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U.S. Department of the Interior
Bureau of Land Management

Preliminary Environmental Assessment
DOI-BLM-NV-L030-2018-0004-EA
August, 2018

Eagle Complex Wild Horse Gather Final Environmental Assessment

EAGLE, CHOKECHERRY, and MT. ELINORE
HERD MANAGEMENT AREAS
WILD HORSE GATHER

Location: Lincoln County, Nevada
Beaver and Iron Counties, Utah

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NATIONAL SYSTEM OF PUBLIC LANDS

Chapter 1 Introduction

This Environmental Assessment (EA) has been prepared to analyze the Bureau of Land Management's (BLM) Caliente Field Office (CFO) and Cedar City Field Office (CCFO) proposal to gather and remove excess wild horses from within and outside the Eagle, Chokecherry, and Mt. Elinore Herd Management Areas (HMAs) also referred to as the Eagle Complex. The wild horse gather plan would allow for an initial gather and follow-up maintenance gathers to be conducted over the next 10 years from the date of the initial gather operation to achieve and maintain appropriate management levels. The proposed gather would include removing excess wild horses from inside and outside the complex and treating mares with a fertility control vaccine.

This EA is a site-specific analysis of the potential impacts that could result with the implementation of the Proposed Action or alternatives to the Proposed Action. The EA assists the BLM Caliente and Cedar City Field Offices in project planning and ensuring compliance with the National Environmental Policy Act (NEPA), and in making a determination as to whether any "significant" impacts could result from the analyzed actions. An EA provides evidence for determining whether to prepare an Environmental Impact Statement (EIS) or a statement of "Finding of No Significant Impact" (FONSI).

This document is tiered to the *Ely Proposed Resource Management Plan/Final Environmental Impact Statement* (RMP/EIS, 2007) released in November 2007 and the Pinyon Management Framework Plan (MFP, 1983). If BLM determines that implementation of the Proposed Action or alternatives will not result in "significant environmental impacts", a FONSI will be prepared to document that determination, and a Decision Record issued providing the rationale for approving the chosen alternative.

1.1 Background

Since the passage of the Wild Free-Roaming Horses and Burros Act (WFRHBA) of 1971, BLM has refined its understanding of how to manage wild horse population levels. By law, BLM is required to control any overpopulation, by removing excess animals, once a determination has been made that excess animals are present and removal is necessary. Program goals have always been to establish and maintain a "thriving natural ecological balance," which requires identifying the Appropriate Management Level (AML) for individual herds. In the past two decades, goals have also explicitly included conducting gathers and applying contraceptive treatments to achieve and maintain wild horse populations within the established AML, so as to manage for healthy wild horse populations and healthy rangelands. The use of fertility controls helps reduce total wild horse population growth rates in the short term, and increases gather intervals and the number of excess horses that must be removed from the range. Other management efforts include improving the accuracy of population inventories and collecting genetic baseline data to support genetic health assessments. Decreasing the numbers of excess wild horses on the range is consistent with findings and recommendations from the National Academy of Sciences (NAS), American Horse protection Association (AHPA), the American Association of Equine Practitioners (AAEP), Humane Society of the United States (HSUS), Government

Accountability Office (GAO), Office of Inspector General (OIG) and current BLM policy. Since 2000 approximately 2,100 wild horses have been gathered and removed from the Eagle Complex. In 2002, 2007, and 2011 AML gathers were conducted in the complex. Since 2010 numerous small gathers have been conducted to remove nuisance horses from public and private lands, as well as along public highways. BLM's management of wild horses must also be consistent with Standards and Guidelines for Rangeland Health and for Healthy Wild Horse Populations developed by the Mohave- Southern Great Basin Resource Advisory Council (RAC).

During past gather and removal operations in these HMAs where Utah or Nevada attempted separate gathers on the HMAs at different times, wild horses would avoid capture by moving back and forth across the Utah/Nevada border. The lack of physical boundaries between the HMAs allows regular interchange and movement of horses. This movement of wild horses both during and after the gather operations made achieving AML difficult. In 2011 a joint gather in the area going across state lines and gathering from all three HMA's was conducted and was very successful.

The Wilson Creek HMA (approximately 687,932 acres of public and private land) and Deer Lodge Canyon HMA (approximately 109,717 of public and private land) were combined in the 2008 Ely District Record of Decision and Approved Resource Management Plan into the Eagle HMA (approximately 670,000 acres of public land). Any proposed wild horse gather would be conducted in coordination and in conjunction with the Cedar City Utah Field Office, due to historic movement and continuing interchange of wild horses between the Eagle, Chokecherry (approximately 38,995 acres public land) and Mt. Elinore (approximately 34,047 acres public land) HMAs. The action should prevent deterioration of the range, as well as restore a thriving natural ecological balance and multiple use relationship on public lands in the area. In 2007 the gather of these HMAs occurred in conjunction with each other. Due to weather conditions at the time, the BLM did not gather enough excess wild horses to achieve AMLs, but was more effective and efficient than previous gathers.

The Eagle Complex is located approximately 50 miles southeast of Ely, Nevada, and 20 miles northeast of Caliente, Nevada, within Lincoln County (Figure 4). Table 1 shows the acres and AML within the HMAs.

Table 1 Herd Management Area, Acres, AML, Estimated Population

Herd	Total Acres Public land	Appropriate Management Level	Estimated Population Including 2017 Foal Crop	Excess Wild Horses to be Removed	Times over AML
Eagle HMA	670,000	100-210	1859	1759	17.6- 8.3
Mt. Elinore HMA	34,047	15-25	128	113	7.5- 4.5
Chokecherry HMA	38,995	30	233	203	6.7
Complex Total	**743,042**	**145-265**	2220	2075	14.3- 7.8

The Appropriate Management Level (AML) is defined as the number of wild horses that can be sustained within a designated HMA so as to achieve and maintain a thriving natural ecological balance (TNEB) in keeping with the multiple-use management concept for the area. The range of AML for the Eagle HMA is 100-210 wild horses. This population range was established at a level that would maintain healthy wild horses and rangelands over the long-term based on monitoring data collected over time as well as an in-depth analysis of habitat suitability. The AML range was established through prior decision-making processes and re-affirmed through the Record of Decision (ROD) and Approved Ely District Resource Management Plan.

The Appropriate Management Levels (AMLs) for the Mt. Elinore and Chokecherry HMAs set in the Pinyon MFP were established at the population levels that existed between 1971 and 1982. The AMLs within the Chokecherry and Mt. Elinore HMAs remain as set in the Pinyon MFP Wild Horse Amendment (1983). The wild horses from these HMAs travel back and forth across the Nevada/Utah border, mixing with wild horses from Nevada's Eagle HMA. Populations in the Utah HMAs can fluctuate weekly from at or near the AML (30 and 25 wild horses, respectively) to more than quadruple the AML because of movement between HMAs.

The Complex was flown in February 2017, and the inventory was conducted using the Double Simultaneous Count method, in which observers in an aircraft independently observe and record groups of wild horses. Sighting rates are estimated by comparing sighting records of the observers. Sighting probabilities for the observers is then computed from the information collected and population estimated generated. The Eagle HMA has an estimated wild horse population of 1,859; Mt Elinore 128; and Chokecherry 233. At the time of implementation of the proposed gather operations, the estimated population will increase 20% a year after the 2017 inventory. Flight inventories traditionally take place every 2 to 3 years on the Complex.

The current estimated population of wild horses Complex is 2,220. This number is based on the statistical analysis for 2017 horse population surveys in Nevada and Utah compiled from the most recent aerial survey of the Complex that took place in February 2017. The current population is over 7.3 times over the upper limit of AML.

Rangeland resources and wild horse health have been and are currently being affected within the Eagle Complex (Figures 1-3). Utilization data using Range Utilization Key Forage Plant Method (KFPM) have been collected since 2011 and show utilization levels increases at key areas. Data collected in 2016 indicated severe (81%-100%), heavy (61%-80%), moderate (41%-60%), levels of utilization with only limited key areas at light (21%-40%) and slight (1%-20%) (See utilization map appendix IV). Utilization is attributed to wild horses, wildlife, and livestock. The Fire Emergency Stabilization and Rehabilitation projects have been receiving severe to heavy use attributed to wild horses and wildlife. Due to the lack of resources within the complex wild horses are residing permanently outside the HMA boundaries and negatively impacting Fire Emergency Stabilization and Rehabilitation projects and range improvement projects (seeding). Livestock grazing has not occurred in some of these areas due to the over utilization of key species within the use area by wild horses. Wild horses have also been documented as a contributing factor for riparian areas not meeting Proper Function Condition and riparian areas are either at a downward trend or non-functioning. Multiple rangeland health evaluation and riparian write-ups identify wild horses as one of the contributing factors in non-achievement of rangeland health management objectives.

Figure 1. 2016 monitoring Cottonwood area severe use on winter fat

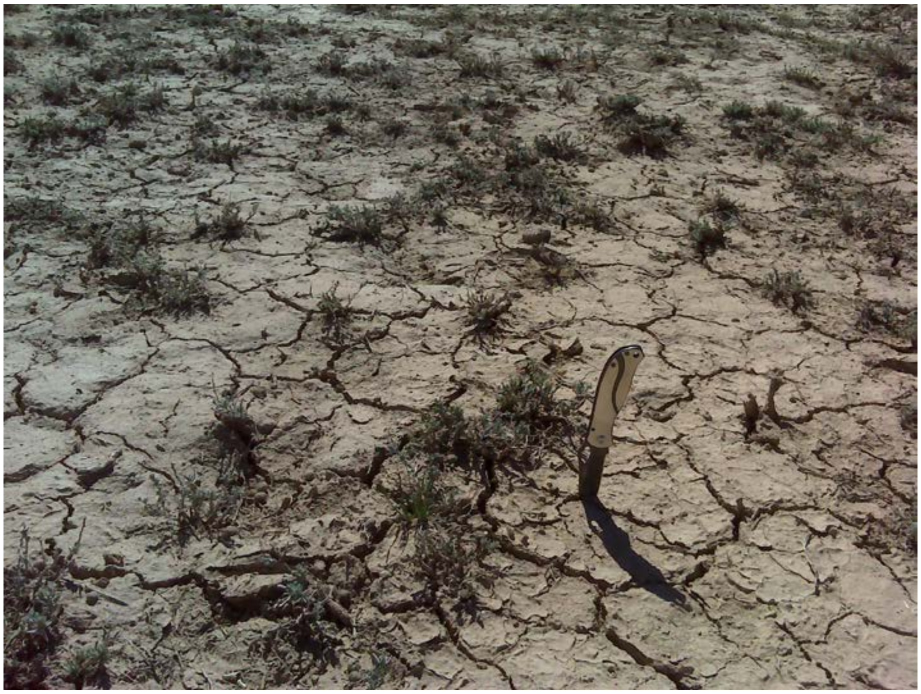


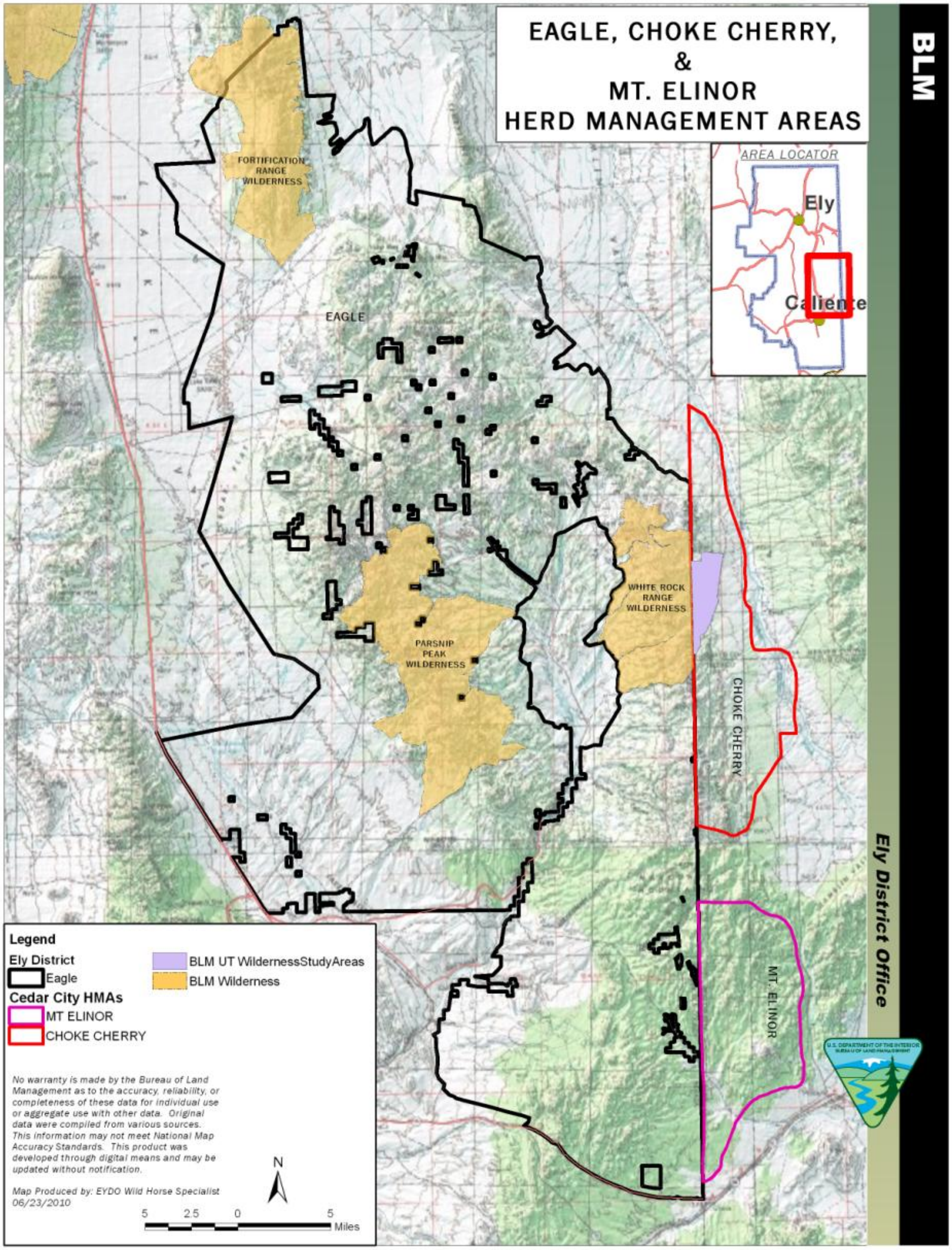
Figure 2. 2016 monitoring Stateline Burn area severe use on grasses

Figure 3. 2016 crested seeding summer use area outside Eagle HMA heavy- severe use by wild horses

Wild horse herd health is currently being impacted due to excess wild horses on the rangeland. Wild horses have been document in body condition score of 2 (very thin) to 4 (moderately thin). Due to the severe and heavy use documented throughout the Complex wild horses have to travel further away from water sources for forage. Large groups of wild horses are also permanently residing outside HMA boundaries in search of resources (forage and water). Some groups also reside around and on private property, as well as Highways 93, 322 and 319 causing public safety concerns for members of the public and motorists along the Hwy. There have been two highway nuisance gathers conducted since February 2016 involving horses outside the Eagle Complex.

Based upon all information available at this time, the BLM has determined that 2,075 excess wild horses reside within the Eagle Complex and need to be removed in order to achieve the established AMLs, restore a thriving natural ecological balance (TNEB) and prevent further degradation of rangeland resources resulting from the current overpopulation of wild horses.

Figure 4. Eagle HMA Complex Map



1.2 Purpose and Need

The purpose of the Proposed Action is to remove excess wild horses from within and outside the Eagle Complex, to manage wild horses to achieve and maintain established AML ranges for the complex, to reduce the wild horse population growth rate in order to prevent undue or unnecessary degradation of the public lands associated with an overpopulation excess wild horses within and outside the complex, and to restore a thriving natural ecological balance and multiple use relationship on the public lands consistent with the provisions of Section 1333 (a) of the Wild Free-Roaming Horses and Burros Act of 1971.

The need for the Proposed Action is to protect rangeland resources and to prevent unnecessary or undue degradation of the public lands associated with excess populations of wild horses within the Eagle Complex and use of rangeland resources by horses outside the Eagle Complex boundaries.

1.3 Conformance with BLM Land Use Plan(s)

The Proposed Action is in conformance with the 2008 Ely District ROD and Approved RMP (August 2008) as required by regulation (43 CFR 1610.5-3(a)) as follows:

- **Goal:** "Maintain and manage healthy, self-sustaining wild horse herds inside herd management areas within appropriate management levels to ensure a thriving natural ecological balance while preserving a multiple-use relationship with other uses and resources."
- **Objective:** "To maintain wild horse herds at appropriate management levels within herd management areas where sufficient habitat resources exist to sustain healthy populations at those levels."
- **Management Action WH-4:** "Manage wild horses within six herd management areas designated from herd areas…."
- **Management Action WH-5:** "Remove wild horses and drop herd management area status for those areas that do not provide sufficient habitat resources to sustain healthy populations."

The Pinyon Management Framework Plan (PMFP) (1983) identifies the Chokecherry and Mt. Elinore HMAs as suitable for wild horses, and allows for, "the removal of horses as required to maintain horse numbers at or below 1982 inventory levels, but not less than 1971 levels." (Pinyon MFP Wild Horse Amendment)(1983).

The proposed action is also consistent with the BLM Utah Riparian Management Policy (Instruction Memorandum UT-93-93, March 1993) which states that riparian areas will be maintained in or improved to "Proper Functioning Condition." In addition, the Proposed Action and No Action Alternative would comply with the following laws and/or agency regulations, other plans and are consistent with Federal, state and local laws, regulations, and plans to the maximum extent possible.

1.4 Relationship to Statutes, Regulations, or other Plans

The Proposed Action is consistent with the following Federal, State, and local plans to the maximum extent possible.

- United States Department of the Interior Greater Sage-Grouse Approved Resource Management Plan Amendment (2015).
- Mojave/Southern Great Basin Resource Advisory Council (RAC) Standards and Guidelines (February 12, 1997)
- Endangered Species Act – 1973
- National Environmental Policy Act of 1969 (as amended)
- Migratory Bird Treaty Act (1918 as amended) and Executive Order 13186 (1/11/01)
- Lincoln County Public Land policy Plan (2015).
- Taylor Grazing Act (TGA) of 1934
- Federal Land Policy and Management Act (FLPMA) of 1976 (43 U.S.C. 1701 et seq.)
- Public Rangelands Improvement Act (PRIA) of 1978
- United States Department of the Interior Manual (910 DM 1.3).
- Title 43 CFR 4100 Grazing Administration-Exclusive of Alaska
- Standards of Quality for Waters of the State, R317-2-6, Utah Administrative Code, December, 1997
- BLM, Utah, Riparian Management Policy (IM UT-93-93) of 1993
- Section 106 of the National Historic Preservation Act of 1966 (as amended).
- National Environmental Policy Act of 1969 (as amended)
- American Indian Religious Freedom Act of 1979
- Archaeological Resource Protection Act of 1979
- National Historic Preservation Act of 1966, as amended
- Appropriations Act, 2001 (114 Stat. 1009) (66 Fed. Reg. 753, January 4, 2001)
- United States Department of the Interior Manual (910 DM 1.3).
- Standards and Guidelines for Healthy Rangelands, 1997 (BLM-UT-GI-98-007-1020)
- Fundamentals of Rangeland Health (43 CFR 4180)
- State of Utah's Resource Management Plan.

The Proposed Action is consistent with all applicable regulations at Title 43 Code of Federal Regulations (43 CFR) 4700 and policies. The Proposed Action is also consistent with the *Wild Free-Roaming Horses and Burros Act of 1971 (WFRHBA)*, which 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"*. Also the WFRHBA of 1971 sec 3 (b)(1): *"The purpose of such inventory shall be to: make determinations as to whether and where an overpopulation exists and whether action should be taken to remove excess animals; determine appropriate management levels of wild free-roaming horses and burros on these areas of public lands; and determine whether appropriate management levels should be achieved by the removal or destruction of excess animals, or other options (such as sterilization, or natural controls on population levels)."* Additionally, federal regulations at 43 CFR 4700.0-6 (a) state *"Wild horses and burros shall be managed as self-sustaining populations of healthy animals in balance with other uses and the productive capacity of their habitat."*

4710.4 Management of wild horses and burros shall be undertaken with the objective of limiting the animals' distribution to herd areas.

According to 43 CFR 4720.2, upon written request from a private landowner, the authorized officer shall remove stray wild horses and burros from private lands as soon as practicable.

The Interior Board of Land Appeals (IBLA) in *Animal Protection Institute et al.*, (118 IBLA 63, 75(1991)) found that under the Wild Free-Roaming Horses and Burros Act of 1971 (Public Law 92-195) BLM is not required to wait until the range has sustained resource damage to reduce herd size; instead proper range management dictates removal of "excess animals" before range conditions deteriorate in order to preserve and maintain a thriving natural ecological balance and multiple-use relationship in that area.

Chapter 2 Proposed Action and Alternatives

2.1 Introduction

This chapter of the EA describes the Action Alternatives, including any that were considered but eliminated from detailed analysis. Alternatives analyzed in detail include the following:

Alternative A. Selective Removal of Excess Wild Horses to within AML range, and Population Growth Control using fertility control treatments PZP-22 or most current formulations.

Alternative B. Selective Removal of Excess Wild Horses to within AML range, and Population Growth Control using fertility control treatments GonaCon™.

Alternative C. Gather and Remove Excess Animals to within AML range without Fertility Control.

Alternative D. No Action Alternative.

The Action Alternatives A, B, and C were developed to achieve and maintain the established AML so as to ensure a thriving natural ecological balance, remove excess wild horses from the range, prevent further deterioration to the range, and ensure the long-term health of wild horses within the Eagle Complex. Fertility control treatments when releasing animals would slow population growth. The No Action Alternative would not achieve the identified Purpose and Need; however, it is analyzed in this EA to provide a basis for comparison with the other action alternatives, and to assess the effects of not conducting a gather at this time.

2.2 Alternative A: Proposed Action – Selective Removal of Excess Wild Horses to within AML range, and Population Growth Control using fertility control treatments PZP-22 or most current formulations

The Proposed Action would gather and remove approximately 90% of the existing wild horses (approximately 1998 animal with the 2017 foal crop) in the initial gather and return periodically over the next ten years to gather excess wild horses to maintain AML and administer or booster population control measures to the other gathered horses. After the initial gather, the target removal number would be adjusted accordingly based off population inventories for the Eagle Complex and the resulting projection of excess animals over AML. All mares released back to the HMA would be treated with porcine zona pellucida (PZP) fertility control vaccine (i.e., PZP-22 or most current formula). The combination of these actions should lower the population growth rate within the complex.

Under the Proposed Action a sufficient number of wild horses would be gathered primarily from heavily concentrated areas within the project area to reduce resource impacts in the most impacted areas and all wild horses residing in areas adjacent to the complex (outside established boundaries) would be gathered and removed during the initial gather operations.

Selective removal procedures would prioritize removal of younger excess wild horses after achieving AML within the complex, and allow older less adoptable wild horses to be released back to the complex.

However, if gather efficiencies during the initial gather do not allow for the attainment of the Proposed Action during the initial gather (i.e., not enough horses are successfully captured to reach low AML), or if BLM is otherwise unable to permanently remove a sufficient number of excess horses to achieve low AML, the Caliente F.O. and/or Cedar City F.O. would return to the Eagle Complex to remove excess horses above low AML and would conduct follow-up gathers over a 10 year period after the initial gather to remove any additional wild horses necessary to achieve and maintain the low range of AML as well as to allow BLM to gather a sufficient number of wild horses so as to implement the population control component of the proposed action (PZP or most current formula) for wild horses remaining in the complex.

If gather efficiencies of the initial gather should exceed the target removal number of horses necessary to bring the population within the AML range of 145-265 wild horses during the initial gather, BLM would begin implementing the population control components (PZP or most current formula) of this alternative with the initial gather. Population inventories and routine resource/habitat monitoring would be completed between gather cycles to document current population levels, growth rates, and areas of continued resource concern (horses concentrations, riparian impacts, over-utilization, etc.) prior to any follow-up gather. The subsequent maintenance gather activities would be conducted in a manner consistent with those described for the initial gather and could be conducted during the period of November through February which is identified as the period of maximum effectiveness for fertility control application. Funding limitations and competing priorities might impact the timing of maintenance gather and population control components of the Proposed Action.

The procedures to be followed for implementing fertility control are detailed in Appendix III. At the AML level established for the complex and based on known seasonal movements of the horses within the complex, sufficient genetic exchange should occur to maintain the genetic health of the population. All horses identified to remain in the Eagle Complex population would be selected to maintain a diverse age structure, herd characteristics and body type (conformation).

BLM's Use of Contraception in Wild Horse Management

Expanding the use of population growth suppression (PGS) to slow population growth rates and reducing the number of animals removed from the range and sent to off-range pastures (ORPs) is a BLM priority. The WFRHBA of 1971 specifically provides sterilization (section 3.b.1). No finding of excess determination is required for BLM to pursue contraception in wild horses or wild burros only. Contraception has been shown to be a cost-effective and humane treatment to slow increases in wild horse populations or, when used with other techniques, to reduce horse population size (Bartholow 2004, de Seve and Boyles-Griffin 2013). All fertility control methods in wild animals are associated with potential risks and benefits, including effects of handling, frequency of handling, physiological effects, behavioral effects, and reduced population growth rates (Hampton et al. 2015). Contraception by itself does not remove excess horses from an HMA's population, so if a wild horse population is in excess of AML, then contraception alone would result in some continuing environmental effects of horse overpopulation. Successful contraception reduces future reproduction. Limiting future population increases of horses could limit increases in environmental damage from higher densities of horses than currently exist. Horses are long-lived, potentially reaching 20 years of age or more in the wild and, if the population is above AML, treated horses returned to the complex may continue exerting negative environmental effects, as described above, throughout their life span. In contrast, if horses above AML are removed when horses are gathered, that leads to an immediate decrease in the severity of ongoing detrimental environmental effects.

Successful contraception would be expected to reduce the effects of frequent horse gather activities on the environment, as well as wild horse management costs to taxpayers. Bartholow (2007) concluded that the application of 2 or 3-year contraceptives to wild mares could reduce operational costs in a project area by 12-20%, or up to 30% in carefully planned population management programs. He also concluded that contraceptive treatment would likely reduce the number of horses that must be removed in total, with associated cost reductions in the number of adoptions and total holding costs. If applying contraception to horses requires capturing and handling horses, the risks and costs associated with capture and handling of horses may be comparable to those of gathering for removal, but adoption and long-term holding costs would be lower. Selectively applying contraception to older animals and returning them to the complex could reduce long-term holding costs for such horses, which are difficult to adopt, and could reduce the compensatory reproduction that often follows removals (Kirkpatrick and Turner 1991). On the other hand, selectively applying contraception to younger animals can slow the rate of genetic diversity loss – a process that tends to be slow in a long-lived animal with high levels of genetic diversity – and could reduce growth rates further by delaying the age of first parturition (Gross 2000). Although contraceptive treatments are associated with a number of potential physiological, behavioral, demographic, and genetic effects, detailed in Section 4, Environmental Effects, those concerns do not generally outweigh the potential benefits of using contraceptive treatments in situations where it is a management goal to reduce population growth rates (Garrott and Oli 2013). The Proposed Action reflects proposed management strategies that are consistent with the WFRHBA, which allows for sterilization as a means of population control as well as consistent with recommendations from the National Academy of Science.

2.3 Alternative B: Selective Removal of Excess Wild Horses to within AML range, and Population Growth Control using fertility control treatments GonaCon™

Under Alternative B management actions would be similar to the proposed action with the exception that all the released mares would be treated with the population growth suppression vaccine GonaCon™ instead of PZP-22. Treated animals would need to be held for a minimum of thirty days after first treatment to administer a booster shot to increase efficacy and treatment longevity. As with PZP, the long-term goal of GonaCon-Equine use is to reduce or eliminate the need for gathers and removals (NRC 2013). GonaCon-Equine vaccine is an EPA-approved pesticide (EPA, 2009a) that is relatively inexpensive, meets BLM requirements for safety to mares and the environment, and is produced in a USDA-APHIS laboratory. Its categorization as a pesticide is consistent with regulatory framework for controlling overpopulated vertebrate animals, and in no way is meant to convey that the vaccine is lethal; the intended effect of the vaccine is as a contraceptive.

Considerations on BLM's use of contraception in wild horse management were noted above, under Alternative A. Whether to use or not use any particular method to reduce population growth rates in wild horses is a decision that must be made considering known effects as well as the potential effects of inaction, such as continued overpopulation and rangeland health degradation.

Under this alternative, the BLM would return to the complex as needed over the ten-year period to remove excess horses and to re-apply GonaCon-Equine and initiate new treatments in order to maintain contraceptive effectiveness in controlling population growth rates. GonaCon-Equine can safely be reapplied as necessary to control the population growth rate. Even with one booster treatment of GonaCon-Equine, it is expected that most, if not all, mares would return to fertility at some point, although the average duration of effect after booster doses has not yet been quantified. It is unknown what would be the expected rate for the return to fertility rate in mares boosted more than once with GonaCon-Equine. Once the herd size in the project area is at AML and population growth seems to be stabilized, BLM could make a determination as to the required frequency of new mare treatments and mare re-treatments with GonaCon, to maintain the number of horses within AML.

Reference in this text to any specific commercial product, process, or service, or the use of any trade, firm or corporation name is for the information and convenience of the public, and does not constitute endorsement, recommendation, or favoring by the Department of the Interior.

2.4 Alternative C: Gather and Remove Excess Animals to within AML range without Fertility Control or Sex Ratio Adjustment.

Alternative C would be similar to Alternative A and B. However, once BLM has met its objective of removing approximately 2,075 excess wild horses (including 2017 foal crop) the gather would conclude. Alternative C includes maintenance gathers over the next ten years to keep population within the AML range as the population increases and again exceeds AML. There would be no use of population growth suppression measures taken for the wild horses remaining in the Complex. All wild horses residing outside the Eagle Complex would be gathered and removed. All the wild horses would be transported to BLM holding facilities where they would be prepared for adoption and/or sale to qualified individuals who can provide them with a good home or to long term holding (grassland pastures) or for any other disposition authorized by law. These actions would be the same as in the proposed action.

2.5 No Action Alternative – Continuation of Existing Management

Although the No Action Alternative does not comply with the WFRHBA of 1971, regulations, Approved Ely District Resource Management Plan (August 2008), Pinyon Management Framework Plan (MFP, 1983) and does not meet the purpose and need for action in this EA, it is included as a basis for comparison with the Proposed Action.

2.6 Summary Comparison of Alternatives

Management Actions Common to Alternatives A, B and C

- Gather operations involve non-HMA areas beyond the Eagle complex boundary.
- Gather operations would be conducted in accordance with the Comprehensive Animal Welfare Program (CAWP) for Wild Horses and Burro Gathers, which includes provisions of the Comprehensive Animal Welfare Program (BLM Instructional Memorandum 2015-151). A combination of gather methods may be used to complete the management actions and the method to be used would depend on the needs of the specific actions. Including management needs in regards to public safety, emergency situations and private land issues.
- Trap sites and temporary holding facilities would be located in previously used sites or other disturbed areas whenever possible. Undisturbed areas identified as potential trap sites or holding facilities would be inventoried for cultural resources. If cultural resources are encountered, these locations would not be used unless they could be modified to avoid impacts to cultural resources.
- Decisions to humanely euthanize animals in field situations would be made in conformance with BLM policy (Washington Office Instruction Memorandum 2015-070). Current policy reference: http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2009/IM_2009-041.html
- Data including sex and age distribution.
- Hair samples would be collected from a minimum of 25 animals returned to the range from each HMA to assess the genetic diversity and pedigree of the herds. Samples would also be collected during future gathers as needed to determine whether BLM's management is maintaining acceptable genetic diversity (avoiding inbreeding depression).
- If at any time in the future the genetic diversity there is determined to be relatively low, then a number of other HMAs could be used as sources for fertile wild horses that could be transported into the Eagle Complex herd to provide genetic diversity throughout the complex.
- A BLM contract Veterinarian, Animal and Plant Health Inspection Service (APHIS) Veterinarian or other licensed Veterinarian would be on call or on site as the gather is started and then as needed for the duration of the helicopter gather to examine animals and make recommendations to the BLM for the care and treatment of wild horses, and ensure humane treatment. Additionally, animals transported to a BLM wild horse facility are inspected by facility staff and the BLM contract Veterinarian, to observe health and ensure the animals have been cared for humanely.
- Noxious weed monitoring at gather sites and temporary holding corrals would be conducted following the gather by BLM.

Monitoring of rangeland forage condition and utilization, water availability, aerial population surveys and animal health would continue.

Helicopter

If the local conditions require a helicopter drive-trap operation, the BLM would use a contractor or in-house gather team to perform the gather activities in cooperation with BLM and other appropriate staff. The contractor would be required to conduct all helicopter operations in a safe manner and in compliance with Federal Aviation Administration (FAA) regulations 14 CFR § 91.119 and BLM IM No. 2010-164.

Helicopter drive trapping involves use of a helicopter to herd wild horses into a temporary trap. The CAWP would be implemented to ensure that the gather is conducted in a safe and humane manner, and to minimize potential impacts or injury to the wild horses. Traps would be set in an area with high probability of access by horses using the topography, if possible, to assist with capturing excess wild horses residing within the area. Traps consist of a large catch pen with several connected holding corrals, jute-covered wings and a loading chute. The jute-covered wings are made of material, not wire, to avoid injury to the horses. The wings form an alley way used to guide the horses into the trap. Trap locations are changed during the gather to reduce the distance that the animals must travel. A helicopter is used to locate and herd wild horses to the trap location. The pilot uses a pressure and release system while guiding them to the trap site, allowing them to travel at their own pace. As the herd approaches the trap the pilot applies pressure and a prada horse is released guiding the wild horses into the trap. Once horses are gathered they are removed from the trap and transported to a temporary holding facility where they are sorted.

If helicopter drive-trapping operations are needed to capture the targeted animals, BLM would assure that an Animal and Plant Health Inspection Service (APHIS) veterinarian or contracted licensed veterinarian is on-site during the gather to examine animals and make recommendations to BLM for care and treatment of wild horses. BLM staff would be present on the gather at all times to observe animal condition, ensure humane treatment of wild horses, and ensure contract requirements are met.

Bait/Water Trapping

Bait and/or water trapping may be used if circumstances require it or best fits the management action to be taken. Bait and/or water trapping generally require a longer window of time for success than helicopter drive trapping. Although the trap would be set in a high probability area for capturing excess wild horses residing within the area, and at the most effective time periods, time is required for the horses to acclimate to the trap and/or decide to access the water/bait.

Trapping involves setting up portable panels around an existing water source or in an active wild horse area, or around a pre-set water or bait source. The portable panels would be set up to allow wild horses to go freely in and out of the corral until they have adjusted to it. When the wild horses fully adapt to the corral, it is fitted with a gate system. The acclimation of the horses creates a low stress trapping method. During this acclimation period the horses would experience some stress due to the panels being setup and perceived access restriction to the water/bait source.

When actively trapping wild horses, the trap would be staffed or checked on a daily basis by either BLM personnel or authorized contractor staff. Horses would be either removed immediately or fed and watered for up to several days prior to transport to a holding facility. Existing roads would be used to access the trap sites.

Gathering excess horses using bait/water trapping could occur at any time of the year and traps would remain in place until the target number of animals are removed. Generally, bait/water trapping is most effective when a specific resource is limited, such as water during the summer months. For example, in some areas, a group of wild horses may congregate at a given watering site during the summer because few perennial water resources are available nearby. Under those circumstances, water trapping could be a useful means of reducing the number of horses at a given location, which can also relieve the resource pressure caused by too many horses. As the proposed bait and/or water trapping in this area is a low stress approach to gathering wild horses, such trapping can continue into the foaling season without harming the mares or foals.

Gather Related Temporary Holding Facilities (Corrals)

Wild horses that are gathered would be transported from the gather sites to a temporary holding corral in goose-neck trailers. At the temporary holding corral, wild horses would be sorted into different pens based on sex. The horses would be aged and provided good quality hay and water. Mares and their un-weaned foals would be kept in pens together. At the temporary holding facility, a veterinarian, when present, would provide recommendations to the BLM regarding care and treatment of the recently captured wild horses. Any animals affected by a chronic or incurable disease, injury, lameness or serious physical defect (such as severe tooth loss or wear, club foot, and other severe congenital abnormalities) would be humanely euthanized using methods acceptable to the American Veterinary Medical Association (AVMA).

Transport, Off-range Corrals, and Adoption Preparation

All gathered wild horses would be removed and transported to BLM holding facilities where they would be inspected by facility staff and if needed a contract veterinarian to observe health and ensure the animals are being humanely cared for.

Those wild horses that are removed from the range and are identified to not return to the range would be transported to the receiving off-range corrals (ORC, formerly short-term holding facility) in a goose-neck stock trailer or straight-deck semi-tractor trailers. Trucks and trailers used to haul the wild horses would be inspected prior to use to ensure wild horses can be safely transported. Wild horses would be segregated by age and sex when possible and loaded into separate compartments. Mares and their un-weaned foals may be shipped together. Transportation of recently captured wild horses is limited to a maximum of 12 hours.

Upon arrival, recently captured wild horses are off-loaded by compartment and placed in holding pens where they are provided good quality hay and water. Most wild horses begin to eat and

drink immediately and adjust rapidly to their new situation. At the off-range corral, a veterinarian provides recommendations to the BLM regarding care, treatment, and if necessary, euthanasia of the recently captured wild horses. Wild horses in very thin condition or animals with injuries are sorted and placed in hospital pens, fed separately and/or treated for their injuries.
After recently captured wild horses have transitioned to their new environment, they are prepared for adoption, sale, or transport to Off-Range pastures. Preparation involves freeze-marking the animals with a unique identification number, vaccination against common diseases, castration, and de-worming. At ORC facilities, a minimum of 700 square feet of space is provided per animal.

Adoption

Adoption applicants are required to have at least a 400 square foot corral with panels that are at least six feet tall. Applicants are required to provide adequate shelter, feed, and water. The BLM retains title to the horse for one year and inspects the horse and facilities during this period. After one year, the applicant may take title to the horse, at which point the horse becomes the property of the applicant. Adoptions are conducted in accordance with 43 CFR Subpart 4750.

Sale with Limitations

Buyers must fill out an application and be pre-approved before they may buy a wild horse. A sale-eligible wild horse is any animal that is more than 10 years old or has been offered unsuccessfully for adoption at least three times. The application also specifies that buyers cannot sell the horse to slaughter buyers or anyone who would sell the animals to a commercial processing plant. Sales of wild horses are conducted in accordance with the 1971 WFRHBA and congressional limitations.

Off-Range Pastures

When shipping wild horses for adoption, sale, or Off-Range Pastures (ORPs) the animals may be transported for up to a maximum of 24 hours. Immediately prior to transportation, and after every 24 hours of transportation, animals are offloaded and provided a minimum of 8 hours on-the-ground rest. During the rest period, each animal is provided access to unlimited amounts of clean water and two pounds of good quality hay per 100 pounds of body weight with adequate space to allow all animals to eat at one time.

Mares and sterilized stallions (geldings) are segregated into separate pastures, except at one facility where geldings and mares coexist. Although the animals are placed in ORP, they remain available for adoption or sale to qualified individuals; and foals born to pregnant mares in ORP are gathered and weaned when they reach about 8-12 months of age and are also made available for adoption. The ORP contracts specify the care that wild horses must receive to ensure they remain healthy and well-cared for. Handling by humans is minimized to the extent possible although regular on-the-ground observation by the ORP contractor and periodic counts of the wild horses to ascertain their well-being and safety are conducted by BLM personnel and/or veterinarians.

Euthanasia or Sale without Limitations

Under the WFRHBA, healthy excess wild horses can be euthanized or sold without limitation if there is no adoption demand for the animals. However, while euthanasia and sale without limitation are allowed under the statute, these activities have not been permitted under current Congressional appropriations for over a decade and are consequently inconsistent with BLM policy. If Congress were to lift the current appropriations restrictions, then it is possible that excess horses removed from the Eagle Complex over the next 10 years could potentially be euthanized or sold without limitation consistent with the provisions of the WFRHBA.

Any old, sick or lame horses unable to maintain an acceptable body condition (greater than or equal to a Henneke BCS of 3) or with serious physical defects would be humanely euthanized either before gather activities begin or during the gather operations. Decisions to humanely euthanize animals in field situations would be made in conformance with BLM policy (Washington Office Instruction Memorandum (WO IM) 2015-070 or most current edition).

Public Viewing Opportunities

Opportunities for public observation of the gather activities on public lands would be provided, when and where feasible, and would be consistent with WO IM No. 2013-058 and the Visitation Protocol and Ground Rules for Helicopter WH&B Gathers. This protocol is intended to establish observation locations that reduce safety risks to the public during helicopter gathers (see Appendix II). Due to the nature of bait and water trapping operations, public viewing opportunities may only be provided at holding corrals.

2.7 Alternatives Considered But Eliminated From Detailed Analysis

Use of Bait and/or Water Trapping Only

An alternative considered but eliminated from detailed analysis was use of bait and/or water trapping as the sole gathering method. The use of bait and water trapping, though effective in specific areas and circumstances, would not be timely, cost-effective or practical as the sole gather method for the Eagle Complex. However, water or bait trapping may be used as a supplementary approach to achieve the desired goals of Alternatives A-C if gather efficiencies are too low using a helicopter, if a helicopter gather cannot be timely scheduled, or for maintenance gathers. This alternative was dismissed from detailed analysis as a primary or sole gather method for the following reasons:

1. The project area is too large to effectively use this gather method as the primary or sole method;

2. Road access for vehicles to potential trapping locations necessary to get equipment in/out as well as safely transport gathered wild horses is limited.

3. The large numbers of horses proposed to be gathered would make water or bait trapping as a sole capture method impossible within a reasonable time frame.

Field Darting PZP Treatment

BLM would administer PZP in the one year liquid dose inoculations by field darting the mares. This method is currently approved for use and is being utilized by BLM in other HMAs. This alternative was dismissed from detailed study for the following reasons: (1) the size of the area at 743,042 acres is too large to use this method; (2) the presence of water sources on both private and public lands inside and outside the complex would make it almost impossible to restrict wild horse access to be able to dart horses consistently; (3) horse behavior limits their approachability/accessibility, so that the number of mares expected to be treatable via darting would be insufficient to control growth; and (4) BLM would have difficulties keeping records of animals that have been treated due to common and similar colors and patterns. For these reasons, this alternative was determined to not be an effective or feasible method for applying PZP to wild horses from the Eagle complex.

Gathering the Eagle complex to upper level AML

Gathering wild horses to achieve a post-gather population size at the upper level of the AML range would result in AML being exceeded with the next foaling season.

The upper levels of the AML range established for the Eagle Complex represents the maximum population for which a thriving natural ecological balance can be maintained. The lower range represents the number of animals that should remain in the complex following a wild horse gather in order to allow for a periodic gather cycle of approximately every four years and to prevent the population from exceeding the established AML between gathers. The need to gather below the upper range of AML has been recognized by the IBLA, which has held that:
. . . the term AML within the context of the statute to mean[s] that "optimum number" of wild horses which results in a thriving natural eco- logical balance and avoids a deterioration of the range (Animal Protection Institute of America v. Nevada BLM. 1989b).

Proper range management dictates removal of horses before the herd size causes damage to the range land. Thus, the optimum number of horses is somewhere below the number that would cause damage. Removal of horses before range conditions deteriorate ensures that horses enjoy adequate forage and an ecological balance is maintained (Animal Protection Institute of America et al. v. Rock Springs District BLM 1991).

Additionally, gathering to the upper level of AML would result in the need to follow up with another gather within one year, and could result in over utilization of vegetation resources, damage to the rangeland, and increased stress to wild horses. For these reasons, this alternative did not receive further consideration in this document.

Control of Wild Horse Numbers by Natural Means

This alternative would use natural means, such as natural predation and weather, to control the wild horse population. This alternative was eliminated from further consideration because it would be contrary to the WFRHBA which requires the BLM to protect the range from deterioration associated with an overpopulation of wild horses. The alternative of using natural controls to achieve a desirable AML has not been shown to be feasible in the past. Wild horse populations in the Eagle Complex are not substantially regulated by predators, as evidenced by the 15-25% annual increase in the wild horse populations. In addition, wild horses are a long-lived species with documented foal survival rates exceeding 95% and are not a self-regulating species. This alternative would allow for a steady increase in the wild horse populations which would continue to exceed the carrying capacity of the range and would cause increasing damage to the rangelands until severe range degradation or natural conditions that occur periodically – such as blizzards or extreme drought – cause a catastrophic mortality of wild horses in the complex.

Raising the Appropriate Management Levels for Wild Horses

This alternative was not brought forward for detailed analysis because it would be outside of the scope of the analysis, and would be inconsistent with the WFRHBA which directs the Secretary to immediately remove excess wild horses and to manage for a thriving natural ecological balance and for multiple uses. The AML was last reevaluated in the Ely Resource Management Plan and there is no basis for modifying the AML at this time. Available data shows that excess wild horses are present on the range, that excess horses need to be removed, and that there is insufficient water and forage within the HMA to support an increase in the wild horse AML. Given the resource degradation occurring with the current overpopulation of wild horses, it is necessary to bring the population back to AML first so the agency can collect data that would help inform whether the range could support additional horses above AML while still ensuring a thriving natural ecological balance. Given the absence of data that would support a modification to the AML, this gather decision is not an appropriate mechanism for adjusting AML.

Remove or Reduce Livestock within the Eagle Complex

This alternative would involve no removal of wild horses and would instead address the excess wild horse numbers and associated range deterioration through the removal of livestock or reductions in livestock grazing allocations within the Eagle Complex. This alternative was not brought forward for analysis because it would be inconsistent with the current land use plans. This gather document and subsequent Decision Record is not the appropriate mechanism for adjusting the authorized livestock use within the allotments associated with the complex in order to reallocate forage to wild horses.

The proposal to reduce livestock instead of wild horse numbers would additionally not meet the purpose and need for action. Monitoring indicates that the current overpopulation of wild horses is causing resource degradation and that there is insufficient water and forage for the number of horses present, resulting in their movement to public and private lands that are not managed for wild horses, and posing a public safety risk along Highways 93, 318, 322.

This alternative would also be inconsistent with the WFRHBA, which directs the Secretary to immediately remove excess wild horses once a determination has been made on the basis of available information that such removal is necessary. Livestock grazing can only be reduced or eliminated if BLM follows regulations at 43 CFR § 4100 and must be consistent with multiple use allocations set forth in the land-use plan. Such changes to livestock grazing cannot be made through a wild horse gather decision, and are only possible if BLM first revises the land-use plans to re-allocate livestock forage to wild horses and to eliminate or reduce livestock grazing.

Furthermore, re-allocation of livestock AUMs to increase the wild horse AMLs would not achieve a thriving natural ecological balance due to differences in how wild horses and livestock graze. Unlike livestock which can be confined to specific pastures, limited periods of use, and specific seasons-of-use so as to minimize impacts to vegetation during the critical growing season or to riparian zones during the summer months, wild horses are present year-round and their impacts to rangeland resources cannot be controlled through establishment of a grazing system, such as for livestock. Thus, impacts from wild horses can only be addressed by limiting their numbers to a level that does not adversely impact rangeland resources and other multiple uses.

While the BLM is authorized to remove livestock from HMAs "if necessary to provide habitat for wild horses or burros, to implement herd management actions, or to protect wild horses or burros from disease, harassment or injury" (43 CFR§ 4710.5), this authority is usually applied in cases of emergency and not for general management of wild horses since it cannot be applied in a manner that would be inconsistent with the existing land-use plans. (43 CFR § 4710.1)
For the reasons stated above, this alternative was dropped from detailed analysis. For modifications in long-term multiple use management, changes in forage allocations between livestock and wild horses would have to be re-evaluated and implemented through the appropriate public decision-making processes to determine whether a thriving natural ecological balance can be achieved at a higher AML and in order to modify the current multiple use relationship established in the land-use plans.

Control of Wild Horse Numbers by Fertility Control Treatment Only

An alternative to gather a significant portion of the existing population (95%) and implement fertility control treatments only without removal of excess wild horses was modeled using a three-year gather/treatment interval over an 11- year period. Based on this modeling, this alternative would not result in attainment of the AML range for the Eagle Complex and the wild horse population would continue to have an average population growth rate of 11.3% to 19.5%, adding to the current wild horse overpopulation, albeit at a slower rate of growth. Over the next 11 years, an average of 16,304 wild horses would need to be gathered for population controls. Of those 7,406 mares would have been treated with PZP-22 or other accepted formulation, and the resulting population in the complex, even with repeated fertility treatments, would be 5,564 -- which is 5,299 wild horses over (and almost 25 times) high AML. It is important to understand that in this scenario, each time a wild horse is gathered it is counted, even though the same wild horse may be gathered multiple times during the 11-year period. And each time a wild horse is treated with PZP-22, it is counted even though the same wild horse may be treated multiple times over the 11- year period.

This alternative would not bring the wild horse population back to AML, would allow the wild horse population to continue to grow even further in excess of AML, and would allow resource concerns to further escalate. Implementation of this alternative would result in increased gather and fertility control costs without achieving a thriving natural ecological balance or resource management objectives. This alternative would not meet the purpose and need and therefore was eliminated from further consideration.

Make Individualized Excess Wild Horse Determinations Prior to Removal

An alternative whereby BLM would make on-the-ground and individualized excess wild horse determinations prior to removal of wild horses from any HMA has been advocated by some members of the public. Under the view set forth in some comments during public commenting for wild horse gathers nationwide, a tiered or phased removal of wild horses from the range is mandated by the WFRHBA. [1] Specifically, this alternative would involve a tiered gather approach, whereby BLM would first identify and remove old, sick or lame animals in order to euthanize those animals on the range prior to gather. Second, BLM would identify and remove wild horses for which adoption demand exists, e.g., younger wild horses or wild horses with unusual and interesting markings. Under the WFRHBA(1333(b)(2)(iv)(C)), BLM would then sell or destroy any additional excess wild horses for which adoption demand does not exist in the most humane and cost effective manner possible, although euthanasia and sale without limitations are currently limited by Congressional appropriations.

This proposed alternative could be viable in situations where the project area is contained, the area is readily accessible and wild horses are clearly visible, and where the number of wild horses to be removed is so small that a targeted approach to removal can be implemented. However, under the conditions present within the gather area and the significant number of excess wild horses both inside and outside of the Complex, this proposed alternative is impractical, if not impossible, as well as less humane for a variety of reasons.

First, BLM does euthanize old, sick or lame animals on the range when such animals have been identified. This occurs on an on-going basis and is not limited to wild horse gathers. During a gather, if old, sick or lame animals are found and it is clear that an animal's condition requires the animal to be put down, that animal is separated from the rest of the group that is being herded so that it can be euthanized on the range. However, wild horses that meet the criteria for humane destruction because they are old, sick or lame usually cannot be identified as such until they have been gathered and examined up close, e.g., so as to determine whether the wild horses have lost all their teeth or are club footed. Old, sick and lame wild horses meeting the criteria for humane euthanasia are also only a small fraction of the total number of wild horses to be gathered, comprising on average about 0.5% of gathered wild horses. Thus, in a gather of over 1,000 wild horses, potentially about five of the gathered wild horses might meet the criteria for humane destruction over an area of over three quarters of a million acres.

Due to the size of the gather area, access limitations associated with topographic and terrain features and the challenges of approaching wild horses close enough to make an individualized determination of whether a wild horse is old, sick or lame, it would be virtually impossible to

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[1] The view that the WFRHBA requires a tiered removal process has been litigated and rejected by Federal courts. See *In Defense of Animals v. Salazar*, 675 F. Supp. 2d 89, 97-98 (D.D.C. 2009); *In Defense of Animals v. United States DOI*, 909 F. Supp. 2d 1178, 1190-1191 (E.D. Cal. 2012), aff'd 751 F.3d 1054, 1064-1065 (9^{th} Cir. 2014).

conduct a phased culling of such wild horses on the range without actually gathering and examining the wild horses. Similarly, rounding up and removing wild horses for which an adoption demand exists, before gathering any other excess wild horses, would be both impractical and much more disruptive and traumatic for the animals. Recent gathers have had success in adopting out approximately 30% of excess wild horses removed from the range on an annual basis. The size of the gather area, terrain challenges, difficulties of approaching the wild horses close enough to determine age and whether they have characteristics (such as color or markings) that make them more adoptable, the impracticalities inherent in attempting to separate the small number of adoptable wild horses from the rest of the herd, and the impacts to the wild horses from the closer contact necessary, makes such phased removal a much less desirable method for gathering excess wild horses. This approach would create a significantly higher level of disruption for the wild horses on the range and would also make it much more difficult to gather the remaining excess wild horses.

Furthermore, if BLM plans to apply any population controls to gathered wild horses prior to release, it would be necessary to gather more than just the excess wild horses to be removed, making this type of phased approach completely unnecessary and counter-productive.

Making a determination of excess as to a specific wild horse under this alternative, and then successfully gathering that individual wild horse would be impractical to implement (if not impossible) due to the size of the gather area, terrain challenges and difficulties approaching the wild horses close enough to make an individualized determination. This tiered approach would also be extremely disruptive to the wild horses due to repeated culling and gather activities over a short period of time. Gathering excess wild horses under this alternative would greatly increase the potential stress placed on the animals due to repeated attempts to capture specific animals and not others in the band. This in turn would increase the potential for injury, separation of mare/foal pairs, and possible mortality.

This alternative would be impractical to implement (if not impossible), would be cost-prohibitive, and would be unlikely to result in the successful removal of excess wild horses or application of population controls to released wild horses. This approach would also be less humane and more disruptive and traumatic for the wild horses. This alternative was therefore eliminated from any further consideration.

Use of Alternative Capture Techniques Instead of Helicopter Capture

An alternative using capture methods other than helicopters to gather excess wild horses has been suggested by some members of the public. As no specific alternative methods were suggested, the BLM identified chemical immobilization, net gunning, and wrangler/horseback drive trapping as potential methods for gathering wild horses. Net gunning techniques normally used to capture big game animals also rely on helicopters. Chemical immobilization is a very specialized technique and strictly regulated. Currently the BLM does not have sufficient expertise to implement either of these methods and it would be impractical to use given the size of the project area, access limitations, and difficulties in approachability of the wild horses.
Use of wrangler on horseback drive-trapping to remove excess wild horses can be fairly effective on a small scale. However, given the number of excess wild horses to be removed, the large

geographic size of the Eagle Complex gather area, access limitations, and difficulties in approaching the wild horses this technique would be ineffective and impractical. Horseback drive-trapping is also very labor intensive and can be very dangerous to the domestic horses and the wranglers used to herd the wild horses. Domestic horses can easily be injured while covering rough terrain and the wrangler could be injured if he/she falls off. For these reasons, this alternative was eliminated from further consideration.

Designation of the HMAs to be Managed Principally for Wild Horses

Designation of all HMAs, as “Wild Horse and Burro Ranges” was proposed through public comments conducted during the development of multiple NEPA documents pertaining to gathering of wild horses across the country. This action under 43 CFR 4710.3-2 would require amendment of the Pinyon Management Framework Plan (MFP, 1983) and Ely RMP which would be outside the scope of this EA. Only the BLM Director or Assistant Director (as per BLM Manual 1203: Delegation of Authority), may establish a Wild Horse and Burro Range after a full assessment of the impact on other resources through the land-use planning process. Wild Horse and Burro Range is not an “exclusive” designation. Designation would not necessarily exclude livestock use, therefore, levels of livestock grazing permitted could remain the same.

Use of Gelding as Non-reproductive Population

A non-reproductive population of gelding was excluded from further consideration due to an AML of 145-265 wild horses. The population of wild horses would not allow enough geldings to be released back into the complex, and could also put at risk the number of breeding horses within the Eagle Complex.

Chapter 3 Affected Environment and Environmental Effects

3.1 General Setting

The Eagle HMA is located in northeastern Lincoln County approximately 30 air miles southeast of Ely, Nevada, and 20 miles northeast of Caliente, Nevada. The Chokecherry and Mt. Elinore HMAs are located in the western Iron and Beaver Counties approximately 50 air miles northwest of Cedar City, Utah. The area is within the Great Basin physiographic regions, characterized by a high, rolling plateau underlain by basalt flows covered with a thin loess and alluvial mantle. On many of the low hills and ridges that are scattered throughout the area, the soils are underlain by bedrock. Elevations within the complex range from approximately 5,000 feet to 9,500 feet. Annual precipitation ranges from approximately 7 inches on some of the valley bottoms to 20 inches on the mountain peaks. Most of this precipitation comes during the winter and spring months in the form of snow, supplemented by localized thunderstorms during the summer months. Temperatures range from greater than 90 degrees Fahrenheit in the summer months to minus 20 degrees in the winter. The area is also utilized by domestic livestock and numerous wildlife species.

3.2 Identification of Issues

Internal scoping was conducted by an interdisciplinary (ID) team on November 28, 2017 that analyzed the potential consequences of the Proposed Action. Potential impacts to the following resources/concerns were evaluated in accordance with criteria listed in the H-1790-1 NEPA Handbook (2008) page 41, to determine if detailed analysis was required. Consideration of some of these items is to ensure compliance with laws, statutes or Executive Orders that impose certain requirements upon all Federal actions. Other items are relevant to the management of public lands in general, and to the Ely and Color Country Districts BLM in particular.

Table 3.1 summarizes which of the critical elements of the human environment and other resources of concern within the project area are present, not present or not affected by the proposed action.

Table 2.1 Summary of Critical and Other Elements of the Human Environment

Resource/Concern	Issue(s) Analyzed? (Y/N)	Rationale for Dismissal from Detailed Analysis or Issue(s) Requiring Detailed Analysis
Air Quality	N	The affected area is not within an area of non-attainment or areas where total suspended particulates or other criteria pollutants exceed Nevada air quality standards. Any increased particulate matter (dust) resulting from the proposed action would be short term (temporary) and

		minimal.
Areas of Critical Environmental Concern (ACEC)	N	Not present in the designated HA boundaries.
Cultural Resources	N	Cultural sites would be avoided by setting temporary holding facilities on previously disturbed areas and by relocating gather sites to avoid cultural resources. Cultural resources around springs would also be better protected with wild horse removal.
Forest Health	N	Project has a negligible impact on forest health.
Migratory Birds	N	Proposed action would occur outside of the migratory bird nesting season.
Native American Religious and other Concerns	N	No potential traditional religious or cultural sites of importance have been identified in the project according to the Ely District RMP Ethnographic report (2003).
Wastes, Hazardous or Solid	N	The proposed action will not use or introduce any hazardous or solid wastes.
Water Quality, Drinking/Ground	N	No effects to water quality are expected. The proposed action will avoid spring and stream locations.
Environmental Justice	N	No environmental justice issues are present at or near the gather area.
Floodplains	N	No floodplains have been identified by HUD or FEMA within the project area. Floodplains as defined in Executive Order 11988 may exist in the area, but would not be affected by the proposed action.
Farmlands, Prime and Unique	N	There are soils within the HMA that have been designated by the Natural Resource Conservation Service as meeting the requirements to be considered prime farmlands. Localized trampling of these soils may occur at the trap sites. The proposed action will not contribute to the loss of these potential farmlands.
Threatened and Endangered Species	N	No federally listed or proposed to be listed species are known to be present. No Designated Critical Habitat present.
Wild and Scenic Rivers	N	Not Present
Special Status Plant Species, other than those listed or proposed by the FWS as Threatened or Endangered. Also, ACECs designated to protect special status plant species.	N	Temporary structures would be constructed in disturbed areas. Potential for herbivory from horses would be reduced if herds are managed within AMLs. No Endangered, Threatened or candidate species have been documented within the Eagle Complex HMA. BLM sensitive species Astragalus oophorus var. lonchocalyx has been located within the Stateline allotment and the Indian Peak allotment of Hamlin Valley. As long as pre-disturbed trap sites are used no surveys would need to be conducted and determination would remain “no impact”.
Fish and Wildlife	N	Impacts from herd management are analyzed on pages 4.6-7 through 4.6-8 and 4.6-31. in the Ely Proposed Resource Management Plan/Final Environmental Impact Statement (November 2007).

Water Resources (Water Rights)	N	No adverse effects to water resources or water rights are expected as the proposed action will avoid spring, riparian, and stream locations.
Mineral Resources	N	There would be no modifications to mineral resources through the proposed action.
Wilderness/WSA	N	Temporary impacts to solitude could occur during gather operations due to low level flights and increased vehicle traffic. Temporary structures would be considered substantially unnoticeable according to BLM Manual 6310. By using existing disturbed sites, and implementing existing interim guidance for WSAs, no impacts would be incurred to the White Rocks WSA in the Cedar City Field Office.
Wild Horses	Y	Analysis in section 3.3.1
Wetlands/Riparian Zones	Y	Analysis in section 3.3.2
Soil Conditions	Y	Analysis in section 3.3.3
Special Status Animal Species, other than those listed or proposed by the FWS as threatened or Endangered.	N (Caliente Field Office)	Temporary structures would be constructed in disturbed areas and timing of gathers would occur outside of lekking and brood rearing seasons. Impacts from herd management are analyzed on pages 4.7-14 through 4.7-15 and 4.7-79 in the Ely Proposed Resource Management Plan/Final Environmental Impact Statement (November 2007.)
	Y (Cedar City Field Office)	Analysis for Pygmy rabbit and sage grouse is in Section 3.3.4
Livestock Grazing	Y	Analysis in section 3.3.5
Non-native Invasive and Noxious Species	Y	Analysis in section 3.3.6
Vegetative Resources	Y	Analysis in section 3.3.7
Public Safety	Y	Analysis in section 3.3.8

3.3 Resources Analyzed

The following critical or other elements of the human environment are present and may be affected by the proposed action or the alternatives. The affected environment is described for the reader to be able to understand the impact analysis.

3.3.1 Wild Horses

Affected Environment

Wild horses are introduced species within North America and have few natural predators. Few natural controls act upon wild horse herds making them very competitive with native wildlife and other living resources managed by the BLM. Population inventory flights have been conducted in the Eagle Complex every two to three years. These population inventory flights have provided information pertaining to population numbers, foaling rates, distribution, and herd health. A population inventory was conducted in February 2017 on the Eagle Complex using a Double Simultaneous Count Method. The current estimated wild horse population of 2,220 wild horses and is approximately 14 times above the low range of AML. Of these, the wild horses residing outside the complex are located along Highways 93,319, and 322 causing public safety concerns. Numerous reports have been brought to the Ely District attention about horses being hit or spotted on the highway. BLM has conducted numerous removals of excess wild horses that are causing public safety concerns along highways and private property issues. However as the wild horse population exceeds AML, groups of horses would continue to leave the complex in search of forage and water resources with the potential of causing safety concerns and private land issues.

Monitoring data shows that wild horses are having negative impacts on rangeland health conditions. The data shows severe to heavy use throughout the complex and areas outside the HMA boundary– including in areas where there has been no cattle grazing. Very few key areas had light to slight use. Monitoring data also shows fire rehabilitation areas are experiencing negative impacts as are range improvements (Crested wheatgrass seedings) outside the complex boundary as a result of heavy and severe wild horse use. Wild horses have been a contributing factor to riparian areas not meeting PFC, or being at risk with a downward trend or non-functional.

The horses within the complex have a Body Condition Score (BCS) of 2-4 based on the Henneke Body Condition Chart. Although spring of 2017 had above average moisture which increased forage production and prevented a catastrophic loss of wild horses within the complex, monitoring data still showed moderate to heavy use at key areas. If the area receives less moisture than average or if there is a really cold winter wild horse lives may be at risk. Genetic baseline data would need to be collected to establish the genetic diversity of the wild horses within the Eagle Complex.

Diet/dietary Overlap with Other Species

Numerous studies identify dietary overlap of preferred forage species and habitat preference between horses, cattle, and wildlife species in the Great Basin ecosystems for all season (Ganskopp 1983; Gandskopp et al. 1986, 1987; McInnis 1984; McInnis 1987; Smith et al 1982; Vavra and Sneva 1987). A strong potential exists for exploitative competition between horses and cattle under conditions of limited forage (water and space) availability (McInnis et al. 1987).

Although horses and cattle are often compared as grazers, horses can be more destructive to the range than cattle due to their differing digestive systems and grazing habits. The dietary overlap between wild horses and cattle is much higher than with wildlife, and averages between 60 and 80% (Hubbard and Hansen 1976, Hansen et al. 1977, Hanley 1982, Krysl et al. 1984, McInnis and Vavra 1987). Horses are cecal digesters while most other ungulates including cattle, pronghorn, and others are ruminants (Hanley and Hanley 1982, Beever 2003). Cecal digesters do not ruminate, or have to regurgitate and repeat the cycle of chewing until edible particles of plant fiber are small enough for their digestive system. Ruminants, especially cattle, must graze selectively, searching out digestible tissue (Olsen and Hansen 1977). Horses, however, are one of the least selective grazers in the West because they can consume high fiber foods and digest larger food fragments (Hanley and Hanley 1982, Beever 2003).

Wild horses can exploit the high cellulose of graminoids, or grasses, which have been observed to make up over 88% of their diet (McInnis and Vavra 1987, Hanley 1982). However, this lower quality diet requires that horses consume 20-65% more forage than a cow of equal body mass (Hanley 1982, Menard et al. 2002). With more flexible lips and upper front incisors, both features that cattle do not have, wild horses trim vegetation more closely to the ground (Symanski 1994, Menard et al. 2002, Beever 2003). As a result, areas grazed by horses may retain fewer plant species and may be subject to higher utilization levels than areas grazed by cattle or other ungulates. A potential benefit of a horse's digestive system may come from seeds passing through system without being digested but the benefit is likely minimal when compared to the overall impact wild horse grazing has on vegetation in general.

Competition from a large dominant species may drive niche partitioning of other species (Carothers and Jaksi, 1984; Ziv et al., 1993; Schuette et al., 2013). The study found that during times of greatest physiological stress (increased temperature, decreased precipitation), horses monopolized access to water sources where they were present up to 73% of the day, leaving limited time for other species. The potential for an exotic species, to outcompete native species for a limited communal resource during peak need raises concern for native species in water-limited environments (Hall et al. 2016)

Population modeling was completed for the Eagle Complex using Version 3.2 of the WinEquus population (Jenkins 200) to analyze how the alternatives would affect the wild horse population. This modeling analyzed removal of excess wild horses with no fertility control, as compared to removal of excess wild horses with fertility control for released horses. The No Action (no removal) Alternative was also modeled. One objective of the modeling was to identify whether any of the alternatives "crash" the population or cause extremely low population numbers or growth rates. Minimum population levels and growth rates were found to be within reasonable levels and adverse impacts to the population not likely. Graphic and tabular results are also displayed in detail in Appendix VI.

Environmental Effects

Proposed Action

The Proposed Action would remove excess wild horses within the Eagle Complex and outside the Eagle Complex boundary. Under this alternative, excess wild horses would be removed to the lower range of the AML. All wild horses residing outside the complex would be removed.

Fertility control would be applied to all breeding age mares that are captured and released after low AML is achieved. Successful implementation of this alternative requires a 90-95% gather efficiency in order to have enough animals in the initial gather available for release post-gather. Historically, gather efficiencies have averaged about 80% on this complex; at this level of efficiency, all the wild horses gathered would need to be removed in order to restore population size to within the established AML. If gather efficiencies do not allow for the attainment of the chosen action, or if BLM is unable to remove a sufficient number of wild horses in the initial gather, the Caliente FO and Cedar City FO would return in two to three years from the initial gather to remove excess wild horses. This would allow the Caliente FO and Cedar City FO to achieve the desired goal of reaching the low range of AML as well as to gather a sufficient number of remaining horses to implement fertility control treatments to control population growth.

When gather efficiencies have been able to achieve horse numbers within the range of AML maintenance gathers to reapply fertility control and to remove adoptable wild horses would be conducted for the next 10 years following the date of the initial gather. All mares selected for release would be treated with a two-year PZP-22 or similar vaccine and released back to the range. Immuno-contraceptive treatments would be conducted in accordance with the approved standard operating and post-treatment monitoring procedures (SOPs, Appendix III). Mares would be selected to maintain a diverse age structure, herd characteristics and conformation (body type).

Studs would be selected to maintain a diverse age structure, herd characteristics and body type (conformation).

Decreased competition for forage following removal of excess animals, coupled with reduced reproduction as a result of fertility control, should result in improved health and condition of mares and foals and would maintain healthy range conditions over the longer-term. Additionally, reduced reproduction rates would be expected to extend the time interval between gathers and reduce disturbance to individual animals as well as herd social structure over the foreseeable future.

The removal of excess horses to AML and maintaining it would reduce damage to the range from the current overpopulation of wild horses and allow vegetation resources time to recover over the next 4-5 years. As a result, there would be fewer disturbances to individual animals and the herd, and a more stable wild horse social structure would be provided.

Removal of excess wild horses would also improve herd health. Less competition for forage and water resources would reduce stress and promote healthier animals.

Helicopter/ Bait and water trap impacts to wild horses

Indirect impacts can occur to horses after the initial stress event (capture) and could include increased social displacement or increased conflict between studs. These impacts are known to occur intermittently during wild horse gather operations. Traumatic injuries could occur and typically involve biting and /or kicking bruises. Horses may potentially strike or kick gates, panels or the working chute while in corrals or trap which may cause injuries. Lowered competition for forage and water resources would reduce stress and fighting for limited resources (water and forage) and promote healthier animals. Indirect individual impacts are those impacts which occur to individual wild horses after the initial stress event, and may include spontaneous abortions in mares. These impacts, like direct individual impacts, are known to occur intermittently during wild horse gather operations. An example of an indirect individual impact would be the brief skirmish which occurs among studs following sorting and release into the stud pen, which lasts less than a few minutes and ends when one stud retreats. Traumatic injuries usually do not result from these conflicts. These injuries typically involve a bite and/or kicking with bruises which don’t break the skin. Like direct individual impacts, the frequency of occurrence of these impacts among a population varies with the individual animal.

Spontaneous abortion events among pregnant mares following capture is also rare, though poor body condition at time of gather can increase the incidence of spontaneous abortions. Given the two different capture methods proposed, spontaneous abortion is not considered to be an issue for either of the two proposed capture methods, since helicopter/drive trap method would not be utilized during peak foaling season (March 1 thru June 30), unless an emergency exists, and the water/bait trapping method is anticipated to be low stress.

Foals are often gathered that were orphaned on the range (prior to the gather) because the mother rejected it or died. These foals are usually in poor, unthrifty condition. Orphans encountered during gathers are cared for promptly and rarely die or have to be euthanized. It is unlikely that orphan foals would be encountered since a majority of the foals would be old enough to travel with the group of wild horses. Also depending on the time of year, the current foal crop would be six to nine months of age and may have already been weaned by their mothers.

Gathering wild horses during the summer months can potentially cause heat stress. Gathering wild horses during the fall/winter months reduces risk of heat stress, although this can occur during any gather, especially in older or weaker animals. Adherence to the SOPs and techniques used by the gather contractor or BLM staff would help minimize the risks of heat stress. Heat stress does not occur often, but if it does, death can result. Most temperature related issues during a gather can be mitigated by adjusting daily gather times to avoid the extreme hot or cold periods of the day. The BLM and the contractor would be pro-active in controlling dust in and around the holding facility and the gather corrals to limit the horses’ exposure to dust.

The BLM has been gathering excess wild horses from public lands since 1975, and has been using helicopters for such gathers since the late 1970’s. Refer to Appendix I for information on the methods that are utilized to reduce injury or stress to wild horses and burros during gathers.

Since 2006, BLM Nevada has gathered over 40,000 excess animals. Of these, gather related mortality has averaged only 0.5%, which is very low when handling wild animals. Another 0.6% of the animals captured were humanely euthanized due to pre-existing conditions and in accordance with BLM policy. This data affirms that the use of helicopters and motorized vehicles are a safe, humane, effective and practical means for gathering and removing excess wild horses and burros from the range. BLM policy prohibits gathering wild horses with a helicopter (unless under emergency conditions) during the period of March 1 to June 30 which includes and covers the six weeks that precede and follow the peak of foaling period (mid-April to mid-May).

Through the capture and sorting process, wild horses are examined for health, injury and other defects. Decisions to humanely euthanize animals in field situations would be made in conformance with BLM policy. BLM Euthanasia Policy IM 2015-070 is used as a guide to determine if animals meet the criteria and should be euthanized. Animals that are euthanized for non-gather related reasons include those with old injuries (broken hip, leg) that have caused the animal to suffer from pain or which prevent them from being able to travel or maintain body condition: old animals that have lived a successful life on the range, but now have few teeth remaining, are in poor body condition, or are weak from old age; and wild horses that have congenital (genetic) or serious physical defects such as club foot, or sway back and should not be returned to the range.

Temporary Holding Facilities During Gathers

Wild horses gathered would be transported from the trap sites to a temporary holding corral within the Complex in goose-neck trailers or straight-deck semi-tractor trailers. At the temporary holding corral, the wild horses would be aged and sorted into different pens based on sex. The horses would be provided ample supply of good quality hay and water. Mares and their un-weaned foals would be kept in pens together. All horses identified for retention in the Cmplex would be penned separately from those animals identified for removal as excess. All mares identified for release would be treated with fertility control vaccine in accordance with the Standard Operating Procedures (SOPs) for Fertility Control Implementation in Appendix III.

At the temporary holding facility, a veterinarian, would provide recommendations to the BLM regarding care, treatment, and if necessary, euthanasia of the recently captured wild horses. Any animals affected by a chronic or incurable disease, injury, lameness or serious physical defect (such as severe tooth loss or wear, club foot, and other severe congenital abnormalities) would be humanely euthanized using methods acceptable to the American Veterinary Medical Association (AVMA).

Transport, Short Term Holding, and Adoption Preparation

Wild horses removed from the range as excess would be transported to the receiving short-term holding facility in a goose-neck stock trailer or straight-deck semi-tractor trailers. Trucks and trailers used to haul the wild horses would be inspected prior to use to ensure wild horses can be safely transported and that the interior of the vehicle is in a sanitary condition. Wild horses would be segregated by age and sex when possible and loaded into separate compartments. Mares and their un-weaned foals may be shipped together. Transportation of recently captured wild horses is limited to a maximum of 8 hours. During transport, potential impacts to individual horses can include stress, as well as slipping, falling, kicking, biting, or being stepped on by another animal. Unless wild horses are in extremely poor condition, it is rare for an animal to die during transport.

Upon arrival, recently captured wild horses are off-loaded by compartment and placed in holding pens where they are fed good quality hay and water. Most wild horses begin to eat and drink immediately and adjust rapidly to their new situation. At the short-term holding facility, a veterinarian provides recommendations to the BLM regarding care, treatment, and if necessary, euthanasia of the recently captured wild horses. Any animals affected by a chronic or incurable disease, injury, lameness or serious physical defect (such as severe tooth loss or wear, club foot, and other severe congenital abnormalities) that was not diagnosed previously at the temporary holding corrals at the gather site would be humanely euthanized using methods acceptable to the AVMA. Wild horses in very thin condition or animals with injuries are sorted and placed in hospital pens, fed separately and/or treated for their injuries. Recently captured wild horses, generally mares, in very thin condition may have difficulty transitioning to feed. A small percentage of animals can die during this transition; however, some of these animals are in such poor condition that it is unlikely they would have survived if left on the range.

After recently captured wild horses have transitioned to their new environment, they are prepared for adoption or sale. Preparation involves freeze-marking the animals with a unique identification number, vaccination against common diseases, castration, and de-worming. During the preparation process, potential impacts to wild horses are similar to those that can occur during transport. Injury or mortality during the preparation process is low, but can occur.

Mortality at short-term holding facilities averages approximately 5% (GAO-09-77, Page 51), and includes animals euthanized due to a pre-existing condition, animals in extremely poor condition, animals that are injured and would not recover, animals which are unable to transition to feed; and animals which die accidentally during sorting, handling, or preparation.

Adoption

Adoption applicants are required to have at least a 400 square foot corral with panels that are at least six feet tall. Applicants are required to provide adequate shelter, feed, and water. The BLM retains title to the horse for one year and the horse and facilities are inspected. After one year, the applicant may take title to the horse at which point the horse become the property of the applicant. Adoptions are conducted in accordance with 43 CFR § Subpart 4750.

Sale with Limitation

Buyers must fill out an application and be pre-approved before they may buy a wild horse. A sale-eligible wild horse is any animal that is more than 10 years old; or has been offered unsuccessfully for adoption at least 3 times. The application also specifies that all buyers are not to sell to slaughter buyers or anyone who would sell the animals to a commercial processing plant. Sale of wild horses are conducted in accordance with the 1971 WFRHBA and congressional limitations that are presently in place.

Off-range Pastures

During the past 5 years, the BLM has removed approximately 19,000 excess wild horses or burros from the Western States. Most animals not immediately adopted or sold have been transported to Off-Range pastures in the Midwest given current Congressional prohibitions on selling excess animals without limitations, or on euthanizing healthy animals for which no adoption or sale demand exists as required by the WFRHBA.

Potential impacts to wild horses from transport to adoption, sale or Off-range Pastures (ORP) are similar to those previously described. One difference is that when shipping wild horses for adoption, sale or ORP, animals may be transported for a maximum of 24 hours. Immediately prior to transportation, and after every 24 hours of transportation, animals are offloaded and provided a minimum of 8 hours on-the-ground rest. During the rest period, each animal is provided access to unlimited amounts of clean water and 2 pounds of good quality hay per 100 pounds of body weight with adequate bunk space to allow all animals to eat at one time. The rest period may be waived in situations where the anticipated travel time exceeds the 24-hour limit but the stress of offloading and reloading is likely to be greater to the animals than the stress involved in the additional period of uninterrupted travel.

Off-range pastures are designed to provide excess wild horses with humane, and in some cases life-long care in a natural setting off the public rangelands. There wild horses are maintained in grassland pastures large enough to allow free-roaming behavior (i.e., the horses are not kept in corrals) and with the forage, water, and shelter necessary to sustain them in good condition. About 33,429 wild horses that are in excess of the current adoption or sale demand (because of age or other factors such as economic recession), are currently located on private land pastures in Oklahoma, Kansas, and South Dakota [SAB1], And Iowa, Missouri, Wyoming, Montana, Nebraska, & Utah. Establishment of an ORP is subject to a separate NEPA and decision-making process. Located in mid or tall grass prairie regions of the United States, these ORPs are highly productive grasslands compared to the more arid western rangelands. These pastures comprise about 256,000 acres (an average of about 10-11 acres per animal). Of the animals currently located in ORP, less than one percent is age 0-4 years, 49 percent are age 5-10 years, and about 51 percent are age 11+ years.

Mares and sterilized stallions (geldings) are segregated into separate pastures except at one facility where geldings and mares coexist. Although the animals are placed in ORP, they remain available for adoption or sale to qualified individuals; and foals born to pregnant mares in ORP are gathered and weaned when they reach about 8-12 months of age and are also made available for adoption. The ORP contracts specify the care that wild horses must receive to ensure they remain healthy and well-cared for. Handling by humans is minimized to the extent possible, although regular on-the-ground observation by the ORP contractor and periodic counts of the wild horses to ascertain their well-being and safety are conducted by BLM personnel and/or veterinarians. A very small percentage of the animals may be humanely euthanized if they are in very poor condition due to age or other factors. Natural mortality of wild horses in ORP averages approximately 8% per year, but can be higher or lower depending on the average age of the horses pastured there (GAO-09-77, Page 52). Wild horses residing on ORP facilities live longer, on the average, than wild horses residing on public rangelands,

Euthanasia and Sale Without Limitation

Under the WFRHBA, healthy excess wild horses can be euthanized or sold without limitation if there is no adoption demand for the animals. However, while euthanasia and sale without limitation are allowed under the statute, these activities have not been permitted under current Congressional appropriations for over a decade and are consequently inconsistent with BLM policy. If Congress should remove this prohibition, then excess horses removed from the Complex could potentially be sold without limitations or humanely euthanized, as required by statute, if no adoption or sale demand exists for some of the removed excess horses.

Wild Horses Remaining or Released into the HMA following Gather

Under the Proposed Action, the post-gather population of wild horses would be about 145 wild horses, which is the low end of the AML range for the Eagle Complex. Reducing population size would also ensure that the remaining wild horses are healthy and vigorous, and not at risk of death or suffering from starvation due to insufficient habitat coupled with the effects of frequent drought (lack of forage and water).

The wild horses that are not captured may be temporarily disturbed and move into another area during the gather operations. With the exception of changes to herd demographics, direct population wide impacts have proven, over the last 20 years, to be temporary in nature with most if not all impacts disappearing within hours to several days of when wild horses are released back into the complex. No observable effects associated with these impacts would be expected within one month of release, except for a heightened awareness of human presence.

As a result of lower density of wild horses across the complex following the removal of excess horses, competition for resources would be reduced, allowing wild horses to utilize preferred, quality habitat. Confrontations between stallions would also become less frequent, as would fighting among wild horse bands at water sources. Achieving the AML and improving the overall health and fitness of wild horses could also increase foaling rates and foaling survival rates over the current conditions.

The primary effects to the wild horse population that would be directly related to this proposed gather would be to herd population dynamics, age structure or sex ratio, and subsequently to the growth rates and population size over time.

The remaining wild horses not captured would maintain their social structure and herd demographics (age and sex ratios). No observable effects to the remaining population associated with the gather impacts would be expected except a heightened shyness toward human contact.

Table 3.8-2 of the Ely Proposed Resource Management Plan/Final Environmental Impact Statement (November 2007) Pinyon Management Framework Plan (1983) shows that the Eagle Complex reproductive viability is adequate. However, genetic data would be collected to continue monitor genetic diversity throughout the complex. At this time, there is no evidence to indicate that the complex wild horses suffer from reduced genetic fitness at the established AML.

Impacts to the rangeland as a result of the current overpopulation of wild horses would be reduced under the two gather and removal alternatives. Fighting among stud horses would decrease since they would protect their position at water sources less frequently; injuries and death to all age classes of animals would also be expected to be reduced as competition for limited forage and water resources is decreased.

Indirect individual impacts are those impacts which occur to individual wild horses after the initial stress event, and may include spontaneous abortions in mares, and increased social displacement and conflict in studs. These impacts, like direct individual impacts, are known to occur intermittently during wild horse gather operations. An example of an indirect individual impact would be the brief skirmish which occurs among older studs following sorting and release into the stud pen, which lasts less than two minutes and ends when one stud retreats. Traumatic injuries usually do not result from these conflicts. These injuries typically involve a bite and/or kicking with bruises which don't break the skin. Like direct individual impacts, the frequency of occurrence of these impacts among a population varies with the individual animal.

Spontaneous abortion events among pregnant mares following capture is also rare, though poor body condition can increase the incidence of such spontaneous abortions. Given the timing of this gather, spontaneous abortion is not considered to be an issue for the proposed gather.

A few foals may be orphaned during gathers. This may occur due to:

- The mare rejects the foal. This occurs most often with young mothers or very young foals,
- The foal and mother become separated during sorting, and cannot be matched,
- The mare dies or must be humanely euthanized during the gather,
- The foal is ill, weak, or needs immediate special care that requires removal from the mother,
- The mother does not produce enough milk to support the foal.

Oftentimes, foals are gathered that were already orphans on the range (prior to the gather) because the mother rejected it or died. These foals are usually in poor, unthrifty condition. Orphans encountered during gathers are cared for promptly and rarely die or have to be euthanized.

Most foals that would be gathered would be over four months of age and some would be ready for weaning from their mothers. In private industry, domestic horses are normally weaned between four and six months of age.

Gathering the wild horses during the fall reduces risk of heat stress, although this can occur during any gather, regardless of season, especially in older or weaker animals. Adherence to the SOPs as well and techniques used by the gather contractor help minimize the risks of heat stress. Heat stress does not occur often, but if it does, death can result.

During summer gathers, roads and corrals may become dusty, depending upon the soils and specific conditions at the gather area. The BLM ensures that contractors mitigate any potential impacts from dust by slowing speeds on dusty roads and watering down corrals and alleyways. Despite precautions, it is possible for some animals to develop complications from dust inhalation and contract dust pneumonia. This is rare, and usually affects animals that are already weak or otherwise debilitated due to older age or poor body condition. Summer gathers pose increased risk of heat stress so Contractors use techniques that minimize heat stress, such as conducting gather activities in the early morning, when temperatures are coolest, and stopping well before the hottest period of the day. The helicopter pilot also brings in the horses at an easy pace. If there are extreme heat conditions, gather activities are suspended during that time. Water consumption is monitored, and horses or burros are often lightly sprayed with water as the corrals are being sprayed to reduce dust. The wild horses and burros appear to enjoy the cool spray during summer gathers. Individual animals are also monitored and veterinary or supportive care administered as needed. Electrolytes can be administered to the drinking water during gathers that involve animals in weakened conditions or during summer gathers. Additionally, BLM Wild Horse and Burro staff maintains supplies of electrolyte paste if needed to directly administer to an affected animal. As a result of adherence to SOPs and care taken during summer gathers, potential risks to wild horses associated with summer gathers can be minimized or eliminated.

During winter gathers, wild horses and burros are often located in lower elevations, in less steep terrain due to snow cover in the higher elevations. Subsequently, the animals are closer to the potential gather corrals, and need to maneuver less difficult terrain in many cases. However, snow cover can increase fatigue and stress during winter gathers, therefore the helicopter pilot allows horses to travel slowly at their own pace. The Contractor may plow trails in the snow leading to the gather corrals to make it easier for animals to travel to the gather site and to ensure the wild horses can be safely gathered.

Through the capture and sorting process, wild horses are examined for health, injury and other defects. Decisions to humanely euthanize animals in field situations would be made in conformance with BLM policy. BLM Euthanasia Policy IM-2015-070 is used as a guide to determine if animals meet the criteria and should be euthanized (refer to SOPs Appendix I). Animals that are euthanized for non-gather related reasons include those with old injuries (broken hip, leg) that have caused the animal to suffer from pain or which prevent them from being able to travel or maintain body condition; old animals that have lived a successful life on the range, but now have few teeth remaining, are in poor body condition, or are weak from old age; and wild horses that have congenital (genetic) or serious physical defects such as club foot, or sway back and should not be returned to the range.

Porcine Zona Pellucida (PZP) Vaccine

Immune-contraceptive PZP vaccines have been used on dozens of horse herds by the National Park Service, US Forest Service, Bureau of Land Management, and Native American tribes and its use is approved for free-ranging wild horse herds. Taking into consideration available literature on the subject, the National Research Council concluded in their 2013 report that PZP was one of the preferable available methods for contraception in wild horses and burros (NRC 2013). PZP use can reduce or eliminate the need for gathers and removals (Turner et al. 1997). PZP vaccines meet most of the criteria that the National Research Council (2013) used to identify promising fertility control methods, in terms of delivery method, availability, efficacy, and side effects. It has been used extensively in wild horses (NRC 2013), and in feral burros on Caribbean islands (Turner et al. 1996, French et al. 2017). PZP is relatively inexpensive, meets BLM requirements for safety to mares and the environment, and is commercially produced as ZonaStat-H, an EPA-registered product (EPA 2012, SCC 2015), or as PZP-22, which is a formulation of PZP in polymer pellets that can lead to a longer immune response (Turner et al. 2002, Rutberg et al. 2017). 'Native' PZP proteins can be purified from pig ovaries (Liu et al. 1989). Recombinant ZP proteins may be produced with molecular techniques (Gupta and Minhas

2017, Joonè et al. 2017a). It can easily be remotely administered in the field in cases where mares are relatively approachable. Use of remotely delivered (dart-delivered) vaccine is generally limited to populations where individual animals can be accurately identified and repeatedly approached within 50 m (BLM 2010).

Under the Proposed Action, the BLM would return to the complex as needed over the ten-year period to re-apply PZP-22, ZonaStat-H, or other improved PZP vaccines that may become available in the future, and initiate new treatments in order to maintain contraceptive effectiveness in controlling population growth rates. Both currently available forms of PZP can safely be reapplied as necessary to control the population growth rate. Even with repeated booster treatments of PZP, it is expected that most, if not all, mares would return to fertility, though some mares treated repeatedly may not (see *PZP Direct Effects*, below). Once the population is at AML and population growth seems to be stabilized, BLM could use population planning software (WinEquus II, currently in development by USGS Fort Collins Science Center) to determine the required frequency of re-treating mares with PZP.

PZP Direct Effects

The historically accepted hypothesis explaining PZP vaccine effectiveness posits that when injected as an antigen in vaccines, PZP causes the mare's immune system to produce antibodies that are specific to zona pellucida proteins on the surface of that mare's eggs. The antibodies bind to the mare's eggs surface proteins (Liu et al. 1989), and effectively block sperm binding and fertilization (Zoo Montana, 2000). Because treated mares do not become pregnant but other ovarian functions remain generally unchanged, PZP can cause a mare to continue having regular estrus cycles throughout the breeding season. More recent observations support a complementary hypothesis, which posits that PZP vaccination causes reductions in ovary size and function (Mask et al. 2015, Joonè et al. 2017b).

Research has demonstrated that contraceptive efficacy of an injected PZP vaccine is approximately 90% for mares treated twice in the first year and boostered annually (Turner and Kirkpatrick 2002, Turner et al. 2008). High contraceptive rates of 90% or more can be maintained in horses that are boostered annually (Kirkpatrick et al. 1992). Approximately 60% to 85% of mares are successfully contracepted for one year when treated simultaneously with a liquid primer and PZP-22 pellets (Rutberg et al. 2017). Application of PZP for fertility control would reduce fertility in a large percentage of mares for at least one year (Ransom et al. 2011). Horses treated with PZP-22 vaccine pellets at the same time as a primer dose may experience two years of ~40% - 50% reduced foaling rates, compared to untreated animals (Rutberg et al. 2017). Other trial data, though, indicate that the pelleted vaccine may only be effective for one year (J. Turner, University of Toledo, Personal Communication).

The fraction of mares treated in a herd can have a large effect on the realized change in growth rate due to PZP contraception, with an extremely high portion of mares required to be treated to lead prevent population-level growth (e.g., Turner and Kirkpatrick 2002). Gather efficiency would likely not exceed 85% via helicopter, and may be less with bait and water trapping, so there would be a portion of the female population uncaptured that is not treated in any given year. Additionally, some mares may not respond to the fertility control vaccine, but instead would continue to foal normally.

Reversibility and Effects on Ovaries

In most cases, PZP contraception appears to be temporary and reversible (Kirkpatrick and Turner 2002, Joonè et al. 2017a). Although the rate of long-term or permanent sterility following repeated vaccinations with PZP has not been quantified, it must be acknowledged that this could be a result for some number of wild horses receiving multiple repeat PZP vaccinations.

The purposes of applying PZP treatment is to prevent mares from conceiving foals, but BLM acknowledges that long-term infertility, or permanent sterility, could be a result for some number of wild horses receiving PZP vaccinations. The rate of long-term or permanent sterility following vaccinations with PZP is hard to predict for individual horses, but that outcome appears to increase in likelihood as the number of doses increases (Kirkpatrick and Turner 2002). Permanent sterility for mares treated consecutively 5-7 years was observed by Nuñez et al. (2010, 2017). In a graduate thesis, Knight (2014) suggested that repeated treatment with as few as three to four years of PZP treatment may lead to longer-term sterility. Repeated treatment with PZP led to long-term infertility in Przewalski's horses receiving as few as one PZP booster dose (Feh 2012). If some number of mares become sterile as a result of PZP treatment, that potential result would be consistent with the contraceptive purpose of applying the vaccine.

In some mares, PZP vaccination may cause direct effects on ovaries (Gray and Cameron 2010, Joonè et al. 2017b). Joonè et al. (2017a) noted reversible effects on ovaries in mares treated with one primer dose and booster dose. Bechert et al. (2013) found that ovarian function was affected by the SpayVac PZP vaccination, but that there were no effects on other organ systems. Mask et al. (2015) demonstrated that equine antibodies that resulted from SpayVac immunization could bind to oocytes, ZP proteins, follicular tissues, and ovarian tissues. It is possible that result is specific to the immune response to SpayVac, which may have lower PZP purity than ZonaStat or PZP-22 (Hall et al. 2016). However, in studies with native ZP proteins and recombinant ZP proteins, Joonè et al. (2017a) found transient effects on ovaries after PZP vaccination in some treated mares; normal estrus cycling had resumed 10 months after the last treatment. SpayVac is a patented formulation of PZP in liposomes that can lead to multiple years of infertility (Roelle et al. 2017) but which is not reliably available for BLM to use at this time. Kirkpatrick et al. (1992) noted effects on ovaries after three years of treatment with PZP. Observations at Assateague Island National Seashore indicate that the more times a mare is consecutively treated, the longer the time lag before fertility returns, but that even mares treated 7 consecutive years did eventually return to ovulation (Kirkpatrick and Turner 2002). Other studies have reported that continued applications of PZP may result in decreased estrogen levels (Kirkpatrick et al. 1992) but that decrease was not biologically significant, as ovulation remained similar between treated and untreated mares (Powell and Monfort 2001). Permanent sterility for mares treated consecutively 5-7 years was observed by Nuñez et al. (2010, 2017). In a graduate thesis, Knight (2014) suggested that repeated treatment with as few as three to four years of PZP treatment may lead to longer-term sterility, and that sterility may result from PZP treatment before puberty. Skinner et al. (1984) speculated about PZP effects on ovaries, based on their study in laboratory rabbits, as did Kaur and Prabha (2014), though neither paper was a study of PZP effects in equids.

Effects on Existing Pregnancies, Foals, and Birth Phenology

PZP vaccine application at the capture site does not appear to affect normal development of the fetus or foal, hormone health of the mare or behavioral responses to stallions, should the mare already be pregnant when vaccinated (Kirkpatrick et al. 2002).

If a mare is already pregnant, the PZP vaccine has not been shown to affect normal development of the fetus or foal, or the hormonal health of the mare with relation to pregnancy (Kirkpatrick and Turner 2003). It is possible that there may be transitory effects on foals born to mares or jennies treated with PZP. In mice, Sacco et al. (1981) found that antibodies specific to PZP can pass from mother mouse to pup via the placenta or colostrum, but that did not apparently cause any innate immune response in the offspring: the level of those antibodies were undetectable by 116 days after birth. There was no indication in that study that the fertility or ovarian function of those pups was compromised, nor is BLM aware of any such results in horses or burros. Unsubstantiated speculative connections between PZP treatment and foal stealing has not been published in a peer-reviewed study and thus cannot be verified. Similarly, although Nettles (1997) noted reported stillbirths after PZP treatments in cynomolgus monkeys, those results have not been observed in equids despite extensive use.

On-range observations from 20 years of application to wild horses indicate that PZP application in wild mares does not generally cause mares to foal out of season or late in the year (Kirkpatrick and Turner 2003). Nuñez's (2010) research showed that a small number of mares that had previously been treated with PZP foaled later than untreated mares and expressed the concern that this late foaling "may" impact foal survivorship and decrease band stability, or that higher levels of attention from stallions on PZP-treated mares might harm those mares. However, that paper provided no evidence that such impacts on foal survival or mare well-being actually occurred. Rubenstein (1981) called attention to a number of unique ecological features of horse herds on Atlantic barrier islands, which calls into question whether inferences drawn from island herds can be applied to western wild horse herds. Ransom et al. (2013), though, identified a potential shift in reproductive timing as a possible drawback to prolonged treatment with PZP, stating that treated mares foaled on average 31 days later than non-treated mares. Those results, however, showed that over 81% of the documented births in this study were between March 1 and June 21, i.e., within the normal spring season. Ransom et al. (2013) advised that managers should consider carefully before using PZP in small refugia or rare species. Wild horses and burros in Nevada do not generally occur in isolated refugia, and they are not a rare species. Moreover, an effect of shifting birth phenology was not observed uniformly: in two of three PZP-treated wild horse populations studied by Ransom et al. (2013), foaling season of treated mares extended three weeks and 3.5 months, respectively, beyond that of untreated mares. In the other population, the treated mares foaled within the same time period as the untreated mares. Furthermore, Ransom et al. (2013) found no negative impacts on foal survival even with an extended birthing season. If there are shifts in birth phenology, though, it is reasonable to assume that some negative effects on foal survival might result from particularly severe weather events.

Effects of Marking and Injection

Standard practices for PZP treatment require that treated animals be readily identifiable, either via brand marks or unique coloration (BLM 2010). BLM has instituted guidelines to reduce the sources of handling stress in captured animals (BLM 2015). Some level of transient stress is likely to result in newly captured mares that do not have markings associated with previous fertility control treatments. It is difficult to compare that level of temporary stress with long-term stress that can result from food and water limitation on the range (e.g., Creel et al. 2013). Handling may include freeze-marking, for the purpose of identifying that mare and identifying her PZP vaccine treatment history. Under past management practices, captured mares experienced increased stress levels from handling (Ashley and Holcombe 2001). Markings may also be used into the future to determine the approximate fraction of mares in a herd that have been previously treated, and could provide additional insight regarding gather efficiency.

Most mares recover from the stress of capture and handling quickly once released back to the HMA, and none are expected to suffer serious long term effects from the fertility control injections, other than the direct consequence of becoming temporarily infertile. Injection site reactions associated with fertility control treatments are possible in treated mares (Roelle and Ransom 2009, Bechert et al. 2013, French et al. 2017), but swelling or local reactions at the injection site are expected to be minor in nature. Roelle and Ransom (2009) found that the most time-efficient method for applying PZP is by hand-delivered injection of 2-year pellets when horses are gathered. They observed only two instances of swelling from that technique. Use of remotely delivered, 1-year PZP is generally limited to populations where individual animals can be accurately identified and repeatedly approached. The dart-delivered formulation produced injection-site reactions of varying intensity, though none of the observed reactions appeared debilitating to the animals (Roelle and Ransom 2009). Joonè et al. (2017a) found that injection site reactions had healed in most mares within 3 months after the booster dose, and that they did not affect movement or cause fever. The longer term nodules observed did not appear to change any animal's range of movement or locomotor patterns and in most cases did not appear to differ in magnitude from naturally occurring injuries or scars.

Indirect Effects

One expected long-term, indirect effect on wild horses treated with fertility control would be an improvement in their overall health (Turner and Kirkpatrick 2002). Many treated mares would not experience the biological stress of reproduction, foaling and lactation as frequently as untreated mares, and their better health is expected to be reflected in higher body condition scores (Nuñez et al. 2010). After a treated mare returns to fertility, her future foals would be expected to be healthier overall, and would benefit from improved nutritional quality in the mares' milk. This is particularly to be expected if there is an improvement in rangeland forage quality at the same time, due to reduced wild horse population size. Past application of fertility control has shown that mares' overall health and body condition remains improved even after fertility resumes. PZP treatment may increase mare survival rates, leading to longer potential lifespan (Turner and Kirkpatrick 2002, Ransom et al. 2014a). To the extent that this happens, changes in lifespan and decreased foaling rates could combine to cause changes in overall age structure in a treated herd (i.e., Turner and Kirkpatrick 2002, Roelle et al. 2010), with a greater prevalence of older mares in the herd (Gross 2000). Observations of mares treated in past gathers showed that many of the treated mares were larger than, maintained higher body condition than, and had larger healthy foals than untreated mares.

Following resumption of fertility, the proportion of mares that conceive and foal could be increased due to their increased fitness; this has been called a 'rebound effect.' Elevated fertility rates have been observed after horse gathers and removals (Kirkpatrick and Turner 1991). More research is needed to document and quantify these hypothesized effects; however, it is believed that repeated contraceptive treatment may minimize the hypothesized rebound effect.

Because successful fertility control would reduce foaling rates and population growth rates, another indirect effect would be to reduce the number of wild horses that have to be removed over time to achieve and maintain the established AML. So long as the level of contraceptive treatment is adequate, the lower expected birth rates can compensate for any expected increase in the survival rate of treated mares. Also, reducing the numbers of wild horses that would have to be removed in future gathers could allow for removal of younger, more easily adoptable excess wild horses, and thereby could eliminate the need to send additional excess horses from this area to long term pastures (ORPs) or for other statutorily mandated disposition. A high level of physical health and future reproductive success of fertile mares within the herd would be sustained, as reduced population sizes would be expected to lead to more availability of water and forage resources per capita.

Reduced population growth rates and smaller population sizes could also allow for continued and increased environmental improvements to range conditions within the project area, which would have long-term benefits to wild horse habitat quality. As the population nears or is maintained at the level necessary to achieve a thriving natural ecological balance, vegetation resources would be expected to recover, improving the forage available to wild horses and wildlife throughout the HMA. With rangeland conditions more closely approaching a thriving natural ecological balance, and with a less concentrated distribution of wild horses across the HMA, there should also be less trailing and concentrated use of water sources, which would have many benefits to the wild horses still on the range. Lower population density would be expected to lead to reduced competition among wild horses using the water sources, and less fighting among horses accessing water sources. Water quality and quantity would continue to improve to the benefit of all rangeland users including wild horses. Wild horses would also have to travel less distance back and forth between water and desirable foraging areas. Should PZP booster treatment and repeated fertility control treatment continue into the future, the chronic cycle of overpopulation and large gathers and removals would no longer occur, but instead a consistent cycle of balance and stability would ensue, resulting in continued improvement of overall habitat conditions and animal health. While it is conceivable that widespread and continued treatment with PZP could reduce the birth rates of the population to such a point that birth is consistently below mortality, that outcome is not likely unless a very high fraction of the mares present are all treated in almost every year.

Behavioral Effects

The NRC report (2013) noted that all fertility suppression has effects on mare behavior, mostly as a result of the lack of pregnancy and foaling, and concluded that PZP was a good choice for use in the program. The result that PZP-treated mares may continue estrus cycles throughout the breeding season can lead to behavioral differences, when compared to mares that are fertile.

Such behavioral differences should be considered as potential consequences of successful contraception.

Ransom and Cade (2009) delineate behaviors that can be used to test for quantitative differences due to treatments. Ransom et al. (2010) found no differences in how PZP-treated and untreated mares allocated their time between feeding, resting, travel, maintenance, and most social behaviors in three populations of wild horses, which is consistent with Powell's (1999) findings in another population. Likewise, body condition of PZP-treated and control mares did not differ between treatment groups in Ransom et al.'s (2010) study. Nuñez (2010) found that PZP-treated mares had higher body condition than control mares in another population, presumably because energy expenditure was reduced by the absence of pregnancy and lactation. Knight (2014) found that PZP-treated mares had better body condition, lived longer and switched harems more frequently, while mares that foaled spent more time concentrating on grazing and lactation and had lower overall body condition. Studies on Assateague Island (Kirkpatrick and Turner 2002) showed that once fillies (female foals) that were born to mares treated with PZP during pregnancy eventually breed, they produce healthy, viable foals.

In two studies involving a total of four wild horse populations, both Nuñez et al. (2009) and Ransom et al. (2010) found that PZP-treated mares were involved in reproductive interactions with stallions more often than control mares, which is not surprising given the evidence that PZP-treated females of other mammal species can regularly demonstrate estrus behavior while contracepted (Shumake and Wilhelm 1995, Heilmann et al. 1998, Curtis et al. 2001). There was no evidence, though, that mare welfare was affected by the increased level of herding by stallions noted in Ransom et al. (2010). Nuñez's later analysis (2017) noted no difference in mare reproductive behavior as a function of contraception history.

Ransom et al. (2010) found that control mares were herded by stallions more frequently than PZP- treated mares, and Nuñez et al. (2009, 2014, 2017) found that PZP-treated mares exhibited higher infidelity to their band stallion during the non-breeding season than control mares. Madosky et al. (2010) and Knight (2014) found this infidelity was also evident during the breeding season in the same population that Nuñez et al. (2009, 2010, 2014, 2017) studied; they concluded that PZP-treated mares changing bands more frequently than control mares could lead to band instability. Nuñez et al. (2009), though, cautioned against generalizing from that island population to other herds. Nuñez et al. (2014) found elevated levels of fecal cortisol, a marker of physiological stress, in mares that changed bands. The research is inconclusive as to whether all the mares' movements between bands were related to the PZP treatments themselves or the fact that the mares were not nursing a foal, and did not demonstrate any long-term negative consequence of the transiently elevated cortisol levels. The authors (Nuñez et al. 2014) concede that these effects "…may be of limited concern when population reduction is an urgent priority." In contrast to transient stresses, Creel et al (2013) highlight that variation in population density is one of the most well-established causal factors of chronic activation of the hypothalamic-pituitary-adrenal axis, which mediates stress hormones; high population densities and competition for resources can cause chronic stress. Creel also states that "…there is little consistent evidence for a negative association between elevated baseline glucocorticoids and fitness." Band fidelity is not an aspect of wild horse biology that is specifically protected by the WFRHBA of 1971. It is also notable that Ransom et al. (2014b) found higher group fidelity after a herd had been gathered and treated with a contraceptive vaccine; in that case, the researchers postulated that higher fidelity may have been facilitated by the decreased competition for forage after excess horses were removed. At the population level, available research does not provide evidence of the loss of harem structure among any herds treated with PZP. Long-term implications of these changes in social behavior are currently unknown, but no negative impacts on the overall animals or populations welfare or well-being have been noted in these studies.

The National Research Council (2013) found that harem changing was not likely to result in serious adverse effects for treated mares:

> "The studies on Shackleford Banks (Nuñez et al., 2009; Madosky et al., 2010) suggest that there is an interaction between pregnancy and social cohesion. The importance of harem stability to mare well-being is not clear, but considering the relatively large number of free-ranging mares that have been treated with liquid PZP in a variety of ecological settings, the likelihood of serious adverse effects seem low."

Nuñez (2010) stated that not all populations would respond similarly to PZP treatment. Differences in habitat, resource availability, and demography among conspecific populations would undoubtedly affect their physiological and behavioral responses to PZP contraception, and need to be considered. Kirkpatrick et al. (2010) concluded that: "the larger question is, even if subtle alterations in behavior may occur, this is still far better than the alternative," and that the "…other victory for horses is that every mare prevented from being removed, by virtue of contraception, is a mare that would only be delaying her reproduction rather than being eliminated permanently from the range. This preserves herd genetics, while gathers and adoption do not."

The NRC report (2013) provides a comprehensive review of the literature on the behavioral effects of contraception that puts research up to that date by Nuñez's et al. (2009, 2010) into the broader context of all of the available scientific literature, and cautions, based on its extensive review of the literature that:

> ". . . in no case can the committee conclude from the published research that the behavior differences observed are due to a particular compound rather than to the fact that treated animals had no offspring during the study. That must be borne in mind particularly in interpreting long-term impacts of contraception (e.g., repeated years of reproductive "failure" due to contraception)."

Genetic Effects of PZP Vaccination

In HMAs where large numbers of wild horses have recent and / or an ongoing influx of breeding animals from other areas with wild or feral horses, contraception is not expected to cause an unacceptable loss of genetic diversity or an unacceptable increase in the inbreeding coefficient. In any diploid population, the loss of genetic diversity through inbreeding or drift can be prevented by large effective breeding population sizes (Wright 1931) or by introducing new potential breeding animals (Mills and Allendorf 1996). The NRC report (2013) recommended that single HMAs should not be considered as isolated genetic populations. Rather, managed herds of wild horses would be better viewed as components of interacting metapopulations, with the potential for interchange of individuals and genes taking place as a result of natural and human-facilitated movements. Introducing 1-2 mares every generation (about every 10 years) is a standard management technique that can alleviated potential inbreeding concerns (BLM 2010).

In the last 10 years, there has been a high realized growth rate of wild horses in most areas administered by the BLM, such that most alleles that are present in any given mare are likely to already be well represented in her siblings, cousins, and more distant relatives. With the exception of horses in a small number of well-known HMAs that contain a relatively high fraction of alleles associated with old Spanish horse breeds (NRC 2013), the genetic composition of wild horses in lands administered by the BLM is consistent with admixtures from multiple domestic breeds. As a result, in most HMAs, applying fertility control to a subset of mares is not expected to cause irreparable loss of genetic diversity. Improved longevity and an aging population are expected results of contraceptive treatment that can provide for lengthening generation time; this result would be expected to slow the rate of genetic diversity loss (Hailer et al. 2006). Based on a population model, Gross (2000) found that a strategy to preferentially treating young animals with a contraceptive led to more genetic diversity being retained than either a strategy that preferentially treats older animals, or periodic gathers and removals.

Even if it is the case that repeated treatment with PZP may lead to prolonged infertility, or even sterility in some mares, most HMAs have only a low risk of loss of genetic diversity if logistically realistic rates of contraception are applied to mares. Wild horses in most herd management areas are descendants of a diverse range of ancestors coming from many breeds of domestic horses. As such, the existing genetic diversity in the majority of HMAs does not contain unique or historically unusual genetic markers. Past interchange between HMAs, either through natural dispersal or through assisted migration (i.e., human movement of horses) means that many HMAs are effectively indistinguishable and interchangeable in terms of their genetic composition. Roelle and Oyler-McCance (2015) used the VORTEX population model to simulate how different rates of mare sterility would influence population persistence and genetic diversity, in populations with high or low starting levels of genetic diversity, various starting population sizes, and various annual population growth rates. Their results show that the risk of the loss of genetic heterozygosity is extremely low except in case where all of the following conditions are met: starting levels of genetic diversity are low, initial population size is 100 or less, the intrinsic population growth rate is low (5% per year), and very large fractions of the female population are permanently sterilized.

It is worth noting that, although maintenance of genetic diversity at the scale of the overall population of wild horses is an intuitive management goal, there are no existing laws or policies that require BLM to maintain genetic diversity at the scale of the individual herd management area or complex. Also, there is no Bureau-wide policy that requires BLM to allow each female in a herd to reproduce before she is treated with contraceptives.

One concern that has been raised with regards to genetic diversity is that treatment with immunocontraceptives could possibly lead to an evolutionary increase in the frequency of individuals whose genetic composition fosters weak immune responses (Cooper and Larson 2006, Ransom et al. 2014a).Many factors influence the strength of a vaccinated individual's immune response, potentially including genetics, but also nutrition, body condition, and prior immune responses to pathogens or other antigens (Powers et al. 2013). This premise is based on an assumption that lack of response to PZP is a heritable trait, and that the frequency of that trait would increase over time in a population of PZP-treated animals. Cooper and Herbert (2001) reviewed the topic, in the context of concerns about the long-term effectiveness of immunocontraceptives as a control agent for exotic species in Australia. They argue that imunocontraception could be a strong selective pressure, and that selecting for reproduction in individuals with poor immune response could lead to a general decline in immune function in populations where such evolution takes place. Other authors have also speculated that differences in antibody titer responses could be partially due to genetic differences between animals (Curtis et al. 2001, Herbert and Trigg 2005). However, Magiafolou et al. (2013) clarify that if the variation in immune response is due to environmental factors (i.e., body condition, social rank) and not due to genetic factors, then there would be no expected effect of the immune phenotype on future generations. It is possible that general health, as measured by body condition, can have a causal role in determining immune response, with animals in poor condition demonstrating poor immune reactions (NRC 2013).

Correlations between physical factors and immune response would not preclude, though, that there could also be a heritable response to immunocontraception. In studies not directly related to immunocontraception, immune response has been shown to be heritable (Kean et al. 1994, Sarker et al. 1999). Unfortunately, predictions about the long-term, population-level evolutionary response to immunocontraceptive treatments are speculative at this point, with results likely to depend on several factors, including: the strength of the genetic predisposition to not respond to PZP; the heritability of that gene or genes; the initial prevalence of that gene or genes; the number of mares treated with a primer dose of PZP (which generally has a short-acting effect); the number of mares treated with multiple booster doses of PZP; and the actual size of the genetically-interacting metapopulation of horses within which the PZP treatment takes place.

BLM is not aware of any studies that have quantified the heritability of a lack of response to immunocontraception such as PZP vaccine or GonaCon-Equine in horses. At this point there are no studies available from which one could make conclusions about the long-term effects of sustained and widespread immunocontraception treatments on population-wide immune function. Although a few, generally isolated, feral horse populations have been treated with high fractions of mares receiving PZP immunocontraception for long-term population control (e.g., Assateague Island and Pryor Mountains), no studies have tested for changes in immune competence in those areas. Relative to the large number of free-roaming feral horses in the western United States, immunocontraception has not been used in the type of widespread or prolonged manner that might be required to cause a detectable evolutionary response. Although this topic may merit further study, lack of clarity should not preclude the use of immunocontraceptives to help stabilize extremely rapidly growing herds.

Alternative B

Impacts from this alternative would be similar to the Proposed Action, however fertility control GonaCon™ would be applied. When gather efficiencies have been able to achieve horse numbers within the range of AML maintenance gathers to reapply fertility control and to remove adoptable wild horses would be conducted for the next 10 years following the date of the decision. All mares selected for release would be treated with a two-year GonaCon™ or similar vaccine and released back to the range.

GonaCon™ Contraception

The literature review is intended to summarize what is known and what is not known about potential effects of treating mares with GonaCon. As noted below, some negative consequences of vaccination are possible. Anti-GnRH vaccines can be administered to either sex, but this analysis is limited to effects on females, except where inferences can be made to females, based on studies that have used the vaccine in males.

The GonaCon immunocontraceptive vaccine has been shown to provide multiple years of infertility in several wild ungulate species including horses (Killian et al., 2008; Gray et al., 2010). GonaCon utilizes a gonadotropin-releasing hormone (GnRH) which is a small neuropeptide that performs an obligatory role in mammalian reproduction. When combined with an adjuvant, the GnRH vaccine stimulates a persistent immune response resulting in prolonged antibody production against GnRH, the carrier protein, and adjuvant (Miller et al., 2008). The most compelling hypothesis on the vaccine effectiveness suggests that antibodies to GnRH likely induce transient infertility by binding to endogenous GnRH, thus preventing attachment to receptors on gonadotropes and suppression of pulsatile luteinizing hormone (LH) secretion (Molenaaret al., 2010). As anti-GnRH antibodies decline over time, concentrations of available endogenous GnRH increase and treated animals usually regain fertility (Power et al., 2011). GonaCon™-Equine has been registered with the U.S. Environmental Protection Agency (EPA) since January 2013.

GonaCon-Equine vaccine meets most of the criteria that the National Research Council of the National Academy of Sciences (NRC 2013) used to identify the most promising fertility control methods, in terms of delivery method, availability, efficacy, and side effects. GonaCon-Equine is approved for use by authorized federal, state, tribal, public and private personnel, for application to wild and feral equids in the United States (EPA 2013, 2015). Its use is appropriate for free-ranging wild horse herds. Taking into consideration available literature on the subject, the National Research Council concluded in their 2013 report that GonaCon-B (which is produced under the trade name GonaCon-Equine for use in feral horses and burros) was one of the most preferable available methods for contraception in wild horses and burros (NRC 2013). GonaCon-Equine has been used on feral horses in Theodore Roosevelt National Park and on wild horses in one BLM-administered HMA (BLM 2015). GonaCon-Equine can be remotely administered in the field in cases where mares are relatively approachable, using a customized pneumatic dart (McCann et al. 2017). Use of remotely delivered (dart-delivered) vaccine is generally limited to populations where individual animals can be accurately identified and repeatedly approached within 50 m (BLM 2010).

As with other contraceptives applied to wild horses, the long-term goal of GonaCon-Equine use is to reduce or eliminate the need for gathers and removals (NRC 2013). GonaCon-Equine vaccine is an EPA-approved pesticide (EPA, 2009a) that is relatively inexpensive, meets BLM requirements for safety to mares and the environment, and is produced in a USDA-APHIS laboratory. Its categorization as a pesticide is consistent with regulatory framework for controlling overpopulated vertebrate animals, and in no way is meant to convey that the vaccine is lethal; the intended effect of the vaccine is as a contraceptive. GonaCon is produced as a pharmaceutical-grade vaccine, including aseptic manufacturing technique to deliver a sterile vaccine product (Miller et al. 2013). If stored at 4° C, the shelf life is 6 months (Miller et al 2013).

Miller et al. (2013) reviewed the vaccine environmental safety and toxicity. When advisories on the product label (EPA 2015) are followed, the product is safe for users and the environment (EPA 2009b). EPA waived a number of tests prior to registering the vaccine, because GonaCon was deemed to pose low risks to the environment, so long as the product label is followed (Wang-Chaill et al. 2017, *in press*).

Under the Proposed Action, the BLM would return to the HMA as needed to re-apply GonaCon-Equine and initiate new treatments in order to maintain contraceptive effectiveness in controlling population growth rates. GonaCon-Equine can safely be reapplied as necessary to control the population growth rate; booster dose effects may lead to increased effectiveness of contraception, which is generally the intent. Even with one booster treatment of GonaCon-Equine, it is expected that most, if not all, mares would return to fertility at some point, although the average duration of effect after booster doses has not yet been quantified. It is unknown what would be the expected rate for the return to fertility rate in mares boosted more than once with GonaCon-Equine. Once the herd size in the project area is at AML and population growth seems to be stabilized, BLM could make a determination as to the required frequency of new mare treatments and mare re-treatments with GonaCon, to maintain the number of horses within AML.

GnRH Vaccine Direct Effects

GonaCon-Equine is one of several vaccines that have been engineered to create an immune response to the gonadotropin releasing hormone peptide (GnRH). GnRH is a small peptide that plays an important role in signaling the production of other hormones involved in reproduction in both sexes. GnRH is highly conserved across mammalian taxa, so some inferences about the mechanism and effects of GonaCon-Equine in horses can be made from studies that used different anti-GnRH vaccines, in horses and other taxa. Other anti-GnRH vaccines include: Improvac (Imboden et al. 2006, Botha et al. 2008, Janett et al. 2009, Schulman et al. 2013, Dalmau et al. 2015), made in South Africa; Equity (Elhay et al. 2007), made in Australia; Improvest, for use in swine (Bohrer et al. 2014); Repro-BLOC (Boedeker et al. 2011); and Bopriva, for use in cows (Balet et al. 2014). Of these, GonaCon-Equine, Improvac, and Equity are specifically intended for horses. Other anti-GnRH vaccine formulations have also been tested, but did not become trademarked products (e.g., Goodloe 1991, Dalin et al 2002, Stout et al. 2003, Donovan et al. 2013). The effectiveness and side-effects of these various anti-GnRH vaccines may not be the same as would be expected from GonaCon-Equine use in horses. Results could differ as a result of differences in the preparation of the GnRH antigen, and the choice of adjuvant used to stimulate the immune response. While GonaCon-Equine can be administered as a single dose, most other anti-GnRH vaccines require a primer dose and at least one booster dose to be effective.

GonaCon has been produced by USDA-APHIS (Fort Collins, Colorado) in several different formulations, the history of which is reviewed by Miller et al. (2013). In any vaccine, the antigen is the stimulant to which the body responds by making antigen-specific antibodies. Those antibodies then signal to the body that a foreign molecule is present, initiating an immune response that removes the molecule or cell. GonaCon vaccines present the recipient with hundreds of copies of GnRH as peptides on the surface of a linked protein that is naturally antigenic because it comes from invertebrate hemocyanin (Miller et al 2013). Early GonaCon formulations linked many copies of GnRH to a protein from the keyhole limpet (GonaCon-KHL), but more recently produced formulations where the GnRH antigen is linked to a protein from the blue mussel (GonaCon-B) proved less expensive and more effective (Miller et al. 2008). GonaCon-Equine is in the category of GonaCon-B vaccines.

Adjuvants are included in vaccines to elevate the level of immune response, inciting recruitment of lymphocytes and other immune cells which foster a long-lasting immune response that is specific to the antigen. For some formulations of anti-GnRH vaccines, a booster dose is required to elicit at contraceptive response, though GonaCon can cause short-term contraception in a fraction of treated animals from one dose (Powers et al. 2011, Gionfriddo et al. 2011a, Baker et al. 2013, Miller et al 2013). The adjuvant used in GonaCon, Adjuvac, generally leads to a milder reaction than Freunds complete adjuvant (Powers et al. 2011). Adjuvac contains a small number of killed *Mycobacterium avium* cells (Miller et al. 2008, Miller et al. 2013). The antigen and adjuvant are emulsified in mineral oil, such that they are not all presented to the immune system right after injection; it is thought that the mineral oil emulsion leads to a depot effect and longer-lasting immune response (Miller et al. 2013). Miller et al. (2008, 2013) have speculated that, in cases where memory-B leukocytes are protected in immune complexes in the lymphatic system, it can lead to years of immune response. Increased doses of vaccine may lead to stronger immune reactions, but only to a certain point; when Yoder and Miller (2010) tested varying doses of GonaCon in prairie dogs, antibody responses to the 200µg and 400µg doses were equal to each other but were both higher than in response to a 100µg dose.

The most direct result of successful GnRH vaccination is that it has the effect of decreasing the level of GnRH signaling in the body, as evidenced by a drop in leutinizing hormone levels, and a cessation of ovulation. Antibody titer measurements are proximate measures of the antibody concentration in the blood specific to a given antigen. Anti-GnRH titers generally correlate with a suppressed reproduction system (Gionfriddo et al. 2011a, Powers et al. 2011). Various studies have attempted to identify a relationship between anti-GnRH titer levels and infertility, but that relationship has not been universally predictable or consistent. The time length that titer levels stay high appears to correlate with the length of suppressed reproduction (Dalin et al. 2002, Levy et al. 2011, Donovan et al. 2013, Powers et al. 2011). For example, Goodloe (1991) noted that mares did produce elevated titers and had suppressed follicular development for 11-13 weeks after treatment, but that all treated mares ovulated after the titer levels declined. Similarly, Elhay (2007) found that high initial titers correlated with longer-lasting ovarian and behavioral anoestrus. However, Powers et al. (2011) did not identify a threshold level of titer that was consistently indicative of suppressed reproduction despite seeing a strong correlation between antibody concentration and infertility, nor did Schulman et al. (2013) find a clear relationship between titer levels and mare acyclicity.

In many cases, young animals appear to have higher immune responses, and stronger contraceptive effects of anti-GnRH vaccines than older animals (Brown et al. 1994, Curtis et al. 2001, Stout et al. 2003, Schulman et al. 2013). Vaccinating with GonaCon at too young an age, though, may prevent effectiveness; Gionfriddo et al. (2011a) observed weak effects in 3-4 month old fawns. It has not been possible to predict which individuals of a given age class would have long-lasting immune responses to the GonaCon vaccine. Gray (2010) noted that mares in poor body condition tended to have lower contraceptive efficacy in response to GonaCon-B. Miller et al. (2013) suggested that higher parasite loads might have explained a lower immune response in free-roaming horses than had been observed in a captive trial. At this time it is unclear what the most important factors affecting efficacy are.

Females that are successfully contracepted by GnRH vaccination enter a state similar to anestrus, have a lack of or incomplete follicle maturation, and no ovarian cycling (Botha et al. 2008). A leading hypothesis is that anti-GnRH antibodies bind GnRH in the hypothalamus – pituitary 'portal vessels,' preventing GnRH from binding to GnRH-specific binding sites on gonadotroph cells in the pituitary, thereby limiting the production of gonadotropin hormones, particularly luteinizing hormone (LH) and, to a lesser degree, follicle-stimulating hormone (FSH) (Powers et al. 2011, NRC 2013). This reduction in LH (and FSH), and a corresponding lack of ovulation, has been measured in response to treatment with anti-GnRH vaccines (Boedeker et al. 2011, Garza et al. 1986).

Females successfully treated with anti-GnRH vaccines have reduced progesterone levels (Garza et al 1986, Stout et al. 2003, Imboden et al. 2006, Elhay 2007, Botha et al. 2008, Killian et al. 2008, Miller et al. 2008, Janett et al. 2009, Schulman et al. 2013, Balet et al 2014, Dalmau et al. 2015) and β-17 estradiol levels (Elhay et al. 2007), but no great decrease in estrogen levels (Balet et al. 2014). Reductions in progesterone do not occur immediately after the primer dose, but can take several weeks or months to develop (Elhay et al 2007, Botha et al. 2008, Schulman et al. 2013, Dalmau et al. 2015). This indicates that ovulation is not occurring and corpora lutea, formed from post-ovulation follicular tissue, are not being established.

Changes in hormones associated with anti-GnRH vaccination lead to measurable changes in ovarian structure and function. The volume of ovaries reduced in response to treatment (Garza et al. 1986, Dalin et al. 2002, Imboden et al. 2006, Elhay et al. 2007, Botha et al. 2008, Gionfriddo 2011a, Dalmau et al. 2015). Treatment with an anti-GnRH vaccine changes follicle development (Garza et al. 1986, Stout et al. 2003, Imboden et al. 2006, Elhay et al. 2007, Donovan et al. 2013, Powers et al. 2011, Balet et al 2014) , with the result that ovulation does not occur. A related result is that the ovaries can exhibit less activity and cycle with less regularity or not at all in anti-GnRH vaccine treated females (Goodloe 1991, Dalin et al. 2002, Imboden et al. 2006, Elhay et al. 2007, Janett et al. 2009, Donovan et al. 2013, Powers et al. 2011). In studies where the vaccine required a booster, hormonal and associated results were generally observed within several weeks after delivery of the booster dose.

GnRH Vaccine Contraceptive Effects

The NRC (2013) review pointed out that single doses of GonaCon-Equine do not lead to high rates of initial effectiveness, or long duration. Initial effectiveness of one dose of GonaCon-Equine vaccine appears to be lower than for a combined primer plus booster dose of the PZP vaccine Zonastat-H (Kirkpatrick et al. 2011), and the initial effect of a single GonaCon dose can be limited to as little as one breeding season. However, preliminary results on the effects of boostered doses of GonaCon-Equine indicate that it can have high efficacy and longer-lasting effects in free-roaming horses (Baker et al. 2017) than the one-year effect that is generally expected from a single booster of Zonastat-H.

GonaCon and other anti-GnRH vaccines can be injected while a female is pregnant (Miller et al. 2000, Powers et al. 2011, Baker et al. 2013) – in such a case, a successfully contracepted mare would be expected to give birth during the following foaling season, but to be infertile during the same year's breeding season. Thus, a mare injected in November of 2018 would not show the contraceptive effect (i.e., no new foal) until spring of 2020.

Too few studies have reported on the various formulations of anti-GnRH vaccines to make generalizations about differences between products, but GonaCon formulations were consistently good at causing loss of fertility in a statistically significant fraction of treated mares for at least one year (Killian et al. 2009, Gray et al. 2010, Baker et al. 2013, 2017). With few exceptions (e.g., Goodloe 1991), anti-GnRH treated mares gave birth to fewer foals in the first season when there would be an expected contraceptive effect (Botha et al. 2008, Killian et al. 2009, Gray et al. 2010, Baker et al. 2013). Goodloe (1991) used an anti-GnRH-KHL vaccine with a triple adjuvant, in some cases attempting to deliver the vaccine to horses with a hollow-tipped 'biobullet,'but concluded that the vaccine was not an effective immunocontraceptive in that study.

Not all mares should be expected to respond to the GonaCon-equine vaccine; some number should be expected to continue to become pregnant and give birth to foals. In studies where mares were exposed to stallions, the fraction of treated mares that are effectively contracepted in the year after anti-GnRH vaccination varied from study to study, ranging from ~50% (Baker et al. 2017), to 61% (Gray et al. 2010) to ~90% (Killian et al. 2006, 2008, 2009). Miller et al. (2013) noted lower effectiveness in free-ranging mares (Gray et al. 2010) than captive mares (Killian et al. 2009). Some of these rates are lower than the high rate of effectiveness typically reported for the first year after PZP vaccine treatment (Kirkpatrick et al. 2011). In the one study that tested for a difference, darts and hand-injected GonaCon doses were equally effective in terms of fertility outcome (McCann et al. 2017).

In studies where mares were not exposed to stallions, the duration of effectiveness also varied. A primer and booster dose of Equity led to anoestrus for at least 3 months (Elhay et al 2007). A primer and booster dose of Improvac also led to loss of ovarian cycling for all mares in the short term (Imboden et al. 2006). It is worth repeating that those vaccines do not have the same formulation as GonaCon.

Results from horses (Baker et al. 2017) and other species (Curtis et al. 2001) suggest that providing a booster dose of GonaCon-Equine would increase the fraction of temporarily infertile animals to higher levels than would a single vaccine dose alone.

Longer-term infertility has been observed in some mares treated with anti-GnRH vaccines, including GonaCon-Equine. In a single-dose mare captive trial with an initial year effectiveness of 94%, Killian et al. (2008) noted infertility rates of 64%, 57%, and 43% in treated mares during the following three years, while control mares in those years had infertility rates of 25%, 12%

and 0% in those years. GonaCon effectiveness in free-roaming populations was lower, with infertility rates consistently near 60% for three years after a single dose in one study (Gray et al. 2010) and annual infertility rates decreasing over time from 55% to 30% to 0% in another study with one dose (Baker et al. 2017). Similarly, gradually increasing fertility rates were observed after single dose treatment with GonaCon in elk (Powers et al. 2011) and deer (Gionfriddo et al. 2011a).

Baker et al. (2017) observed a return to fertility over 4 years in mares treated once with GonaCon, but then noted extremely low fertility rates of 0% and 16% in the two years after the same mares were given a booster dose four years after the primer dose. These are extremely promising preliminary results from that study in free-roaming horses; a third year of post-booster monitoring is ongoing in summer 2017, and researchers on that project are currently determining whether the same high-effectiveness, long-term response is observed after boosting with GonaCon after 6 months, 1 year, 2 years, or 4 years after the primer dose. Four of nine mares treated with primer and booster doses of Improvac did not return to ovulation within 2 years of the primer dose (Imboden et al. 2006), though one should probably not make conclusions about the long-term effects of GonaCon-Equine based on results from Improvac.

It is difficult to predict which females would exhibit strong or long-term immune responses to anti-GnRH vaccines (Killian et al. 2006, Miller et al. 2008, Levy et al. 2011). A number of factors may influence responses to vaccination, including age, body condition, nutrition, prior immune responses, and genetics (Cooper and Herbert 2001, Curtis et al. 2001, Powers et al. 2011). One apparent trend is that animals that are treated at a younger age, especially before puberty, may have stronger and longer-lasting responses (Brown et al. 1994, Curtis et al. 2001, Stout et al. 2003, Schulman et al. 2013). It is plausible that giving ConaGon-Equine to prepubertal mares would lead to long-lasting infertility, but that has not yet been tested.

To date, short term evaluation of anti-GnRH vaccines, show contraception appears to be temporary and reversible. Killian et al. noted long-term effects of GonaCon in some captive mares (2009). However, Baker et al. (2017) observed horses treated with GonaCon-B return to fertility after they were treated with a single primer dose; after four years, the fertility rate was indistinguishable between treated and control mares. It appears that a single dose of GonaCon results in reversible infertility but it is unknown if long term treatment would result in permanent infertility.

Other anti-GnRH vaccines also have had reversible effects in mares. Elhay (2007) noted a return to ovary functioning over the course of 34 weeks for 10 of 16 mares treated with Equity. That study ended at 34 weeks, so it is not clear when the other six mares would have returned to fertility. Donovan et al. (2013) found that half of mares treated with an anti-GnRH vaccine intended for dogs had returned to fertility after 40 weeks, at which point the study ended. In a study of mares treated with a primer and booster dose of Improvac, 47 of 51 treated mares had returned to ovarian cyclicity within 2 years; younger mares appeared to have longer-lasting effects than older mares (Schulman et al. 2013). In a small study with a non-commercial anti-GnRH vaccine (Stout et al. 2003), three of seven treated mares had returned to cyclicity within 8 weeks after delivery of the primer dose, while four others were still suppressed for 12 or more weeks. In elk, Powers et al. (2011) noted that contraception after one dose of GonaCon was reversible. In white-tailed deer, single doses of GonaCon appeared to confer two years of contraception (Miller et al. 2000). Ten of 30 domestic cows treated became pregnant within 30 weeks after the first dose of Bopriva (Balet et al. 2014).

Permanent sterility as a result of single-dose or boostered GonaCon-Equine vaccine, or other anti-GnRH vaccines, has not been recorded, but that may be because no long-term studies have tested for that effect. It is conceivable that some fraction of mares could become sterile after receiving one or more booster doses of GonaCon-Equine, but the rate at which that could be expected to occur is currently unknown. If some fraction of mares treated with GonaCon-Equine were to become sterile, though, that result would consistent with text of the WFRHBA of 1971, as amended, which allows for sterilization to achieve population goals.

In summary, based on the above results related to fertility effects of GonaCon and other anti-GnRH vaccines, application of a single dose of GonaCon-Equine to gathered or remotely-darted wild horses could be expected to prevent pregnancy in perhaps 30%-60% of mares for one year. Some smaller number of wild mares should be expected to have persistent contraception for a second year, and less still for a third year. Applying one booster dose of GonaCon to previously-treated mares should lead to two or more years with relatively high rates (80+%) of additional infertility expected, with the potential that some as-yet-unknown fraction of boostered mares may be infertile for several to many years. There is no data to support speculation regarding efficacy of multiple boosters of GonaCon-Equine; however, given it is formulated as a highly immunogenic long-lasting vaccine, it is reasonable to hypothesize that additional boosters would increase the effectiveness and duration of the vaccine.

GonaCon-Equine only affects the fertility of treated animals; untreated animals would still be expected to give birth. Even under favorable circumstances for population growth suppression, gather efficiency might not exceed 85% via helicopter, and may be less with bait and water trapping. Similarly, not all animals may be approachable for darting. The uncaptured or undarted portion of the female population would still be expected to have normally high fertility rates in any given year, though those rates could go up slightly if contraception in other mares increases forage and water availability.

GnRH Vaccine Effects on Other Organ Systems

BLM requires individually identifiable marks for immunocontraceptive treatment; this may require handling and marking. Mares receiving any vaccine as part of a gather operation would experience slightly increased stress levels associated with handling while being vaccinated and freeze-marked, and potentially microchipped. Newly captured mares that do not have markings associated with previous fertility control treatments would be marked with a new freeze-mark for the purpose of identifying that mare, and identifying her vaccine treatment history. This information would also be used to determine the number of mares captured that were not previously treated, and could provide additional insight regarding gather efficiency, and the timing of treatments required into the future. Most mares recover from the stress of capture and handling quickly once released back to the HMA, and none are expected to suffer serious long term effects from the fertility control injections, other than the direct consequence of becoming temporarily infertile.

Injection site reactions associated with immunocontraceptive treatments are possible in treated mares (Roelle and Ransom 2009). Whether injection is by hand or via darting, GonaCon-Equine is associated with some degree of inflammation, swelling, and the potential for abscesses at the injection site (Baker et al. 2013). Swelling or local reactions at the injection site are generally expected to be minor in nature, but some may develop into draining abscesses. When PZP vaccine was delivered via dart it led to more severe swelling and injection site reactions (Roelle and Ransom 2009), but that was not observed with dart-delivered GonaCon (McCann et al. 2017). Mares treated with one formulation of GnRH-KHL vaccine developed pyogenic abscesses (Goodloe 1991). Miller et al. (2008) noted that the water and oil emulsion in GonaCon would often cause cysts, granulomas, or sterile abscesses at injection sites; in some cases, a sterile abscess may develop into a draining abscess. In elk treated with GonaCon, Powers et al. (2011) noted up to 35% of treated elk had an abscess form, despite the injection sites first being clipped and swabbed with alcohol. Even in studies where swelling and visible abscesses followed GonaCon immunization, the longer term nodules observed did not appear to change any animal's range of movement or locomotor patterns (Powers et al. 2013, Baker et al. 2017).

The result that other formulations of anti-GnRH vaccine may be associated with less notable injection site reactions in horses may indicate that the adjuvant formulation in GonaCon leads a single dose to cause a stronger immune reaction than the adjuvants used in other anti-GnRH vaccines. Despite that, a booster dose of GonaCon-Equine appears to be more effective than a primer dose alone (Baker et al. 2017). Horses injected in the hip with Improvac showed only transient reactions that disappeared within 6 days in one study (Botha et al. 2008), but stiffness and swelling that lasted 5 days were noted in another study where horses received Improvac in the neck (Imboden et al. 2006). Equity led to transient reactions that resolved within a week in some treated animals (Elhay et al. 2007). Donovan et al. noted no reactions to the canine anti-GnRH vaccine (2013). In cows treated with Bopriva there was a mildly elevated body temperature and mild swelling at injection sites that subsided within 2 weeks (Balet et al. 2014).

Several studies have monitored animal health after immunization against GnRH. GonaCon treated mares did not have any measurable difference in uterine edema (Killian 2006, 2008). Powers et al. (2011, 2013) noted no differences in blood chemistry except a mildly elevated fibrinogen level in some GonaCon treated elk. In that study, one sham-treated elk and one GonaCon treated elk each developed leukocytosis, suggesting that there may have been a causal link between the adjuvant and the effect. Curtis et al. (2008) found persistent granulomas at GonaCon-KHL injection sites three years after injection, and reduced ovary weights in treated females. Yoder and Miller (2010) found no difference in blood chemistry between GonaCon treated and control prairie dogs. One of 15 GonaCon treated cats died without explanation, and with no determination about cause of death possible based on necropsy or histology (Levy et al. 2011). Other anti-GnRH vaccine formulations have led to no detectable adverse effects (in elephants; Boedeker et al. 2011), though Imboden et al. (2006) speculated that young treated animals might conceivably have impaired hypothamic or pituitary function.

Kirkpatrick et al. (2011) raised concerns that anti-GnRH vaccines could lead to adverse effects in other organ systems outside the reproductive system. GnRH receptors have been identified in tissues outside of the pituitary system, including in the testes and placenta (Khodr and Siler-

Khodr 1980), ovary (Hsueh and Erickson 1979), bladder (Coit et al. 2009), heart (Dong et al. 2011), and central nervous system, so it is plausible that reductions in circulating GnRH levels could inhibit physiological processes in those organ systems. Kirkpatrick et al. (2011) noted elevated cardiological risks to human patients taking GnRH agonists (such as leuprolide), but the National Academy of Sciences (2013) concluded that the mechanism and results of GnRH agonists would be expected to be different from that of anti-GnRH antibodies; the former flood GnRH receptors, while the latter deprive receptors of GnRH.

GnRH Vaccine Effects on Fetus and Foal

GonaCon had no apparent effect on pregnancies in progress, foaling success, or the health of offspring, in horses that were immunized in October (Baker et al. 2013), elk immunized 80-100 days into gestation (Powers et al. 2011, 2013), or deer immunizeed in February (Miller et al. 2000). Kirkpatrick et al. (2011) noted that anti-GnRH immunization is not expected to cause hormonal changes that would lead to abortion in the horse, but this may not be true for the first 6 weeks of pregnancy (NRC 2013). Curtis et al. (2011) noted that GonaCon-KHL treated white tailed deer had lower twinning rates than controls, but speculated that the difference could be due to poorer sperm quality late in the breeding season, when the treated does did become pregnant. Goodloe (1991) found no difference in foal production between treated and control animals.

Offspring of anti-GnRH vaccine treated mothers could exhibit an immune response to GnRH (Khodr and Siler-Khodr 1980), as antibodies from the mother could pass to the offspring through the placenta or colostrum. In the most extensive study of long-term effects of GonaCon immunization on offspring, Powers et al. (2012) monitored 15 elk fawns born to GonaCon treated cows. Of those, 5 had low titers at birth and 10 had high titer levels at birth. All 15 were of normal weight at birth, and developed normal endocrine profiles, hypothalamic GnRH content, pituitary gonadotropin content, gonad structure, and gametogenesis. All the females became pregnant in their second reproductive season, as is typical. All males showed normal development of secondary sexual characteristics. Powers et al. (2012) concluded that suppressing GnRH in the neonatal period did not alter long-term reproductive function in either male or female offspring. Miller et al. (2013) report elevated anti-GnRH antibody titers in fawns born to treated white tailed deer, but those dropped to normal levels in 11 of 12 of those fawns, which came into breeding condition; the remaining fawn was infertile for three years.

Direct effects on foal survival are equivocal in the literature. Goodloe (1991), reported lower foal survival for a small sample of foals born to anti-GnRH treated mares, but she did not assess other possible explanatory factors such as mare social status, age, body condition, or habitat in her analysis (NRC 2013). Gray et al. (2010) found no difference in foal survival in foals born to free-roaming mares treated with GonaCon.

There is little empirical information available to evaluate the effects of GnRH vaccination on foaling phenology. It is possible that immunocontracepted mares returning to fertility late in the breeding season could give birth to foals at a time that is out of the normal range (Nuñez et al. 2010, Ransom et al 2013). Curtis et al. (2001) did observe a slightly later fawning date for GonaCon treated deer in the second year after treatment, when some does regained fertility late in the breeding season. In anti-GnRH vaccine trials in free-roaming horses, there were no published differences in mean date of foal production (Goodloe 1991, Gray et al. 2010). Unpublished results from an ongoing study of GonaCon treated free-roaming mares indicate that some degree of aseasonal foaling is possible (D. Baker, Colorado State University, personal communication to Paul Griffin, BLM WH&B Research Coordinator). Because of the concern that contraception could lead to shifts in the timing of parturitions for some treated animals, Ransom et al. (2013) advised that managers should consider carefully before using PZP immunocontraception in small refugia or rare species. The same may also apply to GonaCon. It should be noted that wild horses and burros in most areas do not generally occur in isolated refugia, they are not a rare species at the regional, national, or international level, and genetically they represent descendants of domestic livestock with most populations containing few if any unique alleles (NAS 2013). Moreover, in PZP-treated horses that did have some degree of parturition date shift, Ransom et al. (2013) found no negative impacts on foal survival even with an extended birthing season. If there were to be a shift in foaling date for some treated mares, the effect on foal survival may depend on weather severity and local conditions; for example, Ransom et al. (2013) did not find consistent effects across study sites.

Indirect Effects of GnRH Vaccination

One expected long-term, indirect effect on wild horses treated with fertility control would be an improvement in their overall health. Many treated mares would not experience the biological stress of reproduction, foaling and lactation as frequently as untreated mares, and their better health is expected to be reflected in higher body condition scores. After a treated mare returns to fertility, her future foals would be expected to be healthier overall, and would benefit from improved nutritional quality in the mares' milk. This is particularly to be expected if there is an improvement in rangeland forage quality at the same time, due to reduced wild horse population size. Past application of fertility control has shown that mares' overall health and body condition can remain improved even after fertility resumes. Anecdotal, subjective observations of mares treated with a different immunocontraceptive, PZP, in past gathers showed that many of the treated mares were larger, maintained better body condition, and had larger healthy foals than untreated mares.

Body condition of anti-GnRH-treated females was equal to or better than that of control females in published studies. Ransom et al. (2014) observed no difference in mean body condition between GonaCon-B treated mares and controls. Goodloe (1991) found that GnRH-KHL treated mares had higher survival rates than untreated controls. In other species, treated cats gained more weight than controls (Levy et al. 2011), as did treated young female pigs (Bohrer et al. 2014).

Following resumption of fertility, the proportion of mares that conceive and foal could be increased due to their increased fitness; this has been called by some a 'rebound effect.' Elevated fertility rates have been observed after horse gathers and removals (Kirkpatrick and Turner 1991). More research is needed to document and quantify these hypothesized effects. If repeated contraceptive treatment leads to a prolonged contraceptive effect, then that may minimize or delay the hypothesized rebound effect.

Because successful fertility control would reduce foaling rates and population growth rates, another indirect effect would be to reduce the number of wild horses that have to be removed over time to achieve and maintain the established AML. Contraception would be expected to lead to a relative increase in the proportion of older animals in the herd. Reducing the numbers of wild horses that would have to be removed in future gathers could allow for removal of younger, more easily adoptable excess wild horses, and thereby could eliminate the need to send additional excess horses from this area to off-range holding corrals or pastures for long-term holding. Among mares in the herd that remain fertile, a high level of physical health and future reproductive success of fertile mares within the herd would be expected as reduced population sizes should lead to more availability of water and forage resources per capita.

Reduced population growth rates and smaller population sizes could also allow for continued and increased environmental improvements to range conditions within the project area, which would have long-term benefits to wild horse habitat quality. As the local horse abundance nears or is maintained at the level necessary to achieve a thriving natural ecological balance, vegetation resources would be expected to recover, improving the forage available to wild horses and wildlife throughout the HMA or HMAs. With rangeland conditions more closely approaching a thriving natural ecological balance, and with a less concentrated distribution of wild horses across the HMA, there should also be less trailing and concentrated use of water sources. Lower population density would be expected to lead to reduced competition among wild horses using the water sources, and less fighting among horses accessing water sources. Water quality and quantity would continue to improve to the benefit of all rangeland users including wild horses. Wild horses would also have to travel less distance back and forth between water and desirable foraging areas. Should GonaCon-Equine treatment, including booster doses, continue into the future, with treatments given on a schedule to maintain a lowered level of fertility in the herd, the chronic cycle of overpopulation and large gathers and removals might no longer occur, but instead a consistent abundance of wild horses could be maintained, resulting in continued improvement of overall habitat conditions and animal health. While it is conceivable that widespread and continued treatment with GonaCon-Equine could reduce the birth rates of the population to such a point that birth is consistently below mortality, that outcome is not likely unless a very high fraction of the mares present are all treated with primer and booster doses, and perhaps repeated booster doses.

Behavioral Effects of GnRH Vaccination

Behavioral differences should be considered as potential consequences of contraception with GonaCon. The NRC report (2013) noted that all successful fertility suppression has effects on mare behavior, mostly as a result of the lack of pregnancy and foaling, and concluded that GonaCon was a good choice for use in the program. The result that GonaCon treated mares may have suppressed estrous cycles throughout the breeding season can lead treated mares to behave in ways that are functionally similar to pregnant mares.

While successful in mares, GonaCon and other anti-GnRH vaccines are expected to induce fewer estrous cycles when compared to non-pregnant control mares. This has been observed in many studies (Garza et al. 1986, Curtis et al. 2001, Dalin et al. 2002, Killian et al. 2006, Dalmau et al. 2015). In contrast, PZP vaccine is generally expected to lead mares to have more estrous cycles per breeding season, as they continue to be receptive to mating while not pregnant. Females treated with GonaCon had less estrous cycles than control or PZP-treated mares (Killian et al.

2006) or deer (Curtis et al. 2001). Thus, concerns about PZP treated mares receiving more courting and breeding behaviors from stallions (Nuñez et al. 2009, Ransom et al. 2010) are not generally expected to be a concern for mares treated with anti-GnRH vaccines (Botha et al. 2008).

Ransom et al. (2014) found that GonaCon treated mares had similar rates of reproductive behaviors that were similar to those of pregnant mares. Among other potential causes, the reduction in progesterone levels in treated females may lead to a reduction in behaviors associated with reproduction. Despite this, some females treated with GonaCon or other anti-GnRH vaccines did continue to exhibit reproductive behaviors, albeit at irregular intervals and durations (Dalin et al. 2002, Stout et al. 2003, Imboden et al. 2006), which is a result that is similar to spayed (ovariectomized) mares (Asa et al. 1980). Gray et al. (2009) found no difference in sexual behaviors in mares treated with GonaCon and untreated mares. When progesterone levels are low, small changes in estradiol concentration can foster reproductive estrous behaviors (Imboden et al. 2006). Owners of anti-GnRH vaccine treated mares reported a reduced number of estrous-related behaviors under saddle (Donovan et al. 2013). Treated mares may refrain from reproductive behavior even after ovaries return to cyclicity (Elhay et al. 2007). Studies in elk found that GonaCon treated cows had equal levels of precopulatory behaviors as controls (Powers et al. 2011), though bull elk paid more attention to treated cows late in the breeding season, after control cows were already pregnant (Powers et al. 2011).

Stallion herding of mares, and harem switching by mares are two behaviors related to reproduction that might change as a result of contraception. Ransom et al. (2014) observed a 50% decrease in herding behavior by stallions after the free-roaming horse population at Theodore Roosevelt National Park was reduced via a gather, and mares there were treated with GonaCon-B. The increased harem tending behaviors by stallions were directed to both treated and control mores. It is difficult to separate any effect of GonaCon from changes in horse density and forage following horse removals.

Mares in untreated free-roaming populations change bands; some have raised concerns over effects of PZP vaccination on band structure (Nuñez et al. 2009), with rates of band fidelity being suggested as a measure of social stability. With respect to treatment with GonaCon or other anti-GnRH vaccines, it is probably less likely that treated mares would switch harems at higher rates than untreated animals, because treated mares are similar to pregnant mares in their behaviors (Ransom et al. 2014). Indeed, Gray et al. (2009) found no difference in band fidelity in a free-roaming population of horses with GonaCon treated mares, despite differences in foal production between treated and untreated mares. Ransom et al. (2014) actually found increased levels of band fidelity after treatment, though this may have been partially a result of changes in overall horse density and forage availability.

Even in cases where there may be changes in band fidelity, the National Research Council (2013) found that harem changing was not likely to result in serious adverse effects for treated mares:

> "The studies on Shackleford Banks (Nuñez et al., 2009; Madosky et al., 2010) suggest that there is an interaction between pregnancy and social cohesion. The importance of harem stability to mare well-being is not clear, but considering the relatively large

> number of free-ranging mares that have been treated with liquid PZP in a variety of ecological settings, the likelihood of serious adverse effects seem low."

Kirkpatrick et al. (2010) concluded that "the larger question is, even if subtle alterations in behavior may occur, this is still far better than the alternative."

The NRC (2013) provides a comprehensive review of the literature on the behavioral effects of contraception that puts Nuñez's (2009, 2010) research into the broader context of all of the available scientific literature, and cautions, based on its extensive review of the literature that:

> ". . . in no case can the committee conclude from the published research that the behavior differences observed are due to a particular compound rather than to the fact that treated animals had no offspring during the study. That must be borne in mind particularly in interpreting long-term impacts of contraception (e.g., repeated years of reproductive "failure" due to contraception)."

Gray et al. (2009) and Ransom et al. (2014) monitored non-reproductive behaviors in GonaCon treated populations of free-roaming horses. Gray et al. (2009) found no difference between treated and untreated mares in terms of activity budget, sexual behavior, proximity of mares to stallions, or aggression. Ransom et al. (2014) found only minimal differences between treated and untreated mare time budgets, but those differences were consistent with differences in the metabolic demands of pregnancy and lactation in untreated mares, as opposed to non-pregnant treated mares.

Genetic Effects of GnRH Vaccination

In HMAs where large numbers of wild horses have recent and / or an ongoing influx of breeding animals from other areas with wild or feral horses, contraception is not expected to cause an unacceptable loss of genetic diversity or an unacceptable increase in the inbreeding coefficient. In any diploid population, the loss of genetic diversity through inbreeding or drift can be prevented by large effective breeding population sizes (Wright 1931) or by introducing new potential breeding animals (Mills and Allendorf 1996). The NRC report recommended that managed herds of wild horses would be better viewed as components of interacting metapopulations, with the potential for interchange of individuals and genes taking place as a result of both natural and human-facilitated movements. In the last 10 years, there has been a high realized growth rate of wild horses in most areas administered by the BLM, such that most alleles that are present in any given mare are likely to already be well represented in her siblings, cousins, and more distant relatives. With the exception of horses in a small number of well-known HMAs that contain a relatively high fraction of alleles associated with old Spanish horse breeds (NRC 2013), the genetic composition of wild horses in lands administered by the BLM is consistent with admixtures from domestic breeds. As a result, in most HMAs, applying fertility control to a subset of mares is not expected to cause irreparable loss of genetic diversity. Improved longevity and an aging population are expected results of contraceptive treatment that can provide for lengthening generation time; this result would be expected to slow the rate of genetic diversity loss (Hailer et al., 2006). Based on a population model, Gross (2000) found that an effective way to retain genetic diversity in a population treated with fertility control is to preferentially treat young animals, such that the older animals (which contain all the existing genetic diversity available) continue to have offspring. Conversely, Gross (2000) found that preferentially treating older animals (preferentially allowing young animals to breed) leads to a more rapid expected loss of genetic diversity over time.

Even if it is the case that booster treatment with GonaCon may lead to prolonged infertility, or even sterility in some mares, most HMAs have only a low risk of loss of genetic diversity if logistically realistic rates of contraception are applied to mares. Wild horses in most herd management areas are descendants of a diverse range of ancestors coming from many breeds of domestic horses. As such, the existing genetic diversity in the majority of HMAs does not contain genetic markers that have been identified as unique or historically unusual (NRC 2013). Past interchange between HMAs, either through natural dispersal or through assisted migration (i.e. human movement of horses) means that many HMAs are effectively indistinguishable and interchangeable in terms of their genetic composition. Roelle and Oyler-McCance (2015) used the VORTEX population model to simulate how different rates of mare sterility would influence population persistence and genetic diversity, in populations with high or low starting levels of genetic diversity, various starting population sizes, and various annual population growth rates. Their results show that the risk of the loss of genetic heterozygosity is extremely low except in cases where all four of the following conditions are met: starting levels of genetic diversity are low, initial population size is 100 or less, intrinsic population growth rate is low (5% per year), and very large fractions of the female population are permanently sterilized.

Many factors influence the strength of a vaccinated individual's immune response, potentially including genetics, but also nutrition, body condition, and prior immune responses to pathogens or other antigens (Powers et al 2013). One concern that has been raised with regards to genetic diversity is that treatment with immunocontraceptives could possibly lead to an evolutionary increase in the frequency of individuals whose genetic composition fosters weak immune responses (Cooper and Larson 2006, Ransom et al. 2014a). This premise is based on an assumption that lack of response to PZP is a heritable trait, and that the frequency of that trait would increase over time in a population of PZP-treated animals. Cooper and Herbert (2001) reviewed the topic, in the context of concerns about the long-term effectiveness of immunocontraceptives as a control agent for exotic species in Australia. They argue that imunocontraception could be a strong selective pressure, and that selecting for reproduction in individuals with poor immune response could lead to a general decline in immune function in populations where such evolution takes place. Other authors have also speculated that differences in antibody titer responses could be partially due to genetic differences between animals (Curtis et al. 2001, Herbert and Trigg 2005).

BLM is not aware of any studies that have quantified the heritability of a lack of response to immunocontraception such as PZP vaccine or GonaCon-Equine in horses. At this point there are no studies available from which one could make conclusions about the long-term effects of sustained and widespread immunocontraception treatments on population-wide immune function. Although a few, generally isolated, feral horse populations have been treated with high fractions of mares receiving PZP immunocontraception for long-term population control (e.g., Assateague Island and Pryor Mountains), no studies have tested for changes in immune competence in those areas. Relative to the large number of free-roaming feral horses in the western United States, immunocontraception has not been used in the type of widespread or prolonged manner that might be required to cause a detectable evolutionary response at a large scale.

Magiafolou et al. (2013) clarify that if the variation in immune response is due to environmental factors (i.e., body condition, social rank) and not due to genetic factors, then there would be no expected effect of the immune phenotype on future generations. Correlations between immune response and physical factors such as age and body condition have been documented; it remains untested whether or not those factors play a larger role in determining immune response to immunocontraceptives than heritable traits. Several studies discussed above noted a relationship between the strength of individuals' immune responses after treatment with GonaCon or other anti-GnRH vaccines, and factors related to body condition. For example, age at immunization was a primary factor associated with different measures of immune response, with young animals tending to have stronger and longer-lasting responses (Stout et al. 2003, Schulman et al. 2013). It is also possible that general health, as measured by body condition, can have a causal role in determining immune response, with animals in poor condition demonstrating poor immune reactions (Gray 2009, NRC 2013). Miller et al. (2013) speculated that animals with high parasite loads also may have weaker immune reactions to GonaCon.

Correlations between such physical factors and immune response would not preclude, though, that there could also be a heritable response to immunocontraception. In studies not directly related to immunocontraception, immune response has been shown to be heritable (Kean et al. 1994, Sarker et al. 1999). Unfortunately, predictions about the long-term, population-level evolutionary response to immunocontraceptive treatments are speculative at this point, with results likely to depend on several factors, including: the strength of the genetic predisposition to not respond to GonaCon-Equine; the heritability of that gene or genes; the initial prevalence of that gene or genes; the number of mares treated with a primer dose of GonaCon-Equine (which generally has a short-acting effect, if any); the number of mares treated with a booster dose of GonaCon-Equine; and the actual size of the genetically-interacting metapopulation of horses within which the GonaCon treatment takes place.

Alternative C

Gather and Remove Excess Animals to within AML range without Fertility Control. Impacts from this alternative would be similar to the gathering and handling impacts under Proposed Action, however there would be no horses released or fertility control administered to release horses. While wild horses would be gathered to the within the low range of AML, the AML would be exceeded sooner than under the Proposed Action or Alternative B since fertility rates would be higher.

No Action Alternative

Under the No Action Alternative, a gather to remove excess wild horses would not occur. There would be no active management to control the size of the wild horse population or to bring the wild horse population to AML as required to ensure a thriving natural ecological balance. The current wild horse population would continue to increase as wild horse populations grow at an average rate of 20-25% per year. In two years, the wild horse population would exceed 2908 head which is eight times over the upper range of AML. The number of areas experiencing severe utilization by wild horses would increase over time. This would be expected to result in increasing damage to rangeland resources throughout the Eagle Complex. Trampling and trailing damage by wild horses in/around riparian areas would also be expected to increase, resulting in larger, more extensive areas of bare ground. Competition for the available water and forage between wild horses, domestic livestock, and native wildlife would increase.

Wild horses are a long-lived species with documented survival rates exceeding 92% for all age classes and do not have the ability to self-regulate their population size. Predation and disease have not substantially regulated wild horse population levels within or outside the Eagle Complex. Some mountain lion predation occurs, but does not appear to be substantial. Coyote are not prone to prey on wild horses unless young, or extremely weak. Other predators such as wolf or bear do not exist. As a result, there would be a steady increase in wild horse numbers for the foreseeable future, which would continue to exceed the carrying capacity of the range. Individual horses would be at greater risk of death by starvation and lack of water. The population of wild horses would compete for the available water and forage resources, affecting mares and foals most severely. Social stress would increase. Fighting among stud horses would increase as they protect their position at scarce water sources, as well as injuries and death to all age classes of animals. Significant loss of the wild horses in the complex due to starvation or lack of water would have obvious consequences to the long-term viability of the herd. Continued decline of rangeland health and irreparable damage to vegetative, soil and riparian resources, would have obvious detrimental impacts to the future of the complex and all other users of the resources, which depend upon them for survival. As a result, the No Action Alternative would not ensure healthy rangelands, would not allow for the management of a healthy, self-sustaining wild horse population, and would not promote a thriving natural ecological balance.

As populations continue to increase beyond the capacity of the available habitat, even more bands of horses would leave the boundaries of the complex in search of forage and water. This alternative would result in increasing numbers of wild horses in areas not designated for their use, would be contrary to the Wild Free-Roaming Horse and Burro Act and would not achieve the stated objectives for wild horse herd management areas, to “prevent the range from deterioration associated with overpopulation”, and “preserve and maintain a thriving natural ecological balance and multiple use relationship in that area”.

Recent monitoring data shows rangeland deterioration resulting from the current population of wild horses beyond the appropriate management level. BLM has therefore determined that excess wild horses are present in the Eagle Complex and that wild horses that have moved outside of the complex boundaries pose a public safety concern. Given this excess determination, the No Action Alternative would not be in conformance with existing laws and regulations which require the authorized officer to remove excess animals immediately upon determination that excess wild horses are present and their removal is necessary.

3.3.2 Wetlands/Riparian Zones

Affected Environment

Riparian areas at high elevations support cottonwood and aspen woodlands. Small riparian areas and their associated plant species occur throughout the HMAs near seeps, springs, and along sections of perennial drainages. Many of these areas support limited riparian habitat (forage) and water flows. At the present time, wild horse use of the majority of these areas is averaging heavy to severe use. Trampling and trailing damage by wild horses is evident at most locations; soil compaction and surface and rill erosion is evident. The current overpopulation of wild horses is resulting in resource damage and preventing recovery of key sites. Most spring sources within the complex are Functioning at Risk with a Downward Trend and wild horses are a contributing factor to this decline.

Environmental Effects

Proposed Action

To avoid the direct impacts potentially associated with the gather operation, temporary trap sites and holding/processing facilities would not be located within riparian areas.

Managing the wild horse populations within the established AMLs over the next 10 years would be expected to initiate recovery of damaged riparian habitats. The amount of trampling/trailing would be reduced. Utilization of the available forage within the riparian areas would also be reduced to within allowable levels. Over the longer-term, continued management of wild horses within the established AMLs would be expected to result in healthier, more vigorous vegetative communities. Hoof action on the soil around unimproved springs and stream banks would be lessened which should lead to increased stream bank stability and decreased compaction and erosion. Improved vegetation around riparian areas would dissipate stream energy associated with high flows, and filter sediment, resulting in associated improvements in water quality. The Proposed Action would make progress towards achieving and maintaining proper functioning condition at riparian areas. There would also be reduced competition among wildlife, wild horses, and domestic livestock for the available water.

Alternative B

Impacts from this alternative would be similar to the Proposed Action.

Alternative C

Impacts from this alternative would be similar to the Proposed Action. AMLs would be achieved as a result of the gather, but wild horse populations may exceed the high end of AML sooner than under the proposed action. When wild horse numbers reach the high range of AML or are exceeded, damage to riparian areas may be more evident.

No Action Alternative

Wild horse populations would continue to grow. Increased wild horse use throughout the complex would continue to adversely impact riparian resources. Over the longer-term, as native plant health continues to deteriorate and plants are lost, soil erosion would increase. An opportunity to make progress toward achieving and maintaining properly functioning condition riparian areas would be foregone as ever increasing numbers of wild horses continue to trample and degrade riparian areas, springs and other water sources.

3.3.3 Soil Conditions

Affected Environment

Project implementation would stay on existing roads, washes and horse trail areas, and disturbed areas used for gathering and holding operations.

Environmental Impacts

Proposed Action - Horses may be concentrated for a limited period of time in trap. Potential for soil compaction would occur but would be minimal and temporary are not expected to adversely impact soil or hydrologic function. Long term impacts may improve area due to less soil compaction from trailing.

Alternative B **–** Impacts would be the same as described for the Proposed Action.

Alternative C **–** Impacts would be the same as in the proposed action; however, improved soils conditions within the complex may not last as long because wild horse populations may exceed the high end of AMLs more quickly than under the proposed action.

No Action Alternative- Soils/ watersheds would continue to have horse use and as horse populations increase heavy trailing and trampling around water sources would occur. Watershed objectives would not be met due to increased horse populations over time.

3.3.4 Special Status Animal Species (Sage grouse, pygmy rabbit)

Affected Environment

Several BLM sensitive animal species are found within the complex including several species of bats, raptors, and other birds.

The sage grouse is a high-profile sensitive species that has been determined by the U.S. Fish and Wildlife Service to be warranted for listing but precluded due to higher priority species, and therefore considered a candidate species. Sage grouse use the majority of the Eagle HMA and portions of the Chokecherry HMA throughout the year for all of their seasonal habitat needs. These habitat needs include breeding (i.e., strutting grounds or leks), nesting and early brood-rearing, late brood-rearing or summer, and winter. Sage grouse require a herbaceous understory of forbs and grass to provide nest concealment, as well as provide a diet of forbs and insects for sage grouse and their chicks. Riparian areas are frequently used by sage grouse for late brood-rearing habitat. The Eagle HMA is located within the Lincoln population management unit (PMU) identified in the local sage grouse conservation plan. There are 16 known sage grouse leks within the Eagle HMA, and 5 within or adjacent to the Chokecherry HMA. At least 9 of the leks have been active within the past 5 years.

There is potential pygmy rabbit habitat within the Eagle HMA and documented sightings within the Chokecherry HMA. Pygmy rabbits predominately inhabit tall sagebrush with deep friable soils for burrowing.

Environmental Impacts

Proposed Action – Individual raptors and birds may be disturbed during gather operations when the helicopter flies overhead looking for horses. Once the helicopter is gone these birds should return to normal activities. Because trap sites and holding corrals would not be located where sensitive animal and plant species are known to occur, there would be no impact from the placement of and activities at these facilities. Nor would there be any impacts to populations of special status species as a result of gather operations.

Removing excess wild horses from the Eagle complex and managing wild horses within AMLs would result in improved habitat conditions for all special status animal species by increasing herbaceous vegetative cover in the uplands and improving riparian vegetation and water quality springs and seeps, thereby improving the habitat on which they depend. Sensitive plant species would be less likely to be grazed or trampled with the removal of excess wild horses. Additionally, gather sites would not be located within sensitive plant species populations.

Alternative B – Impacts would be the same as in the proposed action.

Alternative C– Impacts would be the same as in the proposed action; however, improved habitat conditions for all special status animal species may not last as long because wild horse populations may exceed the high end of AMLs more quickly than under the proposed action.

No Action Alternative – Individual animals would not be disturbed or displaced because gather operations would not occur under the no action alternative. However, habitat conditions for all special status animal species would continue to deteriorate as wild horse numbers above the established AMLs further reduce herbaceous vegetative cover and trample riparian areas, springs and stream banks. Sensitive plant species would be more likely to be grazed and trampled under the no action alternative because there would be more wild horses in the HMAs.

3.3.5 Livestock Grazing

Affected Environment

The Eagle HMA includes portions of several livestock grazing allotments (see Appendix IV – Allotment Map). Permitted livestock grazing use in the HMA includes both cattle and sheep grazing during all seasons of the year (Table 3.2).

Table 3.2 Eagle Herd Management Area Grazing Allotments

Allotment	Season of Use	Kind of Livestock	Total Acres	% of Allotment Within HMA	Ten Year Average AUM Use	Percent of Permit Use

Wilson Creek	Cattle and Sheep: 3/1 to 2/28	Cattle	1,090,414	47%	20,408	45%
Deer Lodge	3/1 to 2/28	Cattle	7,345	100%	95	57%
N4/N5	3/1 to 2/28	Cattle	41,572	29%	21	3%
Rabbit Spring	6/1 to 3/15	Cattle	20,766	23%	22	3%
McGuffy	3/1 to 2/28	Cattle	22,180	95%	300	101%
Mahogany Peak	5/1 to 10/15	Cattle	28,586	94%	327	46%
Geyser Ranch	3/1 to 2/28	Cattle	245,027	9%	6,778	55%
Condor Canyon	3/1 to 1/24	Cattle	45,298	70%	35	5%
Cottonwood	11/1 to 6/15	Cattle	49,964	60%	824	37%

The Caliente Field Office allotments (Deer Lodge, N4/N5, Rabbit Spring, McGuffy, Mahogany Peak, Condor Canyon) that are wholly or partially within the Eagle HMA are all utilized by wild horses; there is a resident population of wild horses on the Condor Canyon allotment in the vicinity of Gleason Canyon. There is sufficient grazing overlap in these allotments to significantly reduce forage availability to cattle as well as to impede vegetation regrowth and recovery following grazing by authorized livestock. When authorized livestock use of these allotments requires that water for livestock be hauled to the allotment by truck, some of that water is consumed by horses rather than the livestock for which the water is intended. Wild horse impacts on these allotments has been increasing as wild horse populations have increased. Rangeland health is very likely to decline when herbivore populations are regulated by forage and/or water availability.

There are four allotments (Wilson Creek U4 use area, Indian Peak, Chokecherry and Stateline) that occur in whole or in part within the Chokecherry HMA and four allotments (Modena Canyon, Gold Springs, Government Well and Atchison Creek) that occur in whole or in part within the Mt. Elinore HMA. Grazing overlap between livestock and wild horses occurs primarily in the Paradise Fire Emergency Stabilization Rehabilitation area, Gold Springs Allotment, and the Utah part of Wilson Creek Allotment in the U4 use area. Atchison Creek and Indian Peak Allotment are fenced from the Chokecherry and Mt. Elinore HMAs. Permitted livestock grazing use in the HMAs includes both cattle and sheep grazing during all seasons of the year (Table 3.3).

Table 3.3 Chokecherry and Mt. Elinore Herd Management Areas Grazing Allotments

Allotment	Season of Use	Kind of Livestock	Total Acres	% of Allotment Within HMA	Ten Year Average AUM Use	Percent of Permit Use
Wilson Creek (U4 Use Area)	5/1-10/31	Cattle	21,788	100%	See Above	Use area in Wilson Creek Allotment

Indian Peak	3/1-2/28	Cattle/Sheep	84,320	8%	703	40%
Chokecherry	9/1-11/30	Cattle	8,542	100%	159	47%
Stateline	7/15-10/15	Cattle	18,255	51%	54	28%
Modena Canyon	12/1-4/30	Cattle	27,186	46%	36	31%
Gold Springs	3/1-10/15	Cattle	38,698	42%	241	42%
Government Well	1/1-3/31	Cattle	5,633	40%	32	14%
Atchison Creek	7/1-8/10	Cattle	37,675	4%	356	134%

Total acres include Private, State and Federal Acres for the Allotment or Pasture (U4 use area).

Livestock grazing also occurs in areas immediately adjacent to the HMAs. Permitted livestock grazing use has generally been reduced in recent years in a majority of the allotments. Through the grazing Term Permit Renewal process, BLM continues to analyze livestock stocking levels, establish deferred seasons of grazing, rotated grazing areas, and establish water hauling areas that result in more evenly distributed livestock grazing. Since the last AML wild horse gather in 2012, licensed livestock use, or actual use, has generally been less than permitted use for each of the grazing allotments, in part due to persistent drought.

Environmental Effects

Proposed Action

Past experience has shown that wild horse gather operations have few direct impacts to cattle and sheep grazing, and these impacts are minor and short-term. Livestock located near gather activities would be temporarily disturbed or displaced by the helicopter and the increased vehicle traffic during the gather operation. Typically, livestock would move back into the area once gather operations cease. Removal of excess wild horses would result in indirect impacts to livestock through an increase in forage availability and quality, and reduced competition between livestock and wild horses for available forage and water resources.

Alternative B

Impacts would be the same as in the Proposed Action.

Alternative C

Impacts would be the same as in the Proposed Action, however, wild horse populations may increase at a faster rate and exceed the high range of AML sooner than under the proposed action. Consequently, impacts to authorized livestock use, such as reduced forage availability and increased difficulty of livestock management operations (e.g. waterhauls, fence maintenance), could intensify more quickly. Vegetation regrowth and recovery following livestock grazing would be impeded in proportion to the growth of wild horse populations.

No Action Alternative

Livestock would not be displaced or disturbed due to gather operations under the No Action Alternative, however, there would be continued competition with wild horses for limited water and forage resources. Range condition (e.g. forage quantity and quality, rangeland health) would continue to decline due to high numbers of wild horses. Livestock grazing would be impacted due to deteriorating range condition; forage consumed by wild horses reduces the forage available to livestock grazing. This could result in reductions in permitted livestock use.

3.3.6 Non-Native Invasive and Noxious Species

Affected Environment

The BLM defines a weed as a non-native plant that disrupts or has the potential to disrupt or alter the natural ecosystem function, composition and diversity of the site it occupies. The presence of weeds deteriorates the vegetative health of a site by outcompeting native vegetation for resources such as water and sunlight, as well as releasing plant toxins that inhibit native plant production. Weeds are invasive species that require a concerted effort (manpower and resources) to remove from the range, if they can be removed at all. "Noxious" weeds refer to those plant species which have been legally designated in national, state and county or local designations as unwanted or undesirable. Noxious weed species that are documented within the gather area are listed in Appendix V (weed risk assessment).

As indicated in Appendix V, no site specific weed survey was completed for this project. However the Ely District weed inventory data was consulted and inventory data from 2015 identified the following weed species are within the gather area:

Scientific Name	Common Name
Acroptilon repens	Russian knapweed
Carduus nutans	Musk thistle
Centaurea diffusa	Diffuse knapweed
Centaurea stoebe	Spotted knapweed
Cirsium vulgare	Bull thistle
Lepidium draba	Hoary cress
Linaria dalmatica	Dalmatian toadflax
Onopordum acanthium	Scotch thistle
Tamarix spp.	Salt cedar
Tribulus terrestris	Puncturevine

The following noxious and non-native, invasive species are documented along roads and drainages leading to the project area identified in the proposed action:

Acroptilon repens	Russian knapweed
Carduus nutans	Musk thistle
Centaurea diffusa	Diffuse knapweed
Centaurea stoebe	Spotted knapweed
Cirsium arvense	Canada thistle
Cirsium vulgare	Bull thistle
Lepidium draba	Hoary cress
Lepidium latifolium	Tall whitetop
Linaria dalmatica	Dalmatian toadflax
Onopordum acanthium	Scotch thistle
Tamarix spp.	Salt cedar
Tribulus terrestris	Puncturevine

While not officially documented the following non-native invasive weeds probably occur in or around the project area:

Bromus tectorum	Cheatgrass	*Halogeton glomeratus*	Halogeton
Ceratocephala testiculata	Bur buttercup	*Marrubium vulgare*	Horehound
Convolvulus arvensis	Field bindweed	*Salsola kali*	Russian thistle
Elaeagnus angustifolia	Russian olive	*Sysimbrium altissimum*	Tumble mustard
Erodium circutarium	Filaree	*Verbascum thapsus*	Common mullein

The Cedar City Field Office (CCFO) Noxious Weed inventory data does not show any noxious weeds within the Chokecherry or Mt. Elinore HMA boundaries. The CCFO vegetative data does show the non-native invasive weeds listed above to occur within the Chokecherry and Mt. Elinore Boundaries.

Environmental Effects

Proposed Action

The proposed gather may spread existing noxious or invasive weed species if vehicles drive through existing weed infestations and spread seed into previously weed-free areas. To prevent this, any off-road equipment exposed to weed infestations would be cleaned before moving into weed free areas. In addition, the contractor together with the contracting officer's representative or project inspector (COR/PI) would examine proposed trap sites and holding corrals for noxious weeds prior to construction. If noxious weeds are found, the location of the facilities would be moved to another location. All trap sites, holding facilities, and camping areas on public lands would be monitored for weeds during the next several years. Despite short-term risks, over the long term, the reduction in wild horse numbers and the subsequent recovery of the native vegetation would result in fewer disturbed sites, thereby reducing the susceptibility of the range to an invasion or growth in areas occupied by non-native plant species.

Alternative B

Impacts would be the same as in the proposed action.

Alternative C

Impacts would be the same as in the proposed action; however, improved noxious weed control may not last as long because wild horse populations may exceed the high end of AMLs more quickly than under the proposed action.

No Action Alternative

Under this alternative, the wild horse gather would not take place at this time. The likelihood of noxious weeds being spread by gather operations would not exist. However, continued overgrazing of the present plant communities could lead to an expansion of noxious weeds and invasive non-native species due deteriorating vegetative condition which makes the range more susceptible to weed invasion and to the spread of weed infestations.

3.3.7 Vegetative Resources

Affected Environment

The proposed action would impact vegetation temporarily with trampling and disturbance of vegetation occurring at gather sites and holding locations. Disturbance would occur to native vegetation in and around temporary gather corrals and holding facilities due to the use of vehicles and concentration of horses in the immediate area of such facilities. The disturbed area, however, would make up less than one acre. Gather corrals and holding facility locations are usually selected in areas easily accessible to livestock trailers and standard equipment, utilizing roads, gravel pits or other previously disturbed sites, and which are accessible using existing roads. New roads are not created to construct capture corrals.

Environmental Impacts

Proposed Action

Temporary trap sites may have a short term impact on Vegetation Resources. As these Vegetative Resources are currently being used by the horses, the additional impact from a potential trap site would be minimal.

Achieving and maintaining the established AML, would benefit the vegetation by reducing the grazing pressure on the forage resources. Removal of excess wild horses would reduce the populations to levels that would be in balance with the available water sources and forage availability.

Maintaining AML within the Proposed Gather area would prevent overgrazing, damage by trampling or pawing, and would help promote improved rangeland health.

Alternative B

Impacts would be the same as described for the Proposed Action.

Alternative C

Impacts would be the same as in the proposed action; however, improved vegetative conditions for all plant species may not last as long because wild horse populations may exceed the high end of AMLs more quickly than under the proposed action.

No Action Alternative

Vegetative Resources would continue to be utilized, increasing over time as the population of horses increase. Rangeland health standards would not be achieved as the population of wild horses increase over time on the range.

3.3.8 Public Safety

Affected Environment

In recent gathers, members of the public have increasingly traveled to the public lands to observe BLM's gather operations. Members of the public can inadvertently wander into areas that put them in the path of wild horses that are being herded or handled during the gather operations, creating the potential for injury to the wild horses or burros and to the BLM employees and contractors conducting the gather and/or handling the horses as well as to the public themselves. Because these horses are wild animals, there is always the potential for injury when individuals get too close or inadvertently get in the way of gather activities.

The helicopter work is done at various heights above the ground, from as little as 10-15 feet (when herding the animals the last short distance to the gather corral) to several hundred feet (when doing a recon of the area). While helicopters are highly maneuverable and the pilots are very skilled in their operation, unknown and unexpected obstacles in their path can impact their ability to react in time to avoid members of the public in their path. These same unknown and unexpected obstacles can impact the wild horses or burros being herded by the helicopter in that they may not be able to react and can be potentially harmed or caused to flee which can lead to injury and additional stress. When the helicopter is working close to the ground, the rotor wash of the helicopter is a safety concern by potentially causing loose vegetation, dirt, and other objects to fly through the air which can strike or land on anyone in close proximity as well as cause decreased vision.

During the herding process, wild horses or burros will try to flee if they perceive that something or someone suddenly blocks or crosses their path. Fleeing horses can go through wire fences, traverse unstable terrain, and go through areas that they normally don't travel in order to get away, all of which can lead them to injure people by striking or trampling them if they are in the animal's path.

Disturbances in and around the gather and holding corral have the potential to injure the government and contractor staff who are trying to sort, move and care for the horses and burros by causing them to be kicked, struck, and possibly trampled by the animals trying to flee. Such disturbances also have the potential for similar harm to the public themselves.

Public observation of the gather activities on public lands will be allowed and would be consistent with BLM IM No. 2013-058 and in compliance with visitation protocols for scheduled and nonscheduled visitation found in Appendix II.

Environmental Effects

Proposed Action

Public safety as well as that of the BLM and contractor staff is always a concern during the gather operations and would be addressed through Observation Protocols that have been used in recent gathers to ensure that the public remains at a safe distance and does not get in the way of gather operations. Appropriate BLM staffing (public affair specialists and law enforcement officers) will be present to assure compliance with visitation protocols at the site. These measures minimize the risks to the health and safety of the public, BLM staff and contractors, and to the wild horses themselves during the gather operations.

Alternative B

Impacts would be the same as described for the Proposed Action.

Alternative C

Impacts would be the same as described for the Proposed Action.

No Action Alternative

There would be no gather related safety concerns for BLM employees, contractors and the general public as no gather activities would occur.

Chapter 4 Cumulative Impacts

4.1 Introduction

The National Environmental Policy Act (NEPA) regulations define cumulative impacts as impacts on the environment that result from the incremental impact of the Proposed Action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such actions (40 CFR 1508.7). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

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 significant actions taking place over a period of time. The area of cumulative impact analysis is the Eagle, Mt. Elinore and Chokecherry HMAs (See map Appendix IV).

According to the 1994 BLM *Guidelines For Assessing and Documenting Cumulative Impacts*, the cumulative analysis should be focused on those issues and resource values identified during scoping that are of major importance. Accordingly, the issues of major importance that are analyzed are maintaining rangeland health and achieving and maintaining appropriate management levels.

4.2 Past, Present, and Reasonably Foreseeable Future Actions

The Past, Present, and Reasonably Foreseeable Future Actions applicable to the assessment area are identified as the following:

Table 4.1 Past, Present, and Reasonably Foreseeable Future Actions

Project -- Name or Description	
Issuance of multiple use decisions and grazing permits for ranching operations through the allotment evaluation process and the reassessment of the associated allotments.	
Livestock grazing	
Wild Horse and Burro Gathers	
Mineral Exploration / Geothermal Exploration/Abandoned mine land reclamation	
Recreation	
Spring development (fencing water sources)	
Wildlife guzzler construction	
Invasive weed inventory/treatments	
Wild Horse and Burro issues, issuance of Multiple use decisions AML	

adjustments and planning	

Any future proposed projects on public lands within the Eagle, Mt. Elinore and Chokecherry HMAs would be analyzed in an appropriate environmental document following site specific planning. Future project planning would also include public involvement.

The following analysis looks at the incremental impact of the proposed action and alternatives when added to the past, present and reasonably foreseeable future actions identified above.

4.2.1 Past Actions

In 1971 Congress passed the Wild Free-Roaming Horses and Burros Act which placed wild and free-roaming horses, that were not claimed for individual ownership, under the protection of the Secretaries of Interior and Agriculture. In 1976 the Federal Land Policy and Management Act (FLPMA) gave the Secretary the authority to use motorized equipment in the capture of wild free-roaming horses as well as continued authority to inventory the public lands. In 1978, the Public Range Improvement Act (PRIA) was passed which amended the WFRHBA to provide additional directives for BLM's management of wild free-roaming horses on public lands.

Past actions include establishment of wild horse Herd Management Areas, establishment of AML for wild horses, wild horse gathers, vegetation treatment, mineral extraction, oil and gas exploration, livestock grazing and recreational activities throughout the area. Some of these activities have increased infestations of invasive plants, noxious weeds, and pests and their associated treatments.

Eagle HMA

The Schell (1983) and Caliente (1982) MFPs (Ely District) designated the Deer Lodge Canyon and Wilson Creek (Fortification and Patterson-Eagle Herd Areas) HMAs for the long-term management of wild horses. These HMAs were later combined into the Eagle HMA in the Ely District Record of Decision (ROD) and Approved Resource Management Plan (RMP) in August 2008 due to the interchange between the two HMAs. The HMA is nearly identical in size and shape to the original Herd Areas representing where wild horses were located in 1971. The BLM also moved to long- range planning with the development of Resource Management Plans and Grazing Environmental Impact Statements. These EISs analyzed impacts of the Land Use Plan's management direction for grazing and wild horses, as updated through Bureau policies, Rangeland Program direction, and Wild Horse Program direction. Forage was allocated within the allotments for livestock, wild horse and wildlife use, and range monitoring studies have been initiated to determine if allotment objectives were being achieved, or that progress toward the allotment objectives was being made.

Approximately 1931 wild horses have been removed from the Eagle HMA in the last 20 years; populations are thriving and have not been negatively impacted. An Appropriate Management Level determination for the Eagle HMA was re-affirmed through Ely *Proposed Resource Management Plan/Final Environmental Impact Statement* (RMP/EIS, 2007) released in November 2007.

Mt. Elinore and Chokecherry HMAs

In 1971, Herd Areas were identified as areas being occupied by wild horses. The Mt. Elinore and Chokecherry Herd Management Areas (HMAs) were established in the 1980s through the Pinyon Management Framework Plan objectives (PMFP Rangeland Program Summary Record of Decision dated 1983).

The Appropriate Management Levels (AMLs) set in the Pinyon MFP were established at the population levels that existed between 1971 and 1982. The AMLs within the Chokecherry and Mt. Elinore HMAs remain as set in the MFP, as there has been no evidence to support a modification of those AMLs. The wild horses from these HMAs travel back and forth across the Nevada/Utah border, mixing with wild horses from Nevada's Eagle HMA. Populations in the Utah HMAs have fluctuated from at or near the upper range of the AMLs (Mt. Elinore 15-25 head, and Chokecherry 30 head) to more than double the AMLs because of movement from Nevada's HMA.

Approximately 157 wild horses have been directly removed from the Mt. Elinore and Chokecherry HMAs in the last 20 years; populations are thriving and have not been negatively impacted. Some wild horses from the Chokecherry and Mt. Elinore HMAs crossed over the HMA boundary and were removed from the area during past gathers on the Eagle HMA (Wilson Creek and Deer Lodge Canyon HMAs).

4.2.2 Present Actions

Today the Eagle, Mt. Elinore and Chokecherry HMAs have a combined estimated population of 2020 wild horses. Resource damage is occurring in portions of the HMAs due to excess animals. Horses continue to move between the BLM Utah's Chokecherry and Mt. Elinore HMAs and BLM Nevada's Eagle HMA. Due to this movement, the Mt. Elinore and Chokecherry HMAs are being gathered with the Eagle HMA gather, which has the larger population of wild horses, to limit the potential for adverse impacts on the adjacent HMAs by concentrating wild horses on just one of the HMAs. Current BLM policy is to conduct removals targeting portions of the wild horse population based upon age, and allowing the correction of any sex ratio problems that may occur. Further, the BLM's policy is to conduct gathers in order to facilitate a four-year gather cycle. Program goals have expanded beyond establishing a "*thriving natural ecological balance*" (by setting appropriate management level (AML)) for individual herds, to include achieving and maintaining healthy, viable, vigorous, and stable populations.

Current mandates prohibit the destruction of healthy animals that are removed or deemed to be excess. Only sick, lame, or dangerous animals can be euthanized, and destruction is no longer used as a population control method. A 2004 amendment to the Wild Free-Roaming Horses and Burro Act allows the sale of excess wild horses that are over 10 years in age or have been offered unsuccessfully for adoption three times. BLM is adding additional long-term holding grassland pastures in the Midwest to care for excess wild horses for which there is no adoption or sale demand.

Today public interest in the welfare and management of wild horses is as high as it has ever been. Many different values pertaining to wild horse management form current wild horse perceptions. Wild horses are viewed as nuisances, as well as living symbols of the pioneer spirit.

The BLM is continuing to modify grazing permits and conduct vegetation treatments to improve watershed health. Monitoring of vegetative resources, vegetative treatments, rangeland health, and watershed health continues. Currently within the Eagle, Mt. Elinore and Chokecherry HMAs sheep and cattle grazing occurs on a yearly basis.

The focus of wild horse management has also expanded to place more emphasis on achieving rangeland health as measured through the RAC Standards. Mojave-Southern Great Basin Resource Advisory Councils (RAC) developed standards and guidelines for rangeland health that are the basis for managing wild horse and livestock grazing within the Ely District. Adjustments in numbers, season of use, grazing season, and allowable use are based on evaluating progress toward reaching the standards.

4.2.3 Reasonably Foreseeable Future Actions

In the future, the BLM would manage wild horses within HMAs that have suitable habitat for a population range, while maintaining genetic diversity, age structure, and sex ratios. Current policy is to express all future wild horse AMLs as a range, to allow for regular population growth, as well as better management of populations rather than individual HMAs. The Ely BLM District completed the *Ely Proposed Resource Management Plan/Final Environmental Impact Statement* (RMP/EIS, 2007) released in November 2007 which analyzed AMLs expressed as a range and addressed wild horse management on a programmatic basis. Future wild horse management would focus on an integrated ecosystem approach with the basic unit of analysis being the watershed. The BLM would continue to conduct monitoring to assess progress toward meeting rangeland health standards. Wild horses would continue to be a component of the public lands, managed within a multiple use concept.

While there is no anticipation for amendments to the Wild and Free-Roaming Horses and Burros Act that would change the way wild horses could be managed on the public lands, the Act has been amended three times since 1971. Therefore, there is potential for amendment as a reasonably foreseeable future action.

As the BLM achieves AML on a Bureau wide basis, gathers should become more predictable due to facility space. This should increase stability of gather schedules, which would result in the Eagle, Mt. Elinore and Chokecherry HMAs being gathered at least every four years. Fertility control should also become more readily available as a management tool, with treatments that last between gather cycles, reducing the need to remove as many wild horses, and possibly extending the time between gathers. Wild horses will continue to move throughout the Eagle Chokecherry and Mt. Elinore HMA's.

The removal area contains a variety of resources and supports a variety of uses. Any alternative course of wild horse management has the opportunity to affect and be affected by other authorized activities ongoing in and adjacent to the area. Future activities which would be expected to contribute to the cumulative impacts of implementing the Proposed Action include: future wild horse gathers, continuing livestock grazing in the allotments within the area, development of range improvements, continued development of mineral extraction, oil and gas exploration, new or continuing infestations of invasive plants, noxious weeds, and pests and their associated treatments, and continued native wildlife populations and recreational activities historically associated with them. The significance of cumulative effects based on past, present, proposed, and reasonably foreseeable future actions are determined based on context and intensity.

4.3 Cumulative Impacts to Wild Horses

Past actions regarding the management of wild horses have resulted in the current wild horse population within the Eagle, Mt. Elinore and Chokecherry HMAs. Wild horse management has contributed to the present resource condition and wild horse herd structure within the gather area.

The combination of the past, present, and reasonably foreseeable future actions, along with the proposed action, should result in more stable wild horse populations, healthier rangelands, healthier wild horses, and fewer multiple-use conflicts within the Eagle, Mt. Elinore and Chokecherry HMAs.

Chapter 5 Consultation and Coordination

Public hearings are held annually on a state-wide basis regarding the use of motorized vehicles, including helicopters and fixed-wing aircraft, in the management of wild horses (or burros). During these meetings, the public is given the opportunity to present new information and to voice any concerns regarding the use of the motorized vehicles.

The Ely District Office held the state-wide meeting on June 27, 2017; two public participants attended and their comments were entered into the record for this hearing. Specific concerns included: (1) whether most were in support of the use of helicopters and the gathering of excess wild horses. Standard Operating Procedures were reviewed in response to these concerns and no changes to the SOPs were indicated based on this review.

The use of helicopters and motorized vehicles has proven to be a safe, effective and practical means for the gather and removal of excess wild horses and burros from the range. Since July 2004, Nevada has gathered 26,000 animals with a total mortality of 1.1% (of which 0.5% was gather related) which is very low when handling wild animals. BLM also avoids gathering wild horses six weeks prior to or after peak foaling and therefore does not conduct helicopter removals of wild horses from March 1 through June 30.

A Tribal Coordination letter was sent on June 19, 2017. Any issues identified during this meeting will be addressed in the Final Environmental Assessment.

The Utah State meeting was held in December 12, 2017 in Fillmore, Utah. At that meeting no comments and concerns were expressed regarding the use of motorized vehicles in the management of wild horses and burros. Standard Operating Procedures were reviewed in and no changes to the SOPs were indicated based on this review.

The Ely and Cedar City Districts BLM have coordinated with Nevada Department of Wildlife (NDOW) and the Utah Division of Wildlife Resources during the yearly coordination meeting on these gathers.

On December 8, 2009 the Ely District sent a Notice of Proposed Action (NOPA) to the Wilderness and Wilderness Study Area interested public mailing list notifying them of the action taking place in Wilderness.

Chapter 6 List of Preparers

Table 6.1 List of BLM Preparers

Name	Title	Responsible for the Following Section(s) of this Document
Ben Noyes	CFO-Wild Horse Specialist	Project Lead/ Wild Horse
Jessicca McMullen	CFO-Wildlife Biologist	Wildlife, Migratory Birds, Special Status Species
Cameron Boyce	CFO-Natural Resource Specialist	Non-native Invasive Species Including Noxious Weeds
Andy Gault Cameron Boyce	EYDO-Hydrologist CFO-Natural Resource Specialist	Soil, Water, Wetlands and Riparian/Flood Plans
Jay Goodwin	CFO-Rangeland Management Specialist	Livestock Grazing
Harry Konwin	CFO-Archaeologist	Cultural Resources
Elizabeth Seymour	EYDO-Native American Coordinator	Native American Religious Concerns
Chad Hunter	CCFO-Rangeland Management/Wild Horse Specialist	Vegetation, Livestock Grazing, Wild Horses
Dustin Schaible	CCFO-Wildlife Biologist	Wildlife, Migratory Birds, Special Status Species

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7.2 Acronyms

AAEP—American Association of Equine Practitioners
AHPA—American Horse Protection Association
AML—Appropriate Management Level
BCS—Body Condition Score
BLM—Bureau of Land Management
BSU—Biological Significant Unit
CESA—Cumulative Effect Study Area
CFR—Code of Federal Regulations
CFO—Caliente Field Office
DR—Decision Record
EA—Environmental Assessment
EIS—Environmental Impact Statement
FAA—Federal Aviation Administration
FLPMA—Federal Land Policy and Management Act
FONSI—Finding of No Significant Impact
FWS—U.S. Fish and Wildlife Service
GAO—Government Accountability Office
HA—Herd Area
HMA—Herd Management Area
HSUS—Humane Society of the United States
IBLA—Interior Board of Land Appeals
ID—Interdisciplinary
IM—Instructional Memorandum
KFPM—Key Forage Plant Method
MLRA—Major Land Resource Area
NAS—National Academy of Sciences
NDOW—Nevada Department of Wildlife
NEPA—National Environmental Policy Act
NNHP—Nevada Natural Heritage Program
NRCS—Natural Resource Conservation Service
OIG—Office of Inspector General
ORP—Off Range Pasture
PGS—Population Growth Suppression
PZP—Porcine Zona Pellucida
RAC—Resource Advisory Council
RFS—Reasonably Foreseeable Future Action
RMP—Resource Management Plan
SOP—Standard Operating Procedures
WFRHBA—Wild Free-Roaming Horses and Burros Act

Appendix I Standard Operating Procedures for Wild Horse Gathers

Gathers are conducted by utilizing contractors from the Wild Horse Gathers-Western States Contract or BLM personnel. The following standard operating procedures (SOPs) for gathering and handling wild horses apply whether a contractor or BLM personnel conduct a gather. For helicopter gathers conducted by BLM personnel, gather operations would be conducted in conformance with the Wild Horse Aviation Management Handbook (January 2009).

Prior to any gathering operation, the BLM would provide for a pre-gather evaluation of existing conditions in the gather area(s). The evaluation would include animal conditions, prevailing temperatures, drought conditions, soil conditions, road conditions, and a topographic map with Wilderness boundaries, the location of fences, other physical barriers, and acceptable gather locations in relation to animal distribution. The evaluation would determine whether the proposed activities would necessitate the presence of a veterinarian during operations. If it is determined that a large number of animals may need to be euthanized or gather operations could be facilitated by a veterinarian, these services would be arranged before the gather would proceed. The contractor would be apprised of all conditions and would be given instructions regarding the gather and handling of animals to ensure their health and welfare is protected.

Gather sites and temporary holding sites would be located to reduce the likelihood of 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 whenever possible.

The primary gather methods used in the performance of gather operations include:
1. Helicopter Drive Gathering. This gather method involves utilizing a helicopter to herd wild horses into a temporary gather site.

2. Helicopter Assisted Roping. This gather method involves utilizing a helicopter to herd wild horses to ropers.

3. Bait Trapping. This gather method involves utilizing bait (e.g., water or feed) to lure wild horses into a temporary gather site.

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

A. Gather Methods used in the Performance of Gather Contract Operations
The primary concern of the contractor is the safe and humane handling of all animals gathered. All gather attempts shall incorporate the following:

1. All gather sites and holding facilities locations must be approved by the Contracting Officer's Representative (COR) and/or the Project Inspector (PI) prior to construction. The Contractor may also be required to change or move gather locations as determined by the COR/PI. All gather sites and holding facilities not located on public land must have prior written approval of the landowner.

2. The rate of movement and distance the animals travel shall not exceed limitations set by the COR who would consider terrain, physical barriers, access limitations, weather, extreme temperature (high and low), condition of the animals, urgency of the operation (animals facing drought, starvation, fire rehabilitation, etc.) and other factors. In consultation with the contractor the distance the animals travel would account for the different factors listed above and concerns with each HMA.

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

a. Gather sites and holding facilities shall be constructed of portable panels, the top of which shall not be less than 72 inches high for horses and 60 inches high for burros, and the bottom rail of which shall not be more than 12 inches from ground level. All gather sites 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, plywood, metal without holes larger than 2”x4”.

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 above ground level for burros and 1 foot to 6 feet for horses. The location of the government furnished portable fly chute to restrain, age, or provide additional care for the animals shall be placed in the runway in a manner as instructed by or in concurrence with the COR/PI.

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, plastic 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.

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

4. No modification of existing fences would be made without authorization from the COR/PI. 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 gather site 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 or jennies with small foals, sick and injured animals, estrays or other animals the COR determines need to be housed in a separate pen 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 would require that animals be restrained for the purpose of determining an animal’s age, sex, or other necessary procedures. In these instances, a portable restraining chute may be necessary and would be provided by the government.

Alternate pens shall be furnished by the Contractor to hold animals if the specific gathering requires that animals be released back into the gather area(s). In areas requiring one or more satellite gather site, and where 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 would be at the discretion of the COR.

7. The Contractor shall provide animals held in the gather sites and/or holding facilities with a continuous supply of fresh clean water at a minimum rate of 10 gallons per animal per day. Animals held for 10 hours or more in the gather site or holding facilities shall be provided good quality hay at the rate of not less than two pounds of hay per 100 pounds of estimated body weight per day. The contractor would supply certified weed free hay if required by State, County, and Federal regulation.

8. An animal that is held at a temporary holding facility through the night is defined as a horse/burro feed day. An animal that is held for only a portion of a day and is shipped or released does not constitute a feed day.

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

10. The Contractor shall restrain sick or injured animals if treatment is necessary. The COR/PI would determine if animals must be euthanized and provide for the destruction of such animals. The Contractor may be required to humanely euthanize animals in the field and to dispose of the carcasses as directed by the COR/PI.

11. Animals shall be transported to their final destination from temporary holding facilities as quickly as possible after gather unless prior approval is granted by the COR 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 COR. Animals shall not be held in gather sites and/or temporary holding facilities on days when there is no work being conducted except as specified by the COR. 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 COR. Animals shall not be allowed to remain standing on trucks while not in transport for a combined period of greater than three (3) hours in any 24 hour period. Animals that are to be released back into the gather area may need to be transported back to the original gather site. This determination would be at the discretion of the COR/PI or Field Office Wild Horse & Burro Specialist.

B. Gather Methods That May Be Used in the Performance of a Gather

1. Gather attempts may be accomplished by utilizing bait (feed, water, mineral licks) to lure animals into a temporary gather site. If this gather method is selected, the following applies:

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

b. All trigger and/or trip gate devices must be approved by the COR/PI prior to gather of animals.

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

2. Gather attempts may be accomplished by utilizing a helicopter to drive animals into a temporary gather site. If the contractor selects this method the following applies:

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

b. The contractor shall assure that foals shall not be left behind, and orphaned.

3. Gather attempts may be accomplished by utilizing a helicopter to drive animals to ropers. If the contractor, with the approval of the COR/PI, selects this method the following applies:

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

b. The contractor shall assure that foals shall not be left behind, or orphaned.

c. The rate of movement and distance the animals travel shall not exceed limitations set by the COR/PI who would consider terrain, physical barriers, weather, condition of the animals and other factors.

C. Use of Motorized Equipment

1. All motorized equipment employed in the transportation of gathered animals shall be in compliance with appropriate State and Federal laws and regulations applicable to the humane transportation of animals. The Contractor shall provide the COR/PI, if requested, 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 gathered 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 gather 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 floor. Single deck tractor-trailers 40 feet or longer shall have at least two (2) partition gates providing at least three (3) compartments within the trailer to separate animals. Tractor-trailers less than 40 feet shall have at least one partition gate providing at least two (2) compartments within the trailer to separate the 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 a minimum 5 foot wide swinging gate. The use of double deck tractor-trailers is unacceptable and shall 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 or 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 all trailers 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 COR/PI.

5. Floors of tractor-trailers, stock trailers and loading chutes shall be covered and maintained with wood shavings to prevent the animals from slipping as much as possible during transport.

6. Animals to be loaded and transported in any trailer shall be as directed by the COR/PI 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 per adult horse (1.4 linear foot in an 8 foot wide trailer);

- 8 square feet per adult burro (1.0 linear foot in an 8 foot wide trailer);

- 6 square feet per horse foal (0.75 linear feet in an 8 foot wide trailer);

- 4 square feet per burro foal (0.5 linear feet in an 8 foot wide trailer).

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

8. If the COR/PI determines that dust conditions are such that the animals could be endangered during transportation, the Contractor would be instructed to adjust speed.

D. Safety and Communications

1. The Contractor shall have the means to communicate with the COR/PI and all contractor personnel engaged in the gather of wild horses utilizing a VHF/FM Transceiver or VHF/FM portable Two-Way radio. If communications are ineffective the government would 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 contracting officer or COR/PI violate contract rules, are unsafe or otherwise unsatisfactory. In this event, the Contractor would 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 Contracting Officer or his/her representative.

3. The Contractor shall obtain the necessary FCC licenses for the radio system.

4. All accidents occurring during the performance of any task order shall be immediately reported to the COR/PI.

5. Should the contractor choose to utilize a helicopter the following would apply:

a. The Contractor must operate in compliance with Federal Aviation Regulations, Part 91. Pilots provided by the Contractor shall comply with the Contractor's Federal Aviation Certificates, applicable regulations of the State in which the gather is located.

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

E. Site Clearances

1. No personnel working at gather sites may excavate, remove, damage, or otherwise alter or deface or attempt to excavate, remove, damage or otherwise alter or deface any archaeological resource located on public lands or Indian lands.

2. Prior to setting up a gather site or temporary holding facility, BLM would conduct all necessary clearances (archaeological, T&E, etc.). All proposed site(s) must be inspected by a government archaeologist. Once archaeological clearance has been obtained, the gather site or temporary holding facility may be set up. Said clearance shall be arranged for by the COR, PI, or other BLM employees.

3. Gather sites and temporary holding facilities would not be constructed on wetlands or riparian zones.

F. Animal Characteristics and Behavior

Releases of wild horses would be near available water when possible. If the area is new to them, a short-term adjustment period may be required while the wild horses become familiar with the new area.

G. Public Participation

Opportunities for public viewing (i.e. media, interested public) of gather operations would be made available to the extent possible; however, the primary considerations would be to protect the health, safety and welfare of the animals being gathered and the personnel involved. The public must adhere to guidance from the on-site BLM representative. It is BLM policy that the public would not be allowed to come into direct contact with wild horses being held in BLM facilities. Only authorized BLM personnel or contractors may enter the corrals or directly handle the animals. The general public may not enter the corrals or directly handle the animals at any time or for any reason during BLM operations.

H. Responsibility and Lines of Communication

- Contracting Officer's Representative/Project Inspector:

- Contracting Officer's Representative/Project Inspector:

The Contracting Officer’s Representatives (CORs) and the project inspectors (PIs) have the direct responsibility to ensure the Contractor’s compliance with the contract stipulations. The Field Managers for the Humboldt River and Tuscarora Field Offices would take an active role to ensure the appropriate lines of communication are established between the field, Field Office, District

Office, State Office, National Program Office, and BLM Holding Facility offices. All employees involved in the gathering operations would keep the best interests of the animals at the forefront at all times.

All publicity, formal public contact and inquiries would be handled through the Field Manager and District Public Affairs Officer. These individuals would be the primary contact and would coordinate with the COR/PI on any inquiries.

The COR would coordinate with the contractor and the BLM Corrals to ensure animals are being transported from the gather site in a safe and humane manner and are arriving in good condition. The contract specifications require humane treatment and care of the animals during removal operations. These specifications are designed to minimize the risk of injury and death during and after gather of the animals. The specifications would be vigorously enforced.
Should the Contractor show negligence and/or not perform according to contract stipulations, he would be issued written instructions, stop work orders, or defaulted.

Appendix II Wild Horse Gather Observation Protocol

BLM recognizes and respects the right of interested members of the public and the press to observe wild horse gather operations. At the same time, BLM must ensure the health and safety of the public, BLM's employees and contractors, and America's wild horses. Accordingly, the BLM developed these rules to maximize the opportunity for reasonable public access to the gather while ensuring that BLM's health and safety responsibilities are fulfilled. Failure to maintain safe distances from operations at the gather and temporary holding sites could result in members of the public inadvertently getting in the path of the wild horses or gather personnel, thereby placing themselves and others at risk, or causing stress and potential injury to the wild horses. The BLM and the contractor's helicopter pilot must comply with 14 CFR Part 91 of the Federal Aviation Regulations, which determines the minimum safe altitudes and distance people must be from the aircraft. To be in compliance with these regulations, the viewing location at the gather site and holding corrals must be approximately 500 feet from the operating location of the helicopter at all times. The viewing locations may vary depending on topography, terrain and other factors.

Daily Visitor Protocol

☐ A Wild Horse Gather Information Phone Line would be set up prior to the gather so the public can call for daily updates on gather information and statistics. Visitors are strongly encouraged to check the phone line the evening before they plan to attend the gather to confirm the gather and their tour of it is indeed taking place the next day as scheduled (weather, mechanical issues or other things may affect this) and to confirm the meeting location.

☐ Visitors must direct their questions/comments to either their designated BLM representative or the BLM spokesperson on site, and not engage other BLM/contractor staff and disrupt their gather duties/responsibilities - professional and respectful behavior is expected of all. BLM may make the BLM staff available during down times for a Q&A session on public outreach and education days. However, the contractor and its staff would not be available to answer questions or interact with visitors.

☐ Observers must provide their own 4-wheel drive high clearance vehicle, appropriate shoes, winter clothing, food and water. Observers are prohibited from riding in government and contractor vehicles and equipment.

☐ Gather operations may be suspended if bad weather conditions create unsafe flying conditions.

☐ BLM would establish one or more observation areas, in the immediate area of the gather and holding sites, to which individuals would be directed. These areas would be placed so as to maximize the opportunity for public observation while providing for a safe and effective wild horse gather. The utilization of such observation areas is necessary due to the use and presence of heavy equipment and aircraft in the gather operation and the critical need to allow BLM personnel and contractors to fully focus on attending to the needs of the wild horses while maintaining a safe environment for all involved. In addition, observation areas would be sited so as to protect the wild horses from being spooked, startled or impacted in a manner that results in increased stress.

- BLM would delineate observation areas with yellow caution tape (or a similar type of tape or ribbon).

- Visitors would be assigned to a specific BLM representative on public outreach and education days and must stay with that person at all times.

- Visitors are NOT permitted to walk around the gather site or temporary holding facility unaccompanied by their BLM representative.

- Observers are prohibited from climbing/trespassing onto or in the trucks, equipment or corrals, which is the private property of the contractor.

- When BLM is using a helicopter or other heavy equipment in close proximity to a designated observation area, members of the public may be asked to stay by their vehicle for some time before being directed to an observation area once the use of the helicopter or the heavy machinery is complete.

- When given the signal that the helicopter is close to the gather site bringing wild horses in, visitors must sit down in areas specified by BLM representatives and must not move or talk as the wild horses are guided into the corral.

- Individuals attempting to move outside a designated observation area would be requested to move back to the designated area or to leave the site. Failure to do so may result in citation or arrest. It is important to stay within the designated observation area to safely observe the wild horse gather.

- Observers would be polite, professional and respectful to BLM managers and staff and the contractor/employees. Visitors who do not cooperate and follow the rules would be escorted off the gather site by BLM law enforcement personnel, and would be prohibited from participating in any subsequent observation days.

- BLM reserves the right to alter these rules based on changes in circumstances that may pose a risk to health, public safety or the safety of wild horses (such as weather, lightening, wildfire, etc.).

Public Outreach and Education Day

- The media and public are welcome to attend the gather any day, and are encouraged to attend on public outreach and education days. On this day, BLM would have additional interpretive opportunities and staff available to answer questions.

- The number of public outreach and education days per week, and which days they are, would be determined prior to the gather and would be announced through a press release and on the website. Interested observers should RSVP ahead through the BLM-Ely District Office number (TBD). A meeting place would be set for each public outreach and education day and the RSVP list notified. BLM representatives would escort observers on public outreach and education days to and from the gather site and temporary holding facility.

Appendix III Standard Operating Procedures for Population-level Fertility Control Treatments

The following implementation and monitoring requirements are part of the Proposed Action Alternative and Alternative B which involves the use of PZP and GonaCon^{TM}:

1. Fertility control vaccine would be administered only by trained BLM personnel or collaborating research partners.

2. The fertility control drug is administered with two separate injections: (1) a liquid dose of fertility Control is administered using an 18-gauge needle primarily by hand injection; (2) the pellets(PZP22) are preloaded into a 14-gauge needle. These are delivered using a modified syringe and jab-stick to inject the pellets into the gluteal muscles of the mares being returned to the range. The pellets are designed to release PZP over time similar to a time-release cold capsule.

3. Mares that have never been treated would receive 0.5 cc of PZP vaccine emulsified with 0.5 cc of Freund's Modified Adjuvant (FMA) and loaded into darts at the time a decision has been made to dart a specific mare. Mares identified for re-treatment receive 0.5 cc of the PZP vaccine emulsified with 0.5 cc of Freund's Incomplete Adjuvant (FIA).

4. Delivery of the vaccine would be by intramuscular injection into the gluteal muscles while the mare is restrained in a working chute. With each injection, the liquid or pellets would be injected into the left hind quarters of the mare, above the imaginary line that connects the point of the hip (hook bone) and the point of the buttocks (pin bone).

5. In the future, the vaccine may be administered remotely using an approved long range darting protocol and delivery system if or when that technology is developed.

6. All treated mares would be freeze-marked on the hip or neck HMA managers to positively identify the animals during the research project and at the time of removal during subsequent gathers.

Monitoring and Tracking of Treatments:
1. At a minimum, estimation of population growth rates using helicopter or fixed-wing surveys would be conducted before any subsequent gather. During these surveys it is not necessary to identify which foals were born to which mares; only an estimate of population growth is needed (i.e. # of foals to # of adults).

2. Population growth rates of herds selected for intensive monitoring would be estimated every year post-treatment using helicopter or fixed-wing surveys. During these surveys it is not necessary to identify which foals were born to which mares, only an estimate of population growth is needed (i.e. # of foals to # of adults). If, during routine HMA field monitoring (on-the-ground), data describing

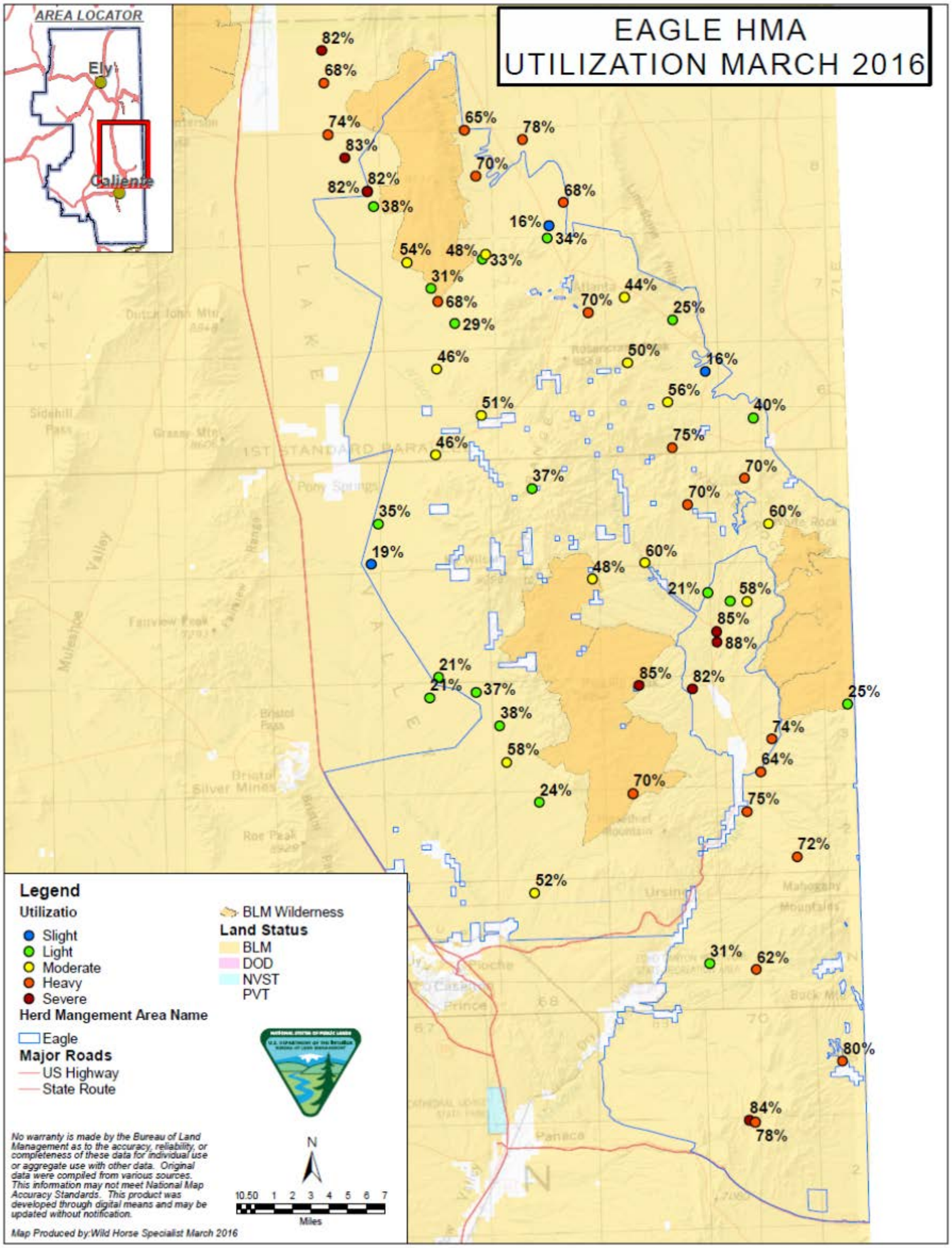
mare to foal ratios can be collected, these data should also be shared with the NPO for possible analysis by the USGS.

3. A fertility Control Application Data sheet would be used by field applicators to record all pertinent data relating to identification of the mare (including photographs if mares are not freeze-marked) and date of treatment. Each applicator would submit an Application Report and accompanying narrative and data sheets would be forwarded to the NPO (Reno, Nevada). A copy of the form and data sheets and any photos taken would be maintained at the field office.

4. A tracking system would be maintained by NPO detailing the quantity of fertility control issued, the quantity used, the number of treated mares by HMA, field office, and State along with the freeze-mark(s) applied by HMA and date.

5. When using GonaCon the horses would need to receive a booster shot at some point and may be held for 30-45 days after the initial treatment.

APPENDIX IV Utilization Map



Appendix V Weed Risk Assessment

RISK ASSESSMENT FOR NOXIOUS & INVASIVE WEEDS

Eagle HMA Gather
Lincoln County, Nevada

In April of 2018 a Noxious & Invasive Weed Risk Assessment was completed for the Eagle Herd Management Area (HMA) wild horse gather. The proposed action is to remove approximately 506 excess wild horses from the Eagle HMA beginning in 2018 in order to achieve and maintain the appropriate management level (AML) and prevent further range deterioration resulting from the current overpopulation of wild horses. The Eagle HMA was last gathered in February 2010 where 646 horses were removed. The Eagle HMA is located in northeastern Lincoln County approximately 50 miles south east of Ely, Nevada, and 20 miles northeast of Caliente Nevada. The HMA encompasses approximately 670,000 acres. The area is within the Great Basin physiographic region, characterized by a high, rolling plateau underlain by basalt flows covered with a thin loess and alluvial mantle.

No field weed surveys were completed for this project. Instead the Ely District weed inventory data was consulted. Currently, the following weed species are found within the Eagle HMA:

Acroptilon repens	Russian knapweed
Carduus nutans	Musk thistle
Centaurea diffusa	Diffuse knapweed
Centaurea stoebe	Spotted knapweed
Cirsium vulgare	Bull thistle
Lepidium draba	Hoary cress
Linaria dalmatica	Dalmatian toadflax
Onopordum acanthium	Scotch thistle
Tamarix spp.	Salt cedar
Tribulus terrestris	Puncturevine

The following noxious and non-native, invasive species are found along roads and drainages leading to the area:

Acroptilon repens	Russian knapweed
Carduus nutans	Musk thistle
Centaurea diffusa	Diffuse knapweed
Centaurea stoebe	Spotted knapweed
Cirsium arvense	Canada thistle
Cirsium vulgare	Bull thistle
Lepidium draba	Hoary cress
Lepidium latifolium	Tall whitetop
Linaria dalmatica	Dalmatian toadflax
Onopordum acanthium	Scotch thistle
Tamarix spp.	Salt cedar
Tribulus terrestris	Puncturevine

The Eagle HMA was last inventoried for noxious weeds in 2015. It should be noted that the Eagle HMA occurs on the Ely District boundary with the Cedar City Field Office. Weed inventory data for this field office is not available. While not officially documented the following non-native invasive weeds probably occur in or around the project area:

Bromus tectorum	Cheatgrass	*Halogeton glomeratus*	Halogeton

Ceratocephala testiculata	Bur buttercup	*Marrubium vulgare*	Horehound
Convolvulus arvensis	Field bindweed	*Salsola kali*	Russian thistle
Elaeagnus angustifolia	Russian olive	*Sysimbrium altissimum*	Tumble mustard
Erodium circutarium	Filaree	*Verbascum thapsus*	Common mullein

Factor 1 assesses the likelihood of noxious/invasive weed species spreading to the project area.

None (0)	Noxious/invasive weed species are not located within or adjacent to the project area. Project activity is not likely to result in the establishment of noxious/invasive weed species in the project area.
Low (1-3)	Noxious/invasive weed species are present in the areas adjacent to but not within the project area. Project activities can be implemented and prevent the spread of noxious/invasive weeds into the project area.
Moderate (4-7)	Noxious/invasive weed species located immediately adjacent to or within the project area. Project activities are likely to result in some areas becoming infested with noxious/invasive weed species even when preventative management actions are followed. Control measures are essential to prevent the spread of noxious/invasive weeds within the project area.
High (8-10)	Heavy infestations of noxious/invasive weeds are located within or immediately adjacent to the project area. Project activities, even with preventative management actions, are likely to result in the establishment and spread of noxious/invasive weeds on disturbed sites throughout much of the project area.

For this project, the factor rates as Moderate (5) at the present time. Given the concentrated use around gather sites and the use of non-certified forage it is likely that project activities will results in new infestations, specifically at the gather sites.

Factor 2 assesses the consequences of noxious/invasive weed establishment in the project area.

Low to Nonexistent (1-3)	None. No cumulative effects expected.
Moderate (4-7)	Possible adverse effects on site and possible expansion of infestation within the project area. Cumulative effects on native plant communities are likely but limited.
High (8-10)	Obvious adverse effects within the project area and probable expansion of noxious/invasive weed infestations to areas outside the project area. Adverse cumulative effects on native plant communities are probable.

This project rates as High (8) at the present time. Aside from along major roads and drainages, such as Meadow Valley Wash and Clover Creek, these HAs are relatively weed free. If new weed infestations spread to the area there would be adverse effects to the surrounding native vegetation. Any increase in cheatgrass or red brome could alter the fire regime in the area.

The Risk Rating is obtained by multiplying Factor 1 by Factor 2.

None (0)	Proceed as planned.
Low (1-10)	Proceed as planned. Initiate control treatment on noxious/invasive weed populations that get established in the area.
Moderate (11-49)	Develop preventative management measures for the proposed project to reduce the risk of introduction of spread of noxious/invasive weeds into the area. Preventative management measures should include modifying the project to include seeding the area to occupy disturbed sites with desirable species. Monitor the area for at least 3 consecutive years and provide for control of newly established populations of noxious/invasive weeds and follow-up treatment for previously treated infestations.
High (50-100)	Project must be modified to reduce risk level through preventative management measures, including seeding with desirable species to occupy disturbed site and controlling existing infestations of noxious/invasive weeds prior to project activity. Project must provide at least 5 consecutive years of monitoring. Projects must also provide for control of newly established populations of noxious/invasive weeds and follow-up treatment for previously treated

	infestations.

For this project, the Risk Rating is Moderate (40). This indicates that the project can proceed as planned as long as the following measures are followed:

- Gather sites will be chosen in previously disturbed areas which are free from noxious weed infestations, to the greatest extent possible.
- Where appropriate, vehicles and heavy equipment used for the completion, maintenance, inspection, or monitoring of ground disturbing activities; or for authorized off-road driving will be free of soil and debris capable of transporting weed propagules. Vehicles and equipment will be cleaned with power or high pressure equipment prior to entering or leaving the work site or project area. Cleaning efforts will concentrate on tracks, feet and tires, and on the undercarriage. Special emphasis will be applied to axels, frames, cross members, motor mounts, on and underneath steps, running boards, and front bumper/brush guard assemblies. Vehicle cabs will be swept out and refuse will be disposed of in waste receptacles. Cleaning sites will be recorded using global positioning systems or other mutually acceptable equipment and provided to the Ely District Office Weed Coordinator or designated contact person.
- Prior to entry of vehicles and equipment to a planned disturbance area, a weed scientist or qualified biologist will identify and flag areas of concern. The flagging will alert personnel or participants to avoid areas of concern.
- Keep removal and disturbance of vegetation would be kept to a minimum through construction site management (e.g. using previously disturbed areas and existing easements, limiting equipment/materials storage and staging area sites, etc.)
- Monitoring of the gather sites will be conducted for at least three years and will include weed detection. Any newly established populations of noxious/invasive weeds discovered will be communicated to the Ely District Noxious and Invasive Weeds Coordinator for treatment.

The Ely District normally requires that all hay, straw, and hay/straw products use in project be free of plant species listed on the Nevada noxious weed list. However, this gather is being implemented through the National Wild Horse & Burro Gather Contract and there are no stipulations in this national contract that require the contractor to provide certified weed-free forage.

Reviewed by: /s/Cameron Boyce 04/29/2018

Cameron Boyce — Date

Caliente Field Office Noxious & Invasive Weeds Coordinator

Appendix VI Eagle Complex 2018 Population Modeling

To complete the population modeling for the Eagle Complex 2018, version 1.40 of the WinEquus program, created February 27, 2018, was utilized.

Objectives of Population Modeling

Review of the data output for each of the simulations provided many use full comparisons of the possible outcomes for each alternative. Some of the questions that need to be answered through the modeling include:

- Do any of the Alternatives "crash" the population?
- What effect does Population growth suppression have on population growth rate?
- What effects do the different alternatives have on the average population size?
- What effects do the different alternatives have on the genetic health of the herd?

Population Data, Criteria, and Parameters utilized for Population Modeling
All simulations used the survival probabilities, foaling rates, and sex ratio at birth that was supplied with the Winn Equus population for the Garfield HMA.

Sex ratio at Birth:
42% Females
58% Males

The following percent effectiveness of Population growth suppression was utilized in the population modeling for Alternative I: Year 1: 94%

The following table displays the contraception parameters utilized in the population model for Proposed Alternative:

Contraception Criteria

Age	Percentages for Fertility Treatment
1	100%
2	100%

Age	Percentages for Fertility Treatment
3	100%
4	100%
5	100%
6	100%
7	100%
8	100%
9	100%
10-14	100%
15-19	100%
20+	100%

Population Modeling Criteria

The following summarizes the population modeling criteria that are common to the Proposed Action and all alternatives:

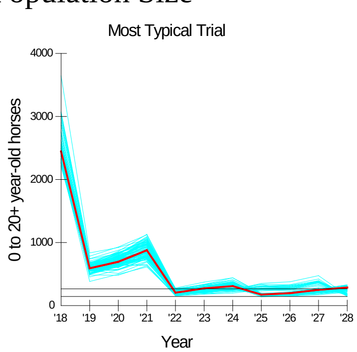
- Starting year: 2018
- Initial Gather Year: 2018
- Gather interval: regular interval of three years
- Gather for fertility treatment regardless of population size: Yes
- Continue to gather after reduction to treat females: Yes
- Sex ratio at birth: 58% males
- Percent of the population that can be gathered: 80%
- Minimum age for long term holding facility horses: Not Applicable (Gate Cut)
- Foals are included in the AML
- Simulations were run for 10 years with 100 trials each

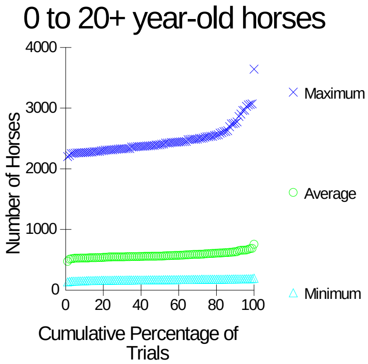
The following table displays the population modeling parameters utilized in the model:

Population Modeling Parameters Modeling Parameter	Alternative A & B: Proposed Action-Gather and Removal of Excess Wild Horses and Application of Population Growth Suppression	Alternative C: Gather and Removal of Excess Wild Horses without Population Growth Suppression.	No Action – Continue Existing Management. No Gather and Removal
Management by removal only	No	Yes	No
Threshold Population Size Following Gathers	145	145	N/A
Target Population Size Following gather	145	145	N/A
Gather for Population Growth Suppression regardless of population size	Yes	No	N/A
Gather continue after removals to treat additional females	Yes	Yes	N/A
Effectiveness of Population Growth Suppression: Year 1	94%	N/A	N/A

Results Alternative A & B: Proposed Action –Gather and Removal of Excess Wild Horses and Application of Population Growth Suppression.

Population Size



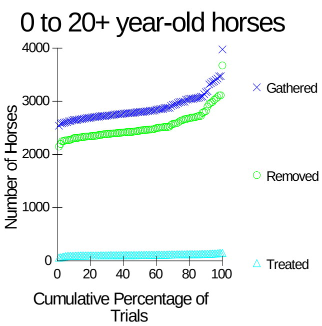


Population Sizes in 11 Years*

	Minimum	Average	Maximum
Lowest Trial	137	475	2202
10th Percentile	156	530	2268
25th Percentile	166	548	2316
Median Trial	172	561	2402
75th Percentile	181	601	2530
90th Percentile	185	633	2764
Highest Trial	197	758	3643

0 to 20+ year-old horses

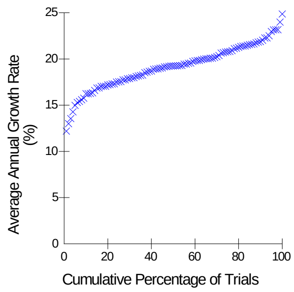
In 11 years and 100 trials, the lowest number 0 to 20+ year-old horses ever obtained was 137 and the highest was 3643. In half the trials, the minimum population size in 11 years was less than 172 and the maximum was less than 2402. The average population size across 11 years ranged from 475 to 758.



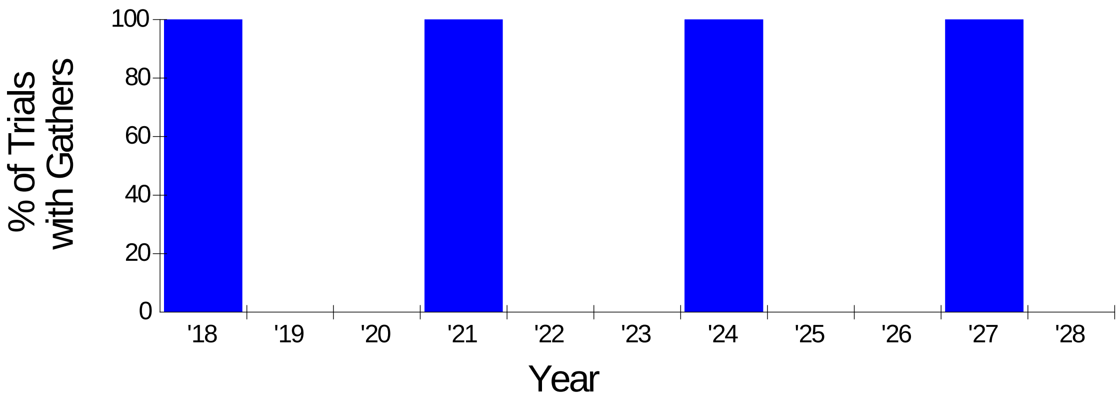
Totals in 11 Years*

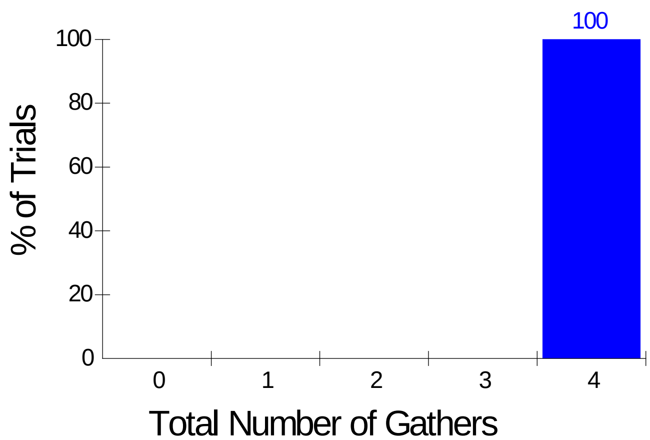
	Gathered	Removed	Treated
Lowest Trial	2542	2147	59
10th Percentile	2649	2308	94
25th Percentile	2716	2368	100
Median Trial	2800	2450	109
75th Percentile	2990	2642	120
90th Percentile	3181	2856	130
Highest Trial	3976	3674	147

0 to 20+ year-old horses



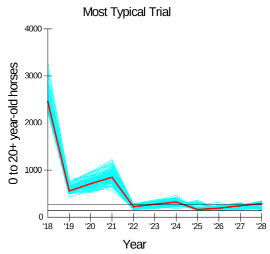
Average Growth Rate in 10 Years	
Lowest Trial	12.2
10th Percentile	16.2
25th Percentile	17.5
Median Trial	19.2
75th Percentile	20.8
90th Percentile	21.9
Highest Trial	24.9

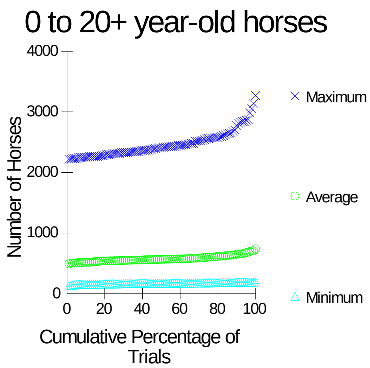




Results Alternative C: Gather and Removal of Excess Wild Horses without Population Growth Suppression

Population Size



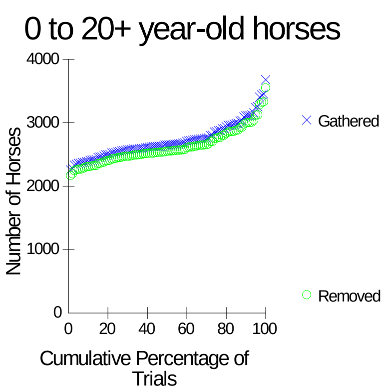


Population Sizes in 11 Years*

	Minimum	Average	Maximum
Lowest Trial	129	491	2217
10th Percentile	154	518	2252
25th Percentile	161	543	2309
Median Trial	170	566	2410
75th Percentile	178	602	2566
90th Percentile	185	652	2794
Highest Trial	194	739	3269

0 to 20+ year-old horses

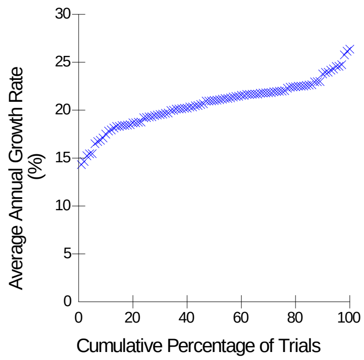
In 11 years and 100 trials, the lowest number 0 to 20+ year-old horses ever obtained was 129 and the highest was 3269. In half the trials, the minimum population size in 11 years was less than 170 and the maximum was less than 2410. The average population size across 11 years ranged from 491 to 739.



Totals in 11 Years*

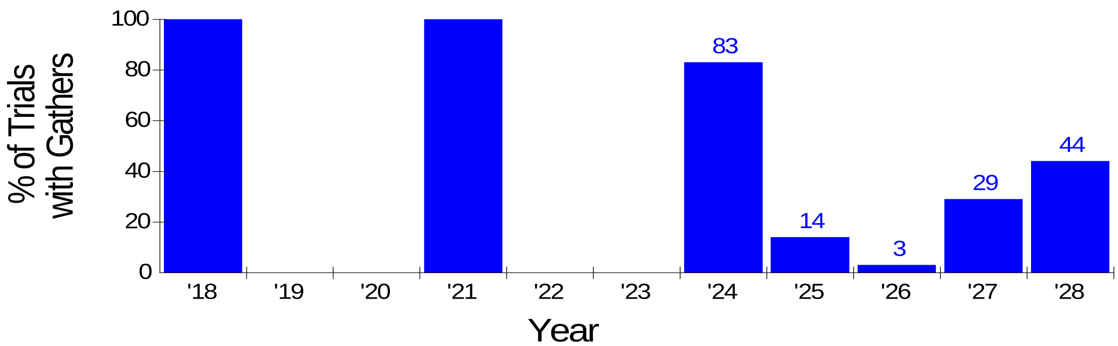
	Gathered	Removed
Lowest Trial	2257	2166
10th Percentile	2398	2310
25th Percentile	2540	2450
Median Trial	2652	2552
75th Percentile	2866	2762
90th Percentile	3112	3000
Highest Trial	3677	3550

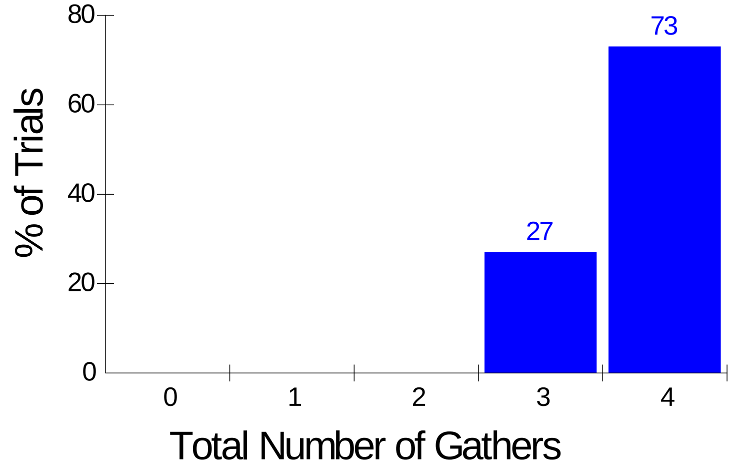
0 to 20+ year-old horses



Average Growth Rate in 10 Years

Lowest Trial	14.3
10th Percentile	17.7
25th Percentile	19.3
Median Trial	21.0
75th Percentile	22.0
90th Percentile	23.9
Highest Trial	26.4

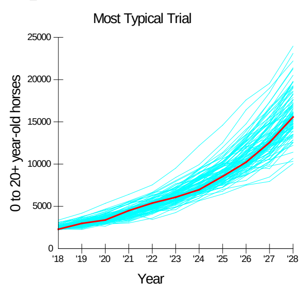




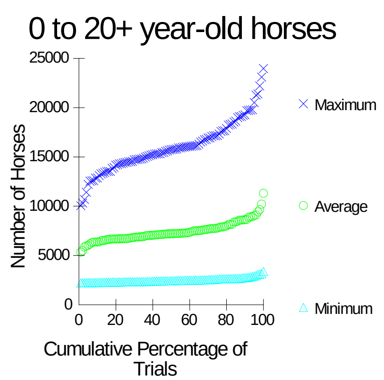
No Action – No Gather, Removal or use of Population Growth Suppression

Results - No Action

Population Size



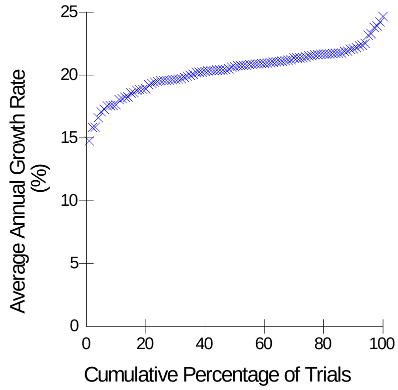
Population Sizes in 11 Years*



	Minimum	Average	Maximum
Lowest Trial	2224	5338	10052
10th Percentile	2256	6370	12988
25th Percentile	2322	6709	14441
Median Trial	2428	7199	15746
75th Percentile	2602	7801	17248
90th Percentile	2752	8639	19482
Highest Trial	3377	11301	23963

0 to 20+ year-old horses

In 11 years and 100 trials, the lowest number 0 to 20+ year-old horses ever obtained was 2224 and the highest was 23,963. In half the trials, the minimum population size in 11 years was less than 2,428 and the maximum was less than 15,746. The average population size across 11 years ranged from 5,338 to 11,301.

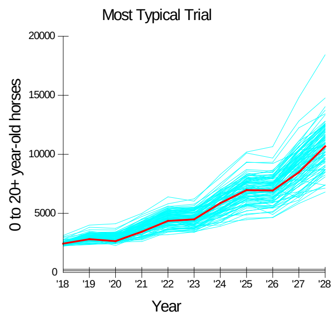


Average Growth Rate in 10 Years	
Lowest Trial	14.8
10th Percentile	17.8
25th Percentile	19.6
Median Trial	20.7
75th Percentile	21.5
90th Percentile	22.1
Highest Trial	24.7

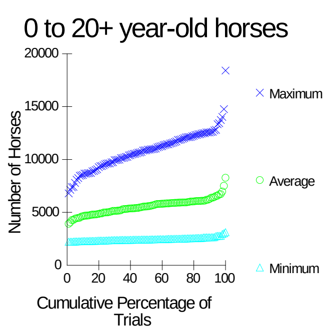
* 0 to 20+ year-old horses

Alternative Considered but Not Analyzed: Population Growth Suppression Only.

Population Size



Population Sizes in 11 Years*

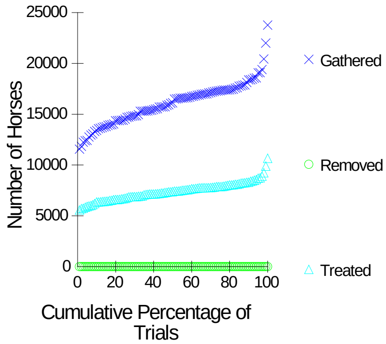


	Minimum	Average	Maximum
Lowest Trial	2225	3923	6794
10th Percentile	2284	4653	8598
25th Percentile	2347	5000	9621
Median Trial	2432	5564	10896
75th Percentile	2532	5948	12101
90th Percentile	2638	6329	12582
Highest Trial	3123	8273	18417

* 0 to 20+ year-old horses

In 11 years and 100 trials, the lowest number 0 to 20+ year-old horses ever obtained was 2,225 and the highest was 18,417. In half the trials, the minimum population size in 11 years was less than 2,432 and the maximum was less than 10,896. The average population size across 11 years ranged from 3,923 to 8,273.

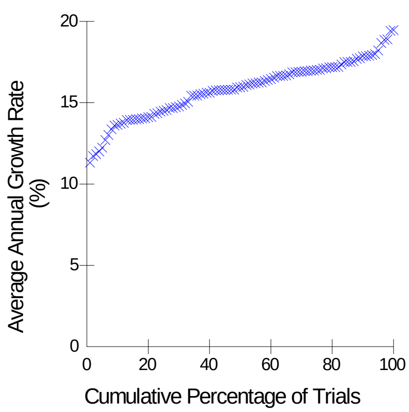
0 to 20+ year-old horses



Totals in 11 Years*

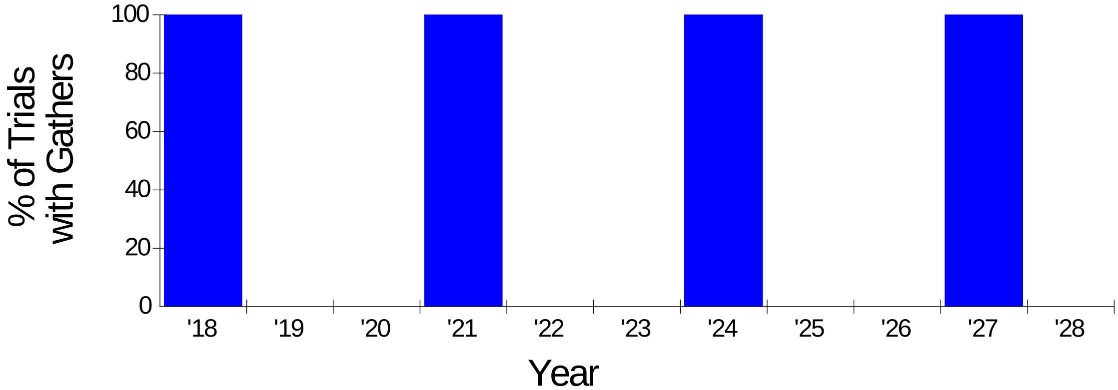
	Gathered	Removed	Treated
Lowest Trial	11557	0	5572
10th Percentile	13488	0	6363
25th Percentile	14600	0	6754
Median Trial	16304	0	7406
75th Percentile	17334	0	7882
90th Percentile	18382	0	8350
Highest Trial	23766	0	10664

0 to 20+ year-old horses



Average Growth Rate in 10 Years

Lowest Trial	11.3
10th Percentile	13.7
25th Percentile	14.5
Median Trial	16.0
75th Percentile	17.0
90th Percentile	17.9
Highest Trial	19.5


% of Trials
with Gathers
100
80
60
40
20
0
'18
'19
'20
'21
'22
'23
'24
'25
'26
'27
'28
Year

Appendix VII Comments and Responses

A preliminary environmental assessment was made available to interested individuals, agencies and groups for a 30 day public review and comment period that opened on May 9, 2018 and closed on June 7, 2018. Comments were received from numerous individuals and agencies. Many of these comments contained overlapping issues/concerns which were consolidated into 65 distinct topics. Below is a detailed summary of the comments received and how BLM used these comments in preparing the final environmental assessment.

No.	Commenter	Comment	BLM Response
Support Gathering Wild Horses			
1.	Southern Nevada Water Authority (SNWA)	SNWA supports BLM management actions that results in a sustainable wild horse population which meets BLM designated AML for the Eagle Complex.	Thank you for the comment.
2.	Lincoln County	The county supports the Proposed Action to gather and remove excess horses to AML. The county supports Alternative C to gather and remove excess horses. Once AML is reached then other population control measures should be used in conjunction with continuing gathers.	Thank you for the comment.
3.	Marilyn Wood Mark Winch N-4 State Grazing Board Iron County Nevada Department of Wildlife	Keeping the Mustangs at AML is so important to keeping the ecosystem and western rangelands healthy.	Thank you for the comment.
4.	Brad Bowler Beaver County	Support Alternative A&B	Thank you for the comment.
5.	Iron County	Iron County is supportive of the three alternatives discussed in the E.A., however use of PZP growth control or GonaCon treatments for fertility control would be more cost effective over the long term if they are in fact effective and can be re-administered within the	Thank you for the comment.

		effective timelines indicated in the document.	
6.	Patrick Glockner	I believe this removal is much needed and offer my help in any way that I can.	Thank you for the comment.
7.			
Oppose Gathering Wild Horses			
8.	Form Letter	I strongly oppose the BLM's Proposed Action in the EA that would • Round up and remove 2,075 horses – 90% of the current population – from the Eagle Complex as well as an unspecified number of horses residing outside the Complex; and • Use fertility control on all mares returned to the range only after the wild horse population is at low AML and only if between 90 and 95 percent of the horses have been rounded up and removed from the Complex.	Thank you for the comment.
9.	Front Range Equine Rescue (FRER)	As the Draft EA recognizes, BLM cannot remove these wild horses from public lands unless "a determination has been made that excess animals are present and removal is necessary." Draft EA at 1 (emphasis added). But the Draft EA fails to explain how removal of approximately 2,075 wild horses is "necessary," and FRER believes that this removal violates BLM's duty to manage the herds "at the minimum feasible level." 16 U.S.C. § 1333(a).	The removal of wild horses to within the 145-265 AML range is described in Section 1.1 *Background* and Section 1.2 *Purpose and Need*. The action is necessary to comply with the provisions of Section 1333 (a) of the Wild Free-Roaming Horses and Burros Act of 1971. The overpopulation of wild horses is causing resource damage and put the health of individual horses at risk. BLM has determined that removal of these excess wild horses is necessary to achieve a thriving natural ecological balance.
10.	Friends of Animals	Friends of Animals strongly opposes the roundup and	Thank you for the comment.

		removal of any wild horses within and around the Eagle Complex. Friends of Animals also opposes the use of fertility control on wild horses as a population management tool.	
		Fertility Control	
11.	Form Letter	Implement a fertility control plan in accordance with the recommendations of the National Academy of Sciences (NAS) in its 2013 report, "Using Science to Improve the BLM Wild Horse and Burro Program: A Way Forward." Immediately vaccinate a sufficient number of mares yearly to attain zero population growth in the shortest amount of time;	The proposed use of fertility controls in Alternatives A and B is in accordance with the NAS recommendations. The use of fertility controls as the sole method of managing the wild horse population is discussed under Section 2.7 Field Darting PZP treatment to reduce population, but was eliminated from further consideration because the proposal would not meet the purpose and need to bring the population back to AML.
12.	The Cloud Foundation	We believe a cost-effective, well-implemented population control plan in conjunction with roundup efforts will be more beneficial for these offices in the long-term, as fertility control will be applied in conjunction with roundups to start suppressing the growth of these herds immediately. Population control efforts are much more humane than roundups, which also, as you know, incur associated holding costs for a program that is already far over budget.	Thank you for your comment. See Sections 2.2 and 2.3 for analysis of those alternatives.
13.	Front Range Equine Rescue	The Draft EA should increase the use of and further emphasize the value of PZP fertility vaccines to slow the reproductive rates of the herd, and de-emphasize gather and removal operations. In particular, the Draft EA should incorporate a PZP application	See response to comment 11.

		into the 2018 management action, rather than only applying PZP in 2018 if all approximately 2,000 wild horses are removed	
14.	Form Letter	Using fertility control is more cost effective over the long run than continuing to remove horses from the range; and	See response to Comment 11. BLM notes that it is in agreement that it is preferable to use fertility controls to reduce the number of excess wild horses that will have to be removed from the range over time, as discussed for Alternatives A and B.
15.	Friends of Animals	The PEA does not take a hard look at the impacts of PZP and GonaCon. Under the Proposed Action, BLM would return to the HMA "periodically" to inject horses with these chemical fertility control drugs. Although BLM references different studies about the negative impacts of PZP, it concludes that PZP contraception appears to be temporary and reversible, and does not appear to cause out-of-season births.	See Section 3.3.1 *Environmental Effects* for an extensive analysis of the impacts of PZP and GonaCon.
16.	Form Letter	The only acceptable and approved fertility control method that is currently available without further research is PZP.	As noted in Section 3.3.1, GonaCon is also an approved fertility control method that has been identified by NAS as a preferred methods.
17.			
Gather methods/ Timing			
18.	Iron County	The BLM needs to consider other alternatives to gather treated horses such as permanent traps around water or feeding areas, where small numbers could be gathered with minimal use of expensive helicopters and crews.	See Section 2.7 for rationale for dismissing this alternative from further analysis.
19.	State of Utah	Recommends gathering horses in either late fall or early winter	Thank you for your comment. BLM would seek

		to remove yearling colts and administer PZP.	to administer PZP between November and February as described in Section 2.2 *Proposed Action*
20.	Form Letter The Cloud Foundation	Utilize only least-intrusive capture methods, such as bait- and water-trapping that are much less expensive and traumatic for the horses than roundups;	Thank you for your comment. BLM would use bait and water trapping when the conditions are such as to make this a suitable gather method.
21.	Friends of Animals	BLM acknowledges that roundups can be stressful for wild horses and indirect impacts could include social displacement or increased conflict between studs. However, BLM fails to acknowledge or discuss the harmful consequences of the stress, specifically the stress caused by helicopter roundups to all horses on the range.	The impacts of helicopter gathers to wild horses described in Section 3.3.1 *Environmental Effects* (pg. 30) apply to all horses on the range. While horses will experience some gather-related stress, such stress is generally of temporary duration.
22.	Friends of Animals	The BLM maintains that helicopters are a humane way of driving wild horses across the land to traps where they can be removed by land-based vehicles. Increasingly, biologists, wild horse advocates, and others disagree. Every indication is that an approaching helicopter produces an equally wide range of emotional and physical responses in a wild horse as it would in a human.	See response to Comment 21. As discussed in Section 3.3.1, helicopter gathers have been used since the late 1970s and have been shown to be a safe and humane method for gathering wild horses.
Costs			
23.	State of Utah	BLM should also include a cost analysis of rehabilitating the rangelands that have seen negative impacts from improper grazing by wild horses.	The Wild Free Roaming Horses and Burros Act (WFRHBA) does not include a cost-based decision-making process if excess horses are present. "Proper range management dictates removal of horses before the herd size causes damage to the range land (118 IBLA 75)." BLM has a responsibility per the

			WFRHBA to remove excess wild horses, ensuring the health of wild horses and the rangeland. Determining the cost of rangeland rehabilitation falls outside the scope of the proposed action.
24.	Form Letter	The final E.A. should include Economic impacts of the Proposed Action to American taxpayers who would be funding this expensive roundup and removal of wild horses from the range;	See response to Comment 23.
25.	The Cloud Foundation	Incurring additional costs to the already costly and inefficient BLM Wild Horse & Burro Program in order to enforce a number deemed arbitrary and unscientific by the nation's leading scientific body seems counterintuitive and ill-advised.	The WFRHBA requires that BLM establish the appropriate management level for wild horses within an HMA, and that BLM remove excess wild horses when necessary to achieve a thriving natural ecological balance.
Number Of Horses Gathered			
26.	Iron County N-4 Grazing Board	We believe the number of planned gather horses should be increased to account for this year's foals.	The goal of the proposed action is to bring the herd numbers to low AML and to maintain the population within AML over a ten-year period. This allows for the removal of the appropriate number of wild horses to achieve that objective.
27.	Iron County	The E.A. indicates that if the initial gather is short of number needing to be removed subsequent gathers would take place over a 10 year period. If this is the case, the BLM needs to adjust the number of wild horses needing to be removed and take into account the annual increase between the initial gather and subsequent gathers.	See response comment 26.
28.	Kena Lytle Glockner	Even though your agency estimates the population at 2,220 animals, I believe the	See response to comment 26.

		numbers are considerably higher since I spend a great deal of time in the 1.1 million acre Wilson Creek Allotment and witness the numerous herds first hand. Because there are so many dense pinion/juniper areas, an aerial count is going to be skewed.	
29.	Kena Lytle Glockner Lincoln County	It is my personal opinion that the wild/feral horse population is much higher than your estimate of 2220. I live within the Eagle Complex and run livestock throughout the entire area. Especially in the last 10 years, I have observed the horse populations grow considerably and their use areas grow. Most importantly, I have observed the extensive damage to the environment and range in their preferred use areas. Along with extensive damage to the native forage, almost all the riparian areas within the Eagle Complex have been damaged extensively. In this complex, a great number of these riparian areas are located on private property and on most, if not all, my family and I own a water right.	See response to comment 26.
30.	Lincoln County	The E.A. should detail a prescribed method to account for annual population increases and incorporate those increases within the gathers and post gather population as it seems likely that several will need to occur to achieve AML.	See response to comment 26.
31.	Lincoln County	Although it is mentioned the E.A. neglects to fully address the many hundreds of horses that reside outside of the designated Eagle Complex.	The proposed action would remove excess wild horses within and outside of the Eagle Complex. By managing wild horses within the complex at AML, there will be sufficient forage and water for the wild horse such that they do not take up residence outside the complex in areas

			not managed for wild horses.
32.	The Cloud Foundation	The proposed removal of 2,075 horses will render the Eagle Complex herds genetically unviable. This proposed removal to a population of 145 horses, as previously stated, would be a 90 percent reduction in herd size. Equine geneticist Dr. Gus Cothran has long stated that in order to remain genetically viable, herds must be 150-200 reproducing animals in size at a minimum.	See section 3.3.1 affected Environment. Hair samples will be taken to monitor genetic diversity and appropriate actions will take place if needed to preserve genetic diversity.
33.	Front Range Equine Rescue Friends of Animals	BLM has failed to consider the impacts of the proposed action in context with the agency's management of wild horses across the United States and in context with recent past gather and removal operations in the Complex. Cumulatively, these gathers are likely to have a major impact on the gene flow and genetic diversity of the herd – scientific assessments that are vital to the survival of these horses.	See response to comment 32.
34.	Front Range Equine Rescue Friends of Animals	the Draft EA does not contain any information regarding what the underlying Ely RMP or Pinyon MFP provided regarding the basis for and potential reevaluation and reconsideration of the AMLs. Instead, the Draft EA simply concludes that the AMLs, even those set more than 30 years ago, continue to be a reasoned basis for BLM's decision to remove wild horses to conform to those AMLs. Draft EA at 20.	A land-use plan amendment must comply with regulatory requirements found at 43 C.F.R. Part 1600. BLM is required to manage wild horses consistent with an existing land-use plan (43 CFR 4710.1 Regulations at 43 CFR 4170.1 require that management actions conform to the existing land-use plan. Such plans are developed over a period of many years and are intended to govern management over an extended period of time.

			There is no basis, at this time, for modifying the AMLs for the Eagle Complex, given that monitoring data confirms that excess wild horses are present and that their removal back to AML is necessary to achieve a thriving ecological balance.
35.	Friends of Animals	The BLM must consider the impacts of its proposed actions on the genetic viability of the wild horses in the Eagle Complex.	See response to Comment 32.
Wild Horse Vs. Livestock Use / AUMS			
36.	Form Letter Friends of Animals	Increase the allowable number of horses (AML) in this Complex to, at minimum, accommodate the current population level, making forage adjustments, as necessary, pursuant to CFR 43 C.F.R. 4710.5(a) to ensure that wild horses are given a fair share of resources on the small amount of public lands designated as their habitat.	Livestock grazing can only be reduced or eliminated if the BLM follows regulations at 43 CFR § 4100 and must be consistent with multiple use allocations set forth in the land-use plan. Forage allocations are addressed at the planning level. Such changes to livestock grazing cannot be made through a wild horse gather decision or through 4710.5(a), and are only possible if BLM first revises the land-use plans to allocate livestock forage to wild horses and to eliminate or reduce livestock grazing. Monitoring data also indicates that wild horses are causing resource degradation, including in areas where there has been no livestock grazing. Not only would removal or reduction of livestock not be in conformance with the existing RMP, it is contrary to the BLM's multiple-use

			mission as outlined in the FLPMA and PRIA, and would be inconsistent with the WFRHBA, which directs the Secretary to immediately remove excess wild horses when such removal is necessary – as is the case in the Eagle Complex. By law, BLM is required to manage wild horses in a thriving natural ecological balance and multiple use relationship on the public lands and to remove excess immediately upon a determination that excess wild horses exist. The WFRHBA requires that wild horses be managed in balance with other multiple uses such as livestock and wildlife – not as an exclusive use of the public lands. BLM cannot use regulations at 43 CFR 4710.5 to manage wild horses and livestock in a manner that is inconsistent with the RMPs. A land-use plan amendment or revision would be necessary to reallocate use in this manner between livestock and wild horses. Livestock adjustments have been made through other actions and documents. The purpose of the EA is not to adjust livestock use. There is no requirement of the WFRHBA or the regulations to reduce or eliminate livestock as a means to restore TNEB. Administration of Livestock grazing on public lands fall

			under 43 CFR Subpart D, Group 4100. Livestock grazing on public lands is also provided for in the Taylor Grazing act of 1934.
37.	Form Letter	Final E.A. should include a complete breakdown of livestock grazing in the Complex as well as the public lands outside of the Complex that are managed by the BLM, including active and actual Animal Unit Months allocations for each of the past five years;	Comment is outside the scope of this environmental assessment. This is not a livestock management action. Information on livestock grazing in the Complex is provided in Section3.3.5.
38.	Form Letter	E.A. should include all data, information, and criteria utilized to delineate the separate impacts of wild horses, livestock, and other wildlife on rangeland resources, including water resources and forage;	See section 3.3.1 of this E.A.
39.	The Cloud Foundation	We feel it would be extremely difficult to point to any direct damage to the land that could be resolved only by reducing the number of wild horses. In the case of legitimate problems with the health of the range, it is critical for these two field offices to take a look at all of the users of the land and their relative impacts, including livestock grazers.	As determined through the land-use planning process, critical habitat components are lacking for management of wild horses within the Eagle HMA, and removal of excess wild horses from the HMA is necessary to protect wildlife habitat and to ensure a thriving natural ecological balance. Monitoring data confirms that wild horses are causing resource damage, including in areas where there has been no livestock grazing.
40.	The Cloud Foundation Friends of Animals	It is unfathomable to us that a determination was made that this land can support more than 55,000 cattle or more than 138,000 sheep but cannot sustain more than 210 wild horses.	See Section 3.3.5 for livestock numbers. The BLM utilizes well established scientific methods in the field of range monitoring, inventory and carrying capacity allocations, following approved methods outlined in official technical

			references and BLM handbooks and manuals. The Field Offices have extensive vegetative trend, utilization, precipitation, actual use, riparian, and rangeland health studies which are contained in the allotment monitoring files.
41.	The Cloud Foundation	According to table 3.3 provided in Section 3.3.5 of the EA, there are 1,581 AUMs in use for part of the year in the Chokecherry and Mt. Elinore HMAs. This number yet again accounts for an exorbitant amount of livestock on a parcel of land the BLM says can only sustain AMLs of 30 and 15 wild horses, respectively. We find this assessment to be extraordinarily misinformed.	Monitoring data that has been collected indicates that wild horses are contributing factors to trampling damage and in some areas are the sole factor. Refer to section 1.1 background.
42.	FRER	BLM does not plan to address any of the other contributing factors impacting achievement of rangeland health objectives, such as by modifying grazing allotments, and provides no quantifying data with respect to which factors are most important for rangeland health. Yet more than half of the nine grazing allotments overlapping with the Complex are being utilized at levels ranging from 37% to 101%	See response to Comment 36.
43.	Friends of Animals	The BLM failed to analyze any action alternative that included an option other than rounding up and permanently removing most of the wild horses. As discussed in more detail below, BLM should circulate an Environmental Impact Statement (EIS) or new Environmental Assessment (EA) that analyzes additional alternatives, including adjusting the	Monitoring data confirms the need to remove excess wild horses to allow for recovery of range resources and for a thriving natural ecological balance. See section 2.6 alternatives considered but eliminated from detailed analysis.

		Appropriate Management Level (AML) in the Eagle HMAs to support additional wild horses and reducing the amount of forage allocated to private ranchers for grazing their domestic cattle and sheep within the HMA.	
44.	Friends of Animals	BLM's states that raising the AML was not considered for detailed analysis because it is not consistent with the WHBA and there is no basis for modifying the AML at this time.	See response to comment 34.
Impacts to gathered wild horses			
45.	Form Letter	Impacts of the proposed removal of 2,075 wild horses on the genetic viability and overall health of the Eagle Complex wild horse population;	See response to Comment 32
46.	Front Range Equine Rescue	Importantly, because the AML for the Eagle HMA is set at a range, it is unreasonable for BLM to take the position that all horses above the low end of its AML are "excess." Draft EA at 2-3. The AML for the Eagle HMA is not 100, and BLM does not explain whether or how its management goals would be materially impacted if, for instance, BLM only gathered "excess" wild horses down to the AML of 210, instead of all the way down to the bare minimum number of 100 wild horses. Yet the number of wild horses gathered and removed obviously can significantly impact herd health, future success and continuation of the gene pool necessary to survival, and conservation.	All horses would not be gathered from the Eagle HMA. See Section 3.3.1 of this E.A. Removal of excess wild horse to the low range of AML is appropriate to allow for a period of several years before AML is exceeded. See Section 2.7 for discussion of consideration and elimination of alternative to gather to high range of AML.
47.	Front Range Equine Rescue	While BLM plans in the future that "[h]air samples would be collected from a minimum of 25 animals returned to the range from each HMA to assess the	See Section 3.3.1 as well as the proposed action and Alternative B 2.2.1.

		genetic diversity and pedigree of the herds," at that point it may be too late to undo the injury to the population. BLM has no plan to collect this data now, which would be the only reasonable and scientifically-based action to take.	
48.	Front Range Equine Rescue	The Draft EA should incorporate current genetic data from the herd and a management plan for ensuring increased and adequate genetic diversity before the 2018 planned gather.	See response to Comment 32 and comment 47.
General			
49.	Lincoln County	Along with vegetative resources in general, the E.A. should detail the consequences of the no action alternative with regard to the numerous rangeland improvements and vegetative rehabilitation projects, both direct and indirect, coupled with target species such as sage grouse deserve greater attention. The horses simply consume any and all newly established and desirable vegetative species as quickly as it grows.	See Section 3.3.7 for analysis of impacts to vegetative resources including rangeland health and vegetation improvements.
50.	Lincoln County	The county would like to emphasize that proper scientific management and following what is prescribed by law is the true direction in which to follow; if the intended goal is a thriving natural ecological balance on our public lands. Horses and our public lands cannot be properly managed by the failed policies of the "far-removed" political, social and emotional arena.	Comment noted. The EA is intended to analyze the options available to the BLM for achieving a thriving natural and ecological balance.
51.	Form Letter	Remedy the conditions that are causing the horses to leave the Eagle Complex by making water improvements, removing livestock fencing and taking	This comment is beyond the scope of this EA which is focused on the impacts of gather operations to resources within the project

		other measures that will allow horses to fully utilize habitat within the designated HMA.	area. Managing wild horses within the AML range will remedy the conditions causing horses to leave the Eagle complex by ensuring sufficient forage and water are available to meet the habitat needs of the wild horses.
52.	Form Letter	I ask that the final EA include the following information: • Impacts to wild horses given the BLM's management plan to Congress that would place the Eagle Complex horses in danger of being killed, sold for slaughter, or sterilized;	Section 1333(b)(1) of the WFRHBA authorizes the Secretary to humanely destroy excess animals for which there is insufficient adoption demand. However, as discussed in Section 3.3.1, a long-standing congressional appropriations rider prohibits BLM from destroying excess wild horses.
53.	The Cloud Foundation	First and foremost, we are concerned about any proposed removals on any herd management area, nationwide, after the National Wild Horse and Burro Advisory Board meeting on October 18-19, 2017 in Grand Junction, CO. There, the board made it quite clear that mass killing is still very much on the table as an option for clearing out the horses in short- and long-term holding. The removal of 2,075 Eagle Complex wild horses could condemn many of them to an uncertain, and potentially lethal, fate.	See response to Comment 52
54.	Front Range Equine Rescue Friends of Animals	Because the Draft EA establishes precedent for BLM's management actions ten years into the future, BLM cannot rely on the Draft EA and instead must prepare an EIS. See Public Citizen v. Dept. of Transp., 316 F.3d 1002, 1023 (9th Cir. 2003) ("If [the] agency's action is	An EA is appropriate where there are no significant impacts. The effects of gathering wild horses is neither highly uncertain nor does it involve unique or unknown risks. There have been hundreds of gathers that have occurred since the passage of the 1971 Wild Free-Roaming Horses and Burros Act that

		environmentally 'significant' according to any of these criteria [set forth in 40 C.F.R. 1508.27], then [the agency] erred in failing to prepare an EIS.").	have been evaluated in environmental assessments and none were found to require an EIS.
55.	Form Letter Friends of Animlas	Detailed annual census information on the wild horse population, both actual counts and projected population numbers, including information about the data on which population projections/estimates are based;	BLM completed a census flight in February 2017 as discussed in Section 1.1. See also Appendix VI for population modeling of the Eagle Complex.
56.	Form Letter	A complete report detailing the current body conditions of the Eagle Complex wild horses as well as the methodology used to determine their body conditions;	The Henneke body condition scoring chart/ system is used by BLM. Current body condition for most horses in the complex appears to be in the 2-4 body condition range (see section 1).
57.	Form Letter	A detailed plan that incorporates the following findings of the NAS's 2013 review of the BLM Wild Horse and Burro Program into the analysis and determination for the Proposed Action: Current management approach of removals is fueling high population growth rates; AMLs lack scientific basis, transparency and equity;	Implementing the recommendations of the 2013 NAS report is not required by law or any other policy. They are recommendations to improve management of wild horses.BLM has determined that management of an AML of 145-265 horses is appropriate, as reflected in the land-use plan. The proposed action is consistent with the NAS recommendations to incorporate greater use of fertility controls in BLM's management of wild horses.

58.	The Cloud Foundation	The Eagle Complex wild horse herds are popular with wild horse advocates, photographers, and tourists. These horses provide an economic benefit through tourism dollars, both locally in Lincoln County, NV and Iron County, UT, as well as for the entire states of Nevada and Utah.	The Eagle Complex will continue to be managed for wild horses; however, BLM is mandated under the WFRHBA to remove excess wild horses when such removal is necessary to ensure a thriving natural ecological balance.
59.	FRER Friends of Animals	BLM violates its legal mandate by removing wild horses pursuant to management action that is anything more than the “minimum feasible level,” including removing horses down to the lowest AML (based on questionable science) when removing a smaller number of animals could also achieve BLM’s management goals.	The WFRHBA mandates the removal of excess wild horses when such removal is necessary to ensure a thriving natural ecological balance. Removing excess wild horses to low AML allows the population to grow for several years without exceeding the high range of AML.
60.	Friends of Animals	The WHBA only authorizes BLM to remove “excess” wild horses in limited circumstances. 12 In making such a management decision, BLM must make a determination that: (1) “an overpopulation [of wild horses] exists on a given area of the public lands,” and (2) “action is necessary to remove excess animals.”13 Moreover, a determination to remove wild horses must be based on, among other things, “the current inventory of lands within his jurisdiction.”14 In interpreting these statutory requirements, BLM has issued guidance that in making an excess determination the authorized officer must first analyze (1) grazing utilization and distribution, (2) trend in range ecological condition, (3) actual use, (4) climate (weather) data, (5) current population inventory, (6) wild horses and	Based on monitoring data indicating that wild horses are causing resource degradation, BLM has determined that an overpopulation of wild horses exists in the Eagle Complex and that removal of these excess animals is necessary to achieve a thriving natural ecological balance. Refer to section 1.4 & 1.5 Relationship to laws, Regulations, and Other Plans under BLM manual 4720-Removal Sec. 4720.1-12: Excess Animals. Excess animals are defined as those animals which must be removed from an area to preserve and maintain a thriving natural ecological balance (TNEB) and multiple-use relationship in that area.

		burros located outside the HMA in areas not designated for their long-term maintenance, and (7) other factors such as the results of land health assessments which demonstrate removal is needed to restore or maintain the range in a thriving, natural ecological balance. Such determination should be made prior to every removal.	This definition includes wild horses or burros located outside the HMA in areas not designated for their long-term maintenance. TNEB occurs when wild horses are managed in a manner that assures significant progress is made toward achieving land health standards. Available data shows that the current overpopulation of wild horses is leading to range deterioration both within the HMA and outside the HMA, and that excess animals need to be removed to allow for a thriving natural ecological balance. This excess determination is consistent with the WFRHBA, its implementing regulations, and BLM guidance. Areas outside the Eagle HMA are not designated for long term management of wild horses because wild horses were not present at passage of the WFRHBA, there is insufficient habitat for wild horses or the lands are being managed for other resource values (such as sensitive or T&E species habitat) that are adversely impacted by wild horses. Excess wild horses in these non-HMA areas negatively impact riparian and vegetative resources, leading to declining health of ecological sites which do not meet land health standards. Because these areas are not designated for long term management of wild horses, the excess wild

			horses outside of the Eagle HMA are not managed to achieve and maintain a TNEB however, these lands are managed in a manner designed to meet land health standards, as the population of excess wild horses outside of the Eagle HMA increases and overutilization occurs, the risk of ecological sites failing to achieve or make progress toward achieving land health standards also increases.
61.	Friends of Animals	Additional NEPA analysis is needed on the following: (1) the impact of the proposed action and alternatives on the genetic viability of the wild horse population in the Eagle Complex; (2) the impacts of fertility control measures; (3) the positive impacts of wild horses on the environment; and (4) the behavioral and physiological impacts of BLM's proposed action and alternatives on wild horses.	These impacts are discussed in Section 3.3.1 *Environmental Effects*
62.	Friends of Animals	According to BLM's own guidance and applicable land use plans, BLM is required to monitor the population and genetic health of the wild horse populations. BLM admits that it has conducted several roundups in the past years, but its PEA is completely void of any information about the impacts of these roundups on the genetic variability and viability of these wild horse herds. In fact, the PEA includes no genetic reports on the wild horses in the Eagle Complex.	See response to Comment 32
63.	Friends of Animals	Studies demonstrate that wild horses support healthy ecosystems on public land if given sufficient habitat and left alone.39 For example, wild	Comment noted. Monitoring data indicates that there is an overpopulation of wild horses in the Eagle

		horses help spread plant seeds over large areas where they roam. Wild horses do not decompose the vegetation they ingest as thoroughly as ruminant grazers, such as cattle or sheep, which allows the seeds of many plant species to pass through their digestive tract intact into the soil that the wild horses fertilize by their droppings. Wild horses also help to prevent catastrophic fires and help to build more moisture-retaining soils. Soil moisture dampens out incipient fires and makes the air coating the earth moister.	Complex and that excess wild horses need to be removed to achieve a thriving natural ecological balance.
64.	Friends of Animals	The PEA concludes, again with no support, that "this alternative would allow for a steady increase in the wild horse populations which would continue to exceed the carrying capacity of the range and would cause increasing damage to the rangelands until severe range degradation or natural conditions that occur periodically—such as blizzards or extreme drought—cause a catastrophic mortality of wild horses" in the Eagle Complex.	The current overpopulation of wild horses is causing damage to rangeland resources. The no action alternative describes the potential environmental impacts if excess wild horses are not removed.
65.	Friends of Animals	There are valleys in the West where wild horse herds do not increase because they are kept in check by mountain lions.56 Managing wild horses naturally is not only free and sustainable, but also ensures that wild horses remain as they should—wild	Wild horse population growth and the current number of wild horses within the Eagle Complex indicates that natural predation by mountain lions is not a viable approach to keep herd numbers at AML.