control would limit the number of foals produced in 2004 and 2005. There may be progress toward a thriving natural ecological balance but it would occur much slower than under the Proposed Action or Alternative I.

Implementation of Alternative IV (No Action) would allow impacts to vegetation and soils to increase each year that a gather is postponed, having a negative affect on vegetation and soils. Utilization levels would continue to be in excess of objectives, and progression toward achieving a thriving natural ecological balance would not be possible.

IV. Cumulative Impacts

Cumulative impacts are impacts on the environment, which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively major or problematic actions taking place over a period of time.

The area affected by the Proposed Action and Alternatives is the Jackson Mountains HMA. Please refer to the Jackson Mountains HMA Map, which displays the HMA boundary. Past, proposed and reasonably foreseeable actions that may have similar effects to the Jackson Mountains HMA wild horse population would include past wild horse gathers and future wild horse gathers. Three gathers have been completed in the past, and future gathers would be scheduled according to a 4-5 year gather cycle. Over time, as wild horse population levels are maintained in an acceptable management range, a thriving natural ecological balance would be achieved and maintained. Cumulative effects that may result would include continued improvement of the range condition, and riparian-wetland condition. Cumulative beneficial effects from implementation of the Proposed Action or Alternatives I, II, or III, to wildlife, the wild horse population and domestic livestock would occur as forage availability and quality is maintained and improved. Water quality and riparian habitat would also continually improve. The opportunity for cumulative beneficial effects decreases for each successive alternative.

Adverse cumulative impacts on natural resources would occur depending on which alternative is selected (Alternative I, II, or III). In general, adverse cumulative impacts increase for each successive alternative, from Alternative I through Alternative III, since the wild horse population is higher for each alternative. Adverse cumulative impacts would include periodic over utilization of vegetative resources, which would result in decreased vegetative density, plant vigor, seed production, seedling establishment, and forage production. This may result in periodic decreases of the ecological status of plant communities.

Adverse cumulative impacts on natural resources for Alternative IV, No Action, would include continued over utilization of vegetative resources which would result in decreased vegetative density, plant vigor, seed production, seedling establishment, forage production, and a potential increase of non-native species to new areas in the HMA. Continued over use of the vegetative community would result in a loss of ecological status of the plant communities which may take decades to restore. Decreased vegetative density would result in an increase of bare ground, which may lead to increased erosion, increased negative impacts to stream banks and riparian habitat condition. A petition has been filed with the U.S. Fish and Wildlife Service to list sage grouse as an endangered species. With continued over use on upland sage grouse habitat, and on potential Lahontan cutthroat trout streams, which could affect future re-introductions, a negative adverse cumulative impact to these two species would occur. Wildlife, migratory birds, and wild horses would all be negatively affected by these adverse cumulative impacts to natural resources.

Other reasonably foreseeable actions within the affected area include development and implementation of the Black Rock Desert-High Rock Canyon Emigrant Trails National Conservation Area Resource Area Management Plan, development and implementation of a Wilderness Management Plan for wilderness (which includes the North Jackson Mountains, South Jackson Mountains, and Black Rock Desert Wilderness Area's), which may influence the AML or timing of

future gathers, as well as, permitted livestock grazing, mining, range improvements, and vegetation monitoring. Because other activities within the potentially affected area are generally isolated from each other and from the Proposed Action and Alternatives, whether by distance or by topography, the potential for cumulative impact on most of these identified resources is minimal.

Based upon these considerations, the effects of other existing and reasonably foreseeable future activities including the Proposed Action and Alternatives I, II, or III, would not cause a major affect to the environment. Alternative IV, No Action, may cause a major impact to the environment.

There would be no known adverse cumulative impacts to any of the resources analyzed in this document as a result of the Proposed Action. There would be minor adverse cumulative impacts from implementing Alternatives I, II, or III, primarily to vegetation, soils and riparian habitat. Cumulative impacts would increase for each successive alternative. Adverse cumulative impacts to vegetation, soils and riparian habitat would occur as a result of selecting Alternative IV, No Action.

V. Consultation and Coordination

Humboldt County Commissioners
Nevada State Clearinghouse
Nevada Commission for the Preservation of Wild Horses

Additionally, this Gather Plan and Environmental Assessment is being sent out to 27 individuals, or organizations on the interested public mailing list for review and comment.

VI. List of Preparers

Tom Seley	Wild Horse and Burro Specialist
Jeff Johnson	Environmental Coordinator
Mark Ennes	Archaeologist
Clarence Covert	Wildlife Biologist
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Brian Murdock	Wilderness Specialist
Mike Zielinski	Soil Scientist

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APPENDIX A
STANDARD OPERATING PROCEDURES

Gathers would be conducted by utilizing contractors from the Wild Horse and Burro Gathers, Western United States Contract, or BLM personnel. The following procedures for gathering and handling wild horses and burros would apply whether a contractor or BLM personnel conduct a gather. For helicopter gathers conducted by BLM personnel, gather operations will be conducted in conformance with the Wild Horse and Burro Aviation Management Handbook (March 2000).

Prior to any gathering operation, the BLM will provide for a pre-capture evaluation of existing conditions in the gather area(s). The evaluation will include animal condition, prevailing temperatures, drought conditions, soil conditions, road conditions, and a topographic map with, wilderness Boundaries, the location of fences, other physical barriers, and acceptable trap locations in relation to animal distribution. The evaluation will determine whether the proposed activities will necessitate the presence of a veterinarian during operations. If it is determined that capture efforts necessitate the services of a veterinarian, one would be obtained before capture would proceed. The contractor will be apprised of all conditions and will be given instructions regarding the capture and handling of animals to ensure their health and welfare is protected.

Trap sites and temporary holding sites will be located to reduce the likelihood of undue injury and stress to the animals, and to minimize potential damage to the natural resources of the area. These sites would be located on or near existing roads.

The following procedures and stipulations will followed to ensure the welfare, safety and humane treatment of wild horses and burros in accordance with the provisions of 43 CFR 4700.

A. Capture Methods Used in the Performance of a Gather

1. Helicopter Drive Trapping

This capture method involves utilizing a helicopter to herd wild horses into a temporary trap. The following stipulations apply:

a. A minimum of two saddle horses shall be immediately available at the trap site to accomplish roping if necessary. Roping shall be done as determined by the BLM. Under no circumstances shall animals be tied down for more than one hour.

b. The Contractor shall assure that bands remain together, and that foals shall not be left behind.

c. Domestic saddle horses may be used as a pilot (i.e. Judas) horse to lead the wild horses into the trap. Individual ground hazers may also be used to assist in the gather.

2. Helicopter Assisted Roping

This capture method involves utilizing a helicopter to herd wild horses or burros to ropers. The following stipulations apply:

a. Under no circumstances shall animals be tied down for more than one hour.

b. Roping shall be performed in such a manner that bands will remain together. Foals shall not be left behind.

3. Bait Trapping

This capture method involves utilizing bait (water or feed) to lure wild horses or burros into a temporary trap. The following stipulations apply:

a. Finger gates shall not be constructed of materials that may be injurious to animals such as; "T" posts, sharpened willows, etc.

b. All trigger and/or trip gate devices must be approved by the BLM prior to capture of animals.

c. Traps shall be checked a minimum of once every 10 hours.

B. Trapping and Care

The primary concern is for the safe and humane handling of all animals captured. All capture attempts shall incorporate the following:

1. All trap and holding facility locations must be approved by the BLM prior to construction. The Contractor may also be required to change or move trap locations as determined by the BLM. All traps and holding facilities not located on public land must have prior written approval of the land owner. Prior to setting up a trap or temporary holding facility, BLM will conduct all necessary clearances (archaeological, T&E, etc.).

2. The rate of movement and distance the animals travel shall not exceed limitations set by the BLM, who will consider terrain, physical barriers, weather, condition of the animals, and other factors.

3. All traps, wings, and holding facilities shall be constructed, maintained and operated to handle animals in a safe and humane manner and be in accordance with the following:

    a. Traps and holding facilities shall be constructed of portable panels, the top of which shall not be less than 72 inches for horses and 60 inches for burros, and the bottom rail of which shall not be more than 12 inches from ground level. All traps and holding facilities shall be oval or round in design.

b. All loading chute sides shall be a minimum of 6 feet high and shall be fully covered with plywood (without holes) or like material.

c. All runways shall be a minimum of 30 feet long and a minimum of 6 feet high for horses, and 5 feet high for burros, and shall be covered with plywood, burlap, plastic snow fence or like material a minimum of 1 foot to 5 feet for burros and 1 foot to 6 feet for horses. The location of the government furnished portable restraining chute used to restrain, age, or to provide additional care for animals shall be placed in the runway in a manner as instructed by or in concurrence with the BLM.

d. All crowding pens including the gates leading to the runways shall be covered with a material which prevents the animals from seeing out (plywood, burlap, snow fence etc.) and shall be covered a minimum of 1 foot to 5 feet above ground level for burros and 2 feet to 6 feet for horses. Eight linear feet of this material shall be capable of being removed or let down to provide a viewing window.

e. All pens and runways used for the movement and handling of animals shall be connected with hinged self-locking gates.

4. No fence modifications will be made without authorization from the BLM. The Contractor shall be responsible for restoration of any fence modification, which he has made.

5. When dust conditions occur within or adjacent to the trap or holding facility, the Contractor shall be required to wet down the ground with water.

6. Alternate pens, within the holding facility, shall be furnished by the Contractor to separate mares of jennies with small foals, sick and/or injured animals, and strays from the other animals. Animals shall be sorted as to age, number, size, temperament, sex and condition when in the holding facility so as to minimize, to the extent possible, injury due to fighting and trampling. Under normal conditions, the government will require that animals be restrained for the purpose of determining an animal's age, sex or other necessary procedure. In these instances, a portable restraining chute will be provided by the government. Alternate pens shall be furnished by the Contractor to hold animals if the specific gathering requires the animals to be released back into the capture area(s). In areas requiring on or more trap sites, and when a centralized holding facility is utilized, the Contractor may be required to provide additional holding pens to segregate animals transported from remote locations so they may be returned to their traditional ranges. Either segregation or temporary marking and later segregation will be at the discretion of the BLM.

7. The Contractor shall provide animals held in the traps and/or holding facilities with a continuous supply of fresh clean water at a minimum rate of 10 gallons per animal per day. Separate water troughs shall be provided at each pen where animals are being held. Water troughs shall be constructed of such material (e.g. rubber, galvanized metal with

rolled edges, rubber over metal) so as to avoid injury to the animals. Animals held for 10 hours or more in the traps or holding facilities shall be provided good quality hay at the rate of not less than 2 pounds of hay per 100 pounds of estimated body weight per day.

8. It is the responsibility of the Contractor to provide security to prevent loss, injury or death of captured animals until delivery to final destination.

9. The Contractor shall restrain sick or injured animals if treatment is necessary. The BLM will determine if injured animals must be destroyed and provide for destruction of such animals. A veterinarian may be called to make a diagnosis and final determination for the disposition of sick or injured animals. The contractor may be required to dispose of the carcasses as directed by the BLM. Destruction shall be done by the most humane method available, in accordance with BLM policy outlined in Washington Office Instruction Memorandum No. 2001-165 which states;

   A BLM authorized officer may authorize the euthanasia of a wild horse or burro with any of the following conditions:

   a. Displays a hopeless prognosis for life;

   b. Suffers from a chronic or incurable disease or serious congenital defect;

   c. Requires continuous treatment for the relief of pain and suffering; or

   d. Is incapable of maintaining a Henneke body condition score greater than 2, in a normal rangeland environment.

10. Animals shall be transported to final destination from temporary holding facilities within 24 hours after capture unless prior approval is granted by the BLM for unusual circumstances. Animals to be released back into the HMA following gather operations may be held up to 21 days or as directed by the BLM. Animals shall not be held not be held in traps and/or temporary holding facilities on days when there is no work being conducted except as specified by the BLM. The Contractor shall schedule shipments of animals to arrive at final destination between 7:00 a.m. and 4:00 p.m. No shipments shall be scheduled to arrive at final destination on Sunday and Federal holidays, unless prior approval has been obtained by the BLM. Animals shall not be allowed to remain standing on trucks while not in transport for a combined period of greater than three (3) hours. Animals that are to be released back into the capture area may need to be transported back to the original trap site. This determination will be at the discretion of the BLM.

11. Branded or privately owned animals captured during gather operations will be handled in accordance with state estray laws and existing BLM policy.

C. Motorized Equipment

1. All motorized equipment employed in the transportation of captured animals shall be in compliance with appropriate State and Federal laws and regulations applicable to the humane transportation of animals. The Contractor shall provide BLM with a current safety inspection (less than one year old) for all motorized equipment and tractor-trailers used to transport animals to final destination.

2. All motorized equipment, tractor-trailers, and stock trailers shall be in good repair, of adequate rated capacity, and operated so as to ensure that captured animals are transported without undue risk or injury.

3. Only tractor-trailers or stock trailers with a covered top shall be allowed for transporting animals from trap site(s) to temporary holding facilities, and from temporary holding facilities to final destination(s). Sides or stock racks of all trailers used for transporting animals shall be a minimum height of 6 feet 6 inches from the vehicle floor. Single deck tractor-trailers 40 feet or longer shall have two (2) partition gates providing three (3) compartments within the trailer to separate animals. Tractor-trailers less than 40 feet shall have at least one partition gate providing two (2) compartments within the trailer to separate animals. Compartments in all tractor-trailers shall be of equal size plus or minus 10 percent. Each partition shall be a minimum of 6 feet high and shall have at the minimum a 5 foot wide swinging gate. The use of double deck trailers is unacceptable and will not be allowed.

4. All tractor-trailers used to transport animals to final destination(s) shall be equipped with at least one (1) door at the rear end of the trailer, which is capable of sliding either horizontally of vertically. The rear door(s) of tractor-trailers and stock trailers must be capable of opening the full width of the trailer. Panels facing the inside of all trailers must be free of sharp edges or holes that could cause injury to the animals. The material facing the inside of the trailer must be strong enough, so that the animals cannot push their hooves through the side. Final approval of tractor-trailers and stock trailers used to transport animals shall be held by the BLM.

5. Floors of tractor-trailers, stock trailers, and the loading chute shall be covered and maintained with wood shavings to prevent the animals from slipping.

6. Animals to be loaded and transported in any trailer shall be as directed by the BLM and may include limitations on numbers according to age, size, sex, temperament, and animal condition. The following minimum square feet per animal shall be allowed in all trailers:

   - 11 square feet/adult horse (1.4 linear feet in an 8 foot wide trailer)
   - 8 square feet/adult burro (1.0 linear feet in an 8 foot wide trailer)
   - 6 square feet/horse foal (0.75 linear feet in an 8 foot wide trailer)
   - 4 square feet/burro foal (0.50 linear feet in an 8 foot wide trailer)

7. The BLM shall consider the condition and size of the animals, weather conditions, distance to be transported, or other factors when planning for the movement of captured animals. The BLM shall provide for any brand and/or inspection services required for the captured animals.

8. If the BLM determines that dust conditions are such that the animals could be endangered during transportation, the Contractor will be instructed to adjust speed.

D. Safety and Communications

1. The Contractor shall have the means to communicate with the BLM and all contractor personnel engaged in the capture of wild horses and burros utilizing a VHF/FM Transceiver or VHF/FM portable Two-Way radio. If communications are ineffective the government will take steps necessary to protect the welfare of the animals.

2. The proper operation, service and maintenance of all contractor furnished property is the responsibility of the Contractor. The BLM reserves the right to remove from service any contractor personnel or contractor furnished equipment which, in the opinion of the BLM, violate contract rules, are unsafe or otherwise unsatisfactory. In this event, the contractor will be notified in writing to furnish replacement personnel or equipment within 48 hours of notification. All such replacements must be approved in advance of operation by the BLM.

3. All accidents occurring during the performance of any delivery order shall be immediately reported to the BLM.

4. The Contractor must operate in compliance with all applicable Federal, State, and Local laws and regulations.

5. Fueling operations shall not take place within 1,000 feet of animals.

E. Public Participation

Opportunities for public viewing (i.e. media, interested public) of gather operations will be made available to the extent possible, however the primary consideration will be to protect the health and welfare of the animals being gathered. The public must adhere to guidance from the on site BLM representative. It is BLM policy that the public will not be allowed to come into direct contact with wild horses and burros held in a BLM facility. Only BLM or contractor personnel may enter the trap site or temporary holding facility corrals. The general public may not directly handle the animals at any time or for any reason during gather operations.

F. Responsibility and Lines of Communication

The Contracting Officer's Representative, and Project Inspectors, from the Winnemucca Field Office, will have the direct responsibility to ensure the Contractor's compliance with the contract stipulations. All employees involved in the gathering operation will keep the best interests of the animals at the forefront at all times.

The Assistant Field Manager for Renewable Resources and the Field Manager will take an active role to ensure that appropriate lines of communication are established between the field, Field Office, Nevada State Office, National Wild Horse and Burro Program Office, and the Palomino Valley Wild Horse and Burro Center. All publicity, formal public contact and inquiries will be handled through the Assistant Field Manager for Renewable Resources.

Appendix B
Minimum Requirement/Tool Worksheets

Step 1 – Determining the Minimum Requirement (a two-part process)

Part A. Minimum Requirement Key to making determinations on wilderness management proposals (This flow chart will help you assess whether the project in the minimum required action for the administration of the area as wilderness. Answering these questions will determine **if** this proposed action really is the **minimum required** action in wilderness).

Guiding Questions	Answers and Explanations
1. **Is this an emergency**? (i.e. a situation that involves an inescapable urgency and temporary need for speed beyond that available by primitive means, such as fire suppression, health and safety of people, law enforcement efforts involving serious crime or fugitive pursuit, retrieval of the deceased or an immediate aircraft investigation) **If Yes>** Document the rationale for line officer approval using the minimum tool form and proceed with the action. **If No>** Go to Question 2	**No.** The proposed action in not considered an emergency.
2. **Does the project or activity conflict with the stated management goals, objectives and desired future conditions of applicable legislation, policy and management plans**? **If Yes>** Do not proceed with the proposed project or activity. **If No>** Go to question 3	**No.** Currently, no approved wilderness management plan exists for the involved wilderness areas. Management is based on law, regulation, and policy. BLM wilderness policy provides for the use of motorized and mechanized equipment, including aircraft use to remove wild horses and burros, when it is considered the minimum tool that can accomplish the task with the least lasting impact to wilderness values.
3. **Is there any less intrusive actions that should be tried first**? (i.e. signing, visitor education, or information) **If Yes** > Implement other actions using the appropriate process. **If No>** Go to question 4	**No.** The only way to reduce the population of wild horses in the wilderness areas to the Appropriate Management Level (AML) is to physically remove the excess horses from the area.

4. **Can this project or activity be accomplished outside of wilderness and still achieve its objective**? (i.e. such as some group events) **If Yes>** Proceed with the action outside of wilderness using the appropriate process. **If No>** Go to Question 5	**No.** Conducting the horse gather outside of wilderness could possibly allow BLM to reach AML in the overall Herd Management Area (HMA), but it would not reduce the impacts that wild horses are having on the Wilderness Areas. The temporary corrals/traps however would be located outside of the wilderness area boundaries.
5. **Is the project or activity subject to valid existing rights**? **If Yes>** Proceed to Minimum Tool Analysis. **If No>** Go to question 6	**No.** Valid existing rights are not associated with the action.
6. **Is there special provisions in legislation (the Wilderness Act of 1964 or the Black Rock Desert-High Rock Canyon Emigrant Trails NCA Act of 2000) that allows this project or activity**? (i.e. signing, visitor education, or information) **If Yes** > the proposed project or activity should be considered but is not necessarily required just because it is mentioned in legislation. **Go to part B** **If No> Go to Part B**	**No.** There are no special provisions dealing with wild horses in the legislation.

Part B. Determining the Minimum Requirement

Responsive Questions for Minimum Requirement Analysis: Explain your answer in the response column. If your responses indicate adverse affects to wilderness character, evaluate whether or not you should proceed with the proposal. If you decide to proceed, begin developing plans to mitigate impacts, and complete a Minimum Tool Analysis. Some of the following questions may not apply to every project.

Effects on Wilderness Character	**Responses**
1. **How does this project/activity benefit the wilderness as a whole as opposed to one resource**?	The objective of the proposed action is to remove excess wild horses from the Jackson Mountains HMA, which includes portions of three designated wilderness areas. Excess wild horses can have a negative impact to the naturalness of the wilderness areas, by competing with the areas native wildlife populations, overgrazing riparian areas, and trampling springs. The proposed action would maintain and enhance the naturalness of the wilderness areas by removing the excess horses and the impacts they are having on the naturalness of the area.

2. **If this project/activity were not completed, what would be the beneficial and detrimental effects to the wilderness resource?**	If the proposed action was not conducted the excess number of wild horses would continue to increase, which would lead to increased competition with native wildlife and increasing impacts to the vegetation resources of the wilderness. The impacts to solitude and primitive recreation that would be associated with the gather operation would not occur if the proposed action was not completed.
3. **How would the project/activity help ensure that the wilderness provides outstanding opportunities for solitude or a primitive and unconfined type of recreation?** (e.g. does the project/activity contribute to the people's sense that they are in a remote place with opportunities for self discovery, adventure, quietness, connection with nature, freedom, etc.)	The project would not enhance the opportunities for solitude or for primitive and unconfined recreation. During the time frame that the gather would be conducted, solitude and primitive recreation would be impacted in a negative way, but the impact would be temporary and relatively short in duration.
4. **How would the project/activity help ensure that human presence is kept to a minimum and that the area is affected primarily by the forces of nature rather than being manipulated by humans?**	The Wild Free-Roaming Horse and Burro Act of 1971 mandated BLM to manage wild horses and burros as an integral part of the natural ecosystem were presently found (i.e. at passage of the Act). Horses were introduced into the area in the late 1800's and/or early1900's prior to the designation of the wilderness areas. Overpopulations of wild horses can impact the naturalness of the areas. Removing excess wild horses would maintain and enhance the naturalness of the areas and allow the areas to be affected primarily by the forces of nature.
Management Situation 5. **What does your management plan, policy, and legislation say to support proceeding with this project?**	Currently, no approved wilderness management plan exists for the involved wilderness areas. Management is based on law, regulation, and policy. BLM wilderness policy provides for the use of motorized and mechanized equipment, including aircraft use to remove wild horses and burros, when it is considered the minimum tool that can accomplish the task with the least lasting impact to wilderness values.
6. **How did you consider wilderness values over convenience, comfort, political, economic or commercial values while evaluating this project/activity?**	The purpose of the proposed action is to enhance the naturalness of the wilderness areas by removing excess wild horses, and alleviating the impacts that they are having on the naturalness of the areas.
7. **Should we proceed?**	**Yes** Go to step 2 (Minimum Tool Analysis)

Step 2 – Determining the Minimum Tool (the Minimum Tool Analysis)

These questions will assist you in determining the appropriate tool(s) to accomplish the project or proposed activity with the least impact to the wilderness resource.

Develop several alternate approaches to implementing the project or activity. At a minimum, consider the three following alternatives.

Alt#1 An alternative using motorized equipment or mechanized transport	Alt#2 An alternative using non-motorized equipment or non-mechanized transport	Alt#3 Variations of methods 1 and 2, as appropriate

Describe the alternatives. Be specific and provide detail.

- *What is proposed?*
- *Why is it being proposed in this manner?*
- *Who is the proponent?*
- *When will the project take place?*
- *Where will the project take place?*
- *How will it be accomplished? (What methods and techniques)*

Alt#1. Remove excess wild horses from the Jackson Mountains HMA. Wild horses would be gathered using the helicopter drive trapping and/or helicopter roping capture methods. This would require low level helicopter flights over the involved wilderness areas. The action is being proposed in this manner because it is the most humane and successful method to gather wild horses from the type of terrain found in the wilderness areas. The proponent is the Winnemucca Field Office, BLM. The project would take place during the late Fall/Winter of 2002. The project will take place in the Jackson Mountains HMA, which includes portions of the North and South Jackson Mountains Wilderness Areas, and a small portion of the Black Rock Desert Wilderness Area. Wild horses would be gathered by herding them with a helicopter to temporary corrals located outside of wilderness.	Alt#2. Same as Alt#1, but wild horses would only be herded by wranglers on horseback to traps located outside of wilderness.	Alt#3. Same as Alt#1, but wild horses would be gathered by setting up bait/water traps. To successfully remove horses from the wilderness areas the traps would need to be set up inside the wilderness areas. Traps would be transported to the sites by helicopter or by motorized vehicle(s) using existing way in the wilderness. Once the wild horses were trapped, they would need to be transported out of the wilderness areas in stock trailers. Motorized vehicle use would only be authorized on existing ways.

Utilize the following criteria to assess each alternative (a brief statement should suffice)

Biophysical Effects

- *Describe the environmental resource issues that would be affected by the propose action.*
- *Describe any effects this action will have on protecting natural conditions within the regional landscape (i.e. non-native insects and disease, or noxious weed control).*
- *Include both biological and physical effects.*

Alt#1	Alt#2	Alt#3
The proposed action would have minimal impacts on the biophysical characteristics of the wilderness areas. There may be some trampling of vegetation and soil by the herding of wild horses, but, these impacts would be similar to those associated with the normal movement of large ungulates.	Same as Alt#1, however there would be additional trampling of vegetation and soil by the wranglers saddle horses as they herd wild horses to traps located outside the wilderness areas.	The trap sites would see an increase in soil and vegetation trampling due to the concentration of wild horses held in the traps, prior to being transported out of the wilderness areas. The likelihood of transferring noxious weeds into the wilderness areas would increase by allowing the use of motorized vehicles and stock trailers to transport the wild horses.

Social/Recreation/Experiential Effects

- *Describe how the wilderness experience may be affected by the proposed action..*
- *Include effects to recreation use and wilderness character.*
- *Consider the proposed effect the proposal may have on the public and their opportunity for discovery, surprise and self-discovery.*

Alt#1	Alt#2	Alt#3
Solitude would be impacted for the duration of the gather. The sights and sounds associated with a low flying helicopter would be heard and seen for long distances in the wilderness areas and would have a impact on the wilderness experience of visitors. This impact will be temporary and relatively short in duration.	Solitude would be impacted for the duration of the gather. This alternative would have the least impact on solitude and the wilderness experience. The use of wranglers on horseback to herd wild horses to traps would be less intrusive and would only impact the immediate area. The impact will be temporary in nature, however it would be longer in duration than alternative #1.	Solitude would be impacted for the duration of the gather. The trap site area(s) in wilderness would impact the wilderness experience of visitors. The use of a helicopter or motorized vehicles and stock trailers to transport the traps and wild horses would impact the solitude of the area. This alternative would take the longest time to accomplish the task and would therefore impact the solitude of the areas for the longest time.

Societal/Political Effects

- *Describe any political considerations, such as MOU's, agency agreements, local positions that may be affected by the proposed action.*
- *Describe relationship of method to applicable laws.*

Alt#1	Alt#2	Alt#3
BLM has made commitments to remove excess wild horses to achieve AML in the Jackson Mountains HMA. Wilderness groups have commented in favor of the project. BLM wilderness policy provides for the use of motorized and mechanized equipment, including aircraft use to remove wild horses and burros when no other alternative exists.	Same as Alt#1.	Same as Alt#1.

Health and Safety Concerns

- *Describe and consider any health and safety concerns associated with the proposed action. Consider the types of tools used, training, certifications and other administrative needs to ensure a safe work environment for employees. Also consider the effect the proposal may have on the health and safety of the public.*

Alt#1	Alt#2	Alt#3
Using low a flying helicopter to herd wild horses can pose some safety concerns. Only experienced contractors with a good safety record would be allowed to conduct the work. The general public would not be put at risk by the project.	Under this alternative, all herding would be by wranglers on horseback. This type of herding also has safety concerns such as; being thrown from a horse, horse falling over on riders, etc. The risk associated with this work would be increased because of the remoteness of the areas where the wild horses would be herded. The general public would not be put at risk by the project.	Under this alternative risks would involve those normally associated with driving motorized vehicles on rough terrain, and sling loading materials by helicopter. The general public would not be put at risk by the project.

Economic and Timing Considerations

- *Describe the costs and timing associated with implementing each alternative.*
- *Assess the urgency and potential cumulative effect from this proposal and similar actions.*

Alt#1	Alt#2	Alt#3
This alternative would greatly decrease the amount of time that would be required for the project because wild horses could be located quickly and then immediately herded to the trap site(s).	This alternative would take a much longer time to accomplish the goal of achieving AML. The wild horses would have to be located and then herded by the wranglers, which would take a considerable amount of time.	This alternative would also take much more time to achieve AML than alternative #1. Because the traps would only hold small numbers of wild horses, it would potentially take months to reach AML in the HMA.

Formulate a preferred alternative from the above alternatives and describe in detail below

The preferred alternative is Alternative #1. This alternative would allow BLM to effectively achieve AML in the area while minimizing the impacts to solitude and primitive recreation by decreasing the amount of time that will be required to complete the gather. A helicopter will be used to herd the horses to trap sites located outside of wilderness. No landing of aircraft will occur other than for emergency purposes, and no motorized vehicles would be used in the wilderness areas.

Further refine the alternative to minimize impacts to wilderness

What will be the specific operating requirements?	All trap sites will be located outside of wilderness. No motorized vehicles will be used inside wilderness. No landing of aircraft will occur except in the case of an emergency.
What are the maintenance requirements?	No maintenance is foreseen.
What standards and designs will apply?	The standard operating procedures found in the EA will be used.
Develop and describe any mitigation measures that apply.	Gather activities will avoid weekends or holidays to minimize the likelihood of impacting wilderness visitors.
What provisions have been made for monitoring and feed back to strengthen future efforts and/or prevent the need for recurring future actions?	A diary detailing all activities related to the gather will be completed daily. BLM personnel administering the gather contract will maintain an open line of communications with the wilderness management team.

Appendix C
Population Modeling

Population Model Overview

WinEquus is a program to simulate the population dynamics and management of wild horses created by Stephen H. Jenkins of the Department of Biology, University of Nevada at Reno. For further information about this model, you may contact Stephen H. Jenkins at the Department of Biology/314, University of Nevada, Reno, NV 89557.

The following data was summarized from the information provided within the WinEquus program, and will provide background about the use of the model, the management options that may be used, and the types of output that may be generated.

The population model for wild horses was designed to help wild horse and burro specialists evaluate various management strategies that might be considered for a particular area. The model uses data on average survival probabilities and foaling rates of horses to project population growth for up to 20 years. The model accounts for year-to-year variation in these demographic parameters by using a randomization process to select survival probabilities and foaling rates for each age class from a distribution of values based on these averages. This aspect of population dynamics is called environmental stochasticity, and reflects the fact that future environmental conditions that may affect a wild horse populations demographics can't be established in advance. Therefore each trial with the model will give a different pattern of population growth. Some trials may include mostly "good" years, when the population grows rapidly; other trials may include a series of several "bad" years in succession. The stochastic approach to population modeling uses repeated trials to project a range of possible population trajectories over a period of years, which is more realistic than predicting a single specific trajectory.

The model incorporates both selective removal and fertility treatment as management strategies. A simulation may include no management, selective removal, fertility treatment, or both removal and fertility treatment. Wild horse and burro specialists can specify many different options for these management strategies such as the schedule of gathers for removal or fertility treatment, the threshold population size which triggers a gather, the target population size following a removal, the ages and sexes of horses to be removed, and the effectiveness of fertility treatment.

To run the program, one must supply an initial age distribution (or have the program calculate one), annual survival probabilities for each age-sex class of horses, foaling rates for each age class of females, and the sex ratio at birth. Sample data are available for all of these parameters. Basic management options must also be specified.

Population Data: Age-Sex Distribution

An important point about the initial age-sex distribution is that it is NOT necessarily the starting population for each of the trials in a simulation. This is because the program assumes that the initial age-sex distribution supplied on this form or calculated from a population size that the user enters is not an exact and complete count of the population. For example, if the user enters an initial population size of 100 based on an aerial survey, this is really an estimate of the population, not a census. Furthermore, it is likely to be an

underestimate, because some horses will be missed in the survey. Therefore, the program uses an average sighting probability of approximately 90% (Garrott et al. 1991) to "scale-up" the initial population estimate to a starting population size for use in each trial. This is done by a random process, so the starting population sizes are different for all trials. An option does exist to consider the initial population size to be exact and bypass this scaling-up process.

Population Data: Survival Probabilities

A fundamental requirement for a population model such as this is data on annual survival probabilities of each age class. The program contains files of existing sets of survival, or it is possible to enter a new set of data in the table.

In most cases, Wild Horse and Burro Specialists don't have information on survival probabilities for their populations, so the sample data files provided with WinEquus are used and assume that average survival probabilities in the populations are similar. These data are more difficult to get than is often assumed, because they require keeping track of known individuals over time. A "snapshot" of a population, providing information on the age distribution at a single gather, can NOT be used to estimate survival probabilities without assuming a particular growth rate for the population (Jenkins1989). More data from long-term studies of marked horses are needed to develop estimates of survival in various habitats.

Population Data: Foaling Rates

Foaling rates are the proportions of females in each age class that produce a foal at that age. Files are available within the program that contain existing sets of foaling rates, or the user may enter a new set of data in the table. The user may also enter the sex ratio at birth, another necessary parameter for population simulation.

Environmental Stochasticity

For any natural population, mortality and reproduction vary from year to year due to unpredictable variation in weather and other environmental factors. This model mimics such environmental stochasticity by using a random process to increase or decrease survival probabilities and foaling rates from average values for each year of a simulation trial. Each trial uses a different sequence of random values, to give different results for population growth. Looking at the range of final population sizes in many such trials will give the user an indication of the range of possible outcomes of population growth in an uncertain environment.

How variable are annual survival probabilities and foaling rates for wild horses? The longest study reporting such data was done at Pryor Mountain, Montana by Garrott and Taylor (1990). Based on 11 years of data at this site, survival probability of foals and adults combined was greater than 98% in 6 years, between 90 and 98% in 3 years, 87% in 1 year, and only 49% in 1 year of severe winter weather. These values clearly aren't normally distributed, but can be approximated by a logistic distribution. This pattern of low mortality in most years but markedly higher mortality in occasional years of bad weather, was also reported by Berger (1986) for a site in northwestern Nevada. Therefore, environmental stochasticity in this model is simulated by drawing random values from logistic distributions. If desired, different values can be entered to change the scaling factors for environmental stochasticity.

Because year-to-year variation in weather is likely to affect foals and adults similarly, this model makes foal and adult survival perfectly correlated. This means that when survival probability of foals is high, so is survival probability of adults, and vice versa. By contrast, the correlation between survival probabilities and foaling rates can be adjusted to any value between -1 and +1. The default correlation is 0 based on the Pryor Mountain data and the assumption that most mortality occurs in winter and winter weather is not highly correlated with foaling-season weather.

The model includes another form of random variation, called demographic stochasticity. This means that mortality and reproduction are random processes even in a constant environment; i.e., a foaling rate of 40% means that each female has a 40% chance of having a foal. Because of demographic stochasticity, even if scaling factors for both survival probabilities and foaling rates were set equal to 0, different runs of the simulation would produce different results. However, variation in population growth due to demographic stochasticity will be small except at low population sizes.

Gathering Schedule

There are three choices for the gather schedule: gather at a regular interval, gather at a minimum interval (the default), or gather in specific years. Gathering at a minimum interval means that gathers will be conducted no more frequently than a prescribed interval (e.g., 3 years), but will not be conducted if the time interval has passed unless the population is above a threshold size that triggers a gather.

Gather interval

This is the number of years between gathers.

Gather for fertility treatment regardless of population size?

If this option is selected (the default), then gathers occur according to the gathering schedule specified regardless of whether or not the population exceeds a threshold population size. One effect of this is that a minimum-interval schedule really functions as a regular interval.

Continue gather after reduction to treat females?

Continuing a gather after a reduction to treat females (with fertility control management options) means that, if a gather for a removal has been triggered because the population has exceeded a threshold population size, then horses will continue to be processed even after enough have been removed to reduce the population to the target population size. As additional horses are processed, females, to be released back, will be treated with an immunocontraceptive according to the information specified in the Contraceptive Parameters form.

Threshold for gather

The threshold population size for triggering a gather is the actual population size in a particular year estimated by the program. This is NOT the same as the number of horses counted in an aerial census, but closer to an estimate of population size taking into account the fact that an aerial census typically underestimates population size.

Target population size

This is the goal for the population size following a gather and removal. Horses will be removed until this target is reached, although it may not be possible to achieve this goal, depending on the removal parameters (percentages of each age-sex class to be removed) and gathering efficiency.

Are foals included in AML?

In most districts, foals are counted as part of the appropriate management level (AML).

Gathering efficiency

Typically, some horses will successfully resist being gathered, either by hiding in habitats where they can't be seen or moved by a helicopter, or following escape routes that make it dangerous or uneconomical for them to be herded from the air. These horses aren't available for removals or fertility treatment. The default gathering efficiency is 80%, meaning that the program assumes that 20% of the population will successfully resist being gathered. This value may be changed.

Note that the program assumes that horses of all age-sex classes are equally likely to be able to be gathered. This is an unrealistic assumption because bachelor males, for example, may be more likely to successfully avoid being gathered than females or foals or band stallions.

Sanctuary-bound horses

Age-selective removals typically target younger age classes such as 0 to 5-year-olds or 0 to 9-year-olds because these horses are more easily adopted. However, it may not be possible to reduce the population to a target size by restricting removals to these younger age classes, especially if age-selective removals have been conducted in the past. In this case, an option is available to remove older animals as well, who may be destined for permanent residence in a long term holding facility rather than for adoption. The minimum age of these long term holding facility horses is specified for this element. When older age classes as well as younger age classes are identified for removal on the Removal Parameters form, horses of these older age classes are selected along with younger age class horses as the population is reduced to the target value. If a minimum age for long term holding facility horses is specified, then older animals are only removed if the population can't be reduced to the target population size by removing the younger ones.

Percent Effectiveness of fertility control

These percentages represent the percentage of treated females that are in fact sterile for one year, two years, etc. (i.e., the efficacy or effectiveness of fertility treatment). The default values are 90% efficacy for one year. However, the user may specify the effectiveness year by year, for up to five years.

Removal Parameters

This allows the user to determine the percentages of horses in each sex and age class to be removed during a gather. The program uses these percentages to determine the probabilities of removing each horse that is processed during a gather. If the percentage for an age-sex class is 100%, then all horses of that age-sex

class that are processed will be removed until the target population size is reached. If the percentage for an age-sex class is 0%, then all horses of that age-sex class will be released. If the percentage for an age-sex class is greater than 0% but less than 100%, then the proportion of horses of that age-sex class removed will be approximately equal to the specified percentage.

Contraception Parameters

This allows the user to specify the percentage of released females of each age class that will be treated with an immunocontraceptive. The default values are 100% of each age class, but any or all of these may be changed.

Most Typical Trial

This is the trial that is most similar to each of the other trials in a simulation

Population Size Table

The default is both sexes and all age classes, but summary results may also be chosen for a subset of the population. The table identifies some key numbers such as the lowest minimum in all trials, the median minimum, and the highest minimum. Thinking about the distribution of minima for example, half of the trials have a minimum less than the median of the minima and half have a minimum greater than the median of the minima. If the user was concerned about applying a management strategy that kept the population above some level, because the population might be at risk of losing genetic diversity if it were below this level, then one might look at the 10th percentile of the minima, and argue that there was only a 10% probability that the population would fall below this size in x years, given the assumptions about population data, environmental stochasticity, and management that were used in the simulation.

Gather Table

The default is both sexes and all age classes, but summary results may be for a subset of the population. The table shows key values from the distribution of the minimum total number of horses gathered, removed, and (if one elected to display data for both sexes or just for females) treated with a contraceptive across all trials. This output is probably the most important representation of the results of the program in terms of assessing the effects of your management strategy because it shows not only expected average results but also extreme results that might be possible. For example, only 10% of the trials would have entailed gathering fewer animals than shown in the row of the table labeled "10th percentile", while 10% of the trials would have entailed gathering more than shown in the row labeled "90th percentile". In other words, 80% of the time one could expect to gather a number of horses between these 2 values, given the assumptions about survival probabilities, foaling rates, initial age-sex distribution, and management options made for a particular simulation

Growth Rate

This table shows the distribution of the average population growth rate. The direct effects of removals are not counted in computing average annual growth rates, although a selective removal may change the average foaling rate or survival rate of individuals in the population (e.g., because the age structure of the population includes a higher percentage of older animals), which may indirectly affect the population growth rate. Fertility control clearly should be reflected in a reduction of population growth rate.

Population Modeling, Jackson Mountains HMA

To complete the population modeling for the Jackson Mountains HMA, version 1.40 of the WinEquus program, created April 2, 2002, was utilized.

Objectives of Population Modeling

Review of the data output for each of the simulations provided many useful comparisons of the possible outcomes for each alternative. The creator of the modeling program, Stephen Jenkins stresses that it is important to think about the range of possible outcomes, not just focus on one average or typical trial. Some of the questions that need to be answered through the modeling include:

- Do any of the Alternatives "crash" the population?
- What effect does fertility control have on population growth rate?
- What effects do the different alternatives have on the average population size?

Population Data, Criteria, and Parameters utilized for Population Modeling

Initial age structure for the 2002 herd was developed from age structure data collected during the 1997 Jackson Mountains HMA wild horse gather. The 1997 release data was combined with a data set developed for an estimated 50 animals not gathered and 3 older studs released without age data in 1997. This data set was based on age structure data from the 1997 gather population.

The following table displays the age structure for released animals, the estimated age structure for animals not gathered/released without age data, and the estimated post gather population for 1997.

Initial Age Structure 1997

Age Class	Jackson Mountains Released Animals - 1997		Typical Population for 50 un-gathered animals and 3 studs missing age data		Jackson Mountains Estimated Post Gather Population 1997	
	Females	Males	Females	Males	Females	Males
Foals	1	0	7	4	8	4
1	0	0	5	3	5	3
2	1	0	5	3	6	3
3	0	0	2	1	2	1
4	0	0	1	1	1	1
5	0	0	2	1	2	1
6	0	0	2	1	2	1
7	0	0	1	0	1	0
8	0	0	1	0	1	0
9	1	0	0	0	1	0
10-14	52	57	4	5	56	62
15-19	17	20	1	3	18	23
20+	2	6	0	0	2	6
Total	74	83	31	22	105	105

A simulation, using the estimated 1997 post gather population as the initial age structure, was then conducted for the years 1997 to 2002 under the "no management" management option, to represent what the population would be comprised of in 2002. The most typical trial obtained from this simulation was saved and used to represent the 2002 age structure of the herd and rescaled to an initial population of 672, which represents the estimated population in 2002.

The following table displays the initial age structure for the 2002 wild horse population utilized in the population model for the Proposed Action and Alternatives.

Initial Age Structure - 2002

Age Class	Jackson Mountains Initial Age Structure 2002	
	Females	Males
Foals	50	35
1	60	41
2	43	42
3	40	50
4	29	40
5	9	9
6	8	4
7	6	4
8	3	2
9	3	1
10-14	17	15
15-19	47	50
20+	27	37
Total	342	330

All simulations used the survival probabilities and foaling rates supplied with the WinEquus population model for the Granite Range HMA. Survival and foaling rate data were extracted from, "Wild Horses of the Great Basin", by J. Berger (1986, University of Chicago Press, Chicago, IL, xxi + 326 pp.). They are based on Joel Berger's 6 year study in the Granite Range HMA in northwestern Nevada. The sex ratio at birth observed by Berger in the Granite Range was modified from 57% males at birth, to 50% males at birth

Survival probabilities and foaling rates utilized in the population model for the Proposed Action and Alternatives are displayed in the following table.

Survival Probabilities and Foaling Rates

Age Class	Survival Probabilities		Foaling Rates
	Females	Males	
Foals	.917	.917	--
1	.969	.969	--
2	.951	.951	.35
3	.951	.951	.40
4	.951	.951	.65
5	.951	.951	.75
6	.951	.951	.85
7	.951	.951	.90
8	.951	.951	.90
9	.951	.951	.90
10-14	.951	.951	.85
15-19	.951	.951	.70
20	.951	.951	.70

The following table displays the removal criteria utilized in the population model for the Proposed Action and Alternatives I, II and III.

Removal Criteria

Age	Percentages for Removals	
	Females	Males
Foal	100%	100%
1	100%	100%
2	90%	100%
3	90%	95%
4	90%	95%
5	90%	95%
6	--	--
7	--	--
8	--	--
9	--	--
10-14	90%	90%
15-19	90%	90%
20+	90%	90%

Population Modeling Criteria

The following summarizes the population modeling criteria that are common to the Proposed Action and Alternatives I, II, and III:

- Starting Year: 2002
- Initial gather year: 2002
- Gather interval: minimum interval of five years
- Sex ratio at birth: 50% male
- Percent of the population that can be gathered: 90%
- Minimum age for long term holding facility horses: 10 years old
- Foals are included in the AML
- Simulations were run for four years with 100 trials each

The following summarizes the population modeling criteria for Alternative IV, No Action:

- Starting Year: 2002
- Sex ratio at birth: 50% male
- Simulations were run for four years with 100 trials each

The following table displays the population modeling parameters utilized in the model for the Proposed Action and Alternatives I, II, and III:

Population Modeling Parameters

Modeling Parameter	Proposed Action	Alternative I	Alternative II	Alternative III
Management by removal and fertility control	Yes	--	Yes	--
Management by removal only	--	Yes	--	Yes
Threshold Population Size for Gathers	217	217	217	217
Target Population Size Following Gathers	130	130	217	217
Gather for fertility control regardless of population size	Yes	--	Yes	--
Gathers continue after removals to treat additional females	No	--	No	--
Effectiveness of Fertility Control: year 1	95%	--	95%	--
Effectiveness of Fertility Control: year 2	85%	--	85%	--

Population Modeling Results

Population size in five years

Out of 100 trials in each simulation, the model tabulated minimum, average and maximum population sizes. The model was ran from 2002 to 2006 to determine what the potential effects would be on population size for the proposed action and alternatives. These numbers are useful to make relative comparisons of the different alternatives, and potential outcomes under different management options. The data displayed within the tables is broken down into different levels. The lowest trial, highest trial and several in between are displayed for each simulation completed. According to the creator of the modeling program, this output is probably the most important representation of the results of the program in terms of assessing the effects of proposed management, because it shows not only expected average results but also extreme results that might be possible.

Population Sizes in 5 years - Minimum

Alternative	Proposed Action	I	II	III	IV
Lowest Trial	86	127	142	206	396
10th Percentile	141	147	237	240	689
25th Percentile	152	159	248	256	702
Median Trial	**168**	**168**	**270**	**274**	**719**
75th Percentile	178	180	284	288	750
90th Percentile	186	191	299	298	801
Highest Trial	223	246	323	316	946

This table shows that in five years and 100 trials for each alternative, the lowest number of 0-20+ year old horses ever obtained was 86 under the Proposed Action. Half of the trials were greater than the median and half were less than the median. Additional interpretation may be made by comparing the various percentile points. For example, for the Proposed Action, only 10% of the trials resulted in fewer than 141 wild horses as the minimum population, and 10% of the trials resulted in a minimum population larger than 186 wild horses. In other words, 80% of the time, one could expect a minimum population between these two values for the Proposed Action, given the assumptions about survival probabilities, foaling rates, initial age-sex distribution, and management options made for this simulation.

The Proposed Action (lower limit of the management range with fertility control) reflects the lowest minimum population of all alternatives. The population size for the Proposed Action is very close to, but slightly less than Alternative I (lower limit of the management range without fertility control). The simulation results for Alternative II (upper limit of the management range with fertility control) and III (upper limit of the management range without fertility control) are both similar, as well. Alternative IV, No Action, reflect the highest minimum population levels of all of the trials.

None of the results obtained for any of the alternatives indicate that a crash of the population would occur if the alternative were implemented. The level to which the population is gathered (lower or upper limit of the management range) appears to be more of an influence to the population size than fertility control. It is clear that fertility control in conjunction with a gather to the low limit of the management range would produce the lowest minimum population, while the No Action Alternative results in the highest minimum population.

The lowest population size ever obtained (86 head) was less than the lower level of the management range of 130 wild horses. However, for 90% of the time the simulation indicates that the population will be 141 head or more, which is higher than the lower level of the management range. This occurs due to the assumptions made by the model, which include census accuracy, effectiveness of the gather, and mares that foal following the gather. These are all realistic assumptions and result in simulations that are closer to real world situations rather than making predictions based on finite numbers.

Population Sizes in 5 years - Average

Alternative	Proposed Action	I	II	III	IV
Lowest Trial	223	273	296	338	480
10th Percentile	274	297	359	385	881
25th Percentile	291	307	371	408	964
Median Trial	**302**	**326**	**393**	**433**	**1049**
75th Percentile	315	345	412	455	1120
90th Percentile	330	364	434	475	1186
Highest Trial	380	458	498	512	1468

This table displays the average population sizes obtained for the 100 trials ran for each alternative. The average population size across five years ranged from a low of 223 wild horses under the Proposed Action, to a high of 1468 wild horses under Alternative IV, No Action. Again, the Proposed Action reflects the lowest overall average population size, followed by Alternatives I, II, and III, and Alternative IV has the highest average population size after five years. In comparing the Proposed Action and Alternative II, gathering to the upper limit of the management range rather than the lower limit of the management range, results in an average median population size that is 30% larger. The difference between the Proposed Action and Alternative I is an 8% increase in average median population size. Both are gathered to the lower limit of the management range but fertility control is not implemented in Alternative I. Results between Alternative II and III are similar to that of the Proposed Action and Alternative I, and show an increase of 10% of the average median population size when the upper limit of the management range is selected instead of the lower limit of the management range. The largest difference (excluding Alternative IV) is noted between the Proposed Action and Alternative III, where the average median population size is 43% larger when fertility control is not implemented and the population is gathered to the upper limit of the management range.

Population Sizes in 5 years - Maximum

Alternative	Proposed Action	I	II	III	IV
Lowest Trial	673	677	675	674	682
10th Percentile	686	693	685	682	1132
25th Percentile	701	702	703	702	1235
Median Trial	**722**	**730**	**727**	**733**	**1396**
75th Percentile	748	768	773	771	1551
90th Percentile	796	818	810	824	1683
Highest Trial	912	998	1095	935	2123

This table displays the largest populations that could be expected out of 100 trials for each alternative. The figures for the Lowest Trial represent what the population is likely to be in 2002. All figures are very similar because under all of the alternatives, the same starting population, and gather efficiency etc., is assumed. The numbers vary due to randomness and assumptions inherent to the modeling program.

Average Growth Rates in 5 years

Average growth rates were obtained by running the model for 100 trials from 2002 to 2006 for the proposed action and each alternative. The following table displays the results obtained from the model:

Average Growth Rate in 4 Years

Alternative	Proposed Action	I	II	III	IV
Lowest Trial	-4.3%	8.0%	-4.0%	3.7%	-9.8%
10th Percentile	10.0%	14.4%	8.0%	12.3%	10.5%
25th Percentile	13.0%	17.6%	11.3%	15.9%	14.3%
Median Trial	**16.9%**	**20.5%**	**14.3%**	**19.4%**	**17.5%**
75th Percentile	19.4%	23.8%	17.1%	23.0%	20.1%
90th Percentile	21.1%	26.9%	19.4%	24.9%	22.2%
Highest Trial	27.4%	31.4%	23.9%	28.7%	26.4%

As expected, the two alternatives implementing fertility control (Proposed Action and Alternative II) reflect the lowest overall median growth rate. For the median trial, the fertility control alternatives are 21% and 36% lower than the respective non-fertility control alternative. For the Proposed Action and Alternative II (fertility control), the average growth rate was less than 10.0% and 8.0% respectively for 10% of the time. The target size to which the population is gathered to (130 or 217 wild horses) appears to have minimal impacts to growth rates, as demonstrated by the growth rates being quite similar for the Proposed Action and Alternative II (fertility control alternatives), and for Alternative I and III (no fertility control alternatives). The lowest trial growth rates of –9.8% for Alternative IV (No Action), -4.3% for the Proposed Action and –4.0% for Alternative II do not appear to be a direct result of the management options, but appear to reflect the random nature of the model and the ability to show extremes in possible outcomes. The one particular trial for each of these alternatives that resulted in the low growth rate must be reflecting a "bad" year. The range of growth rates is a reasonable representation of what could be expected to occur in a wild horse population.

Totals in five years – Gathered, Removed and Treated

The same type of tabular data was obtained from the model for the numbers of wild horses gathered, removed and treated under each alternative. The data is for one gather only that is proposed take place in 2002, and includes all animals 0-20+ years of age.

Totals in 5 Years -- Gathered

Alternative	Proposed Action	I	II	III	IV
Lowest Trial	555	557	557	474	NA
10th Percentile	566	572	564	486	
25th Percentile	578	580	581	504	
Median Trial	**594**	**600**	**600**	**536**	
75th Percentile	618	631	638	568	
90th Percentile	658	674	670	629	
Highest Trial	752	819	898	743	

Totals in 5 Years -- Removed

Alternative	Proposed Action	I	II	III	IV
Lowest Trial	454	454	381	379	NA
10th Percentile	464	467	391	392	
25th Percentile	474	476	406	409	
Median Trial	**490**	**493**	**428**	**432**	
75th Percentile	508	522	465	464	
90th Percentile	542	554	498	509	
Highest Trial	624	674	731	606	

Totals in 5 Years -- Treated

Alternative	Proposed Action	I	II	III	IV
Lowest Trial	29	NA	55	NA	NA
10th Percentile	32		61		
25th Percentile	33		64		
Median Trial	**35**		**67**		
75th Percentile	37		70		
90th Percentile	38		72		
Highest Trial	46		79		

The number of horses gathered does not differ greatly between alternatives because gather criteria is the same for all alternatives. What does differ widely is the number of wild horses removed and treated under the different alternatives. The Proposed Action and Alternatives I are similar in the number of animals removed, because each of these alternatives includes gathering to the target number of 130 which is the lower limit of the management range. Similarly, Alternatives II and III are also similar because they both include a target number of 217.

The model indicates that nearly twice as many mares would be treated with immunocontraception under Alternative II, than under Proposed Action. More animals would be released under Alternative II as the target population is higher than the Proposed Action.

Population Modeling Summary

To summarize the results obtained by simulating the range of alternatives for the Jackson Mountains HMA wild horse gather, the original questions can be addressed.

- Do any of the Alternatives "crash" the population?

None of the alternatives indicate that a crash is likely to occur to the population. Minimum population levels and growth rates are all within reasonable levels, and adverse impacts to the population are not likely.

- What effect does fertility control have on population growth rate?

As expected, the two alternatives implementing fertility control (Proposed Action and Alternative II) reflect the lowest overall growth rate. The fertility control alternatives are 21% and 36% lower than the

respective non-fertility control alternative. The target size to which the population is gathered to (130 or 217 wild horses) appears to have minimal impacts to growth rates, as demonstrated by the growth rates being quite similar for the Proposed Action and Alternative II (fertility control alternatives), and for Alternative I and III (no fertility control alternatives).

- What effect do the different alternatives have on the average population size?

The level to which the population is gathered (lower or upper limit of the management range) appears to be more of an influence to population size than fertility control, as there are larger differences within the population minimums from the lower limit of the management range to the upper limit of the management range alternatives. It is clear that fertility control with a gather to the lower limit of the management range would produce the lowest minimum population, and no fertility control with a gather to the upper limit of the management range would produce the highest minimum population, for the four action alternatives. As expected, the No Action Alternative results in the highest minimum population.

In comparing the Proposed Action and Alternative II, gathering to the upper limit of the management range rather than the lower limit of the management range, results in an average medial population size that is 30% larger. Results obtained under Alternatives I and III are similar to that of the Proposed Action and Alternative II, and show an increase of 10% of the average median population size when the upper limit of the management range is selected instead of the lower limit of the management range. The difference between the Proposed Action and Alternative I is only a 8% increase in average median population size. Both are gathered to lower limit of the management range but fertility control is not implemented in Alternative I. The largest difference (excluding Alternative IV, No Action) is noted between the Proposed Action and Alternative III, where the average median population size is 43% larger when fertility control is not implemented and the population is gathered to the upper limit of the management range.

Appendix D
Summary of Wild Horse Genetic Viability Issues

The following includes excerpts from the *Summary Recommendations, BLM Wild Horse and Burro Population Viability Forum April 21, 1999* (Coates-Markle, 2000)

BLM regulations and policy state that wild horses and burros shall be managed as *viable, self-sustaining populations* of healthy animals in balance with other multiple uses and the productive capacity of their habitat (CFR 4700.0-6).

BLM regulations and policy state that HMAs should be inventoried and monitored for *population size, animal distribution, herd health* and condition and habitat characteristics at least every 4 years (CFR 4710.2). As such, BLM is required to provide reliable estimates of population size and distribution within each herd management area on a regular interval.

Self-sustaining refers to the process whereby established populations are able to persist and successfully produce viable offspring which shall, in turn, produce viable offspring, and so on over the long term. The absolute size which a population must attain to achieve a self-sustaining condition varies based on the demographic and sociological features of the herd (and adjoining herds), and these aspects should be evaluated on a case by case basis. In many cases it is not necessary that populations be isolated genetic units, but both naturally-occurring and management-induced ingress and egress activity can be considered, in order to maintain sufficient genetic diversity within these populations.

Reproductive capacity is, to a large degree, dictated by the genetic fitness of a population. Generally speaking, the higher the level of genetic diversity, within the herd, the greater its long-term reproductive capacity. Inbreeding, random matings (genetic drift), and/or environmental catastrophes can all lead to the loss of genetic diversity within the population. In most herds, though, genetic resources will tend to be lost slowly over periods of many generations (~10 years/generation), and there is little imminent risk of inbreeding or population extinction. Potential negative consequences of reduced diversity, however, may include reduced foal production and survival, as well as reduced adult fitness and noted physical deformities. Smaller, isolated populations (<200 total census size) are particularly vulnerable when the number of animals participating in breeding drops below a minimum needed level. This minimum level can be calculated and is different for each population.

In order to fully evaluate genetic viability issues, populations which participate in a measurable level of natural ingress or egress activity and which are, in reality, a component of larger metapopulations, should be identified, and the genetic impact of this activity should be estimated.

Metapopulation refers to two or more local breeding populations which are linked to one another by dispersal activities of individual animals. These populations may have unique demographic features (birth and death rates) but ultimately may 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.

A complete population census of each herd management area is unrealistic, especially for the larger populations (>200 total census size). However, population size can and should be estimated using reliable scientific techniques. These survey techniques are under continual revision and BLM continues to participate in these research efforts. On a more critical level, however, is the determination of size of the many smaller populations (<200 total census size) over which BLM has responsibility. Available data indicates that almost 70% of the managed herds have AMLs (appropriate management levels) set at 150 animals or less. In fact, almost 40% of the herds in Nevada, Utah, Wyoming, Colorado, and Arizona (71 out of 177 total HMAs) are indicated to have population sizes of less than 50 animals. There is a real possibility that some of these populations will be unable to maintain self-sustaining reproductive ability, over the long term, unless there is a natural or management-induced influx of genetic information from neighboring herds. An exchange of only 2 to 3 breeding age animals (specifically females), every 10 years, is often sufficient to maintain genetic diversity within a given herd. Estimates of existing genetic diversity can be calculated for each wild horse and burro population.

Within the context of wild horse and burro populations, the ability to maintain the quality of "reproductively self-sustaining" is required. This can primarily be accomplished through evaluation and the maintenance of an acceptable level of genetic diversity within the population over the long term.

Establishing baseline genetic diversity, for a wild horse population, often refers to typing up to 29 genetic marker systems from a sample of individual animals (~25 individuals or up to 25% of the population) within a specific herd. Traditionally, these marker systems have included blood group and biochemical systems, and have required fresh blood samples. These systems were originally developed for verifying parentage or founder animals within a herd. Analysis of genetic diversity, however, can also be done through the use of DNA genetic marker systems, and direct testing can utilize almost any bodily product including hair or even feces. Only DNA marker analysis can be used for burros, however, due to the very limited variation in blood protein genes.

Most wild horse herds, sampled to date, have shown fairly high levels of genetic diversity. In some cases, however, this diversity is attributed to a large number of low frequency and relatively rare genetic material which is often easily lost from the herd. Thus, it becomes important to understand the genetic makeup of individual herds. Baseline data needed to establish current levels of genetic diversity in populations is relatively easy to gather. Individual samples cost about $25 to process, and if ~25-50 individuals are sufficient to establish baseline information for herds ranging in size from 100 to 200 animals, then the cost would be approximately $1250 for herds of this size. As a result, a comparison of genetic viability levels in the tested population can be made to existing information from over 100 domestic and wild horse populations representing different herd sizes and demographic backgrounds.

Previous wildlife conservation research, and current efforts with wild horses, suggest management should allow for a 90% probability of maintaining at least 90% of the existing population diversity over the next 200 years. Existing diversity should be sufficient to ensure a self-sustaining reproductive capacity within the herd.

Genetic diversity, within wild horse and burro populations, refers to the entire complement of genetic material representative of all individuals (or a sample of individuals) from within the population. Some populations may possess genetic uniformity to a certain "type" or breed of horse, but management interests are specific to maintaining a maximum diversity of genetic material which appears representative of each herd. Promotion of diversity will minimize the effects of genetic drift, or the random loss of genetic material due to mating processes, and maximize genetic health of the herds.

Once baseline genetic data has been established, the main focus of genetic management, especially for the smaller populations (<200 total census size), becomes the attempt to preserve as much of the existing genetic diversity as possible. Establishing a genetic conservation goal will require re-testing of herd diversity on at least a five-year cycle, with subsequent evaluations of the potential impact of management decisions (including the establishment and/or revision of appropriate management levels) on that diversity. Management may need to evaluate ways to introduce genetic material into a herd which appears genetically deficient in order to be self-sustaining over the long-term (see subsequent recommendations). Baseline genetic data can also be incorporated into PVA (population viability analysis) models, which attempt to predict the impact of management decisions (as well as environmental catastrophes) on existing diversity levels. Most models require reasonably accurate data in terms of age class foaling and mortality rates, as well as individual genetic information. As such, the means to collect accurate data necessary for a genetically-based PVA, for most herds, is probably unavailable at the present time.

BLM should, in its efforts to evaluate the genetic diversity and self-sustaining nature of managed herds, estimate the genetic effective population size (Ne) of all populations, or metapopulations, with a total census size of 200 animals or less.

The genetic effective population size (Ne) is a measure of the total number of mares and stallions which contribute genetically, through successful breeding, to the next generation. Although no standard goal for Ne currently exists for wild horse and burro herds, a goal of Ne=50, which comes from domestic breeding guidelines, can be conservatively applied. Populations, where Ne is calculated to be less than 50, may experience higher rates of loss of genetic diversity than would be considered acceptable under recommended management goals.

Limited research into wild horse herds (Pryor Mountain Wild Horse Range and Assateague Island National Seashore populations) has demonstrated that the "Ne", for a herd under a natural age structure, is about 30-35% of the total census population size. In other words, a total population size of about 150 animals might support only a minimum (Ne=50) genetic effective population size. Ne, however, is difficult to calculate for wild horses, since the calculation is

complicated by a number of issues. The harem structure of the population, for example, greatly limits male participation in breeding, creating an uneven ratio of breeding sexes which reduces Ne and contributes to a high variation in individual reproductive success. Extreme fluctuations in population size, due to the effects of removals, can also act to reduce the value of Ne. Ne is also highly influenced by the sex ratio and age class structure of a population. A sex ratio which favors males and results in larger numbers of smaller sized harems, within the herd, will act to increase Ne (and male participation in breeding) to a point. A population with an age structure involving high numbers of young animals (<5 years of age) will have a lower value of Ne than a similar sized population with a larger component of older breeding-age animals (>5 years of age). Also, there is no single, uniformly accepted method to calculate Ne. However, researchers have used and applied several formulas to certain wild horse herds and have found this comparative approach to provide the best estimates. Generally, the best possible data on population sex ratios and age structures, coupled with reasonable estimates of foaling and mortality rates, will enable managers to evaluate the genetic health of most herds.

BLM should evaluate viable management alternatives for conserving or enhancing genetic diversity within populations (or metapopulations) having a known limited level of diversity, a total census size of less than 200 animals and/or an estimated genetic effective population size (Ne) of less than 50.

Viable management alternatives for conserving genetic diversity within managed wild horse and burro herds may take several forms. Some options to be considered might include: altering population age structure (through removals) to promote higher numbers of reproductively-successful animals; altering breeding sex ratios (through removals) to encourage a more even participation of breeding males and females; increasing generation intervals (and reducing the rate of loss of genetic material) by removing (or contracepting) younger versus older mares; and/or introducing breeding animals (specifically females) periodically from other genetically similar herds to help in conservation efforts. In this last scenario, only one or two breeding animals per generation (~10 years) would need to be introduced in order to maintain the genetic resources in small populations of less than 200 animals.

Simply increasing the total herd size by adding additional animals (adjusting the management AML upward) is not the only viable technique for enhancing the genetic effective population size (Ne) of a wild horse and burro population. With sound knowledge of existing herd demographic information, management alternatives for specific populations can be evaluated through research modeling efforts. As such, management also has the option of adjusting certain aspects of herd structure in order to promote genetic conservation. It should also be noted that any adjoining herds, which are naturally participating in an exchange of animals and genetic material through interbreeding, are probably self-maintaining their genetic diversity and management should consider both supporting and estimating this type of activity.

BLM should continue to manage wild horse and burro herds, beneath the level which is scientifically referred to as the ecological carrying capacity of the population. This is the level at which science has determined that density-dependent population regulatory mechanisms would take effect within the herd. Most herds are currently managed close to their "economic carrying

capacity" which is approximately 50-65% of the ecological carrying capacity. At this level of management, health of both the horse herd and range ecosystem are prioritized.

BLM regulations and policy state that wild horses and burros shall be managed as viable, self-sustaining populations of healthy animals *in balance with other multiple uses and the productive capacity of their habitat* (CFR 4700.0-6). Thus appropriate management levels (AMLs) are established which provide for a level of use by wild horses and burros which results in a thriving natural ecological balance and avoids deterioration of the range. Furthermore, proper management requires that wild horses and burros be in good health and reproducing at a rate that sustains the population and that population control methods be considered before the herd size causes damage to the rangeland.

Ecological carrying capacity of a population, is a scientific term which refers to the level at which density-dependent population regulatory mechanisms would take effect within specific herds. At this level, however, the herds would show obvious signs of ill-fitness including poor individual animal condition, low birth rates, and high mortality rates in all age classes due to disease and/or increased vulnerability to predation. In addition, supporting range conditions would be noticeably deteriorated, with much of the available habitat showing symptoms of irreparable over-grazing.

Populations of wild horses on western rangelands have the capacity for rates of increase as high as 20-25% per year. Recent research has shown that unmanaged populations of wild horses and/or burros might eventually stabilize (due to density-dependent regulatory mechanisms) at very high numbers, near what is known as their food-limited ecological carrying capacity. At these levels, however, the herds would show obvious signs of ill-fitness including poor individual animal condition, low birth rates, and high mortality rates in all age classes due to disease and/or increased vulnerability to predation. In addition, supporting range conditions would be noticeably deteriorated, with much of the available habitat showing symptoms of irreparable over-grazing. Most wild herds are currently managed close to economic carrying capacity which allows the herds to be healthy with strong foal production and high individual survival rates. This approach should be continued, as it benefits the populations and also allows for the maintenance of healthy and in-balance rangeland systems.

The following was summarized from *Genetic Effective Population Size in the Pryor Mountain Wild Horse Herd: Implications for conservation genetics and viability goals in wild horses* by Francis J. Singer and Linda Zeigenfuss, Biological Resources Division of US Geological Survey, Natural Resources Ecology Lab, Colorado State University (Singer, 2000).

Background

Genetics are typically presumed to be the least important component of minimum viable population predictions and catastrophe is the most important. Catastrophe can be guarded against with large populations of longer predicted persistence times, but also with better management of any given population. Consider the concepts of food-limited ecological carrying capacity and economic carrying capacity. The tarpan and Przewalski's wild horses of Europe and

Asia might have been limited by predation by a combination of wolves, brown bears and one or more large cats, but predation (mostly by mountain lions) is significant in only a very small number of wild horse herds in the US west. Most herds grow at phenomenal rates, for ungulates, of 16-22% per year. We observe that most wild horse herds are managed close to economic carrying capacity (which is typically 50-65% of ecological carrying capacity in numbers) and, at this lowered population level, animals are in better body condition, survival is higher (there is less starvation or dehydration), recruitment is higher, there is less conflict with other vertebrates and soil and vegetation resources, population fluctuations are less, and there is less risk of a resource-limited catastrophe.

Furthermore, while genetics is not a consideration in many free-ranging vertebrates, genetic conservation will become a serious consideration over future decades in wild horse management since so many of the herds are now isolated and small. In the Intermountain West region, 61% of all wild horse populations numbered less than 100 and 41% numbered less than 50 animals. Herds managed at these low numbers for decades might become inbred.

Discussion

Evidence from the Pryor Mountain wild horse herd supports the hypothesis that long-term management of wild horse numbers below the unmanaged maximum, has resulted in improved wild horse conditions, apparently improved range conditions, and a lower probability of a large starvation losses. Genetic effective population size (commonly referred to as Ne) is defined as the number of breeding individuals (both male and female) that contribute to the next generation. Ne is a useful number since it can be used to calculate the loss of genetic variation through genetic drift and/or inbreeding from one generation to the next with the formula 1/4Ne. But Ne is a difficult number to calculate for wild horses, since the calculation is complicated by overlapping generations, a harem structure greatly limiting male participation in breeding (an uneven ratio of breeding sexes reduces Ne), high variance in reproductive success of both sexes, population fluctuations due to removals, and by a typical failure to breed until the age of 3 years for mares and 7 years for stallions. No single, universally acceptable formula exists to deal with these complexities.

No standard goal for Ne or for loss of genetic resources currently exists for wild horse herds. If a goal of Ne=50 was applied, the goal for maintenance of domestic livestock production and thus probably an absolute minimum for a population in the wild, census N would need to be in excess of 139-185 wild horses, the excess to account for 3-5 removals per wild horse generation. Management could greatly alter this relationship by: (a) altering breeding sex ratios to increase Ne through removals, (b) increasing generation length through removal scenarios (which reduces the rate of loss of genetic resources, or (c) introducing breeding animals periodically from other genetically similar herds to maintain genetic resources. Only one to two breeding animals per generation (about every 10 years in wild horses) would maintain the genetic resources in small populations of about 100 animals, thus obviating the need for larger populations in all cases. We stress that there is little imminent risk of inbreeding since most wild horse herds sampled have large amounts of genetic heterozygosity, genetic resources are lost slowly over periods of many generations, and wild horses are long-lived with long generation interval.

KENNY C. GUINN
Governor

STATE OF NEVADA

CATHERINE BARCOMB
Administrator

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
COMMISSION FOR THE
PRESERVATION OF WILD HORSES
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Carson City, Nevada 89704
Phone (775) 849-3625 • Fax (775) 849-2391

October 10, 2002

Mr. Colin Christensen
Bureau of Land Management
Winnemucca Field Office
5100 East Winnemucca Blvd.
Winnemucca, Nevada 89445

RE: Jackson Mountain Herd Gather Plan

Dear Mr. Christensen:

The Commission for the Preservation of Wild Horses appreciates this opportunity to review and comment on the Final Gather Plan and Environmental Assessment for the Jackson Herd. This approach and detail for population modeling and management have been real issues with this Commission over the past 10 years.

An appropriate management level for this herd is a result of a series of allotment specific decisions starting in 1994 and ending in 2000. While the appropriate management level is stated at 217 head, the monitoring data and allotment specific objectives are outdated and invalid. Our files indicate that rangeland-monitoring data collected in the Jackson Mountains Allotment ranged in the years 1988 through 1993. Presently, there should be 9 years of new rangeland monitoring data to validate or adjust the appropriate management level for the Jackson Herd. As stated on Page 3, the land use plan requires the assessment of rangeland monitoring data on a three or five year schedule to determine if adjustments to livestock, wild horses, and wildlife are necessary.

Page 4 states the chronology of environmental assessments for previous gathers of the Jackson Wild Horse Herd. Comments by the Commission on all these document thrive for the Field Office to consider the impacts to the surviving wild horse herd. This Gather Plan provides the framework to address the impacts of re-structuring the herd under adoption and fertility policies. However,

we fail to find how field and computer program assumptions give creditable support to the proposed action.

Data presented in this Gather Plan should allow for an accurate population model of the existing herd and an accurate prediction of the post gather herd.

Page 11 and Table 4 shows that BLM gathered 1,343 wild horses in three gathers since 1989. We were assured, and made the assumption, that age, sex, color and productivity data were collected in these gathers. This data can clearly define the longevity, survival probabilities, color composition and foaling rates of the Jackson Mountain Wild Horses. This data could establish annual recruitment rate to support population estimates. While the document strongly suggests that this data exists, the data is not presented or applied to these critical issues for herd modeling. Appendix C applies the 1997 Gather data to WinEquis Program. This program makes the assumptions that Age Classes 15-20 have survival probabilities of .951 with foaling rates of .70. Studies in the Pryor Mountains suggest these numbers are too high and actual data collected from 1989, 1994 and 1997 were not presented to support WinEquis Program assumptions. The 2002 wild horse population model was based upon a 2001 census number increased by 15% recruitment assumption by the Field Office. The WinEquis Program could not match the actual observed animals in 2001. If population data in 1997 was accurate and the Field Office applied their assumption of 15% recruitment, the 2002 population would be 37% less than the estimate. The validity of the population estimate and population model is in serious question, and the determination of no significant impact is weak.

The proposed action is for an 80% reduction of the Jackson Mountain Wild Horse Herd and apply immunocontraception to all surviving mares. This action would reduce the herd 40% below the 1994 appropriate management level and seriously restructure the herd's age composition to animals older than 6 and possibly over 9 years old. Given the amount of available population data collected from past gathers, the document should be able to accurately predict the outcome of the proposed action. The document holds too much disparity in model and Field Office assumptions for population estimates and population dynamics. Further use of actual data might suggest that immigration is occurring into this herd. As previously pointed out, the 1994 appropriate management level is grossly outdated in respect to available data.

We recommend that all allotments receive an environmental assessment to determine a carrying capacity of the Jackson Mountain Herd Area. The validation of survival probabilities and foaling rates with actual data collected from the 1,343 horses gathered from the Jackson Wild Horse Management Area

could correct the WinEquis Program. It would be our hope that these measures would provide the confidence and proper science needed to assure the proposed action is within the context of the Act.

Thank you for your consideration on these matters.

Sincerely,

CATHERINE BARCOMB
Administrator

October 10, 2002

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Bureau of Land Management
Winnemucca Field Office
5100 East Winnemucca Blvd.
Winnemucca, Nevada 89445

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We recommend that all allotments receive an environmental assessment to determine a carrying capacity of the Jackson Mountain Herd Area. The validation of survival probabilities and foaling rates with actual data collected from the 1,343 horses gathered from the Jackson Wild Horse Management Area could correct the WinEquis Program. It would be our hope that these measures would provide the confidence and proper science needed to assure the proposed action is within the context of the Act.

Thank you for your consideration on these matters.

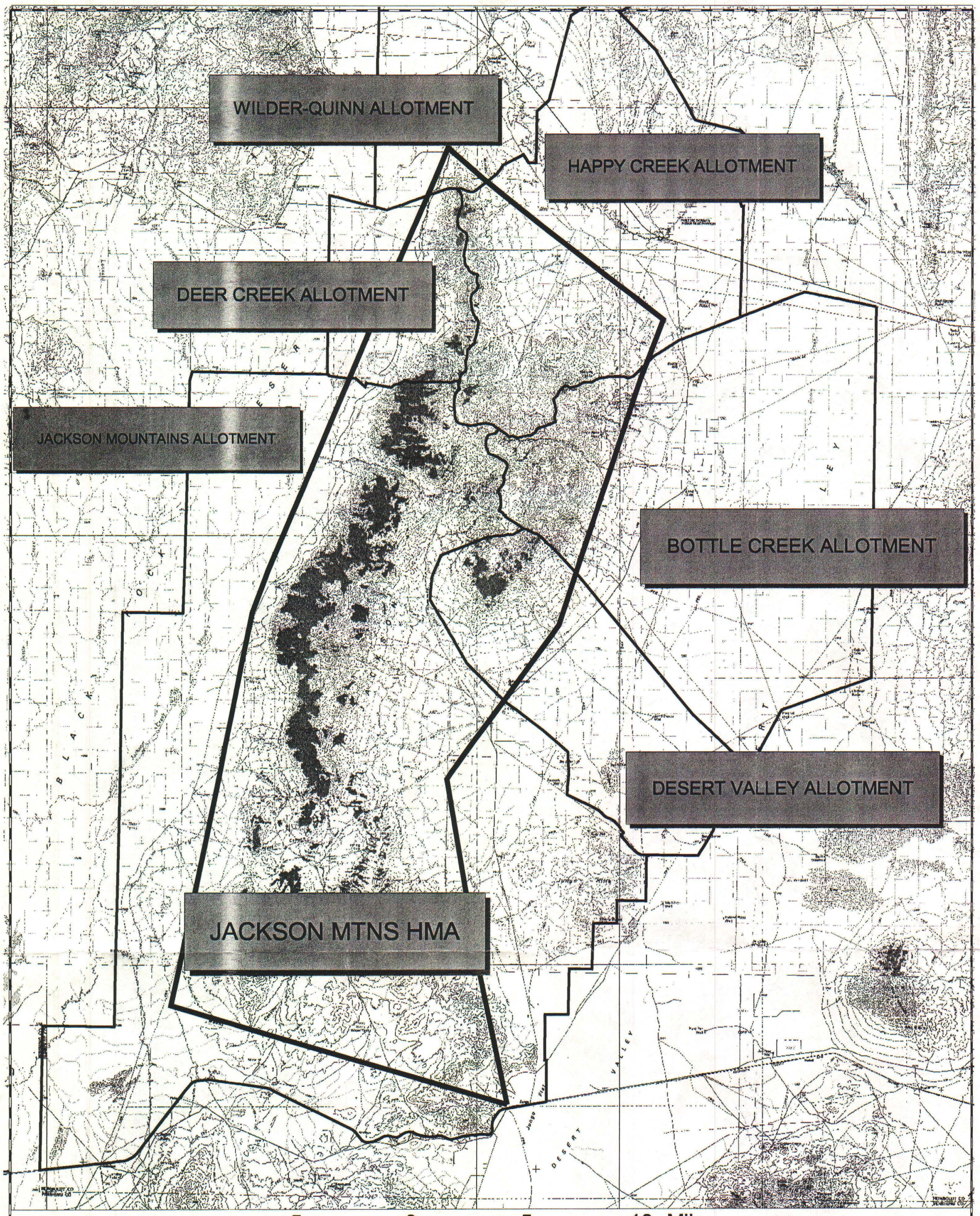
Sincerely,

CATHERINE BARCOMB
Administrator

Sincerely,

Roy Leach
Western Region

REL
Cc. Reno, Habitat



Jackson Mountains HMA and Allotments

Allotment Boundaries

Jackson Mtns HMA

United States Department of the Interior
Bureau of Land Management
Winnemucca Field Office
5100 E. Winnemucca Blvd.
Winnemucca, NV 89445

North Jackson Mountains

Black Rock Desert

South Jackson Mountains

JACKSON MTNS HMA

DESERT VALLEY

Wilderness Areas

Jackson Mtns HMA

5 0 5 10 Miles

United States Department of the Interior
Bureau of Land Management
Winnemucca Field Office
5100 E. Winnemucca Blvd.
Winnemucca, NV 89445

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data.

Jackson Mountains HMA and Wilderness Areas

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W E

S