U.S. Department of the Interior

Bureau of Land Management

Decision Record

DOI-BLM-UT-C010-2018-0054-EA

February 28, 2018

North Hills Wild Horse Herd Management Area Plan and Gather Plan

Location: Iron and Washington Counties, Utah

U.S. Department of the Interior
Bureau of Land Management
Cedar City Field Office

INTRODUCTION

The North Hills Joint Management Area (JMA) contains approximately 74,000 acres and is located within an east-west trending mountain range approximately 2 miles northwest of Enterprise, Utah. The JMA averages from 5,500 to over 6,000 feet in elevation, and supports vegetation types of sagebrush/grassland with pinyon and juniper encroachment. The pinyon and juniper trees dominate the JMA and are very dense with minimal under story forage.

The Bureau of Land Management (BLM) Cedar City Field Office (CCFO) and Dixie National Forest Service Pine Valley Ranger District (USFS) have prepared the North Hills Wild Horse Management Area Plan (HMAP) and Gather Plan Environmental Assessment (EA) to establish short and long term management and monitoring objectives for the wild horse herd and their habitat. These objectives will guide management of the North Hills JMA wild horse herd until policies, regulations, laws or land use plans (LUP) change significantly. The gather and removal will occur to meet population management and HMAP objectives.

Alternatives 2, 4 and 5 involve the capture, removal, treatment and release of wild horses from within and adjacent to the North Hills JMA. These alternatives call for a phased-in approach to reach Appropriate Management Level (AML) as quickly as possible over a six to ten year period by removing excess animals and implementing fertility control. Gathers will remove excess wild horses from the JMA and areas adjacent to the JMA. The population growth suppression management will be used in an attempt to slow population growth by treating captured mares with fertility control vaccine PZP-22 (Porcine Zona Pellucida) or GonaCon. It is also anticipated that once the AML is reached, this approach will help maintain population size within the AML, and extend the time between gather operations. It will also reduce the number of excess wild horses that will need to be removed.

The BLM and USFS are proposing to capture and remove excess wild horses from within and adjacent to the JMA to reduce and maintain the population to within the AML. It is estimated that after the first gather, additional gathers over the next 10 years will be needed to reach and maintain the population within the AML. After the initial gather, the target removal number will be adjusted as needed based on population inventories for the JMA that identify the remaining number of excess animals over the AML. Mares chosen for release to the JMA after capture may be treated with fertility control vaccines to reduce the population growth. This will exclude mares released to improve or maintain genetics within the JMA.

STIPULATIONS

The HMAP and gathers will be accomplished using the design features and standard operating procedures contained in DOI-BLM-UT-C010-2018-0054-EA. The gather design features include, but are not limited to the following.

- Gather operations would be conducted in accordance with the Comprehensive Animal Welfare Program (CAWP) and/or the National Wild Horse Gather Contract as adjusted or amended through the National and State wild horse and burro program direction. These documents can be found here: https://go.usa.gov/xQHCD. When gather objectives require gather efficiencies of 50-80% or more of the animals to be captured from multiple gather sites (traps) within the North Hills JMA, the helicopter drive method and helicopter assisted roping from horseback will be the primary gather methods used. To the extent possible gather sites (traps) will be located in previously disturbed areas. Post-gather, if horses are released back into the JMA, effort would be made to return released animals to the same general area from which they were gathered.
- Helicopter trap sites and temporary holding facilities would not be constructed on riparian resources.
- Given a summer or early fall gather window, bait and/or water trapping may be used provided the gather operations timeframe is consistent with current animal and resource conditions. Bait and/or water trapping may also be selected in other special circumstances as appropriate.
- An Animal and Plant Inspection Service (APHIS) or other licensed veterinarian may be on-site during future gathers, as needed, to examine animals and make recommendations to BLM for care and treatment of wild horses. Decisions to humanely euthanize animals in field situations will be made in conformance with BLM policy.
- Animals would be removed using a selective removal strategy. Selective removal criteria for the North Hills HMA include: (1) First Priority: Age Class Five Years and Younger; (2) Second Priority: Age Class Six to Fifteen Years Old; (3) Third Priority: Age Class Sixteen Years and Older.
- Removal of animals from outside the JMA and on lands not managed by the BLM/FS would be given priory where possible.
- Data including sex and age distribution, reproduction, survival, condition class information (using the Henneke rating system), color, size and other information may also be recorded, along with the disposition of that animal (removed or released).
- All horses identified to remain in the JMA population would be selected to maintain a diverse age structure, herd characteristics and body type (conformation).
- Hair and/or blood samples would be acquired approximately every 10 years, to determine whether BLMs management is maintaining acceptable genetic diversity (avoiding inbreeding depression).
- Post-gather, efforts would be made to return released animals to the same general area from which they were gathered.

- Any burros residing within the boundaries of the North Hills JMA will be removed during the regular gather cycle.
- During gathers 1-3 studs and/or mares from a different HMA, with similar or desired characteristics of the horses within the North Hills JMA could be released to maintain the genetic diversity on the JMA.
- Any horses or burros gathered and determined, with consultation between BLM, USFS and Utah State brand inspectors, to be domestic animals will be turned over to the local brand inspector in accordance with state law. This is in accordance with the Cooperative Agreement between The Department of Agriculture, State of Utah and the Utah State Office, BLM approved January of 2001.
- Excess animals would be transported to a BLM or USFS facility where they would be cared for in accordance with the WFRHBA, most current regulations and policies (i.e. prepared (freeze-marked, vaccinated and de-wormed) for adoption, sale or long-term holding).
- Public notifications would be sent out to the press and public before a gather operations would occur. These public notifications would inform the public of viewing opportunities and where information on the gather operations can be found.
- Funding limitations and competing priorities may require delaying the gather and population control component which would increase the number of horses that would need to be gathered.
- Population inventories and routine resource/habitat monitoring would continue to be completed to document current population levels, growth rates and areas of continued resource concern (horse concentrations, riparian impacts, over-utilization, etc.) throughout the project.
- Any follow-up gather activities would be conducted in a manner consistent with those described for the 2019 gather and when possible would be conducted during the period November through February which is identified for maximum effectiveness of the fertility control vaccines.
- Bait or water trapping could be conducted throughout the year, but if done in the summer mares being treated with fertility control would be held until October before release.
- The procedures to be followed for implementation of fertility control are detailed in https://go.usa.gov/xQHCD
- Decisions to humanely euthanize animals in field situations will be made in conformance with BLM policy (Washington Office Instruction Memorandum 2015-070) or current policy.

DECISION

It is my decision to implement the Proposed Action (Alternative 2) as described in the North Hills Wild Horse Management Area Plan and Gather Plan (DOI-BLM-UT-C010-2018-0054-EA). This decision is effective immediately pursuant to 43 CFR 4770.3(c).

RATIONALE

As identified in the North Hills Wild Horse Management Area Plan and Gather Plan EA, excess wild horses are present within the North Hills JMA and need to be removed to restore a thriving natural ecological balance within a multiple use mandate. The current population of wild horses within the North Hills JMA as of March 1, 2018 is estimated to be 212 head. This number is the direct count of a population inventory using the Simultaneous Double-observer method on August 31, 2017. It is estimated that in the spring of 2018 the foal crop, and survival rate of those foals, increased the estimated wild horse population within the JMA by 20 percent. When the 20 percent increase of the 2018 spring foal crop is added to the population inventory, estimated population in the JMA is estimated at 254 head or 425 percent of the AML. By July of 2019, the estimated population will be 305 head. The BLM and USFS are proposing to capture and remove approximately 213 horses in 2019. Rough terrain and heavy tree cover in the JMA makes gathering wild horses difficult requiring multiple gathers in a 10 year period to achieve and maintain AML.

Analysis of ongoing monitoring data indicates that wild horses are degrading rangeland health through heavy and severe utilization levels, trailing, and trampling of riparian areas. Furthermore, the current drought cycle has substantially reduced forage and water availability for wild horses, resulting in near emergency conditions particularly in the lower elevations. The perennial key forage species have exhibited minimal growth and perennial grasses have not recovered in some locations. Heavy and severe utilization levels by wild horses due to an overpopulation of wild horses in excess of the AML have further compounded the issue.

Excess wild horses are competing heavily with native wildlife including elk, mule deer, and pronghorn, which also depend on these areas for forage and water. In order to allow for drought recovery and upward trends in rangeland health, protect wildlife habitat, ensure long term health and success of wild horses and prevent widespread starvation and death of individual animals due to lack of forage during future seasons, gathers must be conducted to remove excess wild horses.

The Proposed Action will implement a Herd Management Area Plan (HMAP) consistent with the authority provided in 43 CFR 4700 and the 1971 Wild Free-Roaming Horses and Burros Act (WFRHBA). The HMAP is needed to manage wild horses within the North Hills JMA to maintain the herd as a self-sustaining population of healthy animals in balance with other uses and the productive capacity of their habitat. Updates and revisions of the North Hills HMAP will occur with additional public input when policies, regulations, laws or LUP change significantly.

Alternatives 1, 4 and 5, which do not include an HMAP, all meet the Purpose and Need in part, but would result in more excess wild horses being gathered and removed over the next 10-20 year period, resulting in greater disturbance to individual horses and the herd than the Proposed Action (Alternative 2). The No Action HMAP Alternatives would result in increased risk and cost to gather more horses compared to Alternative 2. The use of Population Growth Suppression is expected to reduce the population growth rate on the JMA.

The Proposed Action HMAP includes management direction to monitor and maintain wild horse health in the North Hills JMA. The genetic health will be monitored through genetic testing. The introduction of 1-3 horses from other HMAs with similar characteristics will maintain the genetic diversity of this small herd. Objectives, including the maintenance and development of water and vegetative projects within the JMA, will help to improve wild horse habitat. The improvement to water sources, vegetative and riparian development protection, and monitoring will assure that water and forage is available for wild horse populations within the JMA even during times of drought or severe weather.

The gather is necessary to remove excess wild horses and to bring the wild horse population within the established AML range in order to achieve and maintain a thriving natural ecological balance between wild horses and other multiple uses as required under Section 1333(a) of the 1971 Wild Free Roaming Horses and Burros Act (WFRHBA) and Section 302(b) of the Federal Land Policy and Management Act of 1976.

The BLM is required to manage for multiple uses to avoid degradation of public rangelands, and the removal of excess wild horses is necessary to protect rangeland resources from further deterioration or impacts associated with the current overpopulation of wild horses within the North Hills JMA. This action will help achieve, then maintain population size within the AML of 40-60 head, reduce the number of wild horses that need to be removed, and extend the time between gathers beyond this action.

The Proposed Action is in conformance with the BLM's *Pinyon Management Framework Plan (MFP)* approved in 1983 and the Dixie National Forest Land and Resource Management Plan, approved in 1986, as amended.

Leaving excess wild horses on the range under the No Action Alternative would not comply with the WFRHBA, applicable regulations and Bureau policy, or current land use plans. The No Action Alternative would result in continued deterioration of rangeland resources, including vegetative, soil and riparian resources, and could potentially result in the irreversible loss of native vegetative communities. Wild horses would continue to relocate in increasing numbers to areas outside the JMA boundaries due to competition for limited water and forage within the JMA, adversely impacting public and private land resources not designated for wild horse management. The No Action Alternative also would increase the likelihood of emergency conditions arising, leading to the death or suffering of individual animals or to an emergency gather in order to prevent suffering or death due to insufficient forage or water.

PUBLIC INVOLVEMENT

Public involvement was initiated on March 2, 2018 by posting the Proposed Action on BLM's ePlanning website. Iron and Washington county commissioners have been in contact with the BLM requesting the removal of excess wild horses from private and public lands to within the AML. County resolutions have been passed to manage wild horse population with the counties at the AML as directed by the WFRHBA. Additional requests for removal of wild horses from private and state lands have been received from the State of Utah and landowners adjacent to the JMA.

DOI-BLM-UT-C010-2018-0054-EA was available for review and comment on the ePlanning website at https://go.usa.gov/xUbjB. Hard copies were available from the Cedar City Field Office at the above address from July 12 to August 14, 2018. Comments were received in writing, email and through ePlanning. E-mail comments and form letters were received from approximately 5,000 individuals. Approximately 4,800 of these letters were in a form letter format. Comments received after August 14, 2018 were not accepted. Many of these comments contained overlapping issues/concerns which were consolidated into 79 comments. Many of the comments could be clarified or answered by referring to sections within the EA. Others were outside the scope of the document. All comments were considered, but only those which included substantive comments were addressed in Appendix 8 of the EA. Changes were made to the EA based upon comments and public involvement. Comments which only stated personal opinion or support/opposition to the gather but are not substantive, or are outside of the scope of the EA are included in the case file at the Cedar City Field Office.

As required by regulation [43 CFR 4740.1(b)], a public hearing was held in Vernal, Utah on December 11, 2018 and will be held in subsequent years to discuss the use of helicopters and motorized vehicles in the management of Utah BLM's wild horses and burros. This meeting will be advertised in papers and radio stations statewide. The specific gather(s) that may occur within the state of Utah over approximately the next 12 months will be addressed at that public meeting. Similar meetings have been held each year in Utah since the passage of the Federal Land Policy and Management Act of 1976. Comments received from the public comment period and at the public meetings will be considered and, if applicable, addressed in management actions, NEPA documents, and decision documents using the most current direction from the National Wild Horse and Burro Program.

AUTHORITY

The authority for this Decision is contained in Section 1333(a) of the 1971 Free-Roaming Wild Horse and Burro Act, Section 302(b) of the Federal Land Policy and Management Act (FLPMA) of 1976, and Code of Federal Regulations (CFR) at 43 CFR §4700.

APPEAL PROCEDURES

The Proposed Action (Alternative 2) as described in the North Hills Wild Horse Management Area Plan (HMAP) and Gather Plan Environmental Assessment (EA) DOI-BLM-UT-C010-2018-0054-EA is approved for implementation upon issuance in accordance with 43 C.F.R. § 4770.3 (c) because the action is necessary to preserve and maintain a thriving ecological balance and multiple use relationship. This decision may be appealed to the Interior Board of Land Appeals, Office of Hearings and Appeals, in accordance with provisions found at 43 CFR Part 4.

If you wish to appeal this decision, it may be appealed to the Interior Board of Land Appeals, Office of the Secretary, in accordance with 43 CFR part 4. If you appeal, your appeal must **also** be filed with the Bureau of Land Management at the following address:

Paul N. Briggs, Field Manager
BLM, Cedar City Field Office
176 E. DL Sargent Drive
Cedar City, Utah 84721

Your appeal must be filed within thirty (30) days from receipt or issuance of this decision. The appellant has the burden of showing that the decision appealed from is in error. If you wish to file a petition pursuant to regulation 43 CFR 4.21 (58 FR 4942, January 19, 1993) for a stay (suspension) of the decision during the time that your appeal is being reviewed by the Board, the petition for stay must accompany your notice of appeal. Copies of the notice of appeal and petition for a stay must also be submitted to:

Interior Board of Land Appeals
Office of Hearing and Appeals
801 N. Quincy Street, Suite 300
Arlington, VA 22203

A copy must also be sent to the appropriate office of the Field Solicitor at the same time the original documents are filed with the above office:

Office of the Regional Solicitor
6201 Federal Building
125 South State Street
Salt Lake City, UT 84138-1180

If you request a stay, you have the burden of proof to demonstrate that a stay should be granted. A petition for a stay is required to show sufficient justification based on the following standards:

1. The relative harm to the parties if the stay is granted or denied.
2. The likelihood of the appellants success on the merits.
3. The likelihood of immediate and irreparable harm if the stay is not granted.
4. Whether the public interest favors granting the stay.

The Office of Hearings and Appeals regulations do not provide for electronic filing of appeals, therefore they will not be accepted.

Paul N. Briggs
Cedar City Field Office Manager

Feb 28, 2019
Date

Attachment
Environmental Assessment DOI-BLM-UT-C010-2018-0054-EA
Finding of No Significant Impact (DOI-BLM-UT-C010-2018-0054-EA)

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

Finding of No Significant Impact

DOI-BLM-UT-C010-2018-0054-EA

February 28, 2019

North Hills Wild Horse Herd Management Area Plan and Gather Plan

Location: Iron and Washington Counties, Utah

U.S. Department of the Interior

Bureau of Land Management

Cedar City Field Office

INTRODUCTION

The Bureau of Land Management (BLM) has conducted an environmental analysis (DOI-BLM-UT-C010-2018-0054-EA) to establish short and long term management and monitoring objectives for the North Hills wild horse herd and its habitat through a Herd Management Area Plan (HMAP). These objectives will guide management of the North Hills Joint Management Area (JMA) wild horse herd until policies, regulations, laws or land use plans change significantly. The environmental analysis was also conducted to authorize wild horse gathers to remove excess wild horses until the North Hills Joint Management Area (JMA) wild horse population reaches the lower Appropriate Management Level (AML) within 10 years. The gather and removal will occur to meet population management and HMAP objectives. The first gather is planned for some time in 2019, but could occur in later years. The 10 year time frame will begin after the first gather is completed. If the lower AML is reached before the end of the 10 year period, additional gathers will be conducted to maintain the wild horse population in the North Hills JMA to within the AML. The gather, removal and population growth suppression numbers will vary over the 10 year period to accomplish the objective of achieving and maintaining the wild horse population within the AML.

FINDING OF NO SIGNIFICANT IMPACT

Based upon a review of the EA and the supporting documents, I have determined that the project is not a major federal action and will not significantly affect the quality of the human environment, individually or cumulatively, with other actions in the general area. No environmental effects meet the definition of significance in context or intensity as defined in 40 CFR 1508.27, nor do the environmental effects exceed those described in the Pinyon Management Framework Plan (1983) or the Dixie National Forest Land and Resource Management Plan (1986), as amended. Therefore, an environmental impact statement is not needed. This finding is based on the context and intensity of the project as described below.

Context: The project is a site-specific action on BLM and USFS administered public land and does not in and of itself have international, national, regional, or statewide importance. The HMAP and gathers will occur in the North Hills JMA located in Iron and Washington counties, Utah.

Intensity: The following discussion is organized around the Ten Significance Criteria described in 40 CFR 1508.27 and incorporated into resources and issues considered (includes supplemental authorities Appendix 1 H-1790-1) and supplemental Instruction Memorandum, Acts, Regulations and Executive Orders. The following have been considered in evaluating intensity for this proposal.

Impacts may be both beneficial and adverse: The environmental analysis considered both the beneficial and adverse impacts of the Proposed Action on resources and issues as described in the EA. The HMAP and gather plan is consistent with the standards for rangeland health, and will maintain a thriving natural ecological balance and multiple use relationship consistent with other resource needs as

required under the Wild Free-Roaming Horses and Burros Act (WFRHBA). The HMAP outlines management and monitoring objectives that will benefit wild horse health through improved monitoring and habitat. The gathers, removals and population growth suppression will benefit the health of the rangeland by decreasing the utilization of vegetation and water by wild horses. These actions will benefit riparian and soils resources, as well. A decrease in competition for forage will benefit livestock grazing and wildlife. A decrease in wild horse numbers will reduce soil compaction from horse trampling. Wild horses will be impacted by being gathered and removed from the range. Design features and Comprehensive Animal Welfare Program (CAWP) will be implemented to reduce impacts to wild horses during the gathers. (see Alternative 2 and Appendix 6 of the attached EA)

None of the environmental impacts disclosed above and discussed in detail in the EA are considered significant.

The degree to which the selected alternative will affect public health or safety: The HMAP will establish short and long-term management objectives for the wild horse herd and habitat within the JMA. It will have no effect on public health or safety. The gathers will be conducted in accordance with the specifications and procedures outlined in the EA, insuring compliance with all health and safety regulations and requirements.

Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farm lands, wetlands, wilderness, wild and scenic rivers, or ecologically critical areas: The project area is not proximate to any park lands, wild and scenic rivers, or ecologically critical areas. The HMAP and gathers will have no effect to significant cultural resources. The capture locations will be located in areas of existing disturbance. The possibility of finding intact cultural resources in these areas is minimal to non-existent. If an existing disturbed area cannot be located for a capture area, a cultural resource inventory will take place prior to the gather. If cultural resources are located during this inventory, the capture area will be moved to another location which does not contain cultural resources.

The degree to which the effects on the quality of the human environment are likely to be highly controversial: No anticipated effects have been identified that are scientifically controversial. Comments received during the public comment period for the EA provided no expert scientific evidence supporting claims that the project will have significant effects. Some comments expressed concern that current gather policies are disputed by the National Academy of Sciences, in the findings and recommendations of its report, "Using Science to Improve the BLM Wild Horse and Burro Program: A Way Forward." It is the opinion of the authorized officer that nothing in this report refers to the scientific community being in dispute about the proposed action nor is the proposed action controversial in the scientific community.

The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks: The proposal is not the first of its kind, neither are the effects of gathering wild horses highly uncertain nor involve unique or unknown risks. There have been hundreds of like actions that have occurred since the passage of the 1971 Wild Free-Roaming Horses and Burros Act that have been evaluated in environmental assessments and none were found to require an EIS.

The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration: The Proposed Action will not establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration. Actions were considered by an interdisciplinary team within the context of past, present, and reasonably foreseeable future actions. Any future projects within the

area or in the surrounding areas will be analyzed on their own merits and implemented or not, independent of the actions currently selected. An analysis of the direct, indirect, and cumulative effects of the selected alternative, and all other alternatives considered, is described in Chapter 4 of the EA.

Whether the action is related to other actions with individually insignificant but cumulatively significant impacts - which include connected actions regardless of land ownership: The interdisciplinary team evaluated the possible actions in context of past, present and reasonably foreseeable actions. Significant cumulative effects are not predicted. A disclosure of the effects of the action is contained in Chapter 4 of the EA.

The degree to which the action may adversely affect districts, sites, highways, structures, other objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources: This HMAP and gather will not affect significant cultural resources. The capture locations will be located in areas of existing disturbance. The possibility of finding intact cultural resources in these areas is minimal to non-existent. If an existing disturbed area cannot be located for the capture locations, a cultural resource inventory will take place prior to the gather. If cultural resources are located during this inventory, the capture location will be moved to another location, which avoids or does not contain the cultural resources.

The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973, or the degree to which the action may adversely affect: 1) a proposed to he listed endangered or threatened species or its habitat, or 2) a species on BLM's sensitive species list: No Endangered, Threatened or Candidate species have been documented within the North Hills JMA. There is the potential that wild horses might trample and collapse underground dens and burrows of species such as the kit fox, pygmy rabbit, and burrowing owl. If occupied dens are collapsed, the inhabitants could be crushed and killed. If they are not killed, additional stress and energy could be expended to dig out the collapsed burrow or dig a new burrow, which could affect the individual fitness of the animal. Temporary displacement may occur during the gather however, the impacts are expected to be minimal to these species.

Whether the action threatens a violation of a federal, state, local, or tribal law, regulation or policy imposed for the protection of the environment, where non-federal requirements are consistent with federal requirements: The Proposed Action will not violate or threaten any Federal, State, or local law or requirement imposed for the protection of the environment. Applicable laws and regulations were considered in the EA. State, local and tribal interests were presented with the opportunity to participate in the environmental analysis process.

Paul N. Briggs
Cedar City Field Manager

Feb 28, 2019
Date

U.S. Department of the Interior
Bureau of Land Management
Environmental Assessment
DOI-BLM-UT-C010-2018-0054-EA

NORTH HILLS WILD HORSE HERD MANAGEMENT AREA PLAN AND GATHER PLAN

February 2019

U.S. Department of the Interior
Bureau of Land Management
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1.0 Purpose and Need for the Proposed Action

1.1 Introduction

This Environmental Assessment (EA) has been prepared to analyze a Herd Management Area Plan (HMAP) for the North Hills Herd Management Area (HMA) and North Hills Wild Horse Territory (WHT). These two areas combined will be referred to as the North Hills Joint Management Area (JMA). This area is located in the Bureau of Land Management Cedar City Field Office (BLM) and Dixie National Forest Service Pine Valley Ranger District (USFS). A Memorandum of Understanding between the CCFO and USFS was signed in March 2018. This document authorizes the CCFO to be lead agency for this EA, with the USFS being a cooperating agency.

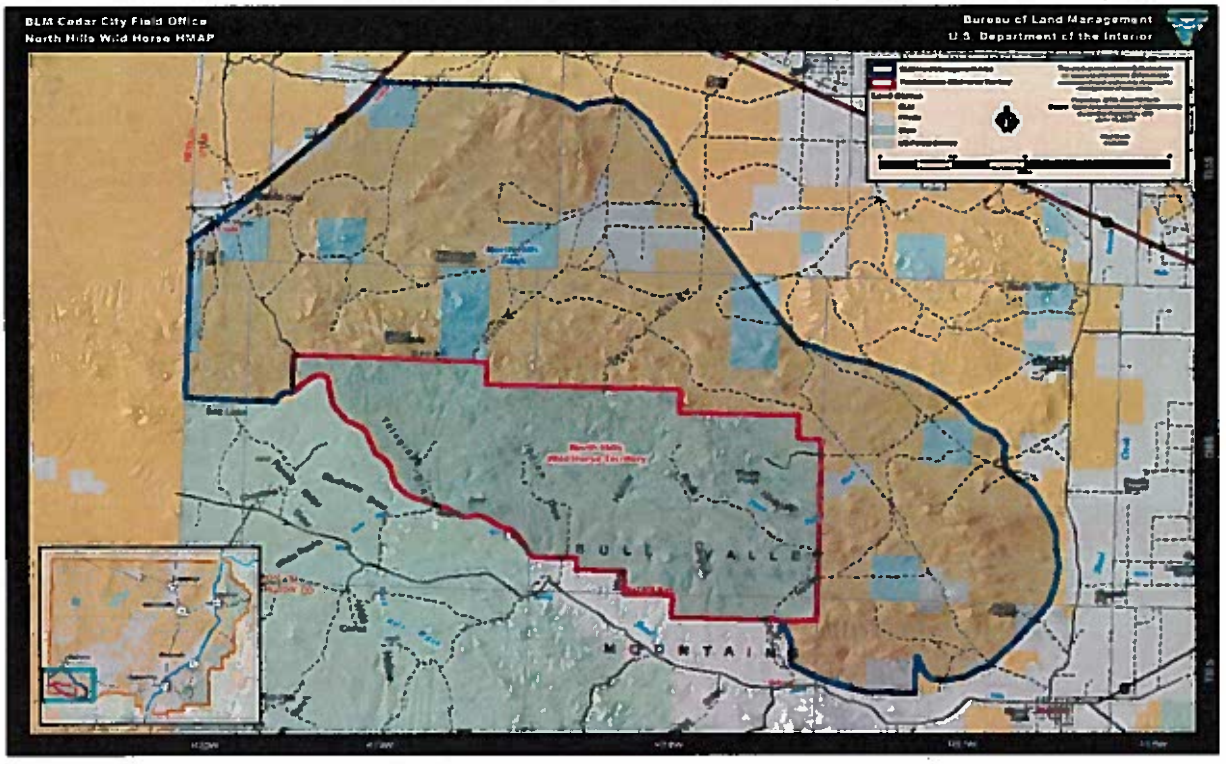
The proposed action would also include multiple gathers of wild horses over a 10 year period after the initial gather for population management, which includes removal of excess wild horses from the HMA/WHT, treatment of animals with fertility vaccines and other population control actions. Additional documentation, including more detailed analyses of project area resources, may be found in the project planning record located on the BLM ePlanning website https://go.usa.gov/xQHCD.

The HMAP will establish short and long-term management objectives for the wild horse herd and habitat within the HMA and WHT. Both areas will be referred to together as the North Hills Joint Management Area (JMA) except where the separation is clarified within the plan. The JMA is approximately 84,600 acres in size and is managed cooperatively by the CCFO and USFS. The HMA contains about 50,127 BLM acres and the WHT contains about 24,006 Forest Service acres with approximately 10,511 acres of private and state lands. The project area is located in Iron County and Washington County, about 2 miles northwest of Enterprise, Utah in Township 37 South, Range 18 West, sections 1-5 and 7-36 and Range 1 (see map below).

1.2 Background

The management of horses is required by the Wild and Free-Roaming Horses and Burros Act (WFRHBA) of 1971, as amended (Public Law 92-195). The WFRHBA requires that land management agencies maintain a current population inventory of horses, maintain a thriving natural ecological balance in combination with other uses and determine an Appropriate Management Level (AML) for horses. The last major gather on the JMA occurred in 2010 with some smaller private land and outside area gathers each year. Since 2010, the horse population on the JMA has grown to an estimated 254 horses which is more than 350 percent above AML. Wild horse population growth rates typically average about 20 percent annually and it is probable that without management the population would continue to rise.

Map 1. Map of North Hills HMA and WHT



1.3 Purpose and Need for the Proposed Action

The purpose and need for the proposed action is to establish short and long term management and monitoring objectives for the wild horse herd and their habitat. These objectives would guide management of the North Hills JMA wild horses. The Proposed Action would remove excess wild horses from within the North Hills JMA and remove all horses that have moved outside the JMA. Included would be application of population growth suppression to mares released following the gather and adjustment of sex ratios to a natural ratio of 50/50. Any wild horses located outside the JMA (in areas not designated for their use) would also be removed.

This action is needed in order to achieve and maintain a population size within the established AML, establish short and long term management and monitoring objectives for the wild horse herd and their habitat, protect rangeland resources from further deterioration associated with the current overpopulation, and restore a thriving natural ecological balance and multiple use relationship on public lands in the area consistent with the provisions of Section 3(b)(2) of the *Wild Free-Roaming Horses and Burros Act* of 1971 (WFRHBA).

1.4 Land Use Plan Conformance

The Pinyon Management Framework Plan (PMFP) (1983) identifies the North Hills HMA 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 PMFP also states that the number of herd units and the population of each herd would depend on the results of monitoring studies, range condition, viewing opportunities, cooperative management, and range developments.

The proposed action is also in compliance with the Dixie National Forest Land and Resource Management Plan, approved in 1986, as amended (Forest Plan). The proposed action would conform to the following:

- Desired Future Condition of the Forest (Range) - "the North Hills wild horse herd will remain at about 50 head. Winter game ranges used by wildlife and livestock will continue to be improved where possible." (USDA, 1986)

- Management Prescriptions and Management Activities, General Direction – "Protect and manage the North Hills wild horse herd in cooperation with BLM". "The wild horse herd will be managed according to Public Law 92-195 and any amendments. B." "The wild horse population will be kept within the population and forage utilization limits as outlined in the joint USFS/BLM Management plan for the herd." (USDA, 1986)

1.5 Relationship to Laws, Regulations, and Other Plans

In conformance with the policy developed by the BLM's Utah State Director and approved by the Secretary of Interior and direction from the Forest Service Chief and Secretary of Agriculture, the proposed action would be in compliance with the following:

- FLPMA of 1976 (43 U.S.C. 1701 et seq.) as amended
- Public Law 92-195 (WFRHBA) as amended by Public Law 94-579 and Public Law 95-514 (Public Rangelands Improvement Act [PRIA] of 1978)
- National Forest Management Act (NFMA) of 1976 (P.L. 94-588)
- Title 54 U.S.C. § 300101 et seq. National Park Service and Related Programs (formerly known as the National Historic Preservation Act of 1966)
- Title 54 U.S.C. § 306108 (commonly known as Section 106 of the National Historic Preservation Act)
- BLM Utah Riparian Management Policy (Instruction Memorandum [IM] UT-93-93, March 1993)
- Taylor Grazing Act (TGA) of 1934
- Endangered Species Act (ESA) of 1973, as amended
- Standards and Guidelines for Healthy Rangelands, 1997 (BLM-UT-GI-98-007-1020)
- Forest Service regulations for wild horse management: 36 CFR, Part 222, Subpart D – Management of Wild Free-Roaming Horses and Burros.

A description of these laws and associated regulations are contained in Appendix 1.

1.6 Decision to be Made

The authorized officer would determine whether to implement all, part, or none of the proposed action as described in Section 2.2.1 to manage wild horses within the JMA. The authorized officer's decision would not adjust livestock use within the JMA, as this was set through previous decisions. The authorized officer's decision may set or adjust AML, select goals and objectives for management of wild horses within the North Hills JMA, select gather methods, timeframes of actions, and numbers of horses gathered, treated and released depending on the alternative or parts of any alternative chosen.

Pre-Decisional Opportunity to Object
Although the environmental analysis is being managed by the BLM (the designated lead agency for this project), the authorized officer for each agency would sign a separate decision. In adherence to BLM policy, the BLM may issue a decision immediately following the conclusion of the environmental analysis. Per Forest Service regulations found in 36 CFR 218, Subparts A and B, their decision would be subject to Forest Service objection procedures. Objectors will have had to follow the procedures in 36 CFR 218, including the eligibility requirements noted in 218.5.

1.7 Scoping and Identification of Issues

Public Involvement was initiated on this proposed action on March 2, 2018 by posting on BLM's ePlanning website. The Utah State Office initiated public involvement at a public hearing about the use of helicopters and motorized vehicles to capture and transport wild horses (or burros) on December 12, 2017 at the BLM's Fillmore Field Office in Fillmore, Utah. This specific gather was addressed at that public meeting as well as other gathers that may occur within the state of Utah over approximately the next 12 months. This meeting was advertised in papers and radio stations statewide.

A preliminary EA was posted on e-Planning on March 2, 2018 and the link to this document (https://go.usa.gov/xQHCD) was distributed e-mail to interested parties for a 30-day comment period. Several comments were received and changes were made to this EA (see Appendix 8).

Issues identified by the public and the BLM and USFS interdisciplinary team include livestock grazing, rangeland health and vegetation, wetlands and riparian, wild horse, and wildlife. These resources are discussed in Chapter 3. Resources which were considered, but would not be affected to the level requiring detailed analysis, are listed in Appendix 2.

2.0 Proposed Action and Alternatives

2.1 Introduction

This section of the EA describes the proposed action and alternatives, including any that were considered but eliminated from detailed analysis. Five alternatives are considered in detail:

- **Alternative 1: No Action** – Continue existing management. No Gather and Removal
- **Alternative 2: Proposed Action** – Implement HMAP with a management strategy, which would include a number of population growth suppression methods, together with the development of new, and/or reconstruction of existing water developments. Gather/removal of excess wild horses, and apply population growth suppression (fertility control) as needed for ten years after the initial gather.
- **Alternative 3**: Implement HMAP with Adjustment to AML, together with maintenance and reconstruction of existing water developments. No Gather/removal of excess wild horses or population growth suppression at this time.
- **Alternative 4**: No Action on HMAP. Gather and Removal with population growth suppression (fertility control) as outlined in Alternative 2 (Proposed Action).
- **Alternative 5**: No Action on HMAP. Gather and Removal without population growth suppression (fertility control).

2.2 Description of Alternatives Considered in Detail

There are two primary actions which are considered in at least one of the alternatives, implementation of the HMAP and the gather/removal of wild horses.

Herd Management Area Plans

The HMAP is a plan for the management of wild horses in the JMA. The HMAPs would be the same for alternatives 1, 4 and 5. The potential HMAPs are described in more detail in Appendix 3, including management, monitoring and implementation objectives. Potential future actions (such as vegetation treatments) listed in the objectives of the HMAP would be reviewed prior to implementation to determine if additional NEPA documentation is required.

Table 1. Comparison of HMAP by Alternative

	Alternatives 1, 4 and 5	Alternative 2	Alternative 3
AML	AML of 40-60. Schedule gathers to remove excess wild horses when the total wild horse population exceeds the AML for the JMA (about every 3 years), when animals permanently reside on lands outside the North Hills JMA boundaries (i.e. use is more than seasonal drift), or whenever animal health/condition is at risk.	AML of 40-60. Manage for a breeding population of 30-50 animals. Excess animals would be removed to the low-range of the AML upon determination that excess animals are present. AML would be evaluated, as needed, following an in-depth analysis of resource conditions including: actual use, utilization, available forage and water, range condition and trend, and precipitation.	AML of 70-130. Manage for a breeding population of 70-110 animals. Excess animals would be removed to the low-range of the AML range upon determination that excess animals are present. The upper AML would be the average population of wild horses in the HMA between 2008 and 2017. The estimated population ranged from 50 to 286 during this time with a 10 year average of 132.

	Alternatives 1, 4 and 5	Alternative 2	Alternative 3
Sex Ratio	The sex ratio of animals released back to the range following future gathers would be approximately 40% males and 60% females.	The sex ratio of animals released back to the range following future gathers would be approximately 50% males and 50% females. Horses that display good confirmation and a variety of colors would be selected first to be placed back on the JMA.	The sex ratio of animals released back to the range following future gathers would be approximately 60% males and 40% females.
Water Develop-ments	Existing water developments would be periodically maintained, but not replaced or reconstructed when they outlive their useful life.	Existing water developments would be maintained and new water developments would be constructed, as needed (see Attachment 3).	Existing water developments would be maintained and new water developments would be constructed, as needed (see Attachment 3).
Population Growth Suppression	Alternatives 1 and 5 would have no population growth suppression. Alternative 4 would be the same as alternatives 2 and 3.	Population Growth Suppression including Immunocontraceptive use would be conducted in accordance with the approved standard operating and post-treatment monitoring procedures. Breeding age horses selected for release back to the range would be treated with Porcine Zona Pellucida (PZP) vaccine, PZP-22 or GonaCon, which would slow reproduction of the treated animals for one to three breeding seasons. This would exclude mares released to improve genetics. Any new fertility controls could be used as directed through the most recent direction of the National Wild Horse and Burro Program. The use of any new fertility controls would use the most current best management practices and humane procedures available for the implementation of the new controls.	

Gather and Removal

The gather and removal of wild horses is proposed in alternatives 2, 4 and 5. The first gather may begin as early as 2019 and take about 6 days to complete. Several factors such as animal condition, herd health, weather conditions, holding capacity limitations or other considerations could result in adjustments in the schedule. Additional gathers over the next 10 years may be needed to reach the lower AML based on gather success, holding capacity limitations, population growth rates and other national gather priorities. The ten year period would begin after the first gather is initiated. Additional gathers may be based on a two year gather cycle for the treatment of PZP, population growth suppression actions or agency priorities. The following are management actions common to the gather and removal of wild horses.

- Gather operations would be conducted in accordance with the Comprehensive Animal Welfare Program (CAWP) and/or the National Wild Horse Gather Contract as adjusted or amended through the National and State wild horse and burro program direction. These documents can be found here: https://go.usa.gov/xQHCD. When gather objectives require gather efficiencies of 50-80% or more of the animals to be captured from multiple gather sites (traps) within the North Hills JMA, the helicopter drive method and helicopter assisted roping from horseback will be the primary gather methods used. To the extent possible gather sites (traps) would be located in previously disturbed areas.
- Helicopter trap sites and temporary holding facilities would not be constructed on riparian resources.
- Given a summer or early fall gather window, bait and/or water trapping may be used provided

the gather operations timeframe is consistent with current animal and resource conditions. Bait and/or water trapping may also be selected in other special circumstances as appropriate.

- An Animal and Plant Inspection Service (APHIS) or other licensed veterinarian may be on-site during future gathers, as needed, to examine animals and make recommendations to BLM for care and treatment of wild horses. Decisions to humanely euthanize animals in field situations will be made in conformance with BLM policy.
- Animals would be removed using a selective removal strategy. Selective removal criteria for the North Hills HMA include: (1) First Priority: Age Class Five Years and Younger; (2) Second Priority: Age Class Six to Fifteen Years Old; (3) Third Priority: Age Class Sixteen Years and Older.
- Removal of animals from outside the JMA and on lands not managed by the BLM/FS would be given priory where possible.
- Data including sex and age distribution, reproduction, survival, condition class information (using the Henneke rating system), color, size and other information may also be recorded, along with the disposition of that animal (removed or released).
- All horses identified to remain in the JMA population would be selected to maintain a diverse age structure, herd characteristics and body type (conformation).
- Hair and/or blood samples would be acquired approximately every 10 years, to determine whether BLMs management is maintaining acceptable genetic diversity (avoiding inbreeding depression).
- Post-gather, efforts would be made to return released animals to the same general area from which they were gathered.
- Any burros residing within the boundaries of the North Hills JMA will be removed during the regular gather cycle.
- During gathers 1-3 studs and/or mares from a different HMA, with similar or desired characteristics of the horses within the North Hills JMA could be released to maintain the genetic diversity on the JMA.
- Any horses or burros gathered and determined, with consultation between BLM, USFS and Utah State brand inspectors, to be domestic animals will be turned over to the local brand inspector in accordance with state law. This is in accordance with the Cooperative Agreement between The Department of Agriculture, State of Utah and the Utah State Office, BLM approved January of 2001.
- Excess animals would be transported to a BLM or USFS facility where they would be cared for in accordance with the WFRHBA, most current regulations and policies (i.e. prepared (freeze-marked, vaccinated and de-wormed) for adoption, sale or long-term holding).
- Public notifications would be sent out to the press and public before a gather operations would occur. These public notifications would inform the public of viewing opportunities and where information on the gather operations can be found.
- Funding limitations and competing priorities may require delaying the gather and population control component which would increase the number of horses that would need to be gathered.
- Population inventories and routine resource/habitat monitoring would continue to be completed to document current population levels, growth rates and areas of continued resource concern (horse concentrations, riparian impacts, over-utilization, etc.) throughout the project.
- Any follow-up gather activities would be conducted in a manner consistent with those described for the 2019 gather and when possible would be conducted during the period

November through February which is identified for maximum effectiveness of the fertility control vaccines.

- Bait or water trapping could be conducted throughout the year, but if done in the summer mares being treated with fertility control would be held until October before release.
- The procedures to be followed for implementation of fertility control are detailed in https://go.usa.gov/xQHCD
- Decisions to humanely euthanize animals in field situations will be made in conformance with BLM policy (Washington Office Instruction Memorandum 2009-041) or current policy.

Table 2. Comparison of Gather/Removal by Alternative

Alternatives 2 and 4	Alternative 5
Gather about 70-75% of horses per gather as needed in the 10 years following the first gather.	
Gather about 170-213 horses in 2019. Remove about 40-120 horses per gather in the 10 years following the first gather.	Gather and remove approximately 265 horses in 2019. Gather approximately 70 head of horses, remove approximately 50 head, treating approximately 10 head per gather in the 10 years following the first gather. Based on a 2 year gather schedule.

2.3 Alternatives Considered But Eliminated From Further Analysis

These alternatives include the following. They are discussed in detail in Appendix 4.

- Provide Supplemental Feed and Water
- Return the HMA to Herd Area Status with Zero AML
- Remove or Reduce Livestock within the HMA
- Gather the JMA to the AML Upper Limit
- Fertility Control Treatment Only Including Using Bait/Water Trapping To Dart Mares with PZP Remotely (No Removal)
- Bait or Water Trap Only
- Wild Horse Numbers Controlled by Natural Means
- Gather and Release Excess Wild Horses Every Two Years and Apply Two-Year PZP to Horses for Release
- Use Alternative Capture Techniques instead of Helicopters to Capture Excess Wild Horses

3.0 Affected Environment

This section briefly discusses the relevant components of the human environment which would potentially be affected by the alternatives.

3.1 General Description of the Affected Environment

The North Hills JMA is approximately 74,000 acres and is located within an east west trending mountain range approximately 2 miles northwest of Enterprise, Utah. The wild horses primarily use the lower elevation toe-slopes and canyons. The BLM has management lead for the two areas. The soils within the area are sandy with considerable amounts of surface rock and scattered rocky outcrops within the canyons resulting in wild horses having difficulty traveling long distances and having to take circuitous routes between water and forage.

The JMA averages 5,500 to over 6,000 feet in elevation, and supports vegetation types of sagebrush/grassland with pinyon and juniper encroachment. The pinyon and juniper trees dominate the JMA and is very dense with minimal under story forage. Open areas outside of the pinyon and juniper canopy are dominated by big sagebrush with Indian Ricegrass and needle-and-thread grass as the primary forage species. There are warm season grasses which supplement these cool season species.

The JMA has one reliable summer water source (Nephi Spring), which is located on the south boundary of the USFS Wild Horse Territory. The water is a spring source with abundant water flow. The spring is located in a canyon with rocky outcrops along the north side and supports a vegetation jumble of pinyon/juniper, big sagebrush, and riparian vegetation such as cottonwood and willow. The riparian area is heavily trampled and over grazed with non-riparian vegetation encroaching. Animal distribution to other portions of the JMA is hampered by topography and vegetative cover types. Scattered ponds exist throughout the JMA occasionally providing water to the horses. These ponds rely on large thunder storms or heavy winter run-off in order to provide water and are not reliable from month to month. Other developments like guzzlers have been proposed in the area, but are not yet constructed.

The estimated population as of March 1, 2018 is approximately 212 wild horses within the JMA. This number is the direct count of a population inventory using the Simultaneous Double-observer method on August 31, 2017. It is estimated that in the spring of 2018 the foal crop and survival of those foals increased the estimated wild horse population within the JMA by 20%. When the 20% increase of the 2018 spring foal crop is added to the population inventory, estimated population in the JMA is estimated at 254 head or 425% of AML. By July of 2019 the estimated population would be 305 head. The lack of forage within close proximity of the Nephi Spring is causing wild horses to begin using more areas outside of the JMA. The lack of water and forage during the summer months, combined with the distance the animals must travel over rocky ground, results in rapid physical deterioration of the animals. During the winters of 2015/2016 the Forest Service provided supplemental feed in the area of Nephi Spring to prevent the death of 20 or more of the wild horses within the JMA. In addition, overlapping wildlife dependence for the same habitat as the wild horses necessitates actions to preserve their physical condition.

3.2 Description of Affected Resources

Resources which might be affected were considered by the public and a BLM/USFS interdisciplinary team. The public was notified by posting the project on the BLM's ePlanning website on March 2, 2018. As required by regulation [43 CFR 4740.1(b)], a public hearing was held in Fillmore, Utah on December 12, 2017 to discuss the use of helicopters and motorized vehicles in managing Utah BLM's wild horses and burros. No comments were received at that meeting specific to the use of helicopters and motorized vehicles in the management wild horses and burros in Utah. Resources which were considered but are not described in detail are listed in Appendix 2. Resources which may be affected are describe below.

Rangeland Health and Vegetation

Vegetation production and vigor has been reduced by drought (precipitation less than 75% of average). Precipitation is the most important single factor determining the type and productivity of vegetation in an area. During the period from 2015-2016, average annual precipitation never

exceeded 12 inches within North Hills JMA and averaged around 75% of the normal precipitation for that area.

The current drought cycle has had a tremendous influence on rangeland vegetation. Year-long grazing by wild horses has put additional stress on key forage species already affected by drought. Some key forage species have been lost. Recovery could take 5 to 15 years, depending on how severely the drought affected a particular area. No livestock used the Forest Service Territory and livestock use with in the HMA was greatly reduced during this time but the wild horse population in the JMA was at the highest point since the passage of the Wild Horse and Burro Act of 1971. Heavy and severe utilization near water by wild horses and some wildlife (mule deer) contributed to the loss of cool season grass species, the increase in warm season grasses and the expansion and increase of pinyon pine and juniper (PJ) into other ecological sites.

The North Hills JMA supports multiple vegetation types including: sagebrush, grasslands, and salt desert shrub with encroaching PJ. Pinyon and juniper woodland currently dominates the JMA and is very dense with minimal understory forage. Open areas outside the PJ canopy are dominated by big sagebrush with Indian ricegrass, wheatgrass, bluegrass, and squirreltail grass as the primary forage species. Additional information, including vegetation percentages, trend studies and rangeland health assessments are contained in Appendix 5.

Wetlands/Riparian Areas
There are no riparian/wetland zones within the North Hills HMA on land administered by the BLM. However, the JMA has one reliable year round water source (Nephi Spring), which is located on the southern boundary on Forest Service lands. The riparian area is heavily trampled and over-grazed by wild horses, resulting in the encroachment of non-riparian vegetation. Nephi Spring often experiences algae blooms during the summer when temperatures rise. Nephi Draw is the only perennial water in the project area and because of mechanical soil disturbance through hoof action, the stream bank exhibits extensive damage resulting in a wide shallow stream.

Livestock Grazing
There is no permitted livestock grazing within the USFS North Hills Wild Horse Territory.
Within the North Hills HMA, approximately 609 sheep AUMs and 4,101 cattle AUMs are permitted on five (5) allotments that have some portion of the allotment within the HMA. It is estimated that the portions of allotments within the HMA account for 201 sheep AUMs and 1,766 cattle AUMs.

Livestock preference as reflected in existing permits for the allotments that overlap North Hills HMA has remained essentially the same from 1983 to present. For the past ten years actual livestock use with the HMA or in the allotments has been substantially reduced or even eliminated during the years of drought. All of the livestock 10-year term permits have been renewed in the past 10 years. Adjustments to livestock grazing permits have included seasons-of-use, kind-of-livestock, AUM's, and numbers of livestock, in order to improve or maintain the vegetative condition on the allotments. As livestock grazing permits are evaluated, additional adjustments to the total number of AUM's of specified livestock grazing on each allotment, seasons-of-use, and kind-of-livestock may be made. Detailed information about the authorized livestock use within the HMA is provided in Term Grazing Permit Renewal EAs DOI-BLM-UT-C010-2009-0009-EA

and EA-UT-040-07-04 for those allotments. See map in Appendix 5.

Allotment Season of Use, Numbers, Kind of Livestock and AUM's in the HMA.

Allotment	Operator Display Name	Livestock Number	Livestock Kind	Grazing Begin	Period End	% Public Land	AUMs
County Line	Bracken Farms, Inc	82	cattle	04/15	10/15	84%	402
Haystack Mountain	Evans Beefmasters, Inc	497	cattle	12/01	05/16	87%	2375
	Phillip & Raelynn Garder	772	sheep	01/01	04/30	100%	609
Holt Mine	Terril & Julie Hunt	168	cattle	04/01	05/15	85%	211
		100	cattle	10/01	12/30	85%	254
SUSC	Terril & Julie Hunt	166	cattle	09/27	12/31	95%	500
Uvada	L&B Farms and Cattle c/o Brad Bowler	66	cattle	05/16	11/15	90%	359
				TOTAL AUMs			4,710

During years of drought, the reduction in the amount of available forage and the utilization of forage by wild horses caused most operators to place a substantial portion of their grazing preference in non-use, as approved by the BLM. Reasons for non-use vary with the operator and area, but often include recognition that either there is not sufficient forage for both the present numbers of wild horses and the preference level of livestock grazing, and the economics of the range livestock industry are down. Although voluntary reductions in cattle AUMs have been taken by permittees, horse numbers have remained at or above the upper AML levels throughout most of the drought years.

Wild horses will drive away livestock and wildlife from watering and feeding areas (Miller, 1981). When these resources become depleted, wildlife and wild horses will move to a new location, while livestock must be removed. Livestock in these allotments depend on windmills, ponds, wells and water hauling during the periods they are on the allotment. The windmills are located on private and state lands. The BLM does not have water rights to the water at these windmills. Several ponds are scattered throughout the allotments and JMA. There is one well on the SUSC Allotment that has not been operated for several years. Most of the developments have been done for livestock grazing with additional benefits for wildlife and wild horses. These developments require maintenance annually from the livestock permittee before livestock are allowed on an allotment. When permittees do not turn any livestock on an allotment or area due to drought or other reasons, these developments are not maintained and fall into disrepair. This has resulted in reduced water sources for wild horses when they are most needed. The BLM has hauled water onto the JMA for wild horses several times during the past ten years.

Some fences have been damaged by wild horses in their natural movement and in their search for water. Most of these fences were in place before the passage of the Wild and Free Roaming Horse and Burro Act of 1971. These fences inhibit the natural and free roaming nature of the wild horses but are necessary for livestock management.

Wild Horses
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/USFS. The last removal of excess wild horses from the North Hills JMA was completed in December of 2010 when 97 horses were gathered and removed. The un-gathered population was estimated at approximately 40 animals.

The estimated population of wild horses within the JMA as of March 1, 2018 is estimated at 212 head. This number is the direct count of a population inventory using the Simultaneous Double-observer method on August 31, 2017. It is anticipated that the actual population is higher than this. It is estimated that in the spring of 2018 the foal crop and survival of those foals increased the estimated wild horse population within the JMA by 20%. When the 20% increase of the 2018 spring foal crop is added to the population inventory estimated population in the JMA is estimated at 254 head or 425% of AML (BLM Wild Horse Gather and Population Inventory Files). By July of 2019 the estimated population would be 305 head.

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 North Hills JMA. Some mountain lion predation may occur, but does not appear to be substantial. Coyotes are not prone to prey on wild horses unless young or extremely weak. Other predators such as wolf or bear do not exist within the JMA.

Rangeland resources and wild horse health have been and are currently being affected within the North Hills JMA, due to drought and overpopulation. Excess wild horses above the AML have reduced available forage, resulting in increased competition for available resources. Wild horses have expanded outside of the JMA in search of forage, water, and cover. Some interchange between horses from the JMA and adjacent HMAs are occurring because of the excess numbers of wild horse currently in the area. More information about wild horse, including forage competition and population modeling are contained in Appendix 6 and Appendix 7.

Public Safety
Public observation of wild horse gathers has increased. Members of the public can inadvertently wander into areas that put them in the path of wild horses, creating the potential for injury to the wild horses, BLM employees and contractors, and the public. 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.

Helicopter work can be as little as 10-15 feet off the ground. 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 being herded by the helicopter, resulting in 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 and decrease 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 other areas they normally wouldn't cross. This can lead to the injury of wild horses or people. Disturbances in and around the gather and holding corral have the potential to injure workers or the public by causing them to be kicked, struck, and possibly trampled by the animals trying to flee.

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 ePlanning: https://go.usa.gov/xQHCD.

Chapter 4. Environmental Consequences

4.1 Introduction

This section of the EA documents the potential environmental impacts which could occur with implementation of the alternatives.

4.2 Direct and Indirect Impacts

Direct impacts are caused by the action and occur at the same time and place, while indirect impacts are caused by the action and occur later in time or farther removed in distance. These impacts will be addressed together by resource.

Rangeland Health and Vegetation

Impact	Alternative				
	1 **No Action** ***Current HMAP*** ***No Gather*** ***AML 40-60***	2 **Proposed Action** ***New HMAP*** ***Gather with Population Growth Suppression*** ***AML 40-60***	3 ***New HMAP*** ***No Gather*** ***AML 70-130***	4 ***Current HMAP*** ***Gather and Population Growth Suppression*** ***AML 40-60***	5 **Current HMAP** ***Gather*** ***No Population Growth Suppression*** ***AML 40-60***
Population Size	Short and long term increase.	Short and long term decrease.	Greatest short and long term increase.	Short and long term decrease.	Short term decrease. Faster long term increase.
Utilization Levels within 3 miles of riparian	61%+	<40-60%	Short term same as 1. Long term greater than 1 due to higher AML.	Same as 2.	Short term same as 2. Long term greater than 2 due to faster population growth.
Vegetative Health	No short term impacts from water developments, gather and holding sites. Long term	Temporary reduction from water developments, gather and holding sites. Long term vegetation	Short term same as 1. Long term greater degradation than 1 due to higher AML.	Short term similar to 2, but no new water developments. Long term same as 2.	Short term similar to 2, but no new water developments. Long term slower recovery than 2.

Impact	Alternative				
	1 **No Action** ***Current HMAP*** ***No Gather*** ***AML 40-60***	**2** **Proposed Action** ***New HMAP*** ***Gather with Population Growth Suppression*** ***AML 40-60***	**3** ***New HMAP*** ***No Gather*** ***AML 70-130***	**4** ***Current HMAP*** ***Gather and Population Growth Suppression*** ***AML 40-60***	**5** **Current HMAP** ***Gather*** ***No Population Growth Suppression*** ***AML 40-60***
	heavy and severe degradation from over utilization.	recovery.			
Soil Erosion	Increase due to trampling and vegetation degradation.	Short term impact from water developments, gather and holding sites. Long-term decrease due to increased ground cover.	Short term same as 1. Long term greater erosion due to higher AML.	Short term similar to 2 but no new water developments. Long term same as 2.	Short term similar to 2 but no new water developments. Long term greater erosion potential due to faster population growth.
Invasive Species Encroachment	Increase due to vegetation degradation.	Decreased due to improved vegetation health.	Short term same as 1. Long term increase due to higher AML.	Short term similar to 2 but no ground disturbance from new water developments. Long term same as 2.	Short term similar to 2 but no ground disturbance from new water developments. Long term greater than 2 due to faster population growth.
Trend for Key Perennial Species	Downward	Upward	Short term same as 1. Long term greater downward trend due to higher AML.	Same as 2.	Short term same as 2. Long term slower recovery due to faster population growth.
Ecological Condition	Reduced	Improved	Short term same as 1. Long term greater degradation due to higher AML.	Same as 2.	Short term same as 2. Long term slower recovery due to faster population growth.
Vegetative Changes	Grasses changed to shrubs and trees.	Increased grasses.	Short term same as 1. Long term decrease in grasses due to higher AML.	Same as 2.	Short term same as 2. Long term slower recovery due to faster population growth.
Forage Competition (wild horses, wildlife and livestock)	Severe	Reduced	Short term same as 1. Long term increased competition due to higher AML.	Same as 2.	Short term same as 2. Long term greater competition due to faster population growth.
Trailing Degradation	Increase	Decrease	Short term same as 1. Long term increase due to	Same as 2.	Short term same as 2. Long term slower recovery

Impact	Alternative				
	1 No Action ***Current HMAP No Gather AML 40-60***	**2 Proposed Action** ***New HMAP Gather with Population Growth Suppression AML 40-60***	**3** ***New HMAP No Gather AML 70-130***	**4** ***Current HMAP Gather and Population Growth Suppression AML 40-60***	**5 Current HMAP** ***Gather No Population Growth Suppression AML 40-60***
			higher AML.		due to faster population growth.

Wetlands/Riparian Areas

Impact	Alternative				
	1-No Action ***Current HMAP No Gather AML 40-60***	**2-Proposed Action** ***New HMAP Gather with Population Growth Suppression AML 40-60***	**3** ***New HMAP No Gather AML 70-130***	**4** ***Current HMAP Gather and Population Growth Suppression AML 40-60***	**5 Current HMAP** ***Gather No Population Growth Suppression AML 40-60***
Utilization Levels within 3 miles of riparian	61%+	<40-60% for uplands. For riparian areas, the standard is 4" on riparian species or 2" if it is dominated by Kentucky bluegrass.	Short term same as 1. Long term greater than 1.	Same as 2.	Short term same as 2. Long term greater than 2.
Proper Function Condition Trend (Nephi Spring is currently Functioning-at-Risk)	Short term and long term downward trend from overutilization and trampling.	Sort term impact to trap sites and water developments. Long term upward trend.	Short term same as 1. Long term downward trend would be greater than 1 due to higher AML.	Short term similar to 2, but no new water developments. Long term similar to 2.	Short term similar to 2, but no new water developments. Long term slower recovery than 2.

Livestock Grazing

Impact	Alternative				
	1-No Action ***Current HMAP No Gather AML 40-60***	**2-Proposed Action** ***New HMAP Gather with Population Growth Suppression AML 40-60***	**3** ***New HMAP No Gather AML 70-130***	**4** ***Current HMAP Gather and Population Growth Suppression AML 40-60***	**5** **Current HMAP** ***Gather No Population Growth Suppression AML 40-60***
Displacement of Livestock due to Gather operations	None	Short term livestock displacement.	None	Same as 2.	Same as 2.
Forage Conditions	Decrease in quality and quantity.	Increase in quality and quantity.	Greater decrease in quality and quantity than 1.	Same as 2.	Short term same as 2. Long term slower recovery.
AUM Reductions	Probable	Unlikely	Probable	Same as 2.	Short term same as 2. Long term more likely than 2.
Water Availability	Decreased due to competition with horses.	Improved due to water developments and less competition with horses.	Greater decrease than 1.	Similar to 2, but no new water developments.	Short term similar to 2 but no new water developments. Long term increased competition.

Wild Horses

Further analysis of the potential impacts to wild horses is contained in Appendix 6.

Impact	Alternative				
	1-No Action ***Current HMAP No Gather AML 40-60***	**2-Proposed Action** ***New HMAP Gather with Population Growth Suppression AML 40-60***	**3** ***New HMAP No Gather AML 70-130***	**4** ***Current HMAP Gather and Population Growth Suppression AML 40-60***	**5** **Current HMAP** ***Gather No Population Growth Suppression AML 40-60***
Conformance with Current Wild Horse Management Science and Handling Practices	Does not conform.	Conforms	Conforms	Does not conform.	Does not conform.
Stress to Wild Horses During	None	Wild horses would be subject to stress	None	Same as 2.	Same as 2.

Impact	Alternative				
	1-No Action ***Current HMAP No Gather AML 40-60***	**2-Proposed Action** ***New HMAP Gather with Population Growth Suppression AML 40-60***	**3** ***New HMAP No Gather AML 70-130***	**4** ***Current HMAP Gather and Population Growth Suppression AML 40-60***	**5** **Current HMAP** ***Gather No Population Growth Suppression AML 40-60***
Gather.		and potential injury.			
Stress to Wild Horses from Lack of Forage and Water.	Short and long term increasing stress which could result in starvation, fighting among studs, and injury and death to all age classes.	Short and long term decrease in stress. Greater water availability due to new water developments.	Greatest short and long term impacts due to lack of forage and water.	Same as 2.	Same as 2.
Horse Health	Death due to starvation and lack of water decrease the health of the herd.	Wild horses are healthy and vigorous.	Same as 1 in short-term. Long-term reduced health from 2.	Same as 2.	Same as 2.
Supports Promotion of a Thriving Ecological Balance	Does not support.	Supports	Does not support.	Supports	Supports
Herd Dispersion	Wild horses would leave the JMA.	Wild horses remain in JMA.	Same as 1.	Same as 2.	Same as 2.
Fertility Injections	None	Yes	None	Yes	None

Public Health and Safety

Impact	Alternative				
	1-No Action ***Current HMAP No Gather AML 40-60***	**2-Proposed Action** ***New HMAP Gather with Population Growth Suppression AML 40-60***	**3** ***New HMAP No Gather AML 70-130***	**4** ***Current HMAP Gather and Population Growth Suppression AML 40-60***	**5** **Current HMAP** ***Gather No Population Growth Suppression AML 40-60***
Potential Safety Concerns	None	Minimal with Observation Protocols.	None	Minimal with Observation Protocols.	Minimal with Observation Protocols.

4.3 Cumulative Impacts

Cumulative impacts 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. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. The cumulative impacts study area (CSA) for the purposes of evaluating cumulative impacts is the North Hills JMA.

The CSA has been impacted by livestock grazing, wildfires, vegetation treatments, range improvements and wild horse management. Historic livestock practices allowed for overgrazing which resulted in a decrease of grasses and shrubs and an increase in PJ encroachment. Improved livestock grazing practices and range improvements since the 1930s have helped to mitigate these impacts. Vegetation treatments have also tried to improve range conditions by reducing PJ and increasing the grass and shrub components of the range. This has also resulted in improved habitat for wildlife, livestock and wild horses. Despite these improvements, the range is still susceptible to wildfire and drought. Consequently, the greater the number of wild horses in the area, the greater the chance of range degradation during periods of drought.

All of the land uses stated above are expected to continue into the future. Continuing to graze livestock in a manner consistent with grazing permit terms and conditions would be expected to achieve, maintain, and make significant progress towards achieving land health standards. Forage for livestock and wildlife should be available at sustainable levels, if balanced with the number of wild horses in the JMA.

Any of the alternatives which do not allow for wild horse gathers, or which allow the numbers of wild horses to increase above AML, would result in the degradation of rangeland health. This would reduce the improvements made to the JMA through vegetation treatments and other methods of range improvement during the last 80 years. These alternatives would result in cumulative degradation to rangeland health and the consequences of starving wild horses and wildlife, increased wild fires and invasive species.

Any of the alternatives which allow for a decrease of wild horse numbers to or below AML would cumulatively help to off-set the results of historic grazing practices and would improve forage for wildlife, livestock and wild horses.

5.0 Consultation and Coordination

Public Involvement

The Utah State Office initiated public involvement at a public hearing about the use of helicopters and motorized vehicles to capture and transport wild horses (or burros) on December 11, 2018 at the BLM's Vernal Field Office in Vernal, Utah. At that public meeting gathers that may occur within the state of Utah over approximately the next 12 months were presented, but were not brought up as a point of discussion by those who attended. This meeting was advertised in papers and radio stations statewide. The meeting was attended by 3 member of the public and Jennifer Patrick (media/student). No comments were received pertaining to this proposed action. Comments from previous meeting and similar actions were considered during the development of the alternatives within this document. The BLM reviewed its SOPs (see

https://go.usa.gov/xQHCD) in response to the views and issues expressed at the hearing and determined that no changes were warranted. However, as most of the comments received at this and previous meeting are directed more toward the policies and regulations that are used to manage wild horses and burros, the comments were shared with the National Program Office for Wild Horse and Burros.

Additional public involvement includes the posting of this EA on March 2, 2018 on the BLM's eplanning website (https://go.usa.gov/xQHCD). A preliminary EA was posted on eplanning and the link to this document was distributed e-mail to interested parties for a 30-day comment period. Several comments were received and changes were made to this EA (see Appendix 8).

Persons, Groups or Agencies Consulted
Slate Stewart, State of Utah School and Institutional Trust Lands Administration (SITLA)
Paiute Indian Tribe of Utah
State Historic Preservation Office

List of Preparers
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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
JMA – Joint Management Area
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
PITU – Paiute Indian Tribe of Utah
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 1. Laws and Regulations

Laws

Wild and Free-Roaming Horses and Burros Act (WFRHBA) of 1971, as amended (Public Law 92-195). The WFRHBA requires that land management agencies maintain a current population inventory of horses, maintain a thriving natural ecological balance in combination with other uses and determine an Appropriate Management Level (AML) for horses.

Public Law 92-195 (WFRHBA) as amended by Public Law 94-579 (FLPMA), and Public Law 95-514 (Public Rangelands Improvement Act [PRIA] of 1978). WFRHBA, as amended, requires the protection, management, and control of wild free-roaming horses and burros on public lands and that the preparation and transport of wild horses will be conducted in conformance with all applicable state statutes.

Endangered Species Act (ESA) of 1973, as amended. This act aims to provide a framework to conserve and protect endangered and threatened species and their habitats.

FLPMA of 1976 (43 U.S.C. 1701 et seq.) as amended. This law provides for multiple use and sustained yield of public lands.

Taylor Grazing Act of 1934. This act regulates the orderly use, improvement and development of public grazing lands and provides for livestock use upon the public range.

Title 54 U.S.C. § 300101 et seq. National Park Service and Related Programs (formerly known as the National Historic Preservation Act of 1966) and **Title 54 U.S.C. § 306108** (commonly known as Section 106 of the National Historic Preservation Act). These acts require federal agencies to determine the possible effects of their actions on historic properties (those archaeological or historic sites eligible for or listed on the National Register of Historic Places). See 36 CFR 800 for a description of this process..

Code of Federal Regulations

43 CFR 4700.0-2. One of the objectives regarding wild horse management is to manage wild horses "as an integral part of the natural system of the public lands under the principle of multiple use . . ."

43 CFR 4700.0-6(a-c) requires that BLM manage wild horses "...as self-sustaining populations of healthy animals in balance with other uses and the productive capacity of their habitat ... considered comparably with other resource values ..." while at the same time "...maintaining free-roaming behavior."

43 CFR 4700.0-6 (e) requires that healthy excess wild horses for which an adoption demand by qualified individuals exists shall be made available at adoption centers for private maintenance and care.

43 CFR 4710.3-1. "Herd management areas shall be established [through the land use planning process] for the maintenance of wild horse and burro herds. In delineating each herd management area, the authorized officer shall consider the appropriate management level for the herd, the habitat requirements of the animals, the relationships with other uses of the public and adjacent private lands, and the constraints contained in 4710.4. The authorized officer shall prepare a herd management area plan, which may cover one or more herd management areas."

43 CFR 4710.4. "Management of wild horses and burros shall be undertaken with the objective of limiting the animals' distribution to herd areas. Management of wild horses shall be at the minimum level necessary to attain the objectives identified in approved land use plans and herd management area plans."

43 CFR 4720.1 "Upon examination of current information and a determination by the authorized officer that an excess of wild horses or burros exists, the authorized officer shall remove the excess animals immediately."

43 CFR 4740.1 "(a) Motor vehicles and aircraft may be used by the authorized officer in all phases of the administration of the Act, except that no motor vehicle or aircraft, other than helicopters, shall be used for the purpose of herding or chasing wild horses or burros for capture or destruction. All such use shall be conducted in a humane manner. (b) Before using helicopters or motor vehicles in the management of wild horses or burros, the authorized officer shall conduct a public hearing in the area where such use is to be made."

43 CFR 4180 states that it is required that all BLM management actions achieve or maintain healthy rangelands.

FS 36 CFR 222 Subpart D discusses wild free-roaming horses and burros management for the US Forest Service.

(a) The Chief, Forest Service, shall:

(1) Administer wild free-roaming horses and burros and their progeny on the National Forest System in the areas where they now occur (wild horse and burro territory) to maintain a thriving ecological balance considering them an integral component of the multiple use resources, and regulating their population and accompanying need for forage and habitat in correlation with uses recognized under the Multiple-Use Sustained Yield Act of 1960 (70 Stat. 215; 16 U.S.C. 528-531);

(2) Provide direct administration for the welfare of wild free-roaming horses and burros that are located on the National Forest System by use of the Forest Service organization rather than by the granting of leases and permits for maintenance of these animals to individuals and organizations;

(3) Establish wild horse and burro territories in accordance with the Act and continue recognition of such territories where it is determined that horses and/or burros will be recognized as part of the natural system, and designate areas within these territories as a specific wild horse and burro range in those situations where he determines such designation as especially fitting to meet the purposes of the Act and the Multiple Use Sustained-Yield

Act, after consultation with the appropriate State agencies where such range is proposed and with the National Advisory Board;

(4) Analyze each wild horse or burro territory and, based on the analysis, develop and implement a management plan, which analysis and plans will be updated, whenever needed, as determined by conditions on each territory;

(5) Maintain a current inventory of wild free-roaming horses and burros on each territory to determine whether and where excess animals exists;

(6) Based on paragraphs (a) (4) and (5) of this section, determine appropriate management levels, whether action should be taken to remove excess animals and what actions are appropriate to achieve the removal or destruction of excess animals; and

(7) In making determinations cited in this section, the authorized officer shall consult with the U.S. Fish and Wildlife Service, wildlife agencies in the State, individuals and organizations independent of Federal or State Government recommended by the National Academy of Sciences, and any other individual or organizations determined to have scientific expertise or special knowledge of wild horse and burro protection, wildlife management and animal husbandry as related to range management.

Policy

FS Manuals 2261 and 2263 discuss wild free-roaming horses and burros management for the US Forest Service.

BLM Manuals H-4700-1, H-4740-1 and H-4750-2discuss wild free-roaming horses and burros management for the BLM.

BLM Instruction Memorandums IM 2018-066 (Guidance for the Sale of Excess Wild Horses and Burros), IM 2015-152 (WH&B Program), IM 2015-151 (Comprehensive Animal Welfare Program for Wild Horse and Burro Gathers), IM 2015-070 (Animal Health, Maintenance, Evaluation and Response), IM 2014-132 (Guidance for the Sale of Wild Horses and Burros) and IM 2018-052 (Transfer of Excess Wild Horses and Burros to Federal, State, and Local Government Agencies for Use as Work Animals).

Appendix 2. Interdisciplinary Team NEPA Checklist

Project Title: North Hills Herd Management Area Plan

NEPA Log Number: DOI-BLM-UT-C010-2018-0021-EA

Project Leader: Chad Hunter

DETERMINATION OF STAFF: ***(Choose one of the following abbreviated options for the left column)***

NP = not present in the area impacted by the proposed or alternative actions
NI = present, but not affected to a degree that detailed analysis is required
PI = present with potential for relevant impact that need to be analyzed in detail in the EA
NC = (DNAs only) actions and impacts not changed from those disclosed in the existing NEPA documents cited in Section D of the DNA form. The Rationale column may include NI and NP discussions.

RESOURCES AND ISSUES CONSIDERED:

Determination	Resource	Rationale for Determination	Signature	Date
NI	Air Quality	Air quality either meets NAAQS or the area is unclassified. Nothing in the proposal would affect the rating.	C. Hunter	01/11/18
NP	Areas of Critical Environmental Concern	There are no ACECs within the CCFO.	D. Jacobson	1-29-2018
NI	Cultural Resources	This project is unlikely to have any effect to cultural resources. The trap and temporary holding locations will be located on an area of existing disturbance, such as road or a wash. The possibility of finding intact cultural resources in these areas is minimal to non-existent. If an existing disturbed area cannot be located for the corral area, a Class III cultural resource inventory will be conducted. Guzzler locations will be inventoried before construction. Any historic properties would be avoided or mitigated in consultation with SHPO.	L. Glidden	3/16/2018
NI	Greenhouse Gas Emissions	The project work would generate emissions of GHG's through operation of internal combustion engines. Emissions would be minor (well below modeling thresholds required for modeling / monitoring) on local, regional, and especially global scales.	C. Hunter	01/11/18
NI	Environmental Justice	The alternatives would have no disproportionately high or adverse human health or other environmental effects on minority or low-income segments of the population.	C. Hunter	01/11/18
NP	Farmlands (Prime or Unique)	There are likely soils in the herd unit capable of being prime or unique farmlands, however only when irrigation water is supplied. Where there is no irrigation water supplied, there are no prime or unique farmlands present.	C. Hunter	01/11/18
NI	Fish and Wildlife	The area is identified as substantial mule deer winter range. The North Hills HMA is identified as blue grouse habitat. Elk have been known to use the North	D. Schaible	1/29/18

Determin-ation	Resource	Rationale for Determination	Signature	Date
		Hills HMA but it is not identified as crucial range. Kit fox habitat is also available in portions of the HMA. There will be a minimal improvement in wildlife habitat by the removal of wild horses but this impact does not need to be addressed in the text of the EA.		
NI	Floodplains	Nothing in the proposal would affect the functioning of a floodplain, therefore the action is consistent with Executive Order 11988.	E. Shotwell	01/12/18
NI	Inventoried Roadless Areas (Forest Service)	A portion of the North Hills Inventoried Roadless Area lies within the project area. Small amounts of brush cutting may occur within the IRA for water development and maintenance. No road construction, reconstruction, improvement or realignment is proposed. The Regional Office provided concurrence on the finding that the project would comply with the 2001 Roadless Area Conservation Rule (USDA, 2001)	Jennifer Green (USFS)	6/6/2018
NI	Fuels/Fire Management	There would be no impacts to Fire/Fuels Management.	M. Mendenhall	1/23/18
NI	Geology / Mineral Resources/Energy Production	The brevity and superficial nature of the proposed action precludes it from having any substantial impact on any mineral resources or ongoing mineral exploration/development activity that may be present in the proposed project area.	E. Ginouves	1/11/18
NI	Hydrologic Conditions	Hydrologic conditions are variable throughout the WHMA, but in general are thought to be relatively good. Specific soil information for these allotments may be found in the NRCS soils survey for Iron County. A review of available data has been completed and none of these allotments contain critical or severe erosion condition class acreages. Field examination of the County Line Allotment in 2007 during rangeland health evaluations revealed a small area (site write-up area C008) with a moderate departure from normal in soil stability. Active gullying was occurring. It is unknown how much wild horses contribute to this particular problem, but it is suspected to be minimal. See EA text under "soils" for more details.	E. Shotwell	01/12/18
NI	Invasive Species/Noxious Weeds	As long as weed free hay is used during any bait trapping, and for any feeding purposes of wild horses and/or domestic horses at the gather site or at holding areas on public land.	M. Bayles	1/19/2018
NI	Lands/Access	Any pending or authorized lands and realty actions in the wild horse gather area would not be substantially affected by the proposed action.	B. Cox	2/27/2018
PI	Livestock Grazing	Livestock and wild horses compete directly for vegetative, water, and cover resources. Higher populations of wild horses mean more competition with livestock. Wild horse populations that are within AML reduce competition. When wild horse populations are above AML the livestock numbers must be reduced to	M. Bayles	1/19/2018

Determination	Resource	Rationale for Determination	Signature	Date
		not over utilize the vegetative and water resources.		
NI	Migratory Birds	Gather activities would occur outside the migratory bird nesting season.	C. England	1/24/2018
NI	Native American Religious Concerns	Past consultation with the PITU indicates that the tribes are generally not concerned about projects of this nature.	L. Glidden	3/16/2018
NI	Paleontology	The surficial geology of the lands in the proposed project area fall within Class 1 and Class 2, very low and low potential, respectively, for vertebrate or scientifically significant invertebrate fossils. That, together with the superficial nature of any surface disturbance activity associated with the proposed projects precludes any impact to paleontological resources.	E. Ginouves	1/11/18
PI	Rangeland Health Standards	This is addressed as part of the rangeland heath/vegetation section of the EA and in other resource sections such as riparian.	M. Bayles	1/19/2018
NI	Recreation	Recreation in the project area is dispersed, and some displacement may occur during gather operations, however impacts will not be substantial. Coordination is necessary with the Utah Division of Wildlife Resources to notify public of operations, and to avoid conflicts during hunting season.	D. Jacobson	1-29-2018
NI	Socio-Economics	The proposed action will not in its self change the socio-economics of the area. There are no proposed changes to other resource uses including changes to livestock permits.	C. Hunter	01/11/18 10/15/18
PI	Soils	Under the current situation (horses above AML), inadequate residual vegetation (forage) and litter remain on certain key use areas in the herd unit. This directly affects the soil's exposure to erosive elements such as wind and water. A reduction in horse numbers would allow additional vegetation to be produced and to remain on these key areas, thus providing additional protection to the soil surface. See EA text.	C. Hunter	01/11/18
NP	Special Status Plant Species	No Endangered, Threatened or candidate species have been documented within the North Hills HMA on BLM lands. There are no known Special Status plant species that occur within the North Hills HMA. New trap sites established in undisturbed areas would need to be cleared for special status plant species.	M. Bayles	1/19/2018
NI	Special Status Animal Species Greater Sage-Grouse	There are no TEC animal species identified within the North Hills HMA. Special Status species that potentially occur within the North Hills HMA include; bald eagle, burrowing owl, ferruginous hawk, kit fox, pygmy rabbit, Townsend's	C. England D. Schaible V. Tyler	1/24/2018 1/29/2018 1/18/2018

Determin-ation	Resource	Rationale for Determination	Signature	Date
		Big-eared bat and short-eared owl. New trap sites established in undisturbed areas would need to be cleared for special status animal species. The North Hills HMA is over 12 miles from greater sage-grouse SGMA.		
NI	Wastes (hazardous or solid)	The proposal should not produce any hazardous or solid wastes. Should any release occur, all State and Federal regulations shall be followed.	S. Houston	01/29/2018
NI	Water Resources/Quality (drinking/surface/ground)	Project proposal would not substantially impact water quality. Project stipulations would minimize adverse impacts to water quality resulting from water trapping operations. It would be desirable to remove horses as soon as practical from any water trap areas. While surface waters in the herd management area are likely meeting water quality standards for most waters, a reduction in wild horse numbers would further improve water quality (sedimentation and fecal coliforms).	E. Shotwell	01/12/18
NI	Wetlands/Riparian Zones	There are no riparian/wetland zones within the North Hills HMA in land administered by the BLM. Nephi Draw, which is administered by the Forest Service is a spring-fed riparian zone where horses and other wildlife congregate especially during the summer months. There would be no direct effects from the proposed action due to the stipulations on water gathers. Indirectly, the Nephi Riparian Zone would minimally benefit from the development of other water developments within the JHMA.	E. Shotwell V. Thacker (USFS)	01/12/18 6/5/18
NP	Wild and Scenic Rivers	None within Field Office boundaries.	D. Jacobson	1-29-2018
NP	Wilderness/WSA	The proposed project area contains no wilderness study areas, or designated wilderness.	D. Jacobson	1-29-2018
NI	Woodland / Forestry	The woodland resource in the analysis area is quite extensive, however, nothing in the proposal would be expected to alter woodland conditions.	C. Peterson	01/16/2018
PI	Vegetation Excluding USFW Designated Species	Removing excess wild horses will benefit vegetative communities. Addressed in EA.	M. Bayles	1/19/2018
NI	Visual Resources	The proposed action includes only minor temporary disturbance. The action will not measurable impact visual resources.	D. Jacobson	1-29-2018
PI	Wild Horses and Burros	See proposed action and EA.	C. Hunter	01/11/18
NI	Lands with Wilderness Characteristics	The proposed action will not impact Lands with Wilderness Characteristics. Placement of gather sites in previously disturbed areas, and along existing roads would ensure no impacts to areas which may have wilderness characteristics.	D. Jacobson	1-29-2018

Determination	Resource	Rationale for Determination	Signature	Date

FINAL REVIEW:

Reviewer Title	Signature	Date	Comments
Environmental Coordinator		2/28/19	
Authorized Officer		02/28/2019	

Appendix 3. Herd Management Area Plans

Alternative 1: No Action Alternative
The HMA will be managed to a range of 40-60 animals. AML will be adjusted, as needed, based on water resources.

- Studies will be continued and improved to determine and monitor mortality, age structure, sex ratio, productivity, population growth rate, habits and movements.
- Monitoring will include utilization, forage condition, water availability, animal health, mortality, age structure, sex ratio, productivity, population growth rate, habits, movement, population census and sampling for genetic diversity would continue.
- Existing water developments would be periodically maintained, but not replaced or reconstructed when they outlive their useful life.
- Population growth suppression would not be applied to animals within released back to the range following gathers.

Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
A. Control Population Numbers		
Manage wild horse populations within the established AML range of 40-60 head to protect the range from deterioration associated with overpopulation. **Objective 1**: Gather foals first to maintain AML. **Objective 2:** Place selected (adoptable horses) into cooperative maintenance agreements (adoption). **Objective 3:** All sick, lame or injured animals will be humanely destroyed.	Conduct population inventories at a minimum of once every 3 years. Conduct additional inventories as money and time allows. Determine population number and annual growth rate. Keep gather, adoption and death records.	Schedule gathers to remove excess wild horses when the total wild horse population exceeds the AML for the JMA, when animals permanently reside on lands outside the North Hills JMA boundaries (i.e. use is more than seasonal drift), or whenever animal health/condition is at risk. Remove younger adoptable horses first. Remove all sick, lame or injured animals.
B. Animals Age Distribution		
Assure all age classes are represented post-gather.	Monitor post-gather results.	Manage wild horses to achieve the following relative age distribution: • 35% Young Age Class (Ages 0-4) • 50% Middle Age Class (Age 5-10) • 15% Old Age Class (Age 11+)
C. Additional Selective Removal Criteria		
None	None	None
D. Habitat (Assure Rangeland Health)		
Objective 1. Allocate 790 AUMs	Locate key monitoring areas	Complete the rangeland health

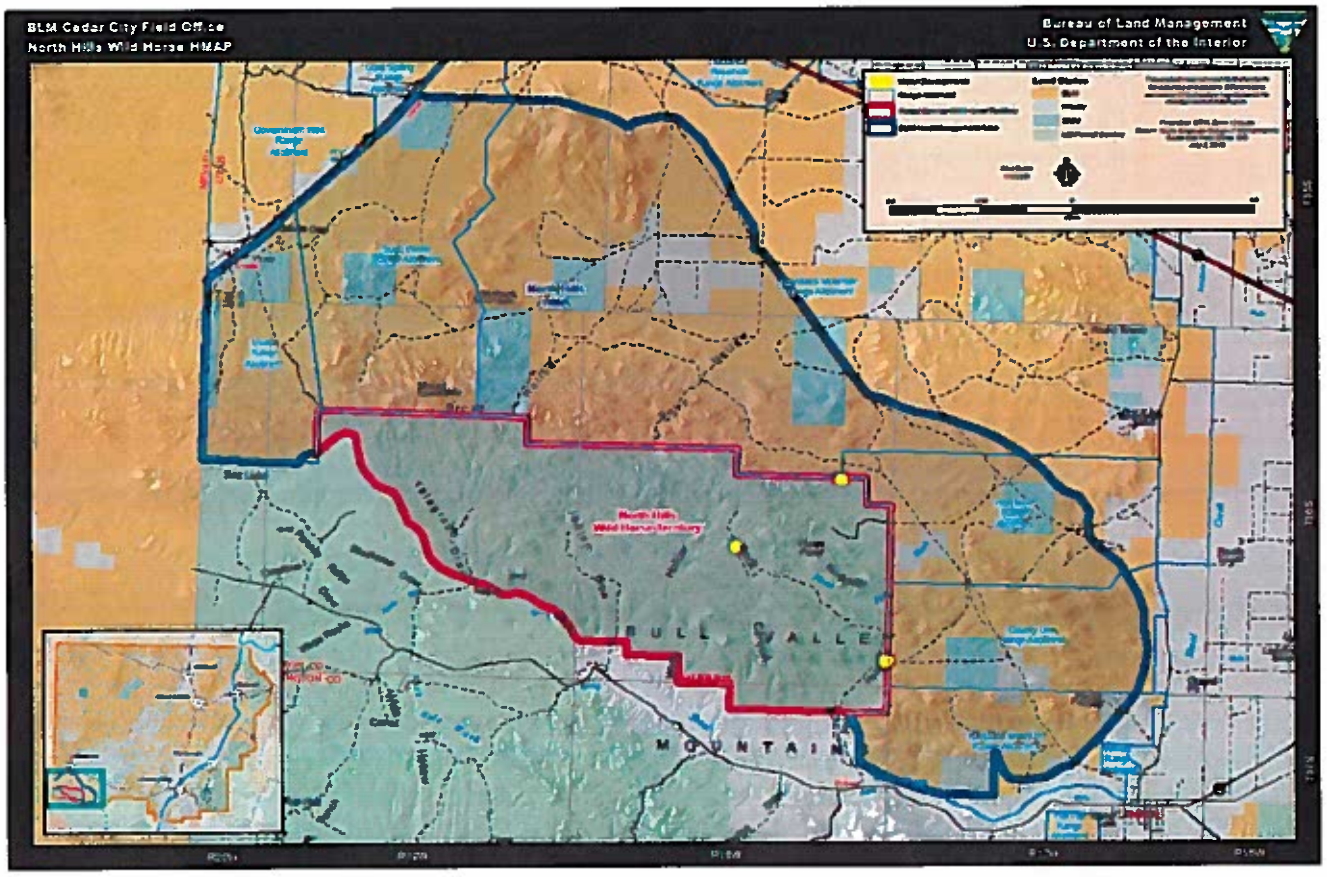
Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
within the JMA to wild horses. **Objective 2.** Conduct vegetative projects (burn or chain and seed) to improve wild horse habitat. **Objective 3.** Maintain and construct catchments (ponds and reservoirs) to improve water sources throughout the JMA, as funding allows. **Objective 4.** Construct range improvements to retain wild horse wild free-roaming behavior as much as possible. **Objective 5.** Assess rangeland health approximately every 10 years on BLM administered lands. **Objective 6.** Limit utilization by all herbivores to 60% of the current year's above ground primary production for key grasses and 45% for key shrubs and forbs.	within the JMA. Establish baseline trend studies using the frequency sampling procedures as outlined in the Rangeland Monitoring Handbook. Measure utilization at key areas/use pattern mapping annually. Assess rangeland health using procedures outlined in Technical Reference 1734-6 and/or the most recent rangeland health technical reference adopted by the local district office.	assessment for the JMA as a whole. Summarize trend, precipitation, riparian, utilization and use pattern mapping with range monitoring. Establish additional site-specific resource management objectives for key areas, as needed. Based on above, re-adjust AML or identify management actions to address/resolve rangeland health issues, as needed/appropriate. Re-adjustments in AML will be based on vegetation monitoring, herd monitoring and water availability as the limiting factors. Any fence construction will be designed to allow for wild free-roaming behavior as much as possible. Construct reservoirs and possibly the development of wells and water sources.
E. Sustain Healthy Populations of Wild Horses		
Objective 1: Manage wild horses to achieve an average body condition class score of 3+.	Visually observe wild horse body condition (Henneke Condition Class Method) key watering locations annually. Record average body condition and document during periodic gather and population inventories operations.	Reconstruct existing water developments to assist in limiting the distance horses trail to and from water sources. Annually maintain water developments. Conduct emergency removals when needed if animal body condition is less than Henneke condition class score 3 due to drought, wildfire or other unplanned/unforeseen event.
F. Sex Distribution		
Adjust the sex ratio immediately following gathers to 60% females and 40% males consistent with past management actions.	Document number of mares and stallions released following each gather.	Manage a breeding population of 30-50 animals within any given 3 year period.

Alternative 2: Proposed Action
The HMAP would implement a management strategy which would incorporate a number of population control methods, together with the development, construction and/or maintenance or reconstruction of existing water sources. Under this strategy, wild horses would be managed under the HMAP objectives and goals within an AML range of 40-60 animals, with updates and revisions of the plan occurring when policies, regulations, laws or LUP change substantially, as follows:

- Approximately 30-50 animals would be managed as a breeding population.
- During gathers, the sex ratio of the population would be adjusted to a natural ratio (50/50 male/female sex ratio).
- AML would be evaluated, as needed, following an in-depth analysis of resource conditions including: actual use, utilization, available forage and water, range condition and trend, and precipitation.
- Horses that display good confirmation and a variety of colors would be selected first to be placed back on the JMA.
- During gathers 1-3 studs or mares from a different HMA, with similar or desired characteristics of the horses within the North Hills JMA may be released to maintain the genetic diversity on the JMA.
- Excess animals would be removed to the low-range of the AML upon determination that excess animals are present.
- Population Growth Suppression including Immunocontraceptives may be used in accordance with the approved standard operating and post-treatment monitoring procedures. Breeding age horses selected for release back to the range would be treated with Porcine Zona Pellucida (PZP) vaccine or GonaCon, which would slow reproduction of the treated animals for one to three breeding seasons.
- Any new fertility controls could be used as directed through the most recent direction of the National Wild Horse and Burro Program. The use of any new fertility controls would use the most current best management practices and humane procedures available for the implementation of the new controls.
- Through agreement with the SITLA and National Mustang Association, additional water storage and repairs will be made to the SITLA Broad Hollow windmill in Sec. 2.
- Vegetation treatments may be considered in the future, subject to additional NEPA analysis.
- As funding allows, BLM will reconstruct, develop, or maintain in original construction standard annually or as needed.
    - Mount Escalante Spring — T. 36 S., R. 19 W., SWSW Sec. 04
    - SUSC Pond — T. 35 S., R. 19 W., SWSW Sec. 28
- As funding allows, USFS will reconstruct, develop, or maintain in original construction standard annually or as needed.
    - Section 3 Pond — T. 37 S., R. 18 W., NWNE Sec. 03
    - Nephi Spring — T. 36 S., R. 19 W., NESW Sec. 25
    - Telegraph Pond — T. 36 S., R. 19 W., SWNW Sec. 16
    - Telegraph Draw Pond — T. 36 S., R. 19 W., NESE Sec. 16

- Pinyon Park Pond — T. 36 S., R. 18 W., NWNE Sec. 26
- Rock Canyon Pond — T. 36 S., R. 18 W., NENW Sec. 27
- Fish Hollow Pond — T. 36 S., R. 18 W., NESW Sec. 36

- New water projects would include two catchments (80,000 gallons each) and one guzzler (10,000 gallons). See map below.
- All new construction sites would be surveyed for cultural resources. Any eligible properties found would be avoided or mitigated in consultation with SHPO.



Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
A. Control Population Numbers		
Manage wild horse populations within the established AML range to protect the range from deterioration associated with overpopulation of wild horses.	Conduct population inventories at a minimum of once every 3 years. Conduct additional inventories as money and time allows. Determine population number and annual growth rate.	Schedule gathers to remove excess wild horses when the total wild horse population exceeds the AML for the JMA, when animals permanently reside on lands outside the North Hills JMA boundaries (i.e. use is more than seasonal drift), or whenever animal health/condition is at risk. Use population growth suppression management actions to reduce

Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
		reproduction rates with the JMA.
B. Animals Age Distribution		
Assure all age classes are represented post-gather.	Monitor post-gather results.	Manage wild horses to achieve the following relative age distribution: 10-25% Young Age Class (Ages 0-5) 50-80% Middle Age Class (Age 6-15) 10-25% Old Age Class (Age 16+)
C. Additional Selective Removal Criteria		
Objective 1: Maintain or improve animal conformation within the JMA. **Objective 2:** Improve Adoptability of wild horses within the JMA.	Maintain photos of wild horse released back into the JMA and/or are introduced to the JMA. Survey Adopters of North Hills wild horses to find what attributes appeal to them.	In selecting animals for return to the range post-gather, animal size and conformation will have priority over color.
D. Habitat (Assure Rangeland Health)		
Objective 1. Assess rangeland health approximately every 10 years on BLM administered lands and every 5 years on USFS administered lands. Objective 2. BLM: Limit utilization by all herbivores to 50% of the current year's above ground primary production for key grasses and 45% for key shrubs and forbs. USFS: Maximum allowable forage use: -Riparian hydric species (i.e. rushes & sedges) 4-6 inch stubble height remaining at end of growing season. -Non-hydric species in riparian areas (i.e. Kentucky bluegrass) 2" stubble height remaining at end of growing season. -Upland species 50% -Wheatgrass seedings 60% -Riparian browse <50% new leader production.	Locate key monitoring areas within the JMA. Assess rangeland health using procedures outlined in Technical Reference 1734-6 and/or the most recent rangeland health technical reference adopted by the local BLM and USFS offices. Establish baseline trend studies using the frequency sampling procedures as outlined in the Rangeland Monitoring Handbook. Measure utilization at key areas/use pattern mapping annually.	Complete the rangeland health assessment for the JMA as a whole. Summarize trend, precipitation, riparian, utilization and use pattern mapping every 10 year. Establish additional site-specific resource management objectives for key areas, as needed. Based on above, re-adjust AML or identify management actions to address/resolve rangeland health issues, as needed/appropriate. Re-adjustments in AML will be based on vegetation monitoring, herd monitoring and water availability limiting factors. AML will also consider balance of other resources use to maintain a Thriving Ecological Balance.

Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
E. Ensure Genetic Diversity		
Maintain genetic diversity within the herd (avoid inbreeding depression) as evidenced by no additional loss (>10%) of genetic diversity (Ho) over the next twenty years.	Collect blood and/or hair samples every gather to detect any changes from the baseline genetic diversity (Ho=.344).	Introduce horses from a different HMA, but displaying similar or desired characteristics of the horses within the North Hills JMA. These horses will be released to maintain the genetic diversity on the JMA. If baseline genetic diversity changes decrease more than 10% additional wild horses will be introduced into the JMA.
F. Sustain Healthy Populations of Wild Horses		
Objective 1: Manage wild horses to achieve an average body condition class score of 3+.	Visually observe wild horse body condition (Henneke Condition Class Method) key watering locations annually. Record average body condition and document during periodic gather and population inventories operations.	Construct and Maintain water developments to increase water sources and availability. Annually maintain water developments following constructions. Keep wild horse population in the JMA within AML. Conduct gathers when needed if animal body condition is less than Henneke condition class score 3. Conduct emergency gathers due to drought, wildfire or other unplanned/unforeseen event.
G. Assure Riparian/Wetland Area Health		
Objective 1: Improve riparian condition at Nephi Springs, which is currently being impacted by heavy to severe wild horse use. Objective 2: Develop new water sources (ie wells, ponds, pipelines) away from riparian areas to reduce wild horses use of Nephi Spring.	Re-evaluate riparian functionality every five years using the Proper Functioning Condition (PFC) method on Nephi Spring. Assess utilization annually. Monitor use of water sources (ponds, guzzler and Nephi	Reconstruct the existing ponds within the JMA to provide water for use by wild horses. Develop new wells, ponds guzzlers and pipelines within the JMA. If trend conditions remain static or is downward by 2028, exclosure fences may be constructed to promote riparian recovery, or additional management measures, including,

Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
	Spring) with the use of wildlife cameras to determine season of use and numbers using the water sources.	adjusting AML, or continued development of new water sources for wild horses.
H. Disperse Wild Horse Use		
Objective 1: Decrease utilization by wild horses within a 1-3 mile radius of existing water developments within the core area from heavy/severe to light/moderate within 10 of the approval of this plan. **Objective 2:** Ensure adequate water is available throughout the hot summer months until additional water sources can be developed. **Objective 3:** Disperse wild horse use throughout the North Hills JMA.	Measure utilization at key areas/use pattern mapping annually. Monitor water sources continuously through the summer months to ensure adequate water availability and to determine if/when supplemental water hauling will be needed. Monitor utilization to determine whether construction of new water developments is effective in reducing wild horse utilization from heavy to light or moderate within the North Hills JMA.	Develop a permanent pump, storage tank, pipeline, and trough at SUSC well. Reconstruct bentonite all ponds within the North Hills JMA. Extend Stud Horse pasture pipeline into North Hills JMA. Develop a minimum of two and up to four new water developments to better disperse wild horse use. Prior to construction of any new water developments, the following would be required: • Acquisition of the necessary water rights. • Planning and design of the water developments. • Completion of a site-specific environmental analysis. • Completion of a site-specific cultural resource inventory. • Acquisition of necessary funding. Annually maintain developments following construction and/or reconstruction. Construct of two 80,000 gallon catchments and one 10,000 gallon or larger guzzler in the central or northern part of the JMA.
I. Additional Population Control Measures		

Management Objective(s)	Monitoring Objective(s)	Implementation Objective(s)
Objective 1: Adjust the sex ratio of the breeding population to a natural ratio. **Objective 2:** Gather to the low-range of the AML and apply population growth suppression to select animals released back to the range following gathers. Additional site-specific environment analysis and population modeling may be used to determine the best population growth suppression method.	Conduct post-fertility control monitoring in accordance with established procedures.	Manage a breeding population of 40-50 animals within any given 10 year period. Within the population, achieve a 50%/50% ratio of males to females immediately following future gathers. Current population growth suppression management will be used. Immunocontraceptives like Porcine Zona Pellucida (PZP) and GonaCon vaccines would be conducted in accordance with the approved standard operating and post-treatment monitoring procedures. Breeding age mares selected for release back to the range would be treated with PZP vaccine that would slow reproduction of the treated mares for one to three breeding seasons. New population control vaccines and/or methods may be use within the JMA as directed through the most recent direction of the National Wild Horse and Burro Program. The use of any new fertility controls would use the most current best management practices and humane procedures available for the implementation of the new controls. Horses treated will have a Henneke body condition score of 4 or above. Periodic population inventories, together with gather data from future gathers, will be used to determine whether population growth suppression management in slowing the average annual population growth on the North Hills JMA.

MONITORING PLAN

Monitoring Item	How	Who	When	Actions to Take (Adaptive Management)
Population Management Monitoring				
Manage wild horse populations within the established AML range to protect the range from deterioration associated with overpopulation.	Population Inventories through aerial flights following established protocols. Determine population number and annual growth rate.	BLM WH&B Specialist Assistance from USFS	Conduct Population Inventories on the JMA a minimum of every three years. Schedule flights in January and February, when possible, to use snow conditions obtain a better tracking conditions and complete counts before foaling moratorium.	Schedule gathers to remove excess wild horses when the total population exceeds the AML, or when animals permanently reside outside the North Hills JMA (i.e. more than seasonal drift), or when animal health/condition is at risk. Use population growth suppression methods to achieve and maintain AML.
Assure all age classes are represented post gather.	Record ages of animals released post-gather.	BLM WH&B Specialist	Every gather.	Adjust age class distribution during gathers that achieve AML or are within 20 head of Upper AML.
Maintain genetic diversity (avoid inbreeding depression).	Hair and/or blood samples would be collected during scheduled gathers to determine whether BLM's management is maintaining acceptable genetic diversity (avoiding inbreeding depression).	BLM WH&B Specialist	During gathers. Minimum once every 10 years.	Introduce 1-3 studs or mares each gather from a different HMA, but displaying similar or desired characteristics of the horses within the North Hills JMA will be released to maintain the genetic diversity on the JMA.
Manage wild horses to achieve an average Henneke body condition class score of 3+.	Visually observe wild horse body condition (Henneke condition class method). Record average body condition and document other health conditions (i.e. lameness, clubfoot etc.) during periodic gather	BLM WH&B Specialist	Annually, at key water locations particularly during periods of hot weather/drought. Every gather and population inventory.	Conduct removals when needed if animal body condition is less than Henneke body condition score 3 due to drought, wildlife, or other unplanned/unforeseen event. Supplemental feeding on the range may be approved on a case by case basis.

Monitoring Item	How	Who	When	Actions to Take (Adaptive Management)
	operations.			
Adjust the sex ratio of the breeding population to natural ratios following future gathers. Apply population control to animals released back to the range following gathers, excluding those selected to maintain or improve genetic mix.	Document number of mares/stallions released following each gather. Conduct post population growth suppression monitoring in accordance with established procedures..	BLM WH&B Specialist	Every gather once excess wild horses are removed. Year 2-4 following each gather.	Adjust the sex ratio to 50/50 males/ females as needed during future gathers pending monitoring results. Adjust population growth suppression during subsequent gathers to keep growth rates below 10%.
Habitat Management Monitoring				
Assess rangeland health approximately every 10 years on BLM-administered lands and every 5 years on USFS-administered lands.. BLM: Limit utilization by all herbivores to 50% of the current year's above ground production for key grasses and 45% for key shrubs and forbs. USFS: -Riparian Hydric Species (i.e. rushes & sedges) 4-6 inch stubble height remaining at end of growing season. -Non-hydric species in riparian areas (i.e. Kentucky bluegrass) 2" stubble height remaining at end of growing season. -Upland species 50% -Wheatgrass seedings 60% -Riparian browse <50%	Locate key monitoring areas within the core area. Assess rangeland health using procedures outlined in Technical Reference 1734-6 and/or the most recent rangeland health technical reference adopted by the local BLM and USFS offices. Establish baseline trend studies using the frequency sampling procedures as outline in the Rangeland Monitoring Handbook. Measure utilization at key areas/use pattern mapping annually.	BLM WH&B Specialist and FO Interdisciplinary team which could include Forest Service Staff.	Document indicators of rangeland health and summarize findings.	Establish additional site-specific resource management objectives for key areas, as needed. Based on the above, re-adjust AML or identify additional management actions to address/resolve identified rangeland health issues, as needed/appropriate.

Monitoring Item	How	Who	When	Actions to Take (Adaptive Management)
new leader production.				
Improve riparian condition at Nephi Spring which is currently being impacted by heavy to severe wild horse use.	Re-evaluate riparian functionality using the Proper Functioning Condition (PFC) method on springs within the JMA. Assess utilization.	BLM/ USFS	Approximately every five years.	Consider adding pipeline, trough, water storage and fencing to protect riparian habitat, pending evaluation of monitoring results.
Decrease utilization by wild horses within a 1-3 mile radius of the existing water developments within the JMA from heavy/severe to light/moderate by 2028.	Measure utilization at key areas/use pattern mapping. Monitor water sources to assure adequate water availability and to determine if/when emergency supplemental water hauling will be needed.	BLM WH&B Specialist, Forest Service Rangeland Management Specialist	Annually (when possible) Continuously through the summer months.	Adjust AML, as needed, pending evaluation of monitoring results (after 2028). Develop vegetative projects that increase or improve forage within the JMA. Develop new water sources and supplies.
Monitor/assess annual maintenance needs.	Site visits at water sources.	BLM/ USFS WH&B Specialist Forest Service Rangeland Management Specialist,	As needed, throughout the year.	Schedule and complete any necessary maintenance work. Document maintenance activities.

TRACKING LOG/PROJECT IMPLEMENTATION SCHEDULE

Description	Who	Where	When	Completed	Remarks
Population Management Actions					
Schedule gathers to remove excess wild horses when the total wild horse population exceeds the AML for the JMA (about every 3	BLM	North Hills JMA	About every 3 years. Summer or winter.		

Description	Who	Where	When	Completed	Remarks
years, more or less often, if needed).					
Assure all age classes are represented post-gather.	BLM	North Hills JMA	About every three years. Summer or winter.		
Prioritize removal of any club-footed horses from the herd.	BLM	North Hills JMA	About every three years. Summer or winter.		
Prioritize size and conformation over color when releasing animals back to the range.	BLM/ USFS	North Hills JMA	About every three years. Summer or winter.		
Collect hair and/or blood samples to determine whether BLMs/USFS management is maintaining acceptable genetics (avoiding inbreeding depression).	BLM	Temporary holding facility and/or short term holding facility.	Every gather from a minimum of 25 animals. Preferably by from horses released back into the HMA.		
Selectively release animals post-gather slightly in favor of males (60/40 males/females).	BLM/ USFS	Temporary holding facility.	During gathers.		
Apply fertility control to horses within the JMA and monitor results following treatment.	BLM	BLM and Temporary holding facilities and on the JMA.	During gathers. Fall and Winter for darting.		

Habitat Management Actions					
Description	Who	Where	When	Completed	Remarks
Reconstruct existing water developments to reduce utilization and limit the distance wild horses trail to and	BLM/ USFS	Nephi Spring Water Catchments	By 2028 Ongoing.		

from water sources and available forage. Add additional water storage capability at several of the sources.					
Develop new water sources.	BLM/ USFS	Throughout the JMA	Ongoing		
Vegetative projects that reduce pinyon juniper trees and increase forage species.	BLM/ USFS	Throughout the JMA	Ongoing		
Maintain developments once built and following reconstruction.	BLM/ USFS	Nephi Spring Water Catchments Pipelines Troughs Wells	Annually		

Alternative 3
The HMAP would implement a management strategy which would include some population control methods, together with the development/construction and reconstruction of existing water developments. Under Alternative 3, wild horses would be managed under the HMAP objectives and goals within an AML range of 70-130 animals, with updates and revisions of the plan occurring when policies, regulations, laws or LUP change substantially, as follows:

- Approximately 70 - 110 animals would be managed as a breeding population.
- Sex ratio of the breeding population would be adjusted slightly in favor of male at about 60% males and 40% females over time.
- Excess animals would be removed to the low-range of the AML range upon determination that excess animals are present.
- Immunocontraceptive could be used in accordance with the approved standard operating and post-treatment monitoring procedures. Breeding age horses selected for release back to the range would be treated with Porcine Zona Pellucida (PZP) vaccine or GonaCon, which would slow reproduction of the treated mares for one to three breeding seasons (see https://go.usa.gov/xQHCD for the current SOPs for the use of PZP vaccine and post-treatment monitoring).
- Existing water developments would be reconstructed over the next 1-5 year period and maintained annually to the construction standard, or as needed.

The upper AML in this alternative is the average population of wild horses in the JMA between 2008 and 2017. The estimated population ranged from 50 to 286 during this time with a 10 year average of 132.

Items A-H from Alternative 2 plus the following:		
I. Additional Population Control Measures **Objective 1.** Gather to the low-range of AML and apply population growth suppression to horses released back to the range following future gathers.	Document number of mares and stallions released back into the JMA; conduct post-fertility control monitoring as outlined in the SOPs for PZP and GonaCon vaccines. Periodic population inventories, together with gather data from future gathers, will be used to determine whether population growth suppression activities are effective in slowing the average annual population growth.	Immunocontraceptives would be used in accordance with the approved standard operating and post-treatment monitoring procedures. Breeding age mares selected for release back to the range would be treated with Porcine Zona Pellucida (PZP) or GonaCon vaccine that would slow reproduction of the treated mares for one to three breeding seasons. New population control vaccines and/or methods may be use within the JMA as directed through the most recent direction of the National Wild Horse and Burro Program. The use of any new fertility controls would use the most current best management practices and humane procedures available for the implementation of the new controls.

Appendix 4. Alternatives Considered but Not Analyzed in Detail

Provide Supplemental Feed and Water
Providing supplemental feed (hay) or hauling water (other than during a short-term emergency situation) does not meet the definition of minimum feasible management and is inconsistent with current law, regulation and policy. Refer to 43 CFR 4710.4.

Manage the Entire Population as a Non-Breeding Population of Geldings
One possible management alternative which has been suggested is to manage the North Hills JMA in its entirety as a non-breeding population of geldings. This alternative could require a land use plan amendment or other possible regulatory changes. Therefore, it was not analyzed in detail at this time.

Return the HMA to Herd Area Status with Zero AML
Another alternative which has been suggested is to return the North Hills HMA to Herd Area status and establish the AML as "0" animals. This suggestion is made because the limited naturally occurring (undeveloped) water available to the North Hills JMA is not adequate to maintain the population in a thriving natural ecological balance and multiple use relationship without the need for continued supplementation during drought. With reconstruction of the existing water developments the available water is expected to be adequate to support a population of 40-60 animals and possibly more. Therefore this alternative was not considered in detail.

Remove or Reduce Livestock within the HMA

This alternative would involve no removal of wild horses and instead address the excess wild horse numbers through the removal or reduction of livestock within the JMA. This alternative was not brought forward for detailed analysis because it is outside of the scope of the analysis, is inconsistent with the Pinyon MFP and the WFRHBA, which directs the Secretary to immediately remove excess wild horses, and is inconsistent with multiple use management. Livestock grazing can only be reduced following the process outlined in the regulations found at 43 CFR Part 4100. Several reductions and changes have been made to livestock grazing within allotments associated to the North Hills JMA through this process. The elimination of livestock grazing in an area would require an amendment to the Pinyon MFP. Such changes to livestock grazing cannot be made through a wild horse gather decision.

Livestock permit renewals were completed from 2007 – 2017 on the allotments within and adjacent to the North Hills HMA. Each of these renewals had Environmental Assessments and Decision Records completed. These decisions established stocking rates for livestock. The decisions also established seasons of use, areas of use, kind and class of livestock and management actions to improve livestock distribution. These management actions included the establishment of grazing systems, allowable use levels, salting and herding practices. Some livestock reductions were made in these decisions on allotments within the North Hills HMA. Livestock grazing continues to be evaluated for allotments and use areas within the North Hills HMA. Monitoring and evaluation of livestock grazing is in accordance with the Pinyon MFP's Rangeland Program Summary Section IV, 17, which states:

"Rangeland studies and monitoring programs will be continued and/or initiated to determine if rangeland management objectives are being achieved and if proposed grazing use levels must be adjusted. This monitoring program will continue on all allotments. Particular attention will be given those areas where there is high resource conflict or there is the possibility of rapid improvement or deterioration of the rangeland resources. The concentration of rangeland monitoring will be on those allotments in the "I" category.

The monitoring program will evaluate changes in range condition and trend which includes determination of plant vigor, plant character, plant density, plant phenology, ground cover and degree of forage utilization on key species. Four primary studies will be used in this evaluation: (1) actual grazing use, (2) forage utilization, (3) range trend, and (4) climate analysis. In addition, data on wildlife habitat, riparian vegetation, and watershed condition will be collected and used as needed. When results of studies are evaluated and it is determined that the objectives are not being achieved on a specific allotment, modifications could include changes in grazing systems, livestock numbers, season of use, additional rangeland developments, or any combination of these alternatives."

The BLM is currently authorized to remove livestock from the HMA, "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" under CFR 4710.5. This authority is usually applied in cases of emergency and not for general management of wild horses or burros in a manner that would be inconsistent with the land-use plan and the separate decisions establishing the appropriate levels of livestock grazing and wild horse use, respectively. Available data also indicates that wild horse use – including where livestock use has been excluded – has resulted in excessive vegetative utilization and impacts to rangelands that are recovering from wildfire.

There is no livestock grazing permitted on the Forest Service Wild Horse Territory in accordance with the Forest Service Dixie National Forest FLRMP.

Gather the JMA to the AML Upper Limit

A post-gather population size at the upper level of the AML range would result in the AML being exceeded with the next foaling season. This would be unacceptable for several reasons.

The AML represents "that 'optimum number' of wild horses which results in a thriving natural ecological balance and avoids a deterioration of the range" (Animal Protection Institute, 109 IBLA 119;1989). The IBLA has also held that, "Proper range management dictates removal of horses before the herd size causes damage to the rangeland. Thus, the optimum number of horses is somewhere below the number that would cause resource damage" (Animal Protection Institute, 118 IBLA 63, 75; 1991).

The upper level of the AML established within the JMA represents the maximum population for which thriving natural ecological balance would be maintained. The lower level represents the number of animals to remain in the JMA following a wild horse gather, in order to allow for a periodic gather cycle, and to prevent the population from exceeding the established AML between gathers.

Additionally, gathering to the upper range of AML would result in the need to follow up with another gather within one year (with resulting stress on the wild horse population), and could

result in overutilization of vegetation resources and damage to the rangeland if the BLM is unable to gather the excess horses in the JMA on an annual basis. This alternative would not reduce the wild horse population growth rate of 20-25% in the North Hills JMA and the BLM would not be able to conduct periodic gathers and still maintain a thriving natural ecological balance. For these reasons, this alternative did not receive further consideration in this document.

Fertility Control Treatment Only Including Using Bait/Water Trapping To Dart Mares with PZP Remotely (No Removal)
Population modeling was completed to analyze the potential impacts associated with conducting gathers about every 2-3 years over the next 20 year period to treat captured mares with fertility control. Under this alternative, no excess wild horses would be removed. While the average population growth could be reduced to about (11) % per year, AML would not be achieved and the damage to the range associated with wild horse overpopulation would continue. This alternative would not meet the Purpose and Need for the Action, and would be contrary to the WFRHBA, and was dismissed from further study.

The use of remote darting to administer PZP within JMAs where the horses are not accustomed to human activity has been shown to be very difficult. In the Cedar Mountain HMA during a two year study where administration of PZP by remote darting was to occur not a single horse was successfully darted. This method has been affective in some HMAs where the wild horses are more approachable but the North Hills JMA is not such an area, so this method of administering PZP was dismissed from further study.

Bait or Water Trap Only
An alternative considered but eliminated from detailed analysis was use of bait and/or water trapping as the primary 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 primary gather method for this JMA due to the timing of the proposed gather. However, water or bait trapping may be used to achieve the desired goals of Alternatives 2-5 if gather efficiencies are too low using a helicopter or a helicopter gather cannot be scheduled. This alternative was dismissed from detailed study as a primary gather method for the following reasons: (1) the project area is too large to effectively use this gather 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) Nephi Spring water availability is to spread out to restrict wild horse access; and (4) the presence of scattered water sources on both private, state and public lands inside and outside the JMA would make it almost impossible to restrict wild horse access to the extent necessary to effectively gather and remove the excess animals through bait and/or water trapping to achieve management goals.

Wild Horse Numbers Controlled by Natural Means
This alternative was eliminated from further consideration because it is contrary to the WFRHBA which requires the BLM to prevent the range from deterioration associated with an overpopulation of wild horses. It is also inconsistent with the Pinyon MFP, which directs that Cedar City Field Office BLM conduct gathers as necessary to achieve and maintain the AML. The alternative of using natural controls to achieve a desirable AML has not been shown to be

feasible in the past. Wild horses in the North Hills JMA are not substantially regulated by predators. In addition, wild horses are a long-lived species with documented foal survival rates exceeding 95% and they are not a self-regulating species. This alternative would result in a steady increase in numbers which would continually exceed the carrying capacity of the range until severe and unusual conditions that occur periodically-- such as blizzards or extreme drought-- cause catastrophic mortality of wild horses.

Gather and Release Excess Wild Horses Every Two Years and Apply Two-Year PZP to Horses for Release

Another alternative to gather a substantial portion of the existing population (90%) and implement fertility control treatment only, without removal of excess horses was modeled using a two-year gather/treatment interval over a 10 year period. Based on WinEquus population modeling, this alternative would not result in attainment of AML for the JMA. And the wild horse population would continue to have an average population growth rate of 6.3% to 16.3% adding to the current wild horse overpopulation, albeit at a slower rate of growth than the No Action Alternative. The modeling reflected an average population size in 11 years of 309 to 640 wild horses under a two year treatment interval. In 90% of the trials this alternative would not decrease the existing overpopulation of wild horses, resource concerns and rangeland deterioration would continue, and implementation would result in substantially increased gather and fertility control costs relative to the alternatives that remove excess wild horses to the AML range. In addition to not achieving AML, the time needed to complete a gather would also increase over time, because the more frequently an area is gathered, the more difficult wild horses are to trap. They become very evasive and learn to evade the helicopter by taking cover in treed areas and canyons. Wild horses would also move out of the area when they hear a helicopter, thereby further reducing the overall gather efficiency. Frequent gathers would increase the stress to wild horses, as individuals and as entire herds. It would become increasingly more difficult over time to repeat gathers every two years to successfully treat a large portion of the population. For these reasons, this alternative was dropped from detailed study.

Use Alternative Capture Techniques instead of Helicopters to Capture Excess Wild Horses
An alternative using capture methods other than helicopters to gather excess wild horses was suggested, other than bait/water trapping, through the public review process. As no specific alternative methods were suggested, the BLM identified chemical immobilization, net gunning, and wrangler/horseback drive trapping as potential methods for gathering horses. Net gunning techniques normally used to capture big games also rely on helicopters. Chemical immobilization is a very specialized technique and strictly regulated. Currently the BLM and USFS do not have sufficient expertise to implement either of these methods and they would be impractical to use given the size of the JMA, access limitations and approachability of the horses.

Use of wrangler on horseback drive-trapping to remove excess wild horses can be fairly effective on a small scale; but due to the number of excess horses to be removed, the large geographic size of the JMA, access limitations and approachability of the horses this technique would be ineffective and impractical. Horseback drive-trapping is also very labor intensive and can be very harmful to the domestic horses and the wranglers used to herd the wild horses.

Appendix 5. Additional Range Information

Vegetation Within the North Hills HMA

HMA	Vegetation Cover	Acres	Percent
NORTH HILLS	Juniper	37,647	51%
NORTH HILLS	Sagebrush	23,808	32%
NORTH HILLS	Pinyon-Juniper	8,112	11%
NORTH HILLS	Grassland	4,252	6%
NORTH HILLS	Salt Desert Shrub	108	0%
	Total	73,927	100%
USFS Wild Horse Territory	Vegetation Cover	Acres	Percent
NORTH HILLS	Basin Big Sagebrush-Basin Wildrye	7	0.03%
NORTH HILLS	Black Sagebrush	104	0.42%
NORTH HILLS	Gambel Oak-Mountain Shrub	68	0.28%
NORTH HILLS	Montane Riparian	9	0.04%
NORTH HILLS	Mountain Shrub- Stansbury Cliffrose	332	1%
NORTH HILLS	Mountain Shrub- Utah Serviceberry	300	1%
NORTH HILLS	Pinyon-Juniper	6,324	27%
NORTH HILLS	Wyoming Big Sagebrush	16,424	70%
NORTH HILLS	Undefined	58	0.23%
	Total	23,626	100%

When the 1999 to 2005 drought began, the SUSC allotments main forage species was Indian ricegrass. By 2005, the Indian ricegrass had been replaced by a warm season grass (curlygrass). Production of forage species was limited by the drought and some plants died, increasing the grazing on surviving forage species. No livestock used the allotment during this time but the wild horse population was over the AML during this time, and in fact, the wild horse population in the JMA was at the highest point since the passage of the Wild Horse and Burro Act of 1971. Heavy and severe utilization near water by wild horses and some wildlife (mule deer) contributed to the loss of cool season grass species, the increase in warm season grasses and the invasion of PJ.

Utilization studies that have been completed during the past 20 years, along with BLM and USFS staff observations, suggest that as wild horse populations increase they contribute to the decrease of forage species. This is especially true in grassland, sagebrush/grassland, and seeded areas.

Four trend studies were set up within and adjacent to the North Hills HMA and USFS Wild Horse Territory by the Utah Division of Wildlife Resources (UDWR) to monitor vegetation for big game. The North Hills (30-62-13) and Sevy Hollow (30-53-98) studies are within the HMA. The Telegraph Draw Study (30-40-13) is within the Wild Horse Territory. The Northwest of

Enterprise Study (30-52-08) is just outside the HMA. These studies were established in 1982 and 2003, depending on the study. All but the Sevy Hollow Study were last read in 2013. These studies are available at Utah Big Game Range Trend Studies website (https://wildlife.utah.gov/range-trend-report-archives.html). These studies describe the soils as being in a stable trend with browse trending slightly up and herbaceous species trending slightly down. They also note that there is pinyon and juniper tree encroachment in the area. These findings are also noted in the BLM frequency studies and the Rangeland Health Assessments that have been completed within the HMA. Frequency studies completed by the BLM on allotments that occur within the HMA suggest the trend is in general stable or static condition. It has been observed on the SUSC Allotment that grasses have converted from cool season to warm season during the 1999-2005 drought. However, the Telegraph Draw Study does have an upward trend on grasses. Additional information on the vegetation studies have been summarized in Term Grazing Permit Renewal EAs DOI-BLM-UT-C010-2009-0009-EA and EA-UT-040-07-04.

On the Forest Service wild horse territory, fifteen long term vegetation trend study plots within the project area are monitored on a five year rotation by the USFS botanist. These are monitoring based-sites that track trend and focus on rangeland health. One site, number 5017, is located near Nephi Spring and considered riparian. The data provided by this evaluation is for individual benchmark sites that are representative of management in the larger area. The monitoring protocol focuses on primary health indicators that are tracked through time to assess trend and determine if changes are needed in management.

The rangeland health assessment can be broken down into several components or criteria:

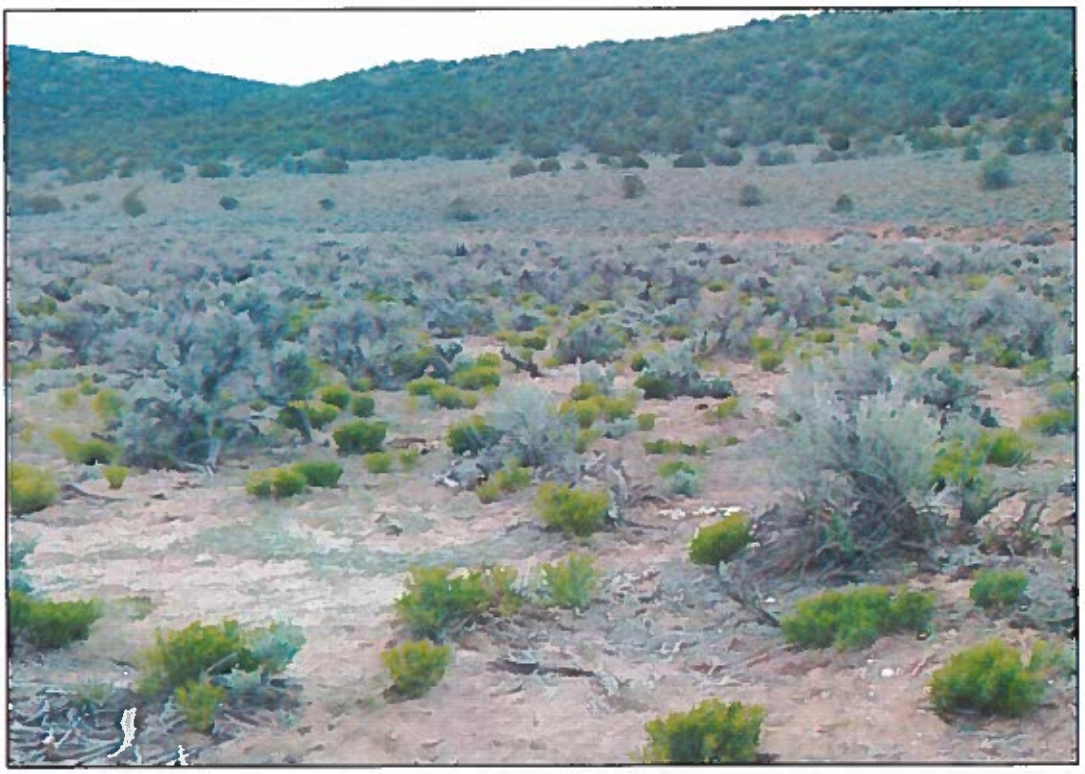
- **Effective Ground Cover** – The percentage of material, other than bare ground covering the land surface. It may include live vegetation, standing dead vegetation, litter, cryptograms, and rock over ¾ inch. Ground cover plus bare ground would total 100 percent. (USDA, 2010).
- **Invasive Plants** – This is the quantity of invasive plants present at each monitoring site. Invasive plants includes not only noxious weeds which have a special designation due to their potential to cause widespread ecological or economic damage, but also invasive plants such as cheatgrass (*Bromus tectorum*) which are now widespread across the landscape and have potential to carry wildland fire.
- **Resource Value Rating (RVR)** – RVR is a system which can be used to assess the quality of species composition on a monitoring site. This system places vegetation values into three equally weighted resource categories 1) wildlife 2) watershed and 3) livestock. The representative monitoring site is then rated based on how the observed and measured plant species contribute to these resources. The objective for RVR is to maintain a plant composition overall resource value rating of greater than "low" on all uplands not affected by fire or already infested by invasive plants.

Rangeland Health Assessment for Long Term Vegetation Plots within the NHJMA

Site ID # /year plot last read	Effective Ground Cover (%)	Invasive Plants (%)	Resource Value Rating (overall)	Range Health Rating	Trend	Meeting Desired Conditions
1529/2015	53.6	0	Low-medium	Functioning	N/A	Yes
4024/2015	86.3	4.4	Low-medium	Functioning	stable	Yes
8029/2013	64.5	15.9	Low	Functioning at risk	down	No
6009/2016	89.8	52.6	Low - medium	Not functioning	N/A	No
5004/2015	53.8	34.9	Low-medium	Not functioning	down	No
5017	---	---	---	---	---	No
30-40/2013	75.09	34.83	N/A	Not functioning	down	No
1663/2016	66.50	51.50	Low-medium	Functioning at risk	N/A	No
1664/2016	58.80	9.60	Low	Functioning	N/A	Yes
1665/2016	78.50	15.50	Low	Functioning	N/A	Yes
1666/2016	57.50	46.20	Low-medium	Functioning at risk	N/A	No
1667/2016	62.30	31.70	Low	Functioning at risk	N/A	No
1668/2016	62.00	25.70	Low-medium	Functioning at risk	N/A	No
1669/2016	77.50	54.50	Low-medium	Functioning at risk	N/A	No
1670/2016	72.80	5.0	Low	Functioning	N/A	Yes
AVG	68 %	27 %		*N/A = Not Applicable, 1 yr. of data, no apparent trend		

According to this assessment, 67 percent of the sites monitored in the project are not meeting desired conditions (defined as either functioning at risk or not functioning). The objective for rangeland health is a rating of functioning or functioning at risk and a trend that is stable to upward. Of the fifteen long term vegetation monitoring plots, 6 plots have a resource value rating of low. One of the goals of this project would be to increase this rating to greater than low. The average percentage for presence of invasive species is 27 percent. Invasive species are a major contributing factor to declining rangeland health and with the exception of site number 8029, nine of fifteen sites monitored are not meeting desired conditions because of a prevalence of invasive plants.

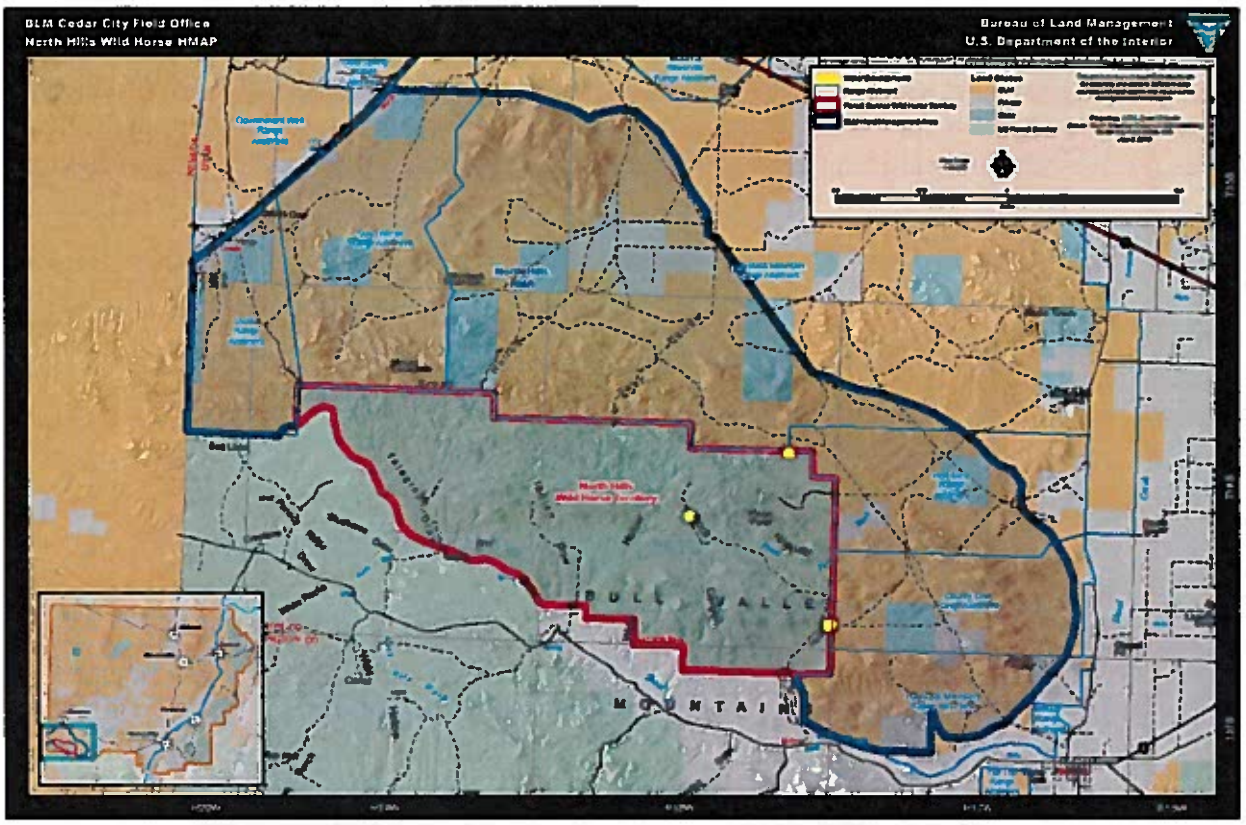
These plots do not fully account for the thousands of acres of encroaching pinyon and juniper across the territory. As previously mentioned, pinyon and juniper tend to shade out and compete with both sagebrush, grasses and other forbs which provide for forage and soil stability. Also, drought conditions and overpopulation of wild horses between 1999 and 2005 have reduced forage production in some of the key wild horse habitat areas. In 2008 and 2009 drought conditions and high horse populations simultaneously occurred. This, along with the reduced vigor of the plants because of the drought, caused mortality of key forage species throughout the NHWHMPA. Inadequate residual vegetation (forage) and litter remaining on certain key use areas allowed soil loss and erosion. Utilization studies that have been completed during the past 20 years, along with CCFO staff observations, suggest that as wild horse populations increase they contribute to the decrease of forage species. This is especially true in grassland, sagebrush/grassland, and seeded areas.



Year-long grazing by wild horses has been one contributing factor to the downward trend of the perennial grasses and the change from cool season grasses to warm season grasses. Horses, because they are territorial, are grazing the same areas repeatedly throughout the spring during critical growing periods for grasses. High populations of wild horses can reduce the available forage for not only the year the grasses are grazed, but also for years to come. Horses will graze the most desirable forage plants first before grazing on other species. Wild horses are capable of cropping forage much more closely than wild or domestic ruminants, causing a loss of the most desirable forage species and reducing plant diversity.

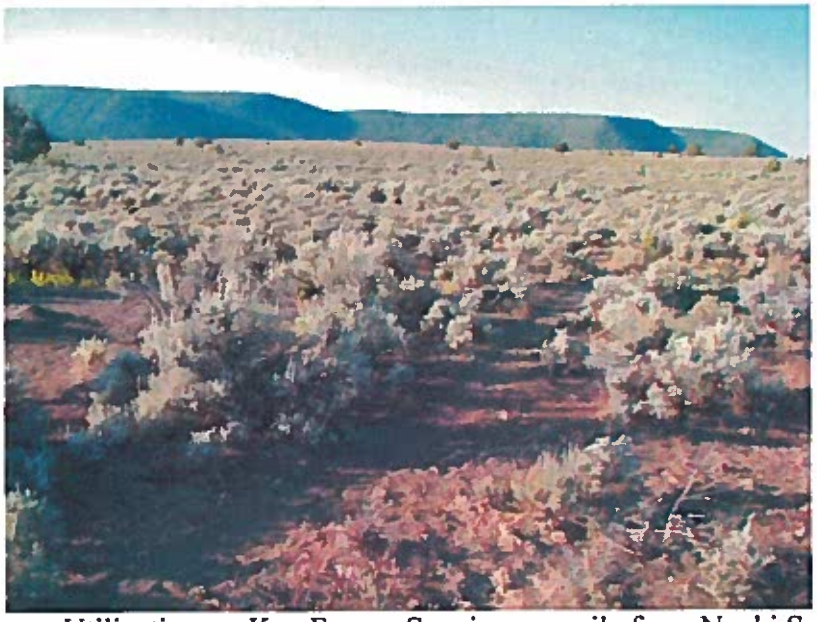
From 1996 to 2003, 2005, 2006 and 2008 to present the excess number of wild horses (numbers over AML) within the JMA reduced the amount of available forage for all grazing animals. It has also prevented recovery of forage species from impacts of past drought.

Allotment Map



Appendix 6. Additional Wild Horse Information

The horses within the JMA have a Body Condition Score (BCS) of 2-4 based on the Henneke Body Condition Chart. Although spring of 2017 had average moisture which provided average forage production and prevented a catastrophic loss of wild horses within the JMA. Monitoring data still showed moderate to heavy use at key areas and severe use near Nephi Spring. If the area receives less moisture than average or if there is a really cold winter wild horse lives may be at risk.



Moderate Utilization on Key Forage Species one mile from Nephi Spring.

The AML for the North Hills JMA was set in the North Hills WHMP and is in conformance with the land use plans that allocated forage for wild horses, livestock, and wildlife. The BLM CCFO and USFS Pine Valley Ranger District has attempted since the completion of the WHMP and Land Use Plans to maintain the wild horse population within the AML on the North Hills HMA. Since 1995 nine (9) gathers and removals have been conducted within the JMA in an attempt to keep the horse population within the AML. In 2003, 2007 and 2010 the population was down near the upper end of the AML. Gathers of wild horses within this JMA have proven difficult due to heavy tree cover, terrain, and horse movement. As the population increases, it becomes harder to gather the number of horses needed to reduce the population to within the AML.

The current North Hills WHMP has only two objectives. The first is to "Maintain or improve current forage productivity of 790 AUMs on the critical wild horse winter range". The second is to "Provide for a horse population of approximately 50 head" with specified age structure and a sex ratio of 40% males and 60% females. Additional management direction for range improvement (water sources), livestock management actions, capture and removals and studies are given in the WHMP. Because this plan is 40 year old they are lacking some of the more current management practices, procedures and scientific information. Over the past 40 year the BLM have developed specific management practices such as the Comprehensive Animal

Welfare Program, Standard Operation Plan for gathers, Population Inventory methods, Rangeland Health Standards, new trend and utilization study methods, which are currently being followed but are not identified in the current WHMP.

Diet/Dietary Overlap with Other Species

Wild horse populations above AML compete for forage, water, and cover allocated to wildlife and livestock. High populations of wild horses impact riparian areas with increased trailing, vegetative use, and trampling. Wild horses will drive away livestock and native ungulates from watering and feeding areas (Miller 1981).

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, Such as the horses, to outcompete native species for a limited communal resourced during peak need raises concern for native communities in water-limited environments (Hall et al. 2016)

Because horses have a cecal digestive system and can cover longer distances than domestic ruminants, wild horses can remain in good health under forage conditions fatal to domestic ruminants (Holechek 1989). In 1999 through 2004, range conditions within the JMA became so bad that even though livestock use was reduced or eliminated on the BLM allotments and several hundred head of wild horses removed, health of some horses declined to critical conditions. Some horses were lost to starvation and dehydration during those years. In 2015 and 2016 the horse population was so high once again horse health became critical during the winter. Supplemental feeding of wild horses near Nephi Spring by the USFS occurred to prevent a large die off of wild horses from starvation that winter.

The overriding limiting factor for the carrying capacity of wild horses in the JMA is normally not the available forage, although this is a concern, but is the supply of reliable water during the summer months. Upland vegetation in proximity to water sources are used heavily by wild horses and wildlife, while vegetation in areas farther from water (i.e., greater than six miles) is used slightly or not at all. There are areas in the far northern part of the JMA that have adequate forage, but can only be used in the winter when snow is available or when summer thunder storms fill ponds. During drought conditions, as has occurred during 1999-2004 and the last few years, ponds have dried up early in the summer, concentrating wild horses on Nephi Spring and limiting the number of horses that the JMA could support. Livestock operators and the National Mustang Association have repaired and operated windmills within the JMA to sustain the current wild horse populations. The increased concentration of wild horses at these sites reduced vegetation and caused soil compaction. In 2010, 2012, 2013, 2014, 2015, 2016 summer thunder storms filled ponds and allowed wild horses to disperse throughout the JMA. However, due to the high population of wild horses within the JMA, water hauling occur to sustain wild horses through the summer.

The AML is not large enough to maintain a good genetic variability without introduction of horses from outside the JMA. A handful of horses from the different HMAs, including the Sulphur HMA, have been released into this JMA. This was done in accordance with recommendations from Dr. Gus Cothran's Genetic Analysis of the North Hills, UT Feral Horse Herd report (2002).

Population modeling was completed for the North Hills JMA using Version 3.2 of the WinEquus population model (Jenkins 2000) to analyze how the alternatives would affect the wild horse population. This modeling analyzed removal of excess wild horses without applying fertility control, as compared to removal of excess wild horses with fertility control. The No Action (no removal) Alternative and an alternative of just fertility control were 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 Population Modeling Report.

Potential Impacts to Wild Horses

Impacts of Alternative 1: No Action Alternative -- Continue Existing Management/No Gather and Removal

No HMAP would be completed at this time. The JMA would be managed under the objectives of the Pinyon MFP, the current HMAP and current regulations and policies. Objectives would not in conformance with the latest science, management, handling and care practices to achieve and maintain a thriving ecological balance within the North Hills JMA.

If No Action is taken, excess wild horses would not be removed from within or outside the North Hills JMA at this time. The animals would not be subject to the individual direct or indirect impacts as a result of a gather operation in 2018. Over the short-term, individuals in the herds would be subject to increased stress and possible death as a result of increased competition for water and forage as the wild horse population continues to grow. 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 JMA. Trampling and trailing damage by wild horses in/around riparian areas and water sources 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 North Hills JMA. Some mountain lion predation may occur, but does not appear to be substantial. Coyotes are not prone to prey on wild horses unless young or extremely weak. Other predators such as wolf or bear do not exist within the JMA. 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.

Substantial loss of the wild horses in the JMA 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 impacts to the future of the JMA 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 increase beyond the capacity of the available habitat, more bands of horses would leave the boundaries of the JMA 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."

Impacts of Alternative 2: Proposed Action (Proposed HMAP with gather, removal and treatment)

The Proposed Action would only decrease the existing overpopulation of wild horses by approximately 100-200 wild horses in each successive gather operation over a period of six to ten years and horses would be selected for release with the objective of establishing a 50:50 sex ratio within the core breeding population of 40-50 horses on the range. The target population when the objectives of this alternative are reached would result in a total population at approximately mid-range AML or 50 horses. Every 4-5 years 1-3 studs or mares from a different HMA, with similar or desired characteristics of the horses within the North Hills JMA maybe released to maintain the genetic health on the JMA. All animals selected to remain in the core breeding population would be selected to maintain a diverse age structure, herd characteristics and body type (conformation). The Proposed Action would not reduce all of the associated impacts to the wild horses and rangeland resources. Over the short-term, individuals in the herd would still be subject to increased stress and possible death as a result of continued competition for water and forage until the project area's population can be reduced to the AML range. Although lessened the areas experiencing heavy and severe utilization levels by wild horses would remain near current levels and impacts to rangeland resources (concentrated trailing, riparian trampling, increased bare ground, etc.) throughout the JMA would be expected to continue until the project area's population can be reduced to the AML range and concentration of horses can be reduced.

Because it will take several successive gather operations over a period of six to ten years to get the combined area's wild horse population to low end of AML, bands of horses would continue to leave the boundaries of the JMA into areas not designated for their use in search of forage and water and would not achieve the stated objectives for wild horse herd management area, 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".

Removal of excess wild horses would improve herd health. Decreased competition for forage and water resources would reduce stress and promote healthier animals. This removal of excess animals coupled with anticipated reduced reproduction (population growth rate) as a result of fertility control should result in improved health and condition of mares and foals as the actual population comes into line with the population level that can be sustained with available forage and water resources, and would allow for healthy range conditions (and healthy animals) over the longer-term. Additionally, reduced population growth rates would be expected to extend the time interval between gathers and reduce disturbance to individual animals as well as to the herd social structure over the foreseeable future.

Bringing the wild horse population back to low range AML by achieving the proposed action would reduce damage to the range from the current overpopulation of wild horses and allow vegetation resources to start recovering, without the need for additional gathers in the interim. 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.

Impacts to individual animals may occur as a result of handling stress associated with the gathering, processing, and transportation of animals. The intensity of these impacts varies by individual animal and is indicated by behaviors ranging from nervous agitation to physical distress. Mortality to individual animals from these impacts is infrequent but does occur in 0.5% to 1% of wild horses gathered in a given gather. Other impacts to individual wild horses include separation of members of individual bands of wild horses and removal of animals from the population.

Indirect impacts can occur after the initial stress event, and may include increased social displacement or increased conflict between stallions. These impacts are known to occur intermittently during wild horse gather operations. Traumatic injuries may occur, and typically involve bruises from biting and/or kicking, which do not break the skin.

The gathers would occur frequently making wild horses more difficult to trap. The horses would become very evasive and learn to evade the helicopter by taking cover in treed areas and canyons. Wild horses would also move out of the area when they hear a helicopter, thereby further reducing the overall gather efficiency. Frequent gathers would increase the stress to wild horses, as individuals and as entire herds. It would become increasingly more difficult over time to repeat gathers if the gathers are within two year intervals to successfully treat mares with population growth suppression treatments.

Stallions selected for release would be released to maintain post-gather sex ratio at approximately 50% stallions in the remaining herds. Stallions would be selected to maintain a diverse age structure, herd characteristics and body type (conformation).

Water/Bait Trapping (if used)
Bait and/or water trapping generally requires a long window of time for success. 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 acclimatization of the horses creates a low stress trap. 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 checked on a daily basis. 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 of the excess horses utilizing bait/water trapping could occur at any time of the year and would extend until the target number of animals are removed to relieve concentrated use by

horses in the area, reach AML, to implement population control measures, and to remove animals residing outside JMA boundaries. 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 of wild horses, such trapping can continue into the foaling season without harming the mares or foals. Conversely, it has been documented that at times water trapping could be stressful to wild horses due to their reluctance related to approaching new, human structures or intrusions. In these situations, wild horses may avoid watering or may travel greater distances in search of other watering sources.

The wild horses that are gathered would be subject to one or more of several outcomes listed below.

Temporary Holding Facilities During Gathers
Wild horses gathered would be transported from the trap sites to a temporary holding corral near the JMA in goose-neck trailers or straight-deck semi-tractor trailers. At the temporary holding corral, the wild horses will be aged and sorted into different pens based on sex. The horses will be provided ample supply of good quality hay and water. Mares and their un-weaned foals will be kept in pens together. All horses identified for retention in the JMA will be penned separately from those animals identified for removal as excess. All mares identified for release will be treated with fertility control vaccine in accordance with the SOPs for Population Growth Control Implementation (see **https://go.usa.gov/xQHCD**).

At the temporary holding facility, a veterinarian, when present, will 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 will be inspected prior to use to ensure wild horses can be safely transported. Wild horses will be segregated by age and sex when possible and loaded into separate compartments. Mares and their un-weaned foals may be shipped together depending on age and size of foals. Mare and un-weaned foals are not separated for longer than 12 hours. Transportation of recently captured wild horses is limited to a maximum of 9 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.

At short-term corral facilities, a minimum of 700 square feet is provided per animal. 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 becomes the property of the applicant. Adoptions are conducted in accordance with 43 CFR § 5750.

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 is conducted in accordance with the 1971 WFRHBA and congressional limitations.

Off-Range Pastures
As of October 2017 there are 32,805 wild horse or burros in Off-Range Pastures. Most of these pastures are grasslands in the Midwest states like Oklahoma and Kansas.

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 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 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 than the stress involved in the additional period of uninterrupted travel.

ORPs 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 and with the forage, water, and shelter necessary to sustain them in good condition. Establishment of ORPs was 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 average of about 10-11 acres per animal.

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 small percentage of the animals may be humanely euthanized if they are in very poor condition due to age or other factors. Although horses residing on ORP facilities live longer, on the average, than wild horses residing on public rangelands, 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).

Euthanasia and Sale Without Limitation
BLM and Forest Service would follow the WFRHBA as amended. 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 by BLM under current Congressional appropriations for over a decade and are consequently inconsistent with BLM policy. If Congress were to lift the current appropriations restrictions for BLM, then it is possible that excess horses removed from the North Hills JMA 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). Conditions requiring humane euthanasia occur infrequently and are described in more detail in Washington Office Instruction Memorandum 2015-070.

Wild Horses Remaining or Released into the JMA following Gather
Under the Proposed Action, the post-gather population of wild horses would be about 40 wild horses, which is the low range of the AML for the North Hills JMA under this alternative. 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 JMA. 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 JMA 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 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.

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.

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; or
- 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. Nearly all 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/winter reduces risk of heat stress, although this can occur during any gather, 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.

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. The 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.

Population Growth Suppression treatments

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 JMA as needed 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 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 (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.

GonaConTM Contraception

All mares selected for release that are not treated with PZP would be treated with a two-year GonaConTM or similar vaccine and released back to the range. 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 JMA 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 JMA. With rangeland conditions more closely approaching a thriving natural ecological balance, and with a less concentrated distribution of wild horses across the JMA, 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.

Sex Ratio

In general the natural sex ratio of a wild horse populations is 50:50 male to female. One management option is to skew the sex ratio of a herd in favor of more males than females to slightly slow the population growth. Any impacts of sex ratio manipulation are expected to be temporary because the sex ratio of wild horse and burro foals at birth is approximately equal between males and females (NAS 2013), and it is common for female foals to reproduce by their second year (NAS 2013). Thus, within a few years after a gather and selective removal that leads

to more males than females, the sex ratio of reproducing wild horses and burros will be returning toward a 50:50 ratio.

Alternative 3:HMAP with adjusted AML. No Gather or Removal

Impacts from this alternatives implementation of the HMAP would be similar to the Proposed Action, however no gather, removal or population growth suppression treatment would be conducted at this time without additional NEPA documentation being completed. The wild horses within the North Hills JMA would be managed under the HMAP objectives and goals with an increased AML of 70 -130 head. The new sex ratio objective would be 60:40.

Sex Ratio

Skewing the sex ratio of a herd so that there are more males than females is an established BLM management technique for reducing population growth rates. As part of a wild horse and burro gather process, the number of animals returned to the range may include more males, the number removed from the range may include more females, or both. By reducing the proportion of breeding females in a population (as a fraction of the total number of animals present), the technique leads to fewer foals being born, relative to the total herd size.

Sex ratio is typically adjusted in such a way that 60 percent of the horses are male. In the absence of other fertility control treatments, this 60:40 sex ratio can temporarily reduce population growth rates from approximately 20% to approximately 15% (Bartholow 2004). While such a decrease in growth rate may not appear to be large or long-lasting, the net result can be that fewer foals being born, at least for a few years – this can extend the time between gathers, and reduce impacts on-range, and costs off-range. Any impacts of sex ratio manipulation are expected to be temporary because the sex ratio of wild horse and burro foals at birth is approximately equal between males and females (NAS 2013), and it is common for female foals to reproduce by their second year (NAS 2013). Thus, within a few years after a gather and selective removal that leads to more males than females, the sex ratio of reproducing wild horses and burros will be returning toward a 50:50 ratio.

Having a larger number of males than females is expected to lead to several demographic and behavioral changes as noted in the NAS report (2013), including the following. Having more fertile males than females should not alter the fecundity of fertile females. Wild mares may be distributed in a larger number of smaller harems. Competition and aggression between males may cause a decline in male body condition. Female foraging may be somewhat disrupted by elevated male-male aggression. With a greater number of males available to choose from, females may have opportunities to select more genetically fit sires. There would also be an increase the genetic effective population size because more stallions would be breeding and existing females would be distributed among many more small harems. This last beneficial impact is one reason that skewing the sex ratio to favor males is listed in the BLM wild horse and burro handbook (BLM 2010) as a method to consider in herds where there may be concern about the loss of genetic diversity; having more males fosters a greater retention of genetic diversity.

Infanticide is a natural behavior that has been observed in wild equids (Feh and Munktuya 2008, Gray 2009), but there are no published accounts of infanticide rates increasing as a result of

having a skewed sex ratio in wild horse or wild burro herds. Any comment that implies such an impact would be speculative.

The BLM wild horse and burro management handbook (BLM 2010) discusses this method. The handbook acknowledges that there may be some behavioral impacts of having more males than females. The handbook includes guidelines for when the method should be applied, specifying that this method should be considered where the low end of the AML is 150 animals or greater, and with the result that males comprise 60-70 percent of the herd. Having more than 70 percent males may result in unacceptable impacts in terms of elevated male-male aggression. In NEPA analyses, BLM has abided by these guidelines, for example:

- In the 2015 Cold Springs HMA Population Management Plan EA (DOI-BLM-V040-2015-022), the low end of AML was 75. Under the preferred alternative, 37 mares and 38 stallions would remain on the HMA. This is well below the 150 head threshold noted above.

- In the 2017 Hog Creek HMA Population Management Plan EA (DOI-BLM-ORWA-V000-2017-0026-EA), BLM clearly identified that maintaining a 50:50 sex ratio was appropriate because the herd size at the low end of AML was only 30 animals.

It is relatively straightforward to speed the return of skewed sex ratios back to a 50:50 ratio. The BLM wild horse and burro handbook (BLM 2010) specifies that, if post-treatment monitoring reveals negative impacts to breeding harems due to sex ratio manipulation, then mitigation measures could include removing males, not introducing additional males, or releasing a larger proportion of females during the next gather.

Under Alternative 3, would increase the AML with a breeding population to 70-110 animals. This could result in concentrating use around available water, with the potential for increased utilization and trampling of soil, vegetation and riparian resources.

When compared to managing horses under the proposed action AML of 30-60, the increased AML would have long-term impacts to individuals in the herds due to increased stress and reduced health as a result of increased competition for water and forage. A number of areas would continue experience heavy to severe utilization by wild horse. The increase AML and lack of a gather and removal at this time would be expected to result in increasing damage to rangeland resources throughout the JMA. Trampling and trailing damage by wild horses in/around riparian areas and water sources 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.

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.

Substantial loss of the wild horses in the JMA 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 impacts to the future of the JMA and all other users of the resources, which depend upon them for survival. This 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 increase beyond the capacity of the available habitat, more bands of horses would leave the boundaries of the JMA 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."

Alternative 4: No Action on HMAP. Gather and Removal With Fertility control.

No HMAP would be completed at this time. The JMA would be managed under the objectives of the Pinyon MFP, the current HMAP and current regulations and policies. No sex ratios would be adjusted.

Impacts of the gather, removal and treatment of released mares with PZP or GonaCon would be similar to those described in Alternative 2 Proposed Action.

Alternative 5: No Action on HMAP. Gather and Removal Without Fertility control.

Impacts from this alternative would be similar to the Alternative 2 Proposed Action, however no sex ratios would be adjusted, and fertility control would not be applied. AML may be achieved but would exceed the high end of AML sooner than the proposed action.

Appendix 7. Population Model 2018

To complete the population modeling for the North Hills Herd Management Area, version 1.40 of the WinEquus program, created April 2, 2002, was utilized.

Objectives of Population Modeling

Review of the data output for each of the simulations provided many 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 fertility control 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: 50% Females; 50% Males. The percent effectiveness of fertility control utilized in the population modeling for Alternative I: Year 1: 94%, Year 2: 82%, Year 3: 68%

The following table displays the contraception parameters utilized in the population model for Gather/Removal/Treatment:

Contraception Criteria

Age	Percentages for Fertility Treatment
1	0%
2	100%
3	100%
4	100%
5	100%
6	100%
7	100%
8	100%
9	100%

Age	Percentages for Fertility Treatment
10-14	100%
15-19	100%
20+	100%

Population Modeling Criteria

The following summarizes the population modeling criteria that are common to the 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: 50% males
- Percent of the population that can be gathered: 80%
- Minimum age for long term holding facility horses: Not Applicable
- Foals are not included in the AML
- Simulations were run for 10 years with 100 trials each

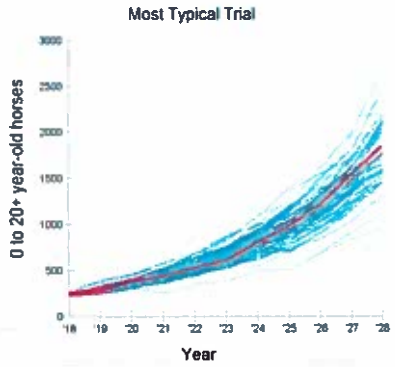
The following table displays the population modeling parameters utilized in the model:

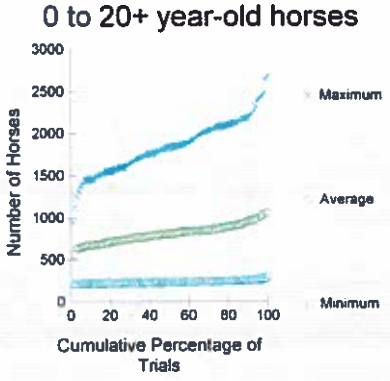
Population Modeling Parameters Modeling Parameter	No Management	Gather/Remove/ Treat with Fertility Control	Gather/Remove	Fertility Only
Management by removal, 60:40 adjustment in sex ratio, and fertility control	**No**	**Yes**	**N/A**	**Yes**
Management by removal only	**No**	**No**	**Yes**	**No**
Threshold Population Size Following Gathers	**N/A**	**60**	**60**	**60**
Target Population Size Following gather	**N/A**	**40**	**40**	**N/A**

Population Modeling Parameters Modeling Parameter	No Management	Gather/Remove/ Treat with Fertility Control	Gather/Remove	Fertility Only
Gather for fertility control regardless of population size	N/A	Yes	N/A	Yes
Gather continue after removals to treat additional females	N/A	Yes	N/A	Yes
Effectiveness of Fertility Control: Year 1	N/A	94%	N/A	94%
Effectiveness of Fertility Control: Year 2	N/A	82%	N/A	82%
Effectiveness of Fertility Control: Year 3	N/A	68%	N/A	68%

Results - No Action

Population Size



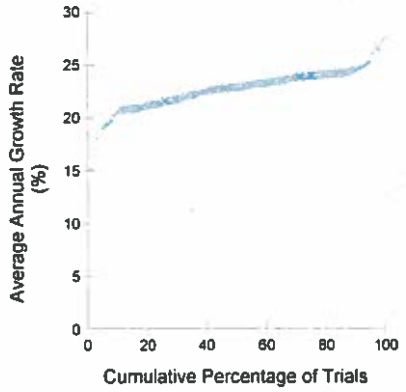


Population Sizes in 11 Years

	Minimum	Average	Maximum
Lowest Trial	212	473	942
10th Percentile	217	669	1456
25th Percentile	222	724	1597
Median Trial	232	804	1842
75th Percentile	246	865	2082
90th Percentile	261	960	2203
Highest Trial	319	1052	2687

* 0 to 20+ year-old horses

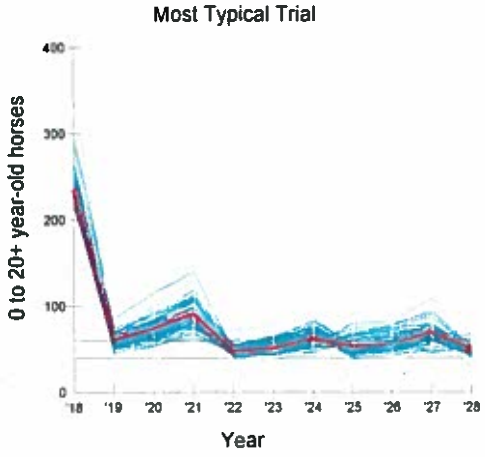
In 11 years and 100 trials, the lowest number 0 to 20+ year-old horses ever obtained was 212 and the highest was 2687. In half the trials, the minimum population size in 11 years was less than 232 and the maximum was less than 1842. The average population size across 11 years ranged from 473 to 1052.

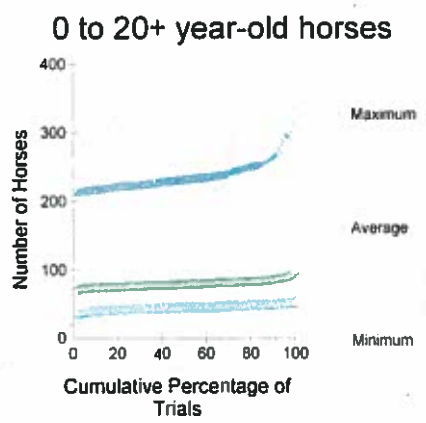


Average Growth Rate in 10 Years	
Lowest Trial	15.1
10th Percentile	20.6
25th Percentile	21.4
Median Trial	22.9
75th Percentile	24.0
90th Percentile	24.5
Highest Trial	27.5

Results- Removal of Excess Animals (Low Point AML); Apply Two-Year Fertility Control.

Population Size



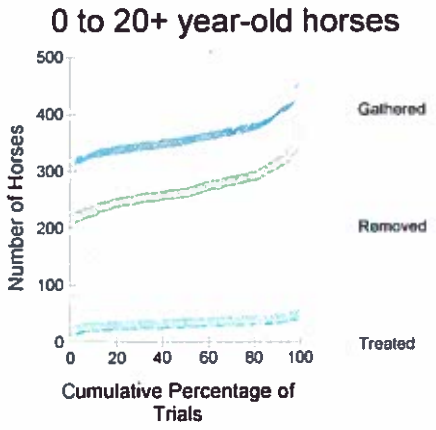


Population Sizes in 11 Years*

	Minimum	Average	Maximum
Lowest Trial	28	67	212
10th Percentile	40	73	217
25th Percentile	43	75	222
Median Trial	45	77	231
75th Percentile	47	81	246
90th Percentile	49	85	264
Highest Trial	53	96	335

* 0 to 20+ year-old horses

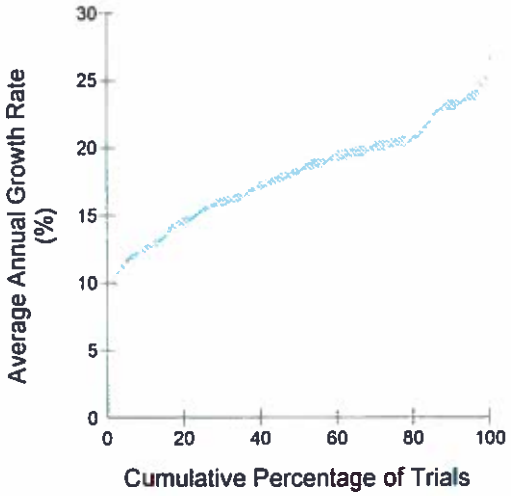
In 11 years and 100 trials, the lowest number 0 to 20+ year-old horses ever obtained was 28 and the highest was 335. In half the trials, the minimum population size in 11 years was less than 45 and the maximum was less than 231. The average population size across 11 years ranged from 67 to 96.



Totals in 11 Years*

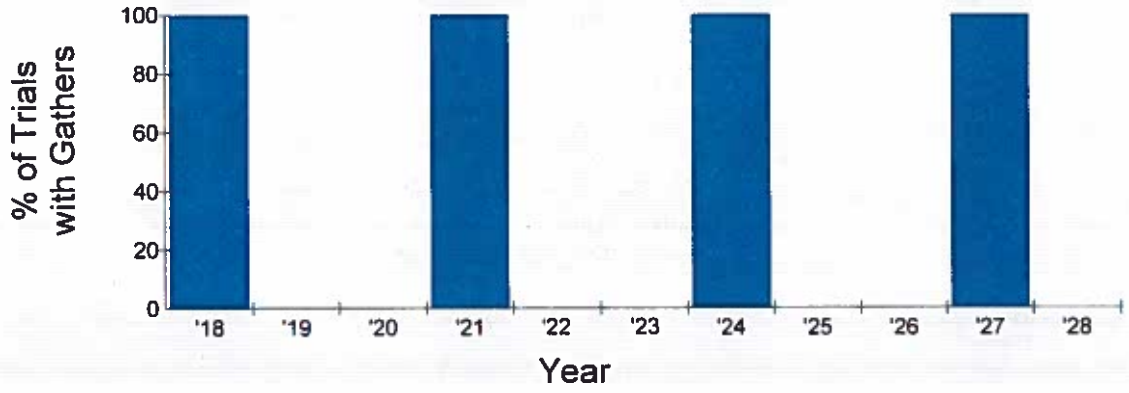
	Gathered	Removed	Treated
Lowest Trial	308	213	18
10th Percentile	329	229	26
25th Percentile	340	247	28
Median Trial	354	261	32
75th Percentile	374	286	36
90th Percentile	402	313	39
Highest Trial	468	393	51

* 0 to 20+ year-old horses



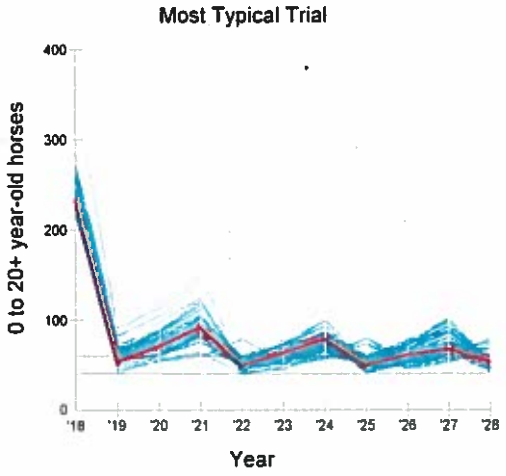
Average Growth Rate in 10 Years

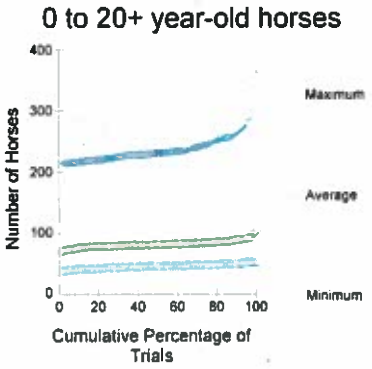
Lowest Trial	9.8
10th Percentile	12.7
25th Percentile	15.5
Median Trial	18.4
75th Percentile	20.4
90th Percentile	23.2
Highest Trial	26.6



Results - Remove Excess Animals (Low Point AML) Without Fertility Control

Population Size



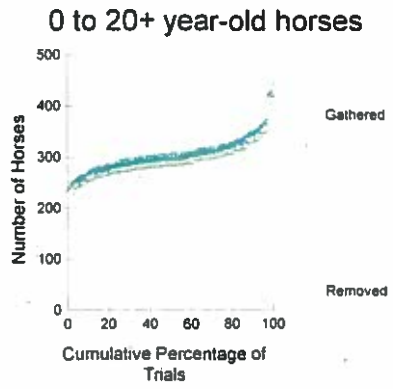


Population Sizes in 11 Years*

	Minimum	Average	Maximum
Lowest Trial	38	69	213
10th Percentile	41	75	217
25th Percentile	43	77	222
Median Trial	45	79	231
75th Percentile	47	82	246
90th Percentile	49	87	262
Highest Trial	53	102	364

* 0 to 20+ year-old horses

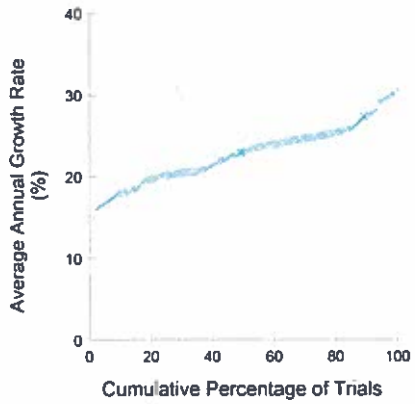
In 11 years and 100 trials, the lowest number 0 to 20+ year-old horses ever obtained was 38 and the highest was 364. In half the trials, the minimum population size in 11 years was less than 45 and the maximum was less than 231. The average population size across 11 years ranged from 69 to 102.



Totals in 11 Years*

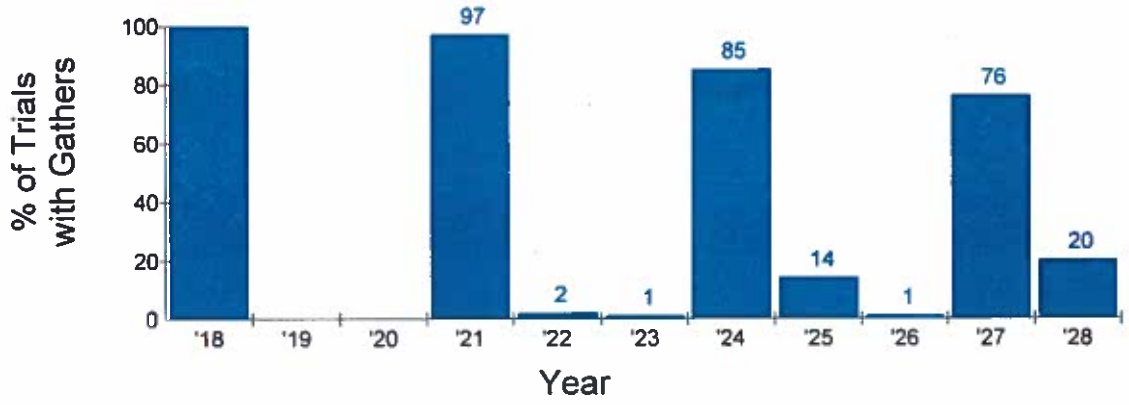
	Gathered	Removed
Lowest Trial	238	226
10th Percentile	270	260
25th Percentile	287	276
Median Trial	301	289
75th Percentile	319	308
90th Percentile	346	336
Highest Trial	442	426

* 0 to 20+ year-old horses



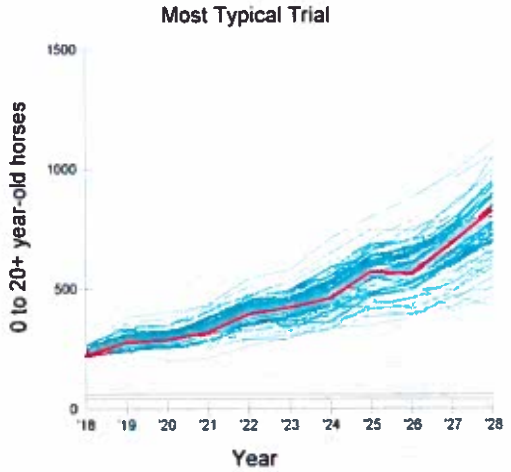
Average Growth Rate in 10 Years

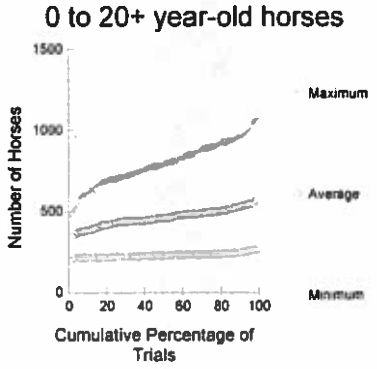
Lowest Trial	14.9
10th Percentile	18.0
25th Percentile	20.2
Median Trial	23.0
75th Percentile	25.0
90th Percentile	27.5
Highest Trial	30.6



Results - Fertility Control Only

Population Size



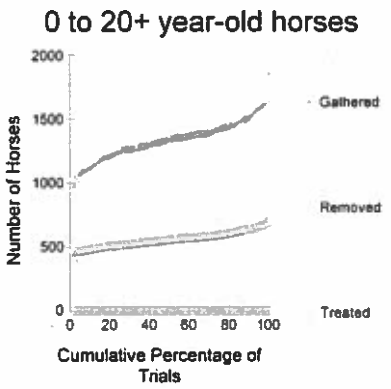


Population Sizes in 11 Years*

	Minimum	Average	Maximum
Lowest Trial	198	309	469
10th Percentile	216	385	618
25th Percentile	222	432	705
Median Trial	229	458	792
75th Percentile	236	495	898
90th Percentile	249	528	959
Highest Trial	275	640	1111

* 0 to 20+ year-old horses

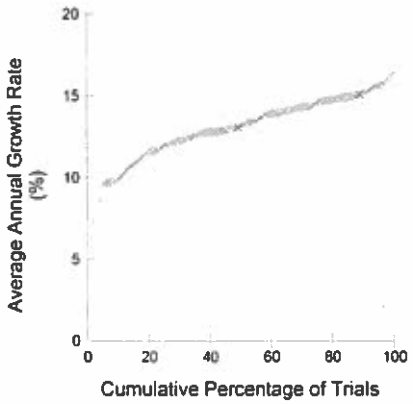
In 11 years and 100 trials, the lowest number 0 to 20+ year-old horses ever obtained was 198 and the highest was 1111. In half the trials, the minimum population size in 11 years was less than 229 and the maximum was less than 792. The average population size across 11 years ranged from 309 to 640.



Totals in 11 Years*

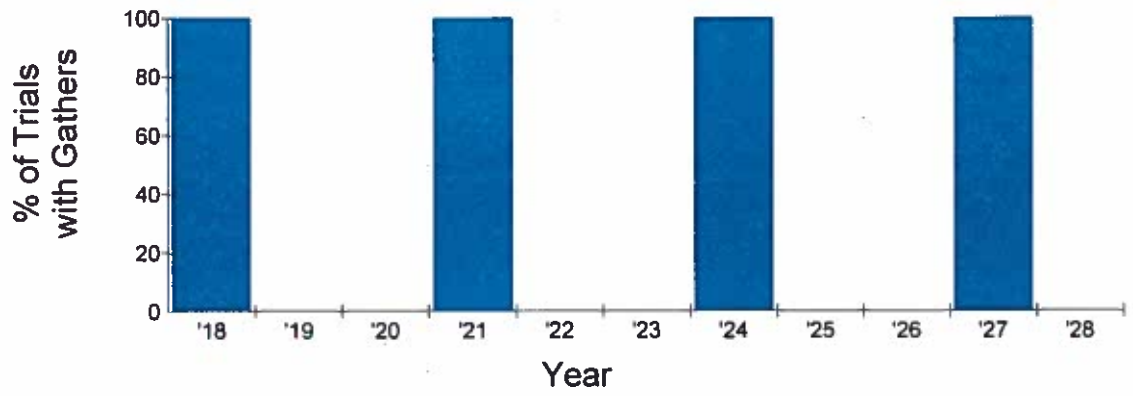
	Gathered	Removed	Treated
Lowest Trial	975	0	416
10th Percentile	1120	0	488
25th Percentile	1245	0	519
Median Trial	1340	0	562
75th Percentile	1425	0	600
90th Percentile	1505	0	644
Highest Trial	1851	0	726

* 0 to 20+ year-old horses



Average Growth Rate in 10 Years

Lowest Trial	6.3
10th Percentile	10.0
25th Percentile	12.0
Median Trial	13.2
75th Percentile	14.6
90th Percentile	15.2
Highest Trial	16.3


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

Appendix 8. Public Comment and Response

An Environmental Assessment (EA) for the North Hills Wild Horse Herd Management Area Plan and Gather Plan DOI-BLM-UT-C010-2018-0054-EA was available to the public for a 30-day review/comment period beginning on July 14, 2018 and ending August 14, 2018. Comments were received from numerous individuals and agencies. Comments received after August 14, 2018 were not accepted. Many of these comments contained overlapping issues/concerns which were consolidated into 79 distinct topics. Many of the comments could be clarified or answered by referring to sections within the EA. Others were outside the scope of the document. All comments were considered but many were grouped with similar comments as addressed below. Changes were made to the EA based upon the comments and public involvement. Comments which are clearly addressed in the EA are not contained below. Below is a summary of the comments received and how BLM used these comments to change the environmental assessment. In addressing the comments the references are to the EA made available for public comment unless otherwise specified.

Number	Commenter	Comment	BLM Response
Support Gathering Wild Horses			
1.	Rep. Derrin R. Owens District 58 Juab & Sanpete Counties	Please use all management tools at your disposal and get the herd back to a manageable 40 horses.	Thank you for the comment.
2.	Keven Whicker Beaver County	Beaver County would like to add support for Alternative 2 within this EA. We believe it is imperative that wild horse gathers remove numbers down to the lower AML when a determination is made that excess wild horse numbers exist. We also feel strongly about utilizing population growth suppression treatments to slow population growth. With lower fertility within the herd, the frequency of repeat gathers is reduced and the number of wild horses sent to long term holding facilities will also be reduced. We would also like to encourage water developments within the HMA to disperse animals across usable habitat and to contain them within the HMA boundaries.	Thank you for the comment.
3.	Ted Chu	Please proceed with plans to reduce the feral horse population in this management area to the appropriate	Thank you for the comment.

Num-ber	Com-menter	Comment	BLM Response
		management level of 40-60 horses. Once that is accomplished please also continue to monitor the range and reduce managed livestock levels to the level necessary to meet range health standards.	
4.	John Taylor	The correct action is to proceed with Alternative 2 and allow the BLM to manage the population responsibly.	Thank you for the comment.
5.	Mark Evens	Please bring the horse numbers down to correct levels.	Thank you for the comment.
6.	Kathleen Clarke State of Utah Public Lands Policy Coordinating Office	The State of Utah has reviewed the North Hills Wild Horse Herd Management Area Plan and Gather Environmental Assessment (EA) and fully supports maintaining wild horse populations at appropriate management levels (AML). The State appreciates the efforts of both the BLM and the Forest Service to bring the wild horse population down to low AML, apply fertility control to decrease future impacts, and address the rangeland degradation caused by excess wild horses.	Thank you for the comment.
Oppose Gathering Wild Horses			
7.	Form Letter	I oppose the roundup and permanent removal of 172 horses from the HMA as well as the use of controversial population control methods.	Thank you for the comment.
8.	Eileen Hennessy	I condemn the proposed action to round up and permanently remove at least 212 wild horses from their legal range in the North Hills herd area and subsequently conducting roundups for the next 10 years removing up to 75% of the herd to maintain a precariously low AML of 40 mustangs, an unsustainable population number. I equally OPPOSE the dangerous use of pesticides PZP, PZP-22 and GonaCona to control fertility and the unnatural skewing of sex ratios.	Thank you for the comment.
9.	Donna Buscemi	I am opposed to this and all roundups as they are unnecessary.	Thank you for the comment.
10.	Beverly Walters	These roundups are simply a dereliction of duty. Humane management is not	Thank you for the comment. Section 1333(b)(1) of the WFRHBA

Number	Commenter	Comment	BLM Response
		rounding up hundreds of horses and selling them so that ultimately they will end up in kill pens.	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.
11.	Mary Loughlin	No Wild Horse roundups.	Thank you for the comment.
Fertility Control			
12.	Form Letter	• Manage the current wild horse population utilizing Catch Treat and Release (CTR) methods for the vaccination of all mares over 1 year of age with the PZP-22 or native PZP fertility control vaccine only, which is 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." • Reject use of the GonaCon vaccine because not much is known about its long-term safety, efficacy or impacts to natural behaviors in wild horses. The EA should analyze the exclusive use of the PZP vaccine to achieve its population growth suppression goals.	The proposed use of fertility controls in alternatives 2, 3 and 4 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 Appendix 4, Alternatives Considered but Not Analyzed in Detail. As noted in Population Growth Suppression Treatments of Appendix 6, GonaCon is also an approved fertility control method that has been identified by NAS as a preferred methods.
13.	Janet Lynch	…inadequately tested population control method GonaCon	See Appendix 6 *Additional Wild Horse Information* for an extensive analysis of the impacts of PZP and GonaCon. As noted in Appendix 6 *Additional Wild Horse Information*, GonaCon is also an approved fertility control method that has been identified by NAS as a preferred methods.
14.	Return to Freedom	We have completed population and economics modeling analysis, and submitted a proposal to both Washington D.C. DOI administrators and Congress, for managing wild horses and burros on public lands via a multipronged gather-removal; placement into partnered long-term	See response to Comment 12. Under Alternative 2 immunocontra-ceptive is a tool that can be used to slow the growth rate. The current products immunocontra-ceptive products that are available cannot stop or reverse the growth rate in wild free roaming herds to achieve a thriving ecological

Num-ber	Com-menter	Comment	BLM Response
		holding facilities; and immunocontraceptive fertility control plan. Our modeling shows that that immuno-contraceptive fertility control will work. Our wishes are not based on opinion, but on fact, and on a program that can and will work. We ask that a slowing of gathers, but not a cessation, paired with slight re-adjustment of AML at this JMA (because of implementation of fertility control, and thus a slowing of the population growth rate) and aggressive use of fertility control vaccination programs alongside slower gathers (not after AML is reached) be implemented.	balance. Under Alternative 3, an increase in the AML is proposed. The direct and indirect impacts of increasing the AML are analyzed under that alternative.
15.	Brieanah Schwartz American Wild Horse Campaign	We conclude that the BLM should not proceed with the proposed action and instead the BLM should consider how to implement a comprehensive on-the-range management program in the North Hills JMA utilizing only the proven PZP immunocontraceptive vaccine.	See response to Comment 12.
16.	Brieanah Schwartz American Wild Horse Campaign	BLM must analyze all reasonable alternatives to the proposed removal of wild horses to below the low AML in the North Hills JMA. Simply put, BLM's evaluation of alternatives must address a full range of alternatives, including plainly reasonable alternatives such as exclusive PZP use within the JMA and a reduction in livestock grazing within the JMA.	The BLM is required to explore a "reasonable" range of alternatives that meet the purpose and need for the action. Five different alternatives were analyzed in this EA that would meet some or all of the purpose and need. Many other alternatives were considered and dismissed from analysis These were listed and reasons for dismissal were explained in Appendix 4. Alternatives Considered but Not Analyzed in Detail. Included in those dismissed from analysis is the exclusive use of PZP to manage the population.
17.	Bruce A. Wagman Schiff Hardin	Compared to mass removals like the one BLM proposes here, PZP fertility control is a more benign method of population management that better aligns with BLM's mandate to manage horses "at the minimum feasible level."... PZP has proven to be a safe	See response to Comment 12 and 14.

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		alternative that is effective in reducing the herd's reproduction rate, and PZP application should play a major role in the current management plan.	
18.	Bruce A. Wagman Schiff Hardin	The Draft HMAP is arbitrary and capricious and violates the APA to the extent that BLM has elected a course of management for this JMA without articulating the specific facts and details upon which it relies for its decision. BLM seeks open-ended authority and approval at this time to manage the herd for the next ten years, using techniques and measures that it has not identified. If BLM were permitted to manage the herd using undisclosed methods, there would be no need for BLM to issue planned management actions for public review and comment.	In Alternative 2's draft HMAP, under the Implementation Objectives it states: "New population control vaccines and/or methods may be use within the JMA as directed through the most recent direction of the National Wild Horse and Burro Program. The use of any new fertility controls would use the most current best management practices and humane procedures available for the implementation of the new controls." Any new population control vaccines and/or methods would have to be analyzed in through additional NEPA documents to develop the best management practices and humane procedures.
19.	Eileen Hennessy	...artificially suppress growth using dangerous fertility control pesticides -- PZP, PZP-22 and GonaCona combined- which are unsafe and often lead to permanent sterility (sufficient analysis on the benefits and effectiveness of GonaCon on wild equine are non-existent); and endanger mares...	See response to Comment 12 and 14.
20.	Iron County	Fertility control options explained in Alt 2 seems reasonable, provided that the BLM and FS keep up with re-treatment before the mare becomes fertile again.	Under alternatives 2 and 4 population growth suppression management would be conducted under the best management practices. The frequency of the treatment of these practices would depend on several factors including but not limited to availability of vaccines, budget, personal availability, health of horses and other management priorities.
Gather methods/ Timing			
21.	Form Letter	Prioritize bait and/or water trapping over helicopter roundup. Any capture methods utilized should be minimally intrusive and preserve the integrity of	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.

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		herd social structure throughout the CTR process.	
22.	Return to Freedom	We would like it stated that we are opposed to the use of helicopters during roundups.... Since bait/water trapping can occur year round, while helicopter gathers only occur under limited circumstances (time of year, weather, avoidance of foaling season, scheduling of limited number of helicopter contractors), is it actually more efficient to use helicopters when time and resources are figured into the calculation	See response to Comment 21. As discussed in Appendix 6, Additional Wild Horse Information, helicopter gathers have been used since the late 1970s and have been shown to be a safe and humane method for gathering wild horses.
23.	Brieanah Schwartz American Wild Horse Campaign	The EA must further analyze alternative methodologies for wild horse removal including the exclusive use of bait/water trapping. Helicopter roundups are known to inflict stress, trauma, injury and death on wild horses and collateral damage to sensitive sagebrush, grasslands, and riparian habitat areas and disruption to other wildlife species.	See response to Comment 21. As discussed in Section 4.2, Environmental Consequences and Appendix 6, Additional Wild Horse Information, helicopter gathers have been used since the late 1970s and have been shown to be a safe and humane method for gathering wild horses.
24.	Friends of Animals	In interpreting these statutory requirements, BLM 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 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 before **every** removal. BLM's handbook also confirms that a determination to remove excess wild horses must be based on "current" information. According to BLM's own interpretation, it is not acceptable to justify a removal based on nothing more than the established AML.	All of the factors to make an excess determination have been met within the EA. The purpose and need for the proposed actions, the proposed action, and appendices 5 and 6 describe these factors. There is no requirement or guidance that requires BLM to make an excess determination before **every** gather. The terrain and thick tree cover makes the JMA difficult to gather wild horses. The multi-year plan is needed because it will take several successive gather operations over a period of six to ten years to get the JMA wild horse population to low end of AML, 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"

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Number Of Horses Gathered			
25.	Form Letter	Make any removals that do take place incremental (no more than 25 per a year) and manage this population at the high AML of 60 horses rather than reducing it to the low AML of 40. The AML range was established to allow the population to grow in the years between roundups; if the population is being managed properly with PZP fertility control, then an AML range is unnecessary.	Conducting gathers in small increments of 25 head doesn't meet the purpose and need to achieve and maintain a population size within the established AML. With a 20% population growth annually and the current estimated population of 254, horses the population would continue to increase with such small removals. This comment is not in compliance with the FRWHBA, which requires the establishment of Appropriate Management Levels and the removal of excess wild horses to maintain a thriving ecological balance with other resources.
26.	K.R. Gregg Michele Anderson	In addition, the BLM's most recently published wild horse population statistics (available on the BLM website) stated the North Hills Utah wild horse population as of March 1, 2018 was 117 wild horses. The current North Hills HMA EA states the current wild horse population is 212 wild horses.	The most current estimated population of 212 head of wild horses as of March 1, 2018 was used in the EA. This estimate is the direct count of a population inventory using the Simultaneous Double-observer method on August 31, 2017. The 117 head that is referenced by the comment is the BLM portion (55%) of the estimated population. The FS portion (45%) of the estimated population is 95 head.
27.	Kathleen Clarke State of Utah Public Lands Policy Coordinating Office	On page seven, the fifth bullet point, BLM states that monitoring and population inventories would be completed between and prior to any follow-up gathers. The State fully supports active and efficient monitoring, however follow-up gathers should not be restricted in the case that monitoring between gathers has not occurred. If the BLM has an estimate on the herd size and a gather does not reduce that estimate to AML, the BLM should be able to perform a follow-up gather without having to reassess the size of the herd. The requirement of constant monitoring is overly	Document edited for clarification. It now reads: "Population inventories and routine resource/habitat monitoring would continue to be completed to document current population levels, growth rates and areas of continued resource concern (horse concentrations, riparian impacts, over-utilization, etc.) throughout the project."

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		burdensome and time consuming and can restrict the BLM's flexibility and ability to respond efficiently to horse overpopulation.	
28.	Kathleen Clarke State of Utah Public Lands Policy Coordina-ting Office	On page 15, the first row of the table, under Livestock Grazing, BLM claims that Alternatives one and three would result in no displacement of livestock if no gather occurred. This statement is untrue. If no gather occurs, wild horse herds will continue to grow by 20 percent annually, which would result in livestock displacement due to a lack of forage and water and deteriorating range conditions. The BLM already notes that displacement has occurred due to wild horses and drought, on page ten, with livestock producers taking voluntary reductions in their number of AUMs per year. A voluntary reduction due to a lack of forage from wild horse overconsumption constitutes livestock displacement.	Document edited for clarification. It now reads: "Displacement of Livestock due to Gather operations."
29.	Brieanah Schwartz American Wild Horse Campaign	Removals, if they occur, should be incremental over time (no more than 50 horses per year). This alternative should include managing this population at the high AML of 60 horses rather than reducing it to the low AML of 40, or below the low AML to 30, as discussed above. The BLM must consider all information it has available about the need to keep horse herds at certain population levels in order to prevent adverse genetic harm to the population, including inbreeding.	See response 12 and 25.
30.	Return to Freedom	We suggest slowing of gathers but continued application of fertility control so that on range population growth rate continues to decrease.	See response 12 and 25.
31.	Bruce A. Wagman Schiff Hardin	The resources available and the competing resource allocations likely cannot be the same today as they were decades ago when the original AML was set. Additionally, the significant advance of other population management tools for wild horses over the past three decades mandates a	There is no basis, at this time, for modifying the AML for the North Hills JMA, 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.

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		modern look at the AML here. Before taking any steps that could negatively impact the wild horses, BLM should be re-calculating the AML to ensure that the proposed action is necessary, and that the horses it intends to remove are indeed "excess."	
32.	Friends of Animals	The last population inventory was conducted in August 2017, and based on this number, BLM estimated that approximately 212 wild horses resided within the JMA in March 2018 BLM believes that, based on these numbers, the population has now grown to an estimated 254 wild horses. Notably, BLM does not include the population numbers from the August 2017 inventory nor does it explain how the population increased by over 40 horses in only a few months. Friends of Animals urges BLM to include previous North Hills wild horse population inventories	See section 3.2, Wild Horses which explains the estimated population of 254 used in the document.
33.	Iron County	Pg. 39 "Excess animal would be removed to the low-range of the AML upon determination that the excess animals are present". This is confusing, if animals are over AML, then excess animals are present. Needs clarification or restated.	This statement is within the HMAP. This is referring to each time a gather plan is prepared and analyzed under the NEPA process. Using the current monitoring data at that time, a determination of excess needs to be made in accordance with WFRHBA. The WFRHBA then 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. There is no requirement or guidance that requires BLM to make an excess determination before every gather.
34.	Iron County	…"AML would be evaluated, as needed, following an in-depth analysis of resource conditions including: actual use, utilization, available forage and	See responses to comments 31 and 33.

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		water, range condition and trend, and precipitation." Periodic assessment on range land health needed, but need to add a caveat that if range land health is below established standards and wild horses are over AML, the excess wild horses shall be removed prior to any livestock adjustment. "Re-adjust AML" in Implementation column – Iron County feels that current AML is adequate as long as wild horses are kept within those levels.	
Wild Horse Vs. Livestock Use / AUMS			
35.	Form Letter	Reduce livestock grazing in the JMA pursuant to 43 C.F.R. 4710.5(a). The BLM has a statutory mandate to protect wild horses, while livestock grazing is permitted solely at the discretion of the Interior Department. Livestock grazing is not required to fulfill the agency's "multiple use" mandate. Further, it is far more cost effective to curtail taxpayer-subsidized commercial livestock grazing in this area than it is to permanently remove wild horses from the range.	Livestock grazing can only be increased, 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 MFP and Dixie National Forest Land and Resource Management Plan it is contrary to the agencies multiple-use mission as outlined in the FLPMA and PRIA, and would be inconsistent with the WFRHBA, which directs the Secretary to immediately remove

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			excess wild horses when such removal is necessary – as is the case in the North Hills. 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 land use plans. 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 increase, 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.
36.	Eileen Hennessy Barbara Warner	The BLM must reduce or eliminate destructive livestock grazing pursuant to CFR 43 C.F.R. 4710.5(a) which the agency has full authority to do "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". If the BLM believes the range cannot support both	See response to Comment 35.

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		wild equines and invasive livestock, it is the livestock that should be removed to accommodate the needs of a PROTECTED species, in this case our wild horses.	
37.	Jeremy Hunt	In the new EA 1.6 states that the authorized officers decision may set or adjust AML. Based on how AML is set in this HMA that can not be done. You do not have any AUMs unless it is changed to specify AML can be adjusted down.	Only Alternative 3 proposes to adjust the AML. In Chapter 4 of the EA, the impacts of each alternative are summarized. In appendixes 5 and 6 additional information is available about impacts to resources from the different alternatives. Consistent with 43 CFR 4700.0-6, WH&B shall be managed in balance with other uses and the productive capacity of their habitat (i.e., WH&B will be managed to achieve and maintain a thriving natural ecological balance and multiple use relationships on the public lands). The amount of forage available to allocate to WH&B shall be determined through in-depth evaluation of resource monitoring data and following a site-specific environmental analysis and decision process. Forage for WH&B (AUMs) is allocated based on the AML upper limit. Handbook H-4700-1 Section 4.2 outlines establishing the appropriate management level.
38.	Jeremy Hunt	Existing Plan shows where all AUMs for horse use were taken from and from which allotments. That established the number of horses the BLM can manage. Found in Section VIII page 10 also in section II. On page 3 it shows the AUMs the Forest Service has to add with BLM AUMs to establish a management level of 40-60 head of horses. That is very plain and simple. Horse numbers are based on how many AUMs you have.	See response to Comment 35. Wild horses are managed under the WFRHBA of 1971 while livestock grazing is managed under the Taylor Grazing Act of 1934. Forage allocations are done under two different processes. For wild horses the AML is established first, then the AUMs are allocated for the upper number of the AML. With grazing permits the AUMs are allocated first then the numbers, season of use, etc.

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			is established.
39.	Janet Lynch	This reckless plan does NOTHING to address the livestock grazing issue, which is the primary issue if the goal is responsible stewardship of the resource.	See response to Comment 35.
40.	Kathleen Clarke State of Utah Public Lands Policy Coordinating Office	The draft EA outlines that the removal of excess wild horses will reduce the number of AUMs consumed annually by wild horses. However, this EA does not state how those AUMs would be used. The document seems to suggest that the land would be rested and stocking rates would remain the same. There are currently 2,642 suspended AUMs in allotments within the North Hills HMA and further permitted AUMs that are not being used due to voluntary reductions by ranchers to avoid overgrazing. In its recently adopted State Resource Management Plan, Utah adopted the policy that: The state of Utah supports restoring AUMs to domestic livestock as Wild Horse populations are brought back to AML and conditions improve.2 BLM should work with permittees to reallocate those 2,642 AUMs to livestock grazing as conditions allow. Year-round grazing by excess wild horses was one of the principal issues that forced livestock reductions to begin with. Consequently, as the vegetation on the ground recovers, those AUMs should be returned to permittees through their annual operating instructions until all permitted AUMs are actively being used and further NEPA analyses should be performed to restore suspended AUMs if rangeland conditions support more than the currently permitted AUMs.	See response to Comment 35.
41.	Kathleen Clarke State of Utah Public Lands Policy	Livestock production is the second largest contributor to the agricultural industry in Iron County at 21.4 percent and contributed $78 million to the local economy in 2016 (Headwaters Economics 2018). Addressing the overpopulation of wild horses would	There is nothing in the proposal that would adjust or change current livestock permits (See response to Comment 35). Because there is not a change of AUMs on current livestock permits no impacts to socio-economics are anticipated..

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	Coordinating Office	reduce the economic harm that wild horses have on agriculture, which contributes to the economy and creates agricultural jobs in the county. This economic data needs to be incorporated into the alternatives to highlight how wild horses are having negative impacts on the economic livelihood of some residents in Iron County. The livestock grazing section on page ten of the draft EA would benefit from the inclusion of this economic data.	
42.	Brieanah Schwartz American Wild Horse Campaign	An in-depth analysis of reducing or removing livestock will support a more detailed consideration of wild horse and livestock effects on range conditions within the JMA. The BLM must consider and adequately analyze how reduction or elimination of livestock grazing, instead of mass removal of wild horses, could help meet long-term goals to protect the habitats in this JMA.	See response to Comment 35.
43.	Eileen Hennessy	Even if these wild horses were managed at the high end of the AML, this would be the equivalent of allowing 1,233 acres for each mustang while simultaneously authorizing the equivalent of 1,005 sheep (201 AUMs) and 147 cow/calf pairs (1,766 AUMs) to graze in the HMA where wild horses are supposed to be managed as the PRINCIPAL USERS of their own legally designated habitat. Considering a cow/calf pair is actually TWO ANIMALS, 147 becomes 294 when doubled. To make matters worse, destructive privately owned livestock is grazed mostly during winter and spring, the most crucial growth periods for rangeland health. So, how is 40-60 wild horses over the carrying capacity? Obviously, there are TOO MANY COWS and SHEEP -- NOT too many mustangs!	See response to Comment 35.
44.	Friends of Animals	Reducing forage for cattle and sheep in wild horse ranges is not only consistent	See response to Comment 35.

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		with BLM's legal duties, it is required. The proposed action, to remove wild horses while refusing to reduce forage for private ranchers blatantly violates the WHBA, which states that the range should be principally devoted to wild horses. Moreover, the multiple use principles of FLPMA do not preclude BLM from reducing forage allotments to private ranchers. BLM still authorizes private grazing on the majority of BLM land. Of the 245 million acres of public land managed by the BLM, 155 million is open to livestock grazing (virtually all BLM land outside of Alaska). By contrast, wild horses are restricted to just 26.9 million acres, which they must share with cattle and sheep. Reducing private grazing on the small fraction of public lands where wild horses are found (approximately 11%) would not violate multiple use principles. Notably, BLM's regulations explicitly state that it can close public lands to grazing use by all or a particular kind of livestock "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."	
Impacts to Gathered Wild Horses			
45.	Eileen Hennessy	Introducing horses from outside the HMA is absurd. To proposed introducing mustangs from elsewhere, suggests that too many animals are being removed from the HMA in the first place! Why not LEAVE THEM ALONE to maintain their genetic health.	P. 63. The AML is not large enough to maintain a good genetic variability without introduction of horses from outside the JMA. A handful of horses from the different HMAs, including the Sulphur HMA, have been released into this JMA. This was done in accordance with recommendations from Dr. Gus Cothran's Genetic Analysis of the North Hills, UT Feral Horse Herd report (2002).
46.	Janet Lynch	Helicopter roundups are intrinsically inhumane, resulting in trauma as well as	The impacts of helicopter gathers to wild horses described in Appendix 6,

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		multiple serious injuries and deaths, and those individuals removed from the range face a high probability of death by the most inhumane means imaginable (that is death in a slaughterhouse) because of recent regulatory policy changes.	Additional Wild Horse Information (pg. 61), apply to all horses on the range. While horses will experience some gather-related stress, such stress is generally of temporary duration. Helicopter gathers have been used since the late 1970s and have been shown to be a safe and humane method for gathering wild horses.
47.	Bruce A. Wagman Schiff Hardin	One of the alternatives considered but rejected by BLM was increasing the AML for the JMA to 70-130 horses.	See response to Comment 45. This is an alternative in the EA and has not been rejected, but has been analyzed.
48.	Bruce A. Wagman Schiff Hardin	Given the scientific reality that a small breeding population, equivalent to the size of what BLM proposes for this herd, is likely to lack sufficient animals to avoid inbreeding, BLM has not explained how its proposed management action will not detrimentally impact the animals it is obligated to protect.... While the draft management plan pays lip service to genetic diversity, BLM has proposed scarce concrete actions to actually determine the level of genetic diversity, before it permanently removes approximately 75% of all wild horses in the JMA.	See response to Comment 45.
General			
49.	Form Letter	Relocate any horses outside the boundaries of the HMA back inside their federally designated range.	In accordance with the FRWHBA excess wild horse shall be removed from public and private lands. BLM manual 4720 states that:-. Excess animals are defined as those animals which must be removed from an area to preserve and maintain a thriving natural ecological balance and multiple-use relationship in that area. This definition includes wild horses or burros located outside the JMA in areas not designated for their long-term maintenance. The proposed action would remove excess wild horses within and outside of the North Hills JMA. By

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			managing wild horses within the JMA at AML, there will be sufficient forage and water for the wild horse such that they do not take up residence outside the JMA in areas not managed for wild horses.
50.	Kim Crumbo Wildlands Network	Ecologically effective populations of mountain lions have significant affect on wild horse behavior and measurably contribute to stability of equid populations. We urge that management options for wild horses should include designation of cougar refugia within the ten Cedar City Field Office (CCFO) and Dixie National Forest with the goal of restoring ecologically effective populations of cougars.	Addressed in: • Appendix 4, Alternatives Considered but Not Analyzed in Detail, under Wild Horse Numbers Controlled by Natural Means. • Potential Impacts to Wild Horses Impacts of Alternative 1: No Action Alternative paragraph 3. • 3.2 Description of Affected Resources, Wild Horses Some mountain lion predation may occur, but does not appear to be substantial. Coyotes are not prone to prey on wild horses unless young or extremely weak. Other predators such as wolf or bear do not exist within the JMA. 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. Wildlife are managed under the Utah Division of Wildlife Resources and not the BLM. Wildlife is monitored through The Utah Division of Wildlife Resources and not the BLM. The annual cougar reports can be found at: https://wildlife.utah.gov/cougar/pdf/17_cougar_annual_report.pdf Information on other wildlife species can be found at the Utah Division of Wildlife Resources at: https://wildlife.utah.gov/
51.	Friends of Animals	An alternative including a combination of protecting natural predators within	See response to Comment 50.

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		the JMA, such as mountain lions, as well as new and/or reconstructed water developments, would help to alleviate any of the alleged long-term damage, and allow horses to live free with natural predation helping to naturally "manage" the population numbers. Notably, the last major roundup within the JMA occurred in December 2010 – nearly eight years ago.11 Clearly, numbers have not increased substantially since that time; therefore, natural predation coupled with the already proposed development of new and/or reconstructed of water sources, would allow to BLM to achieve the objectives set forth in the North Hills EA.	
52.	Kim Crumbo Wildlands Network	We also strongly advise that the Dixie National Forest and the Cedar City Field Office, in cooperation with the BLM's Ely District Office and Great Basin National Park, initiate a science advisory panel consisting of a preponderance of independent scientists to develop a robust, credible, research-based monitoring program as integral to evaluating the effectiveness of cougar presence on influencing free-ranging horse behavior.	Outside the scope of this document.
53.	Eileen Hennessy	The AML for the North Hills mustangs must also be raised to a sustainable level, NOT a level below genetic viability, as most wild equines herds are presently being managed at by the BLM which is threatening the future survival of these wild herds.	See response to Comment 45.
54.	Kathleen Clarke State of Utah Public Lands Policy Coordina-ting Office	In addition to addressing the overpopulation of wild horses on the range, BLM should also address the degradation to the habitat.	Chapter 3 describes the impacts of the current excess wild horses within the JMA. In appendixes 5 and 6, additional information is available about impacts to resources from the different alternatives.
55.	Return to	Bodies of water are subject to algae	Changed Document to "Nephi

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	Freedom	blooms during increased temperature and/or reduction of fresh water input (drought conditions) leading to eutrophication. It is important that wild horses are not "blamed" for any and all range deteriorations as this does not result in an even analysis of resource use and balance.	Spring often experiences algae blooms during the summer when temperatures rise which can occur due to several factors including but not limited to drought, wildlife and wild horse use."
56.	Return to Freedom	The BLM has never considered wild horses as anything other than "feral" in terms of management. It stands to reason that BLM's management mantra for wild horses should be updated in regards to recent mitochondrial DNA evidence placing wild horses into a category different than "feral," and not quite livestock.	The statement is incorrect. The BLM manages wild and free roaming horses and burro. Horse are only referred to as feral in research papers from outside the agency.
57.	Friends of Animals	The National Environmental Policy Act (NEPA) is "our basic national charter for protection of the environment." It serves two fundamental purposes: (1) to require agencies to consider detailed information concerning every significant environmental impact of a proposed action; and (2) to inform the public that the agencies have considered the environmental concerns in their decision-making process while ensuring that the public can both access and contribute to that body of information via comments. The heart of NEPA is the requirement to prepare an Environmental Impact Statement (EIS). NEPA requires agencies to prepare an EIS for any major federal action "significantly affecting the quality of the human environment." An EIS is a statement regarding "the environmental impacts of the proposed action, any adverse environmental effects which cannot be avoided should the proposal be implemented, [and] alternatives to the proposed action."	An EA is appropriate where no significant impacts are anticipated as a result of the chosen alternative. 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 have been evaluated in environmental assessments and none were found to require an EIS. The North Hills Wild Horse Herd Management Area Plan and Gather Plan DOI-BLM-UT-C010-2018-0054-EA was available to the public for a 30-day review/comment period beginning on July 14, 2018 and ending August 14, 2018.
58.	Brieanah Schwartz American	It is clear that BLM is required to prepare an EIS for this action because the EA will be legally insufficient.	See response to comment 57.

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	Wild Horse Campaign	The BLM must prepare an EIS due to the breadth and scope of the project. The Action will span 10 years and impact 84,600 acres that make up the JMA with the conduct of multiple roundups, removals, and other untested or inhumane wild horse management practices. Thus, BLM's decision to prepare an EA here, in lieu of an EIS, is contrary to NEPA and its implementing regulations. Furthermore, "[a] determination that significant effects on the human environment will in fact occur is not essential" for an EIS to be required; "[i]f substantial questions are raised whether a project may have a significant effect upon the human environment, an EIS must be prepared	
59.	Jeremy Hunt	In new EA on Page 39 bottom of the page the last stud horse trough will be maintained. Where is the trough?	After reviewing the location of The Last Stud Horse Trough listed on page 69 of the PEA, that project was deleted from the final EA due to it being outside the JMA.
60.	Jeremy Hunt	In EA 1.6 states that the authorized officers decision may set or adjust AML. Based on how AML is set in this HMA that cannot be done. You do not have any more AUMs unless it is changed to specify AML can be adjusted down.	There is no basis, at this time, for modifying the AML for the North Hills JMA, 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. The existing and proposed HMAPs clarify what information is needed to make adjustments to AML. They state: "Based on above, re-adjust AML or identify management actions to address/resolve rangeland health issues, as needed/appropriate. Re-adjustments in AML will be based on vegetation monitoring, herd monitoring and water availability

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			limiting factors. AML will also consider balance of other resources use to maintain a Thriving Ecological Balance." "Adjust AML, as needed, pending evaluation of monitoring results (after 2028)." The WFRWHBA directs the Secretary of Interior to determine the Appropriate Management Levels and adjust them as needed to achieve a thriving ecological balance.
61.	Brandon Guy Humphries Mayor City of Enterprise	It is my understanding that the BLM is asking for comment on a new North Hills Wild Horse Management Area Plan and Gather Plan. It is my opinion, as a rancher, and as the Mayor of the City of Enterprise, that a new plan is not needed. The BLM should honor their agreement as outlined in the 1977 North Hills Wild Horse Management Plan. The 1977 Plan should be implemented and given the chance to succeed before another study is done and replacement plan is created.	Thank you for your Comment.
62.	Iron County	We would ask that the BLM and the FS review the ICMP, Wild Horse Section, and incorporate the Desired Future Conditions section in the JMP.	BLM/FS reviewed the ICMP and found that although worded differently, many of the Desired Future Conditions are incorporated into the alternatives within the EA.
63.	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	Based on monitoring data indicating that wild horses are causing resource degradation, BLM and FS have determined that an overpopulation of wild horses exists in the North Hills JMA and that removal of these excess animals is necessary to achieve a thriving natural ecological balance. Refer to sections 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

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		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 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.	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. 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 JMA and outside the JMA, 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 North Hills JMA 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 North Hills JMA 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 North Hills JMA

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			increases and overutilization occurs, the risk of ecological sites failing to achieve or make progress toward achieving land health standards also increases.
64.	Friends of Animals	BLM's entire analysis ignores scientific information about the positive impact of wild horses. Instead, it provides an incomplete and misleading analysis of the impact of wild horses on the range.	These impacts are discussed in Section 3.0, Affected Environment and Appendix 6, Additional Wild Horse Information.
65.	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.	Throughout the document it talks about the stress that different gathering methods have on wild horses. P. 61 in Appendix 6 discusses the impacts to wild horses from the gather actions proposed within this EA.
66.	Friends of Animals	The stress of capture and captivity can put the horse "on a path of accelerated deterioration," leading to long-term physical and mental health problems and a shortened life expectancy. Likewise, the ongoing trauma experienced by wild horses after the initial roundup extends to both the captive horses and those horses (if any) that were left in the wild.	There have been over 200,000 wild horses that have been gathered and placed in private care or on long term pastures. These horses have shown that their life expectancy is expanded 5-10 years once in captivity. The horse population continue to thrive on the range after each gather, requiring additional gathers on each HMA every few years.
67.	Iron County	May wish to consider erecting permanent trap pens around strategic watering or feeding locations to re-treat animals every two to three years rather than rely solely on helicopters.	As part of alternatives 2 and 4, water/bait trapping can be used for treatment of animals with population growth suppression. No permanent trap pens are proposed at this time. The rough terrain and lack of vehicle access to reliable water sources make water/bait trapping on a large scale difficult at best. Water/bait trapping has not been an effective way to capture a high percentage of wild horses within the JMA.
68.	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. Managing wild horses	See response to Comment 50. Wild horse population growth and the current number of wild horses within the North Hills JMA indicate that

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		naturally is not only free and sustainable, but also ensures that wild horses remain as they should—wild.	natural predation by mountain lions is not a viable approach to keeping herd numbers at AML.
69.	Marybeth Devlin	Multiple inaccurate statements and comments.	All outside the scope of the document.
70.	Brieanah Schwartz American Wild Horse Campaign	AWHC asks that establishing skewed sex ratios as part of the management plan for the North Hills JMA be eliminated from consideration. However, if the BLM chooses to consider skewed sex ratios as a management tool, the EA must consider that skewing of sex ratios is not scientifically supported and is unreasonable given that the majority of mares will be treated with an immunocontraceptive vaccine.	Sex ratios were changed in alternatives B and C. Skewing the sex ratio of a herd so that there are more males than females is an established BLM management technique for reducing population growth rates. By reducing the proportion of breeding mares in a population (as a fraction of the total number of animals present), the technique leads to fewer foals being born per adult horse. The BLM Wild horses and burros management handbook Section 4.5.3.2 (BLM 2010) discusses this technique and its proper application at length.
71.	Brieanah Schwartz American Wild Horse Campaign	The BLM must further analyze the alternative of managing the horses at high AML. This alternative should include details concerning management of this population at the high AML of 60 horses rather than reducing it to the low AML of 40 horses, or below the low AML to 30 horses. The BLM must consider all information it has available about the need to keep horse herds at certain population levels in order to prevent adverse genetic harm to the population, including inbreeding.	Monitoring data also indicates that wild horses are causing resource degradation, including in areas where there has been no livestock grazing. Removal of excess wild horses to the low range of AML will allow for a period of several years before AML is exceeded. See Appendix 4, Alternatives Considered but Not Analyzed in Detail, for discussion of consideration and elimination of an alternative to gather to the high range of AML.
72.	Brieanah Schwartz American Wild Horse Campaign	Horses outside the JMA should be relocated within the boundaries of the JMA, back inside their federally designated range. The BLM must consider this action as an alternative to simply removing any horses that are found outside of the JMA.	See response to comment 49.
73.	Brieanah Schwartz American Wild	The BLM must analyze the implementation of range improvements, such as the development of additional water sources and removal of fencing,	Included in Alternative 2 is specific recommendations to reconstruct, develop or maintain a number of springs and ponds within the JMA.

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	Horse Campaign	to enhance the ability of the North Hills JMA wild horses to utilize the entire JMA instead of forcing them to concentrate in certain areas or move off the JMA. The BLM cannot simply wait for the horses to come into bad health or wander off the JMA. Instead, the BLM must adequately analyze actions that will actively manage the range for the benefit of these federally protected animals.	Also, two new guzzlers are identified. The HMAPs in alternatives 1-3 all identify objectives for projects to improve water and vegetative resources within the HMA.
74.	Brieanah Schwartz American Wild Horse Campaign	Removal of wild horses from public lands negatively impacts the human environment for those who enjoy observing, photographing and researching these wild horses. Given the tremendous public interest and in fulfillment of the agency's claims to operate with full transparency, the following actions should be considered, analyzed and implemented to ensure that the EA is implemented in a manner that minimizes stress and injuries to wild horses and ensures interested parties have the ability to adequately monitor the BLM's actions once the EA is finalized: Trap sites should be located on public lands to allow public observation of roundup activities. No trap site shall be located on private lands for which the owners will not give permission for public observation of roundup activities. Real-time cameras with GPS should be installed on all helicopters used in roundup operations and video should be live streamed on the Internet. This will improve the transparency of roundup operations and enable the BLM and public to monitor the direct impact motorized vehicle usage has on wild horses and the environment. Real-time cameras should be installed on the trap, the corral and the temporary holding pens, again, so that BLM	This is outside the scope of this document. This comment refer to policy, regulation and contractual matter at state and national levels. P 13. Public observation of the gather activities on public lands would be consistent with BLM IM No. 2013-058 and in compliance with visitation protocols for scheduled and nonscheduled visitation found in ePlanning: https://go.usa.gov/xQHCD.

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		personnel, public and media can monitor the entire roundup operation and treatment of the horses and burros.	
75.	Iron County	P .41 Need to add direction to be taken on lands outside of HMA, Private lands, and lands where the livestock permittee has an agreement to keep separate wild horses and livestock. Essentially, wild horses should be removed from these areas first.	In Section 2.2, under the Gather and Removal heading, the following bullet was added. "Removal of animals from outside the JMA and on lands not managed by the BLM/FS would be given priority where possible."
76.	Iron County	Need to consider more pinyon/juniper treatment projects, especially north of Hebron west to Nephi Springs (Forest Service), and along the north side of the North Hills ridge (BLM).	Under alternatives 2 and 3, additional vegetative projects would be considered under the HMAP. These projects would need more planning and NEPA review and would be address in future documents.
77.	Iron County	Disperse Wild Horse Use - Iron County agrees with the objectives, but disagree that federal land agencies should "acquire" water rights. Need to work with land owners, permittees, and water right owners where needed.	Thank you for your comment.
78.	Friends of Animals	Potential future actions listed in the objectives of the HMAP would be reviewed prior to implementation to determine if additional NEPA documentation is required. Please provide clarity as to what future actions you are referring to....	These are listed in Appendix 3 and include actions such as vegetation treatments, range improvements and water source maintenance.
79.	Friends of Animals	Euthanasia or sale without limitation should be analyzed through an EIS	This document addresses the gather and removal of wild horses. Euthanasia and sale with limitation after gather and removal are not within the scope of this EA.