ENVIRONMENTAL ASSESSMENT

Preliminary Desatoya Herd Management Area Wild Horse Gather Plan

DOI-BLM-NV-C010-2021-0004-EA

Preparing Office

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It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

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Acronyms

AML	Appropriate Management Level
AUM	Animal Unit Month
BCS	Body condition score
BLM	Bureau of Land Management
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CRMP	Consolidated Resource Management Plan
DHR	Desatoya Habitat Resiliency, Health and Restoration Project
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FLPMA	Federal Land Policy and Management Act
FONSI	Finding of No Significant Impact
GAO	Government Accountability Office
GHMA	General Habitat Management Areas
GRSG	Greater Sage-grouse
HMA	Herd Management Areas
Ho	Heterozygosity
IM	Instruction Memorandum
IUD	intrauterine device
MOU	Memorandum of Understanding
MUD	Multiple Use Decision
NEPA	National Environmental Policy Act
NRC	National Research Council
OHMA	Other Habitat Management Areas
ORC	Off-Range Corrals
ORP	Off-Range Pastures
PFC	Proper Functioning Condition
PHMA	Priority Habitat Management Areas
PJ	pinyon and juniper
PMU	Population Management Unit
PZP	Porcine Zona Pellucida
RDF	Required Design Features
SOP	Standard Operating Procedure
TNEB	Thriving Natural Ecological Balance
USFWS	United States Fish and Wildlife Service
WFRHBA	Wild Free Roaming Horses and Burros Act
WSA	Wilderness Study Area

1.0 Purpose and Need

1.1 Introduction

The Bureau of Land Management Stillwater Field Office (BLM) is proposing to gather and remove excess wild horses from within and outside the Desatoya Herd Management Area (HMA). This action is necessary because an over population of wild horses is casing overuse to

upland and riparian vegetation which is degrading wild horse and wildlife habitat. Native bunch grasses, the primary forage for wild horses and some wildlife species is being over grazed, over grazing native bunch grasses can lead to the loss of the grasses depriving wild horses of the forage that they require to survive. Riparian areas are also being overused, these areas are critical for many species of native wildlife and two creeks within the HMA provide habitat for Lahontan cutthroat trout a threatened species. Overuse of riparian areas and creeks causes erosion and loose of native vegetation which leads to a decrease in water quality that can adversely affect Lahontan cutthroat trout and other aquatic species.

In compliance with the National Environmental Policy Act (NEPA), this Environmental Assessment (EA) is a site-specific analysis of potential impacts that could result from implementation of the Proposed Action or Alternatives. If the BLM determines significant impacts could occur, an Environmental Impact Statement (EIS) would be prepared for the project. If no significant impacts are expected, an EIS would not be prepared and a decision would be issued along with a Finding of No Significant Impact (FONSI) documenting the reasons why implementation of the selected Alternative would not result in significant environmental impact.

1.2 Background

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

The Desatoya HMA contains 161,678 acres of public and private lands (157,836 acres of which are public), consisting of a vast, diverse, and remote landscape. The HMA lies about 60 miles east of Fallon, Nevada in Churchill, and Lander Counties (Figure 1, map of HMA and project area). The HMA falls within the Edwards Creek Grazing Allotment, Cold Springs pasture of the

Clan Alpine Grazing Allotment, Porter Canyon Grazing Allotment, and South Smith Creek Grazing Allotment.

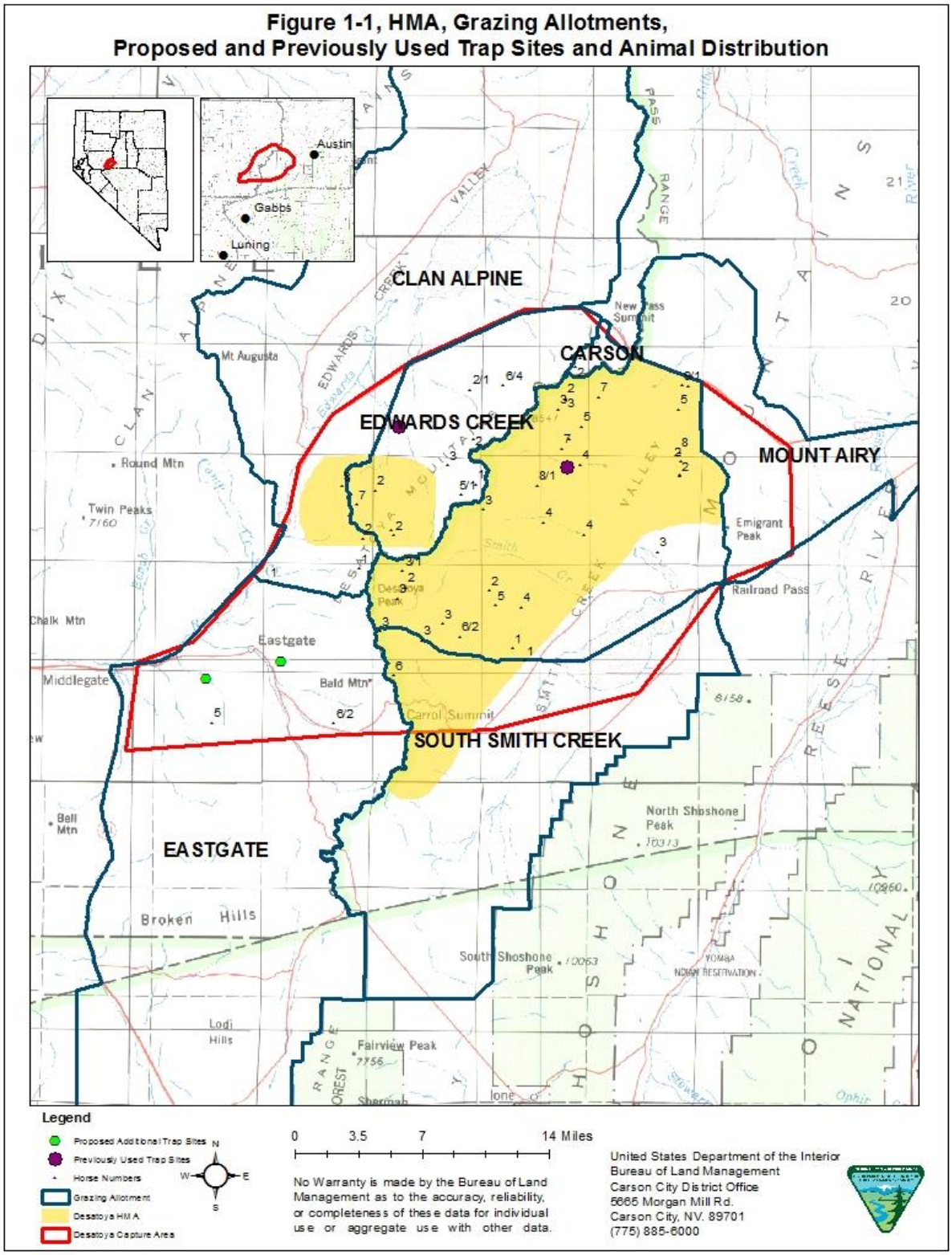
Table 1-1 Appropriate Management Levels for the HMA By Grazing Allotment

HMA Allotment(s)	**AML**	**% of HMA**	**% of Allot.**	**MUD date**
Clan Alpine	32-43	5	2	1992
Edwards Creek	41-55	8	24	1992
South Smith Creek	9-15	14	23	1999
Porter Canyon	45-67	70	81	1999
Total	127-180			

Allot.: Allotment; AML: Appropriate Management Level; BLM: Bureau of Land Management; HMA: Herd Management Area; MUD: Multiple Use Decision

The total forage allocation for wild horses in the HMA ranges between 1,524 Animal Unit Months (AUMs) at the low AML, to 2,160 AUMs at the high AML.

Figure 1: Figure 1-1, HMA, Grazing Allotments, Proposed and Previously Use Trap Sites and Animal Distribution



The HMA contains many unique and important biological, geological, scenic, and cultural resources. Besides providing forage and habitat for wild horses, the HMA provides important habitat for many wildlife species, including the Greater Sage-grouse (GRSG), mule deer, pronghorn, bighorn sheep and many other species of wildlife. The other predominant land uses within the HMA are livestock grazing, wilderness recreation, and general recreation, including hunting, hiking, and exploring.

The AML [1]range within the HMA is 127 to 180 wild horses. The AML upper limit is the maximum number of wild horses that BLM has determined the HMA can support, while maintaining a thriving natural ecological balance (TNEB) and multiple use relationship on the BLM-administered public lands in the area. Establishing AML as a population range allows for the periodic removal of excess animals (to the low range) and subsequent population growth (to the high range) between removals. The AML for the Edwards Creek Grazing Allotment, and Cold Springs pasture of the Clan Alpine Grazing Allotment, was established through a Multiple Use Decision (MUD) (BLM 1992) and reaffirmed in the CRMP (2001). The AML was determined based on an in-depth analysis of habitat suitability, resource monitoring, and population inventory data with public involvement. The AML within the Porter Canyon and South Smith Creek Grazing Allotments was established in the Desatoya Mountains Ecosystem Management Plan EA in 1999 (DOI-BLM-NV-C010-1998-044-EA).

In 2019, 456 wild horses were gathered, 432 of which were removed; 14 stallions and 10 treated mares were released. The released mares were treated with Porcine Zona Pellucida (PZP) PZP-22 and freeze marked for future identification.

The most recent direct animal count within and outside the HMA occurred in October 2020, with 215 wild horses seen. This number is based on an aerial survey observation made using the simultaneous double-observer method, in which observers in an aircraft independently observe and record groups of wild horses (Lubow and Ransom 2016). Sighting rates are estimated by comparing sighting records of the observers. Sighting probabilities for the observers is then computed from the information collected and population estimated generated. (Griffin et al. 2020). Direct counts of wild horse and burro populations have been proven to consistently underestimate the true populations (National Research Council [NRC] 2013); therefore, it is likely that the 2020 count is lower than the actual number of animals present both within and outside of the HMA. This is the raw uncorrected number; a final estimate would be based on a statical analysis of the data, following methods noted in Griffin et al. (2020).

[1] The Interior Board of Land Appeals (IBLA) defined the goal for managing wild horse (or burro) populations in a thriving natural ecological balance as follows: "As the court stated in Dahl vs. Clark, supra at 594, the 'benchmark test' for determining the suitable number of wild horses on the public range is 'thriving natural ecological balance.' In the words of the conference committee which adopted this standard: 'The goal of WH&B management should be to maintain a thriving ecological balance (TNEB) between WH&B populations, wildlife, livestock and vegetation, and to protect the range from the deterioration associated with overpopulation of wild horses and burros.'"

Table 1-2: Wild horse population estimates and removals (estimates are based on helicopter counts)

Census/Removal	Date	Number Counted or Removed	Comments
Census	March 1995	182	
Removal	January 1996	26	
Census	January 1997	103	
Census	June 1997	187	
Census	August 2000	304	Not a complete count
Census	December 2001	294	Not a complete count
Census	January 2002	435	
Removal	July 2003	207	
Removal	February 2004	95	
Census	April 2007	238	
Census	April 2010	434	
Census	July 2011	543	
Removal	August 2012	405	Released 24 males
Census	August 2014	331	
Census	April 2017	465	
Census	July 2019	493	Incomplete count
Removal	December 2019	432	Released 10 PZP[1] treated mares
Census	October 2020	215	Direct count raw data, has not yet been analyzed

[1]PZP: Porcine Zona Pellucida

Based on all information available at this time, the BLM has determined that excess wild horses exist within and outside the HMA and need to be removed. This assessment is based on the following factors including, but not limited to:

1. In October 2020, the BLM conducted an aerial survey of the Desatoya HMA and counted 215 wild horses. The BLM has determined that approximately 88 excess wild horses reside within and outside of the HMA and need to be removed. These excess wild horse numbers are an estimate; the population is continually increasing so when a gather takes place there would likely be a greater number of excess horses.

2. Riparian proper functioning assessments completed in 2013 and 2018 (BLM 2020) documented wild horse use as a significant, causal factor in not achieving wetland-riparian area standards, due to extensive spring degradation, streambank alteration, trailing damage, and utilization of forage within riparian and wetland habitats.

3. Land health evaluations and determinations completed between 2000 and 2020 indicate that the wild horse overpopulation is contributing to the following standard(s) not being met: Riparian/Wetland.

1.3 Purpose and Need for Action

The purpose of the Proposed Action and Alternatives is to implement actions that would achieve and maintain the wild horse population within the established AML over a period of 10 years, to reduce the wild horse population growth rate in order to prevent undue or unnecessary degradation of the public lands associated with an overpopulation of excess wild horses within and outside the HMA, and to restore a thriving natural ecological balance and multiple use relationship on the public lands consistent with the provisions of Section 1333 (a) of the Wild Free-Roaming Horses and Burros Act of 1971.

This action is needed to protect rangeland resources and to prevent undue or unnecessary degradation of the public lands associated with excess population of wild horses within and outside the Desatoya Herd Management Area and to preserve rangeland health.[2]

1.4 Land Use Plan Conformance

This EA is in conformance with the Carson City Field Office Consolidated Resource Management Plan (CRMP) (May 2001):

- WHB-1,2. "Remove excess wild horses from public land to preserve and maintain a thriving ecological balance and multiple-use relationship."
- WHB-2, Desired Outcomes #2 – "Maintain sound thriving populations of wild horses within herd management areas."
- WLD-2, Desired Outcomes #4 – "Maintain and improve wildlife habitat, including riparian/stream habitats, and reduce habitat conflicts while providing for other appropriate resource uses."

1.5 Relationship to Laws, Regulations, and Other Plans

The Proposed Action and Alternatives are in compliance with the following federal, state, and local plans to the maximum extent possible:

- Federal Land Policy and Management Act (FLPMA) of 1976 (43 U.S.C. 1701 et seq.);
- Fundamentals of Rangeland Health (43 CFR [Code of Federal Regulations] 4180);
- Migratory Bird Treaty Act, 1918, as amended, and Executive Order 13186;
- National Environmental Policy Act of 1969, as amended;
- National Historic Preservation Act of 1966, as amended;
- Public Rangelands Improvement Act of 1978;
- State Protocol Agreement between the BLM, Nevada and the Nevada Historic Preservation Officer (2014);
- Special Status Species Manual and Direction for State Directors to Review and Revise Existing Bureau Sensitive Species Lists (IM No. NV-2011-059);
- Taylor Grazing Act of 1934, as amended;
- Wild Free-Roaming Horses and Burros Act of 1971, as amended (WFRHBA);
- Protection, Management, and Control of Wild Free-Roaming Horses and Burros (43 CFR 4700);

[2] The Interior Board of Land Appeals (IBLA) defined the goal for managing wild horse (or burro) populations in a thriving natural ecological balance as follows: "As the court stated in Dahl vs. Clark, supra at 594, the 'benchmark test' for determining the suitable number of wild horses on the public range is 'thriving natural ecological balance.' In the words of the conference committee which adopted this standard: 'The goal of WH&B management should be to maintain a thriving ecological balance (TNEB) between WH&B populations, wildlife, livestock and vegetation, and to protect the range from the deterioration associated with overpopulation of wild horses and burros.'"

- Wild Horses and Burros Management Handbook (H-4700-1).

Refer to Appendix A for additional Laws and Regulations.

The Proposed Action and action Alternatives (except Alternative 4) are consistent with the applicable regulations at 43 CFR 4700 and are also consistent with the WFRHBA, which mandates that BLM "*prevent the range from deterioration associated with overpopulation*," and "*remove excess wild horses in order to preserve and maintain a thriving natural ecological balance and multiple use relationships in that area."* Additionally, federal regulations at 43 CFR 4700.0-6 (a) state that, "*Wild horses shall be managed as self-sustaining populations of healthy animals in balance with other uses and the productive capacity of their habitat*."

- 43 CFR 4710.4: Constraints on management. "Management of wild horses and burros shall be undertaken with limiting the animals' distribution to herd areas. Management shall be at the minimum feasible 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."
- WFRHBA 1333 (b) (2) (iv) states that once the Secretary determines "…that an overpopulation exists on a given area of the public lands and that action is necessary to remove excess animals, he shall immediately remove excess animals for the range so as to achieve appropriate management levels."

1.6 Conformance with Rangeland Health Standards and Guidelines

From 1977 to 2019, the BLM established and/or monitored numerous plots for land health assessments within the Desatoya HMA, resulting in land health assessments published in 2003 and 2019. More information regarding the upland soil and biodiversity standards for land health assessments conducted in all four grazing allotments of the Desatoya HMA between 1989 and 2019 can be found in the following BLM documents:

- Multiple Use Decisions for the Clan Alpine and Edwards Creek allotments (1992)
- Desatoya Mountains Ecosystem Management Plan (1999).
- South Smith Creek Allotment Evaluation (1999)
- Cow Canyon, Clan Alpine, and Dixie Valley Allotments Landscape Project Environmental Assessment (2017)
- Rangeland Health Assessments for the Edwards Creek and Porter Canyon allotments (2020)
- The Desatoya Habitat Resiliency, Health and Restoration Project (DHR) DOI-BLM-NV-C010-2011-0513-EA) is incorporated by reference. Incorporation by reference and tiering provide opportunities to reduce paperwork and redundant analysis in the NEPA process. When incorporating by reference, the author refers to other available documents that cover similar issues, effects, and/or resources considered in the NEPA analysis that is being prepared. Incorporation by reference allows brief summarizations of relevant portions of other documents rather than repeating them.

1.7 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 hoses within the Desatoya HMA. The authorized officer's decision may select gather methods, numbers of horses gathered, and population growth suppression technique(s) depending on the alternative or parts of any alternative chosen. Proposed Action decision would not set or adjust AML nor would it adjust livestock use, as these were set through previous land use planning decisions.

1.8 Scoping and Identification of Issues

In accordance with the H-1790-1, internal scoping was conducted by the SFO Interdisciplinary (ID) team to identify potential resources which may be impacted by implementation of the Proposed Action and alternatives. Relative to the BLM's management of wild horses in the HMA, the BLM interdisciplinary team identified issues through internal scoping. For this assessment, the BLM also considered issues from previous scoping with the public during the DHR.

1. Impacts to individual wild horses and the population. Indicators for this issue include the following:
   - Projected population size and annual growth rate (WinEquus population modeling)
   - Effectiveness of proposed fertility control application (WinEquus)
   - Impacts to animal health and condition

2. Impacts to vegetation/soils, riparian/wetland, and cultural resources. Indicators for this issue include the following:
   - Forage utilization and alteration
   - Impacts to vegetation/soils and riparian/wetland resources assessed by Proper Functioning Condition (PFC) (BLM 2020)

3. Impacts to wildlife, migratory birds, and threatened, endangered, and special status species and their habitat. Indicators for this issue include the following:
   - Displacement, trampling, or disturbance
   - Competition for forage and water

A 30-day public comment period will be conducted. Mailings will be sent to tribes, local and state governments, media, and members of the public.

2.0 Description of the Alternatives

2.1 Introduction

This section describes the Proposed Action and Alternatives, including any that were considered but eliminated from detailed analysis. For this EA, four Alternatives are analyzed in detail including the preferred.

2.2 Description of Alternatives Considered in Detail

The action Alternatives were developed in response to the identified resource issues and the purpose and need, as described in Section 1.3. The no action Alternative (alt 4) would not

achieve the identified purpose and need. However, it is analyzed in this EA to provide a basis for comparison with the other action Alternatives and to assess the effects of not conducting a gather. The no action Alternative is in violation of the WFRHBA which requires the BLM to immediately remove excess wild horses and burros when a determination is made that excess animals are present and that action is necessary to remove excess animals.

2.2.1 Management Actions Common to Alternatives 1 through 3

- The gathers would begin when the initial gather is scheduled by the BLM National Wild Horse and Burro Program Office. Several factors such as animal condition, herd health, weather conditions, or other considerations could result in adjustments in the schedule.
- The duration of the gathers would depend on the number of animals approved for removal following coordination with the National Wild Horse and Burro Program Office.
- Gather operations would be conducted in accordance with the Comprehensive Animal Welfare Program (CAWP) for Wild Horse and Burro Gathers, which includes provisions of the Comprehensive Animal Welfare Program (BLM Instructional Memorandum 2015-151; Appendix B). A combination of gather methods may be used to complete the management actions and the methods to be used would depend on the needs of the specific actions including management needs regarding emergency situations. re) Methods would be the helicopter drive method with occasional helicopter assisted roping (from horseback). Bait and water trapping may also be used to capture animals for removal or for fertility control treatment. Trapping methods would be determined on a case-by-case basis. The BLM may conduct in house gather operations to facilitate with administrating population growth suppression treatments and/or remove excess wild horses. The Stillwater Field Office may enter into a Memorandum of Understanding (MOU) with Smith Creek Ranch in order to water trap wild horses and administer fertility control vaccine to mares within the Desatoya HMA. If BLM enters into a MOU all SOP's will be adhered to. While water trapping the majority of wild horses within this HMA is not feasible, there are groups in the Smith Creek Valley where water trapping could assist with applying fertility control.
- Trap sites and temporary holding facilities would be in previously used sites or other disturbed areas whenever possible (Figure 1-1) shows previously used trap sites.
- Multiple, temporary gather sites (traps) would be used to gather wild horses both from within and outside the HMA. In addition to public lands, private property may be utilized for gather sites and temporary holding facilities (with the landowner's permission) if necessary, to ensure accessibility and/or based on prior disturbance. Use of private land would be subject to Standard Operating Procedures (SOPs) (Appendix B) and to the written approval/authorization of the landowner.
- Any trapping activities would be scheduled in locations and during time periods that would be most effective to gather sufficient numbers of animals to achieve management goals for the areas being gathered. The most efficient gather technique would be chosen as determined by the gather needs of the specific area.
- Temporary gather and holding sites would be no larger than 0.5 acres. Bait or water trapping sites could remain in place up to one year. Temporary holding sites could be in place for up to 45 days depending on length of gather. The exact location of gather sites and holding sites may not be determined until immediately prior to the gather because the location of the animals on the landscape is variable and unpredictable.

- Undisturbed areas, identified as potential trap sites or holding facilities, would be inventoried for cultural, botanical, and wildlife resources prior to initiation of gathers. If such resources are encountered, these locations would not be used unless they could be modified to avoid impacts to the resources, as determined by the appropriate specialist (i.e., archaeologist, wildlife biologist, or botanist).
- A U.S. Department of Agriculture – Animal and Plant Inspection Service, or other veterinarian, may be on site during the gather or on call, as needed, to examine animals and make recommendations to the BLM for care and treatment of wild horses.
- Decisions to humanely euthanize animals in field situations would be made in conformance with BLM policy (Instruction Memorandum [IM] 2015-70; https://www.blm.gov/policy/im-2015-070).
- Data including sex and age distribution, 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).
- Genetic monitoring of captured animals would inform the BLM about the current conditions of genetic diversity, in accordance with BLM IM 2009-062 or current policy and the WHB Handbook BLM-4700-1.
- Excess animals would be transported to BLM off-range corrals (ORC) where they would be prepared (e.g., freeze marked, micro chipped, vaccinated, de-wormed, and gelded) for adoption, sale (with limitations), or off-range pastures (ORP). Under the WFRHBA, healthy excess wild horses or burros can be humanely 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, for several decades Congress has prohibited the use of appropriated funds for this purpose. If Congress were to lift the current appropriations restrictions, then it is possible that excess horses removed from the HMA over the next 10 years could potentially be euthanized or sold without limitation consistent with the provisions of the WFRHBA.
- During gathers 1-3 studs and/or mares from a different HMA, with similar or desired characteristics of the horses within the HMA could be released to maintain the genetic diversity.
- 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.
- All animals outside of established HMA boundaries would be removed. No horses would be returned to areas outside the HMA.
- Population inventories and routine resource/habitat monitoring would be completed every two to three years to document current population levels, growth rates, and area of continued resource concerns (horses concentrations, riparian impacts, over-utilization, etc.) prior to any follow-up gather.

Helicopter Drive Trapping

The BLM would utilize a contractor to perform the gather activities in cooperation with the BLM. The contractor would be required to conduct all helicopter operations in a safe manner and in compliance with Federal Aviation Administration (FAA) regulations 14 CFR § 91.119, WO.

Per BLM WO IM No. 2013-059 and BLM WO IM No. 2010-164 helicopter landings would not be allowed in wilderness except in the case of an emergency. Helicopter-drive trapping may be needed to meet management objectives to capture the highest percentage of wild horses possible. The appropriate gather method would be decided by the Wild Horse and Burro Specialist based on the location, accessibility of the animals, local terrain, vegetative cover, and available sources of water and forage. The use of roping from horseback could also be used when necessary. Based on wild horse watering locations in this area, it is estimated that multiple trap sites may be used during trapping activities.

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

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

Bait/Water Trapping

Bait and/or water trapping would be used as appropriate to gather wild horses efficiently and effectively. Bait and water trapping may be utilized, when wild horses are in an area where there are limited resource (such as food or water). 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 or sole gather method for the HMA. However, water or bait trapping could be used as a supplementary approach to achieve the desired goals of Alternatives 1-3 throughout portions of the Complex. Bait and/or water trapping generally require a longer window of time for success than helicopter drive trapping. Although the trap would be set in a high probability area for capturing excess wild horses residing within the area and at the most effective time periods, time is required for the horses to acclimate to the trap and/or decide to access the water/bait. Trapping involves setting up portable panels around an existing water source or in an active wild horse area, or around a pre-set water or bait source. The portable panels would be set up to allow wild horses to go freely in and out of the corral until they have adjusted to it. When the wild horses fully adapt to the corral, it is fitted with a gate system. The adaptation of the horses creates a low stress trapping method. During this acclimation period the horses would experience

some stress due to the panels being setup and perceived access restriction to the water/bait source. See Water and Bait Trapping SOP Appendix B.

Gathering excess horses using bait/water trapping could occur at any time of the year and traps would remain in place until the target numbers of animals are removed. As the proposed bait and/or water trapping in this area is a lower stress approach to gathering wild horses, such trapping can continue into the foaling season without harming the mares or foals.

Gather-related Temporary Holding Facilities (Corrals)

Wild horses that are gathered would be transported from the gather sites to a temporary holding corral. At the temporary holding corral wild horses would be sorted into different pens. Mares would be identified for fertility control and treated at the corrals. The horses would be provided good quality hay and water. At the temporary holding facility, a veterinarian, when present, would provide recommendations to the BLM regarding care and treatment of 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). Herd health and characteristics data would be collected as part of continued monitoring of the wild horse herds. Genetic baseline data would be collected to monitor the genetic health of the wild horses within the combined project area. Additional samples may be collected to analyze ancestry.

Gathered wild horses would be transported to BLM off-range corrals where they would be prepared for adoption and/or sale to qualified individuals or transfer to off-range pastures or other disposition authorized by the WFRHBA.

Transport, Off-range Corrals, and Adoption Preparation

All gathered wild horses would be removed and transported to BLM off range corrals where they would be inspected by facility staff (and if needed by a contract veterinarian) to observe health conditions and ensure that the animals are being humanely cared for. Wild horses removed from the range would be transported to the receiving Off-Range Corrals (ORC, formerly short-term holding facility) in a gooseneck stock trailer or straight-deck semi-tractor trailers. Trucks and trailers used to haul the wild horses would be inspected prior to use to ensure wild horses can be safely transported. Wild horses would be segregated by age and sex when possible and loaded into separate compartments. Mares and their unweaned foals may be shipped together. Transportation of recently captured wild horses is limited to a maximum of 10 hours. Upon arrival, recently captured wild horses are off-loaded by compartment and placed in holding pens where they are provided good quality hay and water. Most wild horses begin to eat and drink immediately and adjust rapidly to their new situation. At the ORC, 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) 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.

After recently captured wild horses have transitioned to their new environment, they are prepared for adoption, sale, or transport to off-range pastures. Preparation involves freeze marking the animals with a unique identification number, vaccination against common diseases, castration, microchipping, and deworming. At ORC facilities, a minimum of 700 square feet of space is provided per animal.

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

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

Off-Range Pastures
When shipping wild horses for adoption, sale or Off-Range Pastures (ORPs), the animals may be transported for up to a maximum of 24 hours. Immediately prior to transportation, and after every 24 hours of transportation, animals are off-loaded and provided a minimum of 8 hours on the-ground rest. During the rest period, each animal is provided access to unlimited amounts of clean water and two pounds of good quality hay per 100 pounds of body weight with adequate space to allow all animals to eat at one time. Mares and sterilized stallions (geldings) are segregated into separate pastures. Although the animals are placed in ORP, they remain available for adoption or sale to qualified individuals; and foals born to pregnant mares in ORP are gathered and weaned when they reach about 8-12 months of age and are also made available for adoption. The ORP contracts specify the care that wild horses must receive to ensure they remain healthy and well-cared for. Handling by humans is minimized to the extent possible although regular on-the-ground observation by the ORP contractor and periodic counts of the wild horses to ascertain their well-being and safety are conducted by BLM personnel and/or veterinarians.

Euthanasia or Sale without Limitations
Under the WFRHBA, healthy excess wild horses can be euthanized or sold without limitation if there is no adoption demand for the animals. However, while euthanasia and sale without limitation are allowed under the statute, for several decades Congress has prohibited the use of appropriated funds for this purpose. If Congress were to lift the current appropriations restrictions, then it is possible that excess horses removed from the Complex over the next 10 years could potentially be euthanized or sold without limitation consistent with the provisions of the WFRHBA.

Any old, sick or lame horses unable to maintain an acceptable body condition (greater than or equal to a Henneke BCS of 3) or with serious physical defects would be humanely euthanized

either before gather activities begin or during the gather operations as well as within off-range corrals.. 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.

Public Viewing Opportunities
Opportunities for public observation of the gather activities on public lands would be provided, when and where feasible, and would be consistent with WO IM No. 2013-058 and the Visitation Protocol and Ground Rules for Helicopter WH&B Gathers within Nevada (Appendix B). This protocol is intended to establish observation locations that reduce safety risks to the public during helicopter gathers (e.g., from helicopter-related debris or from the rare helicopter crash landing, or from the potential path of gathered wild horses), to the wild horses (e.g., by ensuring observers would not be in the line of vision of wild horses being moved to the gather site), and to contractors and BLM employees who must remain focused on the gather operations and the health and well-being of the wild horses. Observation locations would be located at gather or holding sites and would be subject to the same cultural resource requirements as those sites.

During water/bait trapping operations, spectators and viewers would be prohibited as it would impact the contractor's ability to capture wild horses. Only essential gather operation personnel would be allowed at the trap site during operations.

2.2.2 Alternative 1 (Proposed Action): Gather and Removal of Excess Wild Horses to Low-AML, Sex Ratio Adjustment, and Population Growth Suppression

The Proposed Action would gather and remove approximately 85% of the existing wild horses (remove approximately 88 excess wild horse in the initial gather) and return periodically to gather excess wild horses to maintain AML and administer or booster population control measures over a period of ten years. All horses residing outside the HMA boundary would be gathered and removed. This would allow BLM to achieve management goals and objectives of attaining a herd size that is at the low range of AML, reducing population growth rates, and obtaining a thriving natural ecological balance on the range as identified within the WFRHBA.

Over the next 10 years subsequent gathers will occur as needed to treat and retreat mares and to maintain the population within the AML.

The management objective for the Desatoya Herd Management Area would be to gather and remove excess wild horses within and outside the HMA to achieve and maintain AML. BLM would achieve this through population growth suppression measures to include:

- Administration of fertility control vaccine (i.e. PZP vaccines, GonaCon or newly developed vaccine formulations) to released mares.
- Use Interturn Device (IUD)
- Adjustment of sex ratios to achieve a 60% male to 40% female ratio.

While in the temporary holding corral horses would be identified for removal or release based on age, gender and/or other characteristics. As part of periodic sampling to monitor wild horse genetic diversity in the HMA, hair follicle samples would be collected from a minimum of 25 horses of the released population from the HMA. Samples would be collected for analysis to assess the levels of observed heterozygosity, which is a measure of genetic diversity (BLM 2101), within the HMA and may be analyzed to determine relatedness to established breeds and other wild horse herds. Mares identified for release would be aged, micro chipped and freeze-marked for identification prior to being released to help identify the animals for future treatment/boosters and assess the efficacy of fertility control treatment.

Population Growth Suppression Methods

The Proposed Action would include population growth suppression methods such as fertility control vaccines, and sex ratio adjustments in the herd. In cases where a booster vaccine is required, mares could be held for approximately 30 days and given a booster shot prior to release. Over the course of multiple gathers over the 10-year time period, BLM would treat/retreat mares with fertility control to help meet herd management objectives. Since release of the 2013 NRC Report, the BLM has supported field trials of potential fertility control methods that may be used in WHB management, but inclusion of any particular method as a part of management does not depend on completion of any given research project. The use of any new fertility control method would conform to current best management practices at the direction of the National Wild Horse and Burro Program.

Sex Ratio Adjustment

Sex ratio adjustment, leading to a reduced fraction of mares in the herd, can be considered a form of contraceptive management, insofar as it can reduce the realized per-capita growth rate in a herd. 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 number of 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 alone 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.

Use of IUDs

IUDs do not sterilize mares; they are a temporary fertility control method. Only open mares would be considered, to receive an IUD. IUDs prevent pregnancy in mares, so long as the device stays in place in the uterus. BLM would consider flexible IUDs that have been shown to be safe and effective in experimental trials, and which work only though physical action -- i.e., without any chemically active ingredient. See Appendix C for an in-depth discussion of the various fertility control techniques contemplated in this EA. The procedures to be followed for implementing female physical sterilization, or application of IUDs, are detailed in Appendix F.

Contraception

The BLM has identified fertility control as a method that could be used to protect rangeland ecosystem health and to reduce the frequency of wild horse and burro gathers and removals.

Expanding the use of population growth suppression to slow population growth rates and reduce the number of animals removed from the range and sent to ORPs is a BLM priority. No finding of excess animals is required for the BLM to pursue contraception in wild horses or burros.

Contraception has been shown to be a cost-effective and humane treatment to slow increases in wild horse populations or, when used with other techniques, to reduce horse population size (Bartholow 2004; de Seve and Boyles-Griffin 2013; Fonner and Bohara 2017)

Porcine Zona Pellucida (PZP) Vaccine

Immunocontraceptive Porcine Zona Pellucida (PZP) vaccines are currently being used on over 75 areas managed for wild horses by the National Park Service, US Forest Service, and the Bureau of Land Management and 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 PZP vaccine was one of the preferred available methods for contraception in wild horses and burros (NRC 2013). PZP vaccine 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 a population of feral burros in territory of the US (Turner et al. 1996). PZP vaccine can be 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, Carey et al. 2019). It can easily be remotely administered (dart-delivered) in the field, but only where mares are relatively approachable.

Under the Proposed Action, mares being treated for the first time would receive a liquid primer dose along with time release pellets. BLM would return to the HMA as needed to re-apply PZP-22 and/or ZonaStat-H and initiate new treatments in order to maintain contraceptive effectiveness in controlling population growth rates. Application methods could be by hand in a working chute during gathers, or through field darting if mares in some portions of the HMA prove to be approachable. Both 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, and not all mares would be treated or receive boosters within the HMA due to the sheer numbers of the population, the large size of the HMA and logistics of wild horse gathers. Once the population is at AML and population growth seems to be stabilized, BLM could use population planning software (PopEquus, currently in development by USGS Fort Collins Science Center) to determine the required frequency of re-treating mares with PZP or other fertility control methods.

GonaCon-Equine

The immune-contraceptive 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. GonaConEquine 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 (Baker et al. 2018) and on a small number of wild horses in the Water Canyon area within the Antelope Complex (DOI-BLM-NV-L020-2015-0014-EA). 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 meters or less (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-Cahill et al. in press).

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

Please refer to Appendix C for further information on BLM's use of contraception in wild horse management and Appendix D for procedures to be followed for implementation of fertility control.

2.2.3 Alternative 2: Removal Only

Alternative 2, this alternative, BLM would gather and remove excess animals to within AML range without fertility control, sex ratio adjustments. Impacts from this alternative would be similar to the gathering and handling impacts under the Proposed Action, however there would be no horses released or fertility control administered to released horses. While wild horses would be gathered to the low range of AML, the AML would be exceeded sooner than under the Proposed Action since per-capita fertility rates would be higher. This alternative may result in more gathers within the next 10 years since the population would be increasing at a higher rate than Alternative 1. Also, more excess wild horses would need to be removed over the next 10 years since more foals would be born.

2.2.4 Alternative 3: Removals with Physical Sterilization Mares , and Gelding animals returned to the HMA

This alternative would be similar to Alternative 1, BLM would gather and remove excess animals to within AML range, implement fertility control vaccines, and managing a portion of population as non-reproducing (physical sterilization of mares and/or gelding). Impacts from this alternative would be similar to the gathering and handling impacts under the proposed action, However, a population of the population would be managed as non-reproducing (physical sterilization of mares/or gelding)

Male Sterilization

After low AML is reached, to reduce the number of animals in off-range pastures, a portion of male horses would be sterilized, either by gelding (neutering) or vasectomy, and returned to the HMA. These non-reproducing males would bring the population closer to mid-AML (from low AML), but the herd would not exceed a roughly 60:40 male to female ratio. All animals treated with any type of fertility control would be freeze marked and identified according to current policy. Intact studs and mares released back to the HMA would be selected to maintain a diverse age structure, historical herd characteristics, and correct conformation. The procedures to be followed for implementing male sterilization are detailed in Appendix E.

Neutering (gelding)

In order to reduce the total number of excess wild horses that would otherwise be permanently removed from the HMA, up to 25 percent of the male horse population would be managed as geldings, but the total number of male horses would not exceed roughly 60 percent of the population.

The BLM routinely gelds all excess male horses that are captured and removed from the range prior to their adoption, sale, or shipment to off-range facilities. The gelding procedure for excess wild horses removed from the range would be conducted at temporary (field) or off-range corrals by licensed veterinarians and follows industry standards. Under Alternative 3, some geldings would be returned to resume their free-roaming behaviors on the public range instead of being permanently removed from the HMA.

By including some geldings in the population, and having a slightly skewed sex ratio with more males than females overall in the potential breeding population, the anticipated result would be a reduction in population growth rates while allowing for management of a larger total wild horse

population on the range. See Appendix C for an in-depth discussion of the various fertility control techniques contemplated in this EA.

Physical sterilization of mares

As with gelding a certain number of mares would be physically sterilized (i.e., ovariectomized, tuballoy ligated, oviducts occluded, or other forms of humane physical sterilization). In most cases the current contraceptives available for use in wild horses are only effective for one to several years unless a booster is given, and giving boosters are not feasible on an annual basis as a helicopter gather is often the only practical way to gather and booster the number of horses needed to substantially slow the population growth. Physical sterilization offers a permanent method to prevent pregnancies in treated mares which would reduce the rate of population increase and potentially increase the interval between gathers and reducing the total number of animals that would need to be gathered and removed in the future.

2.2.5 Alternative 4: No Action

Under Alternative 4, no gather and no population management to control the size of the wild horse population within the HMA would occur. The wild horse population would increase to a point where the resources are depleted resulting in a loss of native wildlife and eventually the wild horses themselves.

2.3 Alternatives Considered but Dismissed from Detailed Analysis

1. Exclusive Use of Bait and/or Water Trapping

This Alternative involves the use of bait (feed) and/or water to lure horses into traps as the primary gather method. It would not be timely, cost-effective, or practical to use bait and/or water trapping as the primary gather method because the number of water sources on both private and public lands within and outside the HMA would make it almost impossible to restrict wild horse access to the selected water trap sites. Bait and/or water trapping may be used in strategic locations to assist in removals and fertility control treatments. As a result, this Alternative was dismissed from detailed analysis as the primary capture method.

2. Remove or Reduce Livestock within the HMA

This Alternative would involve no removal of wild horses and would instead remove or reduce authorized livestock grazing instead of gathering and removing wild horses within the HMA. This Alternative was not considered in detail because it is contrary to previous decisions which allocated forage for livestock use and would not be in conformance with the existing land use plan nor does it achieve the purpose and need for this EA. Livestock grazing can only be reduced or eliminated through provisions identified within regulations (43 CFR 4100) and must be consistent with multiple use allocation set forth in the CRMP. This Alternative would exchange use by livestock for use by wild horses, and eliminating or reducing grazing in order to shift forage use to wild horses would not be in conformance with the CRMP and is contrary to the BLM's multiple-use mission as outlined in the 1976 FLPMA. The BLM is required to manage wild horses and burros in a manner designed to achieve a TNEB between wild horse and burro populations, wildlife, livestock, and other uses.

Information about the Congress' intent is found in the Senate Conference Report (92-242) which accompanies the 1971 WFRHBA (Senate Bill 1116): "The principal goal of this legislation is to

provide for the protection of the animals from man and not the single use management of areas for the benefit of wild free-roaming horses and burros. It is the intent of the committee that the wild free-roaming horses and burros be specifically incorporated as a component of the multiple-use plans governing the use of the public lands."

Furthermore, simply re-allocating livestock Animal Unit Months (AUMs) to increase the wild horse AMLs would not achieve a thriving natural ecological balance. Wild horses are unlike livestock which can be confined to specific pastures, limited to specific periods of use, and specific seasons-of-use so as to minimize impacts to vegetation during the critical growing season and to riparian zones during the summer months. Horses are present year-round and their impacts to rangeland resources differ from livestock, as livestock can be controlled through an established grazing system (confinement to specific pastures and limited period or season of use to minimize impacts to vegetation and riparian areas). This Alternative would also be inconsistent with the WFRHBA, which directs the immediate removal of excess wild horses and burros. In addition, this would only be a short-term solution as the wild horse population would soon increase to a point where resources were becoming degraded. Because there would now be more horses within the HMA producing a greater number of foals futures gathers would need to remove a greater number of excess wild horses.

3. Gather the HMA to the AML Upper Limit

Under this Alternative, a gather would be conducted to remove enough wild horses to achieve the upper range of the AML. This Alternative was dismissed from detailed study because AML would be exceeded by the next foaling season following gather resulting in the need to conduct another gather within one year. This would result in increased stress to individual wild horses and the herd and resource damage due to wild horse overpopulation in the interim, as the upper level of the AML established for the HMA represents the maximum population for which TNEB would be maintained. This Alternative is not consistent with the WFRHBA, which upon determination excess wild horses and burros are present requires their immediate removal.

4. Fertility Control Treatment Only (No Removal)

Under this Alternative, no excess wild horses would be removed. Population modeling was completed to analyze the potential impacts associated with conducting gathers about every two to three years over the next 20-year period to treat captured mares with fertility control. Due to the vast size of this HMA, wide distribution of animals, and accessibility to the animals, remote darting opportunities are extremely limited because of the annual retreatment requirements to maintain vaccination efficiency. While the average population growth would be reduced to approximately 13 percent (as modeled in WinEquus) per year, AML would still not be achieved through fertility control alone and damage to the range associated with wild horse overpopulation would continue. Moreover, this Alternative would not meet the Purpose and Need for the Action and would be contrary to the WFRHBA.

5. Raising the Appropriate Management Level for Wild Horses

The BLM has established current AML ranges based on many years of data collection, resource monitoring, and multi-agency planning efforts. The current AMLs are based on established biological resource monitoring protocols and land health assessments and were approved in the CRMP. Delay of a gather until the AML can be reevaluated is not consistent with the

WFRHBA, Public Rangelands Improvement Act, FLPMA, or the existing CRMP. Monitoring data collected within the HMA does not indicate that an increase in AML is warranted at this time. On the contrary, such monitoring data confirms the need to remove excess wild horses to reverse downward resource trends and promote improvement of rangeland and riparian health. Severe resource degradation would occur in the meantime and large numbers of excess animals would ultimately need to be removed from the HMA to achieve AML or to prevent the death of individual animals under emergency conditions. This Alternative was eliminated from further consideration because it is contrary to the WFRHBA which requires the BLM to manage the rangelands to prevent resources from deterioration associated with an overpopulation of wild horses and burros. In addition, raising the AML where there are known resource degradation issues associated with an overpopulation of wild horses does not meet the purpose and need of this EA to restore and maintain a thriving ecological balance. If future data suggests that adjustments in the AML are needed (either upward or downward), once the AML has been achieved then changes would be based on an analysis of monitoring data, including a review of wild horse habitat suitability, such as the condition of water sources in the HMA. For the reasons stated above, this Alternative was eliminated from further consideration.

6. 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 range deterioration associated with an overpopulation of wild horses and burros. The Alternative of using natural controls to achieve a desirable AML has not been shown to be feasible in the past. Wild horse populations in the HMA have not been shown to be controlled by predators or other natural factors. In addition, wild horses are a long-lived species with documented survival rates exceeding 95 percent and they do not self-regulate their population.

This Alternative would result in a steady increase in the wild horse populations which would continue to exceed the carrying capacity of the range resulting, eventually, in a catastrophic mortality of wild horses in the HMA (NRC 2013). As the vegetative and water resources are degraded to the point of no recovery because of the wild horse overpopulation, wild horses would start showing signs of malnutrition and starvation. The weaker animals, generally the older animals, and the mares and foals, would be the first to be impacted. It is likely that most of these animals would die from starvation and dehydration which could lead to a catastrophic die off. Allowing horses to die of dehydration and starvation would be inhumane treatment and would be contrary to the WFRHBA, which mandates removal of excess wild horses.

This Alternative would also lead to irreparable damage to rangeland resources from excess wild horses, which is contrary to the WFRHBA, which mandates the BLM to *"protect the range from the deterioration associated with overpopulation", "remove excess animals from the range so as to achieve appropriate management levels",* and *"to preserve and maintain a thriving natural ecological balance and multiple-use relationship in that area."* Wild horses can be aggressive around water sources, and some wildlife may not be able to compete, which could lead to the death of individual animals. Wildlife habitat conditions would deteriorate as wild horse numbers above AML reduce herbaceous vegetative cover, damage springs, and increase erosion, and could result in irreversible damage to the range. For these reasons, this Alternative was eliminated from further consideration. This Alternative would not meet the purpose and need for

this EA which it is to remove excess wild horses from within and outside the HMA and to reduce the wild horse population growth rates to manage wild horses within established AML ranges.

Chemical Immobilization
Chemical immobilization as a method of capturing wild horses is not a viable alternative because it is a very specialized technique and is strictly regulated. Currently the BLM does not have sufficient expertise to implement this method and it would be impractical to use given the size of the HMA, access limitations and approvability of the horses.

Use of Wrangler on Horseback Driver-trapping
Use of wranglers on horseback drive-trapping to remove excess wild horses can be somewhat effective on a small scale but due to the number of horses to be gathered, the large geographic size of the HMA, and lack of approachability of the animals, this technique would be ineffective and impractical as a substitute for helicopter trapping. Wild horses often outrun and outlast domestic horses carrying riders. Helicopter assisted roping is typically only used if necessary and when the wild horses are in close proximity to the gather site. For these reasons, this method was eliminated from further consideration

3.0 Affected Environment

This section of the EA briefly discusses the relevant components of the human environment which would be either affected or potentially affected by the action Alternatives or no action (Table 3-1).

Supplemental Authorities that are subject to requirements specified in statute, regulation, or executive order must be considered in all BLM documents (Appendix A). Table 3-1 lists the Critical Elements and their status as well as rationale to determine whether a Critical Element would be affected by the Proposed Action and Alternatives.

In addition to the Critical Elements listed under Supplemental Authorities, the BLM considers other important resources and resource uses that occur on public lands in which impacts may occur from implementation of the Proposed Action or Alternatives.

The affected environment and environmental impacts are described for all resources/resource uses, including Critical Elements, which are potentially affected by the Proposed Action or Alternatives. Those resources listed below that received a ‘not present’ determination (not present in the area impacted by the proposed or Alternative actions) or a ‘no’ or ‘May be Affected’ determination (present, but not affected to a degree that detailed analysis is required) will not be discussed beyond this point. Only those resources receiving a Present and May be Affected determination (present and may be impacted to some degree) will be analyzed in affected environment and environmental impacts section(s). The elimination of non-relevant issues follows Council on Environmental Quality (CEQ) regulations, as stated in 40 CFR 1500.4.

Table 3-1: Supplemental Authorities and Other Relevant Resources Brought Forward for Analysis

		CRITICAL ELEMENTS	
Present	**May be Affected**	**Resource**	**Rationale for Determination**
Yes	No	Air Quality *(Clean Air Act of 1955, as amended)*	The analysis area is not within an area of non-attainment or areas where total suspended particulates or other criteria pollutants exceed Nevada air quality standards. Any increased particulate matter (dust) resulting from the Proposed Action or Alternatives would be short term (temporary), minimal, and too small to quantify.
No	No	Areas of Critical Environmental Concern (ACEC) *(Federal Land Policy and Management Act of 1976)*	There are no ACECs located within the proposed project area.
Yes	No	Cultural Resources *(National Historic Preservation Act of 1966, as amended)*	Historic properties would be avoided. Proposed trap sites at locations not previously inventoried for cultural resources would require a Class III inventory. Tribal notification prior to gather and trap activities would be needed.
Yes	Potentially Affected	Environmental Justice *(Executive Order 12898)*	Refer to Appendix G: Environmental Justice.
Yes	No	Farmlands (Prime & Unique) *(Surface Mining Control and Reclamation Act of 1977)*	Some soils within the analysis area have been designated as meeting the requirements for prime or unique farmlands. Localized trampling of these soils may occur at gather sites however impacts would be minimal, temporary, and too small to quantify. The Proposed Action or Alternatives would not impact soils as to irreversibly convert farmlands to nonagricultural use.
No	No	Floodplains *(Executive Order 11988)*	There are no FEMA mapped 100-year floodplains within the allotments.
Yes	No	Invasive, Non-native weed species *(Federal Noxious Weed Act of 1974, as amended)*	The ubiquitous nature of invasive species creates no potential significant affect from the actions in this gather. Noxious species would continue to be treated and monitored as planned.
Yes	No	Native American Religious Concerns	In accordance with Executive Order. 13007, Native American access to sacred and traditional sites

		CRITICAL ELEMENTS	
Present	**May be Affected**	**Resource**	**Rationale for Determination**
		(Executive Order 13007)	would not be prohibited; however, tribal notification prior to gather and trap activities would be needed.
No	No	Noxious Weeds	No infestation records of noxious weeds in areas where trap sites would be placed.
No	No	Threatened, Endangered, or Candidate Plant Species *(Endangered Species Act of 1973, as amended)*	There are no known occurrences of threatened or endangered plant species within the project area.
Yes	No	Threatened, Endangered, or Candidate Animal Species *(Endangered Species Act of 1973, as amended)*	After consulting with the BLM wildlife biologist and the USFWS website for Nevada, the only federally listed threatened or endangered species within the project area is Lahontan cutthroat trout in Edwards, and Topia Creeks. However, gather operations would not directly impact the trout or their habitat. Fewer horses would result in an increase in water quality, water flow, riparian vegetation and a decrease in erosion all of which would benefit Lahontan cutthroat trout. Carried forward for analysis in Sections 3.2.7 and 4.3.7.
Yes	No	Wastes (hazardous or solid) *(Resource Conservation and Recovery Act of 1976, and Comprehensive Environmental Response, Compensation, and Liability Act of 1980)*	Any hazardous materials would be transported, used, and stored following the Nevada State Environmental Commission's Handbook of Best Management Practices. All wastes generated would be disposed of offsite following all local, state, and federal regulations. Any release of hazardous materials or hydrocarbons would be contained, remediated, and disposed of following all local, state, and federal regulations.
Yes	No	Water Quality (surface/ground) *(Safe Drinking Water Act of 1974, as amended and Clean Water Act of 1977)*	The Proposed Action or Alternatives would not impact surface or groundwater quality. Currently, water quality conditions within the analysis area are achieving Nevada state standards. Gathering could slightly increase sedimentation if horses were to cross streambanks or springs however impacts would be minimal, temporary, and are not expected to exceed current impacts observed from wild horse usage. Removal of excess wild horses would ultimately reduce sedimentation and fecal matter within or near wetlands and riparian areas, which

		CRITICAL ELEMENTS	
Present	**May be Affected**	**Resource**	**Rationale for Determination**
			would contribute to improved water quality conditions over time.
Yes	No	Wetlands / Riparian Zones *(Executive Order 11990)*	Wetlands and riparian zones are unlikely to be impacted by the Proposed Action or Alternatives. Trap sites are not located in or near wetlands or riparian areas. Horses may cross streams or springs during helicopter drive trapping operations which could cause minor streambank sloughing, trampling, and soil compaction, however impacts would be temporary, minimal, and is not expected to exceed current impacts observed from wild horse usage. Removal of excess horses would ultimately reduce the pressure on wetlands and riparian areas which would contribute to improved riparian conditions over time.
No	No	Wild and Scenic Rivers *(Wild and Scenic Rivers Act of 1968, as amended)*	There are no designated/eligible/suitable wild and scenic rivers within the project area.
No	No	Wilderness *(Federal Land Policy and Management Act of 1976 and Wilderness Act of 1964)*	The Desatoya WSA is within the HMA, however all of the trap sites are well outside of the WSA boundary. There are no designated Wilderness areas within the Project Area.
		OTHER RELEVANT RESOURCES / CONCERNS	
Determination*		**Resource**	**Rationale for Determination**
No	No	Cave and Karst Resources	There are no cave and/or karsts located within the analysis area.
No	No	Fuels / Fire Management	The Proposed Action would not change the fire management in the analysis area.
Yes	Yes	Fish and Wildlife including Special Status Species other than USFWS candidate or listed species Migratory birds *(E.O. 13186)*	Carried forward for analysis in Sections 3.2.3, 3.2.7, 4.3.7, and 4.3.2
Yes	Yes	General Wildlife	Carried forward for analysis in Sections 3.2.5 and 4.3.5.

		CRITICAL ELEMENTS	
Present	**May be Affected**	**Resource**	**Rationale for Determination**
Yes	No	Geology / Mineral Resources	Mining claims or mineral development may occur within the project area. Impacts to minerals are not anticipated.
Yes	No	Global Climate/Greenhouse Gas Emissions	The Proposed Action or Alternatives would result in an insignificant amount of greenhouse gas emissions, and therefore be too small to analyze. There would be no direct or indirect impacts to global climate or greenhouse gases. Cumulative impacts resulting from the project would be too small to quantify relative to other sources of GHGs.
No	No	Lands / Access / Rights-of-Way	None present
No	No	Lands with Wilderness Characteristics	Project activities would be temporary and would have no effect on LWCs.
Yes	Yes	Livestock Grazing *(Taylor Grazing Act of 1934, National Environmental Policy Act of 1969 Endangered Species Act of 1973, Federal Land Policy and Management Act of 1976, and the Public Rangelands Improvement Act of 1978)*	Carried forward for analysis in 3.2.1 and 4.3.1.
No	No	Paleontology *(Paleontological Resources Protection Act P.L. 111-011, HR 146)*	Proposed trap sites would occur on deposits with a low to very low potential to contain significant fossil resources.
Yes	No	Recreation	Temp project with no effects on recreation.
Yes	Yes	Socioeconomics	Carried forward for analysis in Sections 3.2.8 & 4.3.8.
Yes	No	Soils	The Proposed Action or Alternatives would have a minimal impact on soils. Trap sites would be located on previously disturbed soil which would minimize local overland surface erosion and subsequent rill and/or gully formation. Gathering

		CRITICAL ELEMENTS	
Present	**May be Affected**	**Resource**	**Rationale for Determination**
			could result in soil compaction during helicopter drive trapping however this would be temporary, minimal, and too small to analyze in comparison to the extent of the analysis area. The removal of excess horses would contribute to the maintenance of sufficient vegetation and litter to protect soil from erosion, and thus overall benefits to soil health would result over time.
No	No	Trails and Travel Management	None present
Yes	Yes	Vegetation	Carried forward for analysis in Sections 3.2.2 and 4.3.3.
No	No	Visual Resource Management *(FLPMA 1976, NEPA 1969)*	The Proposed Action does not have the potential to adversely affect the resource.
Yes	No	Water Quantity, Surface/Ground	The Proposed Action or Alternatives would not impact surface or groundwater quantity. Given the temporary nature of the proposed gathering and removal, no impacts to designated beneficial uses of water rights located within the analysis area are anticipated.
Yes	Yes	Wild Horses and Burros *(Wild and Free Roaming Horses and Burros Act of 1971, as amended)*	Wild Horses carried forward for analysis in Sections 3.2.6 and 4.3.6. Burros do not exist within the gather area.
No	No	Woodland / Forestry	There are no woodland vegetation or forestry products in the proposed project area.

BLM: Bureau of Land Management; COVID-19: Coronavirus Disease 2019; EJ: Environmental Justice; FEMA: Federal Emergency Management Agency; FLPMA: Federal Land Policy and Management Act; USFWS: United States Fish and Wildlife Service; GHGs: Greenhouse Gasses; HMA: Herd Management Areas; LWC: Lands with Wilderness Characteristics; WSA: Wilderness Study Area

3.1 General Description of the Affected Environment

The Desatoya HMA encompasses 161,678 acres of public, and private, lands within the Carson City and Battle Mountain District Offices, in Churchill and Lander Counties NV (Figure 1) Topography varies from gently rolling hills to deeply dissected canyons. Elevation varies from approximately 5,000 feet to 10,000 feet. Precipitation averages 6 inches at lower elevations to 20 inches at the highest elevations. Temperatures also vary from 0 to over 100 degrees Fahrenheit.

The wild horses of the HMA are descendants of local ranch horses. The first aerial inventory of the HMA was undertaken by the BLM in 1971, which identified 42 horses.

Vegetation is typical of sagebrush steppe with co-dominance of shrubs, pinyon pine, juniper and native perennial grasses. Water is available through a variety of undeveloped streams, springs, and seeps, as well as developed water sources such as stock tanks, pits, troughs, and reservoirs on public and private lands. These are scattered throughout the HMA.

A more detailed description of the HMA, history, and elements of the affected environment can be found in the DHR and is incorporated into this assessment by reference.

3.2 Description of Affected Resources/Issues

Table 3-1 lists the elements of the human environment subject to requirements in statute, regulation, or executive order which were considered for detailed analysis. The BLM has discussed all the resources mentioned below and has either incorporated and analyzed them within this EA or provided an explanation of why they were not analyzed in detail. Resources that may be affected by the Proposed Action and Alternatives were identified to be analyzed in detail. Resources that are not present or not affected by the Proposed Action and Alternatives were considered but eliminated from detailed analysis.

3.2.1 Livestock Grazing

The gather project area encompasses all or parts of four grazing allotments: Clan Alpine, Edwards Creek, Porter Canyon, and South Smith Creek. Six different operators hold grazing permits on these allotments. Table 3-2 lists the allotments and livestock information for those portions included in the HMA.

Table 3-2: Cattle Grazing Summary in the Desatoya Gather Area

Allotment	Season of Use	Horse AUMs	% of Allotment in HMA	Permitted Use Within HMA (AUMs)	Actual Use AUMs Within HMA
Clan Alpine	Cattle: year-round; Sheep: December 1 - March 15	516	2%	684	650
Edwards Creek	Cattle: year-round	660	24%	1,937	1,566
Porter Canyon	Cattle: year-round	804	81%	6,352	4,264
South Smith Creek	Domestic horses: December - July; Cattle: March - December	180	23%	635	152

AUM: Animal Unit Month; HMA: Herd Management Area

Grazing for the Edwards Creek, Porter Canyon, and South Smith Creek allotments is done in accordance with the Desatoya Ecosystem Management Plan, which allows for an adaptive management approach. This management plan outlines an approximate grazing schedule, with

the summer use areas being predominantly in the foothills and at the higher elevations. Winter grazing occurs mainly on the flats. The Desatoya Ecosystem Management Plan includes active management in changing on/off times and grazing deferment to support growth of valuable plant species. The primary livestock management tools consist of early season deferment to favor herbaceous species and late season deferment to favor woody species. Other management tools include training the cattle on these allotments to graze the uplands by use of off-riparian watering areas and using grazing behavior as a culling criterion. Livestock movement is timed to meet utilization objectives, and timing can vary based on forage production, weather, livestock behavior, and progress towards objectives.

Through a cooperative agreement, Smith Creek Ranch and the BLM developed a long-term monitoring program that provides feedback to the grazing program based on cooperatively collected baseline data. Upland monitoring included species composition, frequency, cover, and utilization data. Riparian monitoring included green line, riparian cross section, aspen density, and stubble height data. Innovative solutions to resource issues on the Porter Canyon and Edwards Creek allotments have resulted in significant improvement in riparian and upland vegetation conditions, which in turn benefits wildlife habitat. However, riparian and upland objectives are not being met due to pinyon (Pinus monophylla) and juniper (Juniperus osteosperma) (PJ) encroachment coupled with overpopulation of wild horses that have degraded wet meadows and sagebrush plant communities.

3.2.2 Upland Vegetation

A variety of vegetation communities can be found in the Desatoya HMA as a result of the range in elevations, soils, geology, and climate. Dominant plant community types include pinyon juniper woodlands, sagebrush shrublands, and salt desert shrubland. Lower, mid, and upper elevations of the HMA vary in the types of vegetation found.

Lower elevations of the Desatoya HMA consist of vegetation including shadscale (*Atriplex confertifolia*), bud sagebrush (*Picrothamnus desertorum*), winterfat (*Krascheninnikovia lanata*), Indian ricegrass (*Achnatherum hymenoides*). Populations of Wyoming big sagebrush (*Artemisia tridenta wyomingensis*) and low sagebrush (*Artemisia arbuscula*) can mix into the salt desert scrub however, they generally lie above the salt desert scrub zone and finger into the woodland zone. Grasses associated with these communities include Indian ricegrass, squirreltail (*Elymus elymoides*), and needle-and-thread grass (*Hesperostipa comata*).

Sagebrush communities extend into the higher elevations and are generally comprised of mountain big sagebrush (*Artemisia tridenta vaseyana*), black sagebrush (*Artemisia nova*) and low sagebrush communities. Grasses associated with these communities include Idaho fescue (*Festuca idahoensis*), and needlegrass (*Achnatherum sp*.). Pinyon pine (*Pinus monophylla*) and Utah Juniper (*Juniperus osteosperma*) communities generally dominate the steeper slopes of the Desatoya Mountains and are expanding into adjacent sagebrush communities. These communities have an understory of big sagebrush, bitterbrush (*Purshia tridentata*), Idaho fescue (*Festuca idahoensis*) or in some places, little to no understory.

Invasive plants common within the HMA include cheatgrass (*Bromus tectorum*), halogeton (*Halogeton glomeratus*), bull thistle (*Cirsium vulgare*) and white top (*Cardaria draba*).

Wild horses generally prefer perennial grass species as forage when available. Shrubs are more important during the fall and winter, and in drought years. The species of grasses preferred depends on the season of the year. Needle-and-thread and Indian rice grass are most important during the winter and spring and wheatgrasses during the summer and fall. The mosaic of plant communities that are found throughout the HMA also support a wide variety of wildlife species that use the various habitats for food and water, thermal protection, escape cover and reproduction.

While the current livestock grazing system and efforts to manage the wild horses within the AML has reduced the potential of past historic impacts, the current overpopulation of wild horses is continuing to contribute to areas of heavy vegetation use and trailing and trampling damage within uplands and riparian-wetland areas. Current wild horse overpopulation is preventing the BLM from managing for rangeland health and achieving a thriving natural ecological balance, as well making it difficult to develop a multiple use relationship on BLM-administered lands in the area. Wild horses can have substantial impacts on rangeland resources, including vegetation (Crist et al. 2019). This overpopulation has resulted in observed past and present degradation of upland vegetation and riparian-wetland areas.

3.2.3 Migratory Birds

Migratory birds, including golden eagles, are found within the HMA (refer to DHR for more information). Gather activities would have little direct impact on migratory birds, however the reduction in horse numbers would result in improved habitat which would benefit migratory birds including golden eagles.

3.2.4 Sensitive Species: Animals

Affected Environment

Species designated as Bureau sensitive must be native species found on BLM-administered lands for which the BLM has the capability to significantly affect the conservation status of the species through management, and either:

1. There is information that a species has recently undergone, is undergoing, or is predicted to undergo a downward trend such that the viability of the species or a distinct population segment of the species is at risk across all or a significant portion of the species range, or

2. The species depends on ecological refugia or specialized or unique habitats on BLM-administered lands, and there is evidence that such areas are threatened with alteration such that the continued viability of the species in that area would be at risk.

Nevada BLM sensitive species expected and/or found in or near the project area are displayed in Appendix H. Details of high priority sensitive species are described below. No BLM Sensitive Plant species are known to occur in the project area.

Desert Bighorn Sheep ─ See description under Affected Environment.

Sage-Grouse ─ In March 2010, the United States Fish and Wildlife Service (USFWS) published the 12-month findings for petitions to list the GRSG under the Endangered Species Act (1964). In these findings, the sage-grouse that inhabit the project area were found to be warranted but precluded by higher priority listing actions and were given a priority ranking of 8.

Raptors
Multiple species of raptors exist within the Proposed Action boundary and many are BLM – designated sensitive species. Current diversity exists because of the proximity of multiple habitat types that provide nesting, foraging, and roosting sites. For instance, northern goshawks have documented nests in aspen/cottonwood stands in riparian areas associated with Edwards and Smith Creeks, but roost in old growth PJ stands and forage in sagebrush or cold desert scrub habitats. Northern goshawks are adept flyers when foraging but need open canopy woodlands with a significant understory that supports an abundant prey base.

Bats
Four sensitive species of bats are known to inhabit Key Habitats within the project area. These include pallid bat (*Antrozous pallidus*), spotted bat (*Euderma maculatum*), Townsend's big-eared bat (*Corynorhinus townsendii*), and fringed myotis (*Myotis thysanodes*). These bats use a variety of habitats for roosting and foraging. Roosting habitats include crevices in rock cliffs and rimrock, abandoned mines, abandoned structures, and in trees with loose bark such as junipers. Foraging habitats include open grasslands, shrub-steppe, and in and around trees.

3.2.5 Fish, Wildlife, and Key Habitat (Vegetative Resources)
Affected Environment
Based on the Southwest Regional GAP Analysis Project, the Nevada Department of Wildlife's Wildlife Action Plan (2013) characterized Nevada's vegetative land cover into 8 broad ecological system groups and linked those with Key Habitat types. The **primary** Key Habitat types found in project area are described in the DHR.

Big Game
Desert Bighorn Sheep ─ The desert bighorn sheep are found in the proposed project area. They prefer rough, rocky, and steep terrain; require water in the summer months or during drought; and mainly eat grasses, shrubs, and forbs. The project area contains 105,221 acres (46%) of occupied habitat, primarily in the Desatoya Mountains Wilderness Study Area (WSA). Due to the dietary overlap with wild horses and the wild horse's ability to access steep terrain excess wild horses can negatively impact bighorn sheep habitat

Pronghorn ─ Pronghorn (*Antilocarpa americana*) primarily eat forbs and shrubs with grasses being the least preferred forage. The project area supports about 149,168 acres (65%) of delineated year-round habitat.

Mule Deer ─ Mule deer (*Odocoileus hemionus*) generally browse on forbs, grasses, and shrubs depending on the time of year. For instance, forbs and grasses are most important in spring and summer while shrubs are most utilized during winter and the dry summer months.

Greater Sage-grouse

The GRSG is a BLM Sensitive Species as a result of a 2015 decision by the USFWS to not list the species under the Endangered Species Act. GRSG are a landscape-scale species that are seasonally mobile and annually have a large home range (Stiver et al. 2006). Specific factors that limit population expansion of GRSG include loss of vegetation cover, degradation of riparian areas, and degradation of wet meadows. Chick recruitment is diminished in areas lacking an abundance of succulent vegetation or available clean water. The presence of wild horses is associated with a reduced degree of greater sage-grouse lekking behavior (Muñoz et al. 2020). Moreover, increasing densities of wild horses, measured as a percentage above AML, are associated with decreasing greater sage-grouse population sizes, measured by lek counts (Coates 2020).

The HMA falls almost entirely within the boundary of the Desatoya GRSG Population Management Unit. The HMA contains lands classified as Priority Habitat Management Areas (PHMA), General Habitat Management Areas (GHMA), Other Habitat Management Areas (OHMA), and unclassified (typically non-habitat) (Figure 2, Map Sage-Grouse Habitat Types). PHMAs are defined as BLM-administered lands identified as the highest value to maintaining sustainable GRSG populations. GHMAs are BLM-administered lands where special management would apply to sustain GRSG populations in adjacent areas. OHMAs are BLM-administered lands identified as unmapped habitat within the planning area and contain seasonal or connectivity habitat areas.

GRSG and their habitat are present within the HMA. There are currently 6 known active or pending leks (strutting grounds vital to mating) within the HMA. Early brood-rearing consists of upland sagebrush sites relatively close to nest sites, typically characterized by high species richness, with an abundance of forbs and insects. Late brood-rearing habitat are characterized by succulent forbs next to or intermixed with sagebrush. Hens typically move their chicks to more mesic conditions, such as higher elevation sagebrush communities, wet meadow complexes, or agricultural fields. Based on telemetry detections and visual observations GRSG use portions of the HMA year-round. Degradation of riparian and wetland habitats from continuous use by excess wild horses is one reason these birds are at risk. Refer to the DHR for more details relating to GRSG.

3.2.6 Wild Horse

The herd is in overall good health. Few animals rate lower than a 3 Henneke body condition score, and the evident growth of the herd over time and observed ratios of foals to adults consistently indicate that the herd would maintain high reproductive rates, in the absence of fertility control. As the population increases, however, competition for resources, especially water in drought years, would likely lead to more animals in poorer body conditions. The Desatoya HMA experienced persistent drought after the 2019 gather, starting with abnormally dry conditions first being documented on February 11, 2020 by the U.S. Drought Monitor. Drought steadily spread across Nevada and deepened in intensity for the rest of the year, with the HMA lying well within the Extreme Drought zone starting on October 13, 2020.

Rangeland resources have been and are currently being impacted within the HMA due to the over-population of wild horses. Resource monitoring data shows heavy use in critical areas for wildlife habitat including sage-grouse. The most recent monitoring was conducted in November

2020 and documented heavy use in sage-grouse and other wildlife habitats, this heavy use was found with four months remaining in the grazing year. In the course of collecting data for a rangeland health assessment (RHA) (BLM 2020) completed in 2019, wild horses were determined to be a causal factor in lands within the HMA not meeting rangeland health standards for soils, riparian/wetland areas, and plant and animal habitat. Trend monitoring data included in the RHA indicated that key species at study plots in the HMA were reduced with an ongoing shift from perennial grasses to shrubs and invasive species as the dominant species. Riparian assessments revealed signs of wild horse in addition to livestock use, including streambank alteration, hummocking, trampling, soil compaction, and bare ground at levels above what should be expected. Heavy utilization and hedging of key forage species, particularly winterfat (*Krascheninnikovia lanata*), was observed in the Smith Creek Valley portion of the HMA.

Genetic Diversity

Because of history, context, periodic natural movements, and human-caused introductions, wild horses that live in the Desatoya HMA herd are not a truly isolated population. The National Academies of Sciences report to the BLM (2013) recommended that single HMAs should not be considered isolated genetic populations. Rather, managed herds of wild horses should be considered as components of interacting metapopulations, connected by interchange of individuals and genes due to both natural and human-facilitated movements. In the specific case of the Desatoya HMA, the ancestry of horses in this area is of mixed origin from a number of domestic breeds (Cothran 2004). These animals are part of part of a larger metapopulation (NAS 2013) that has demographic and genetic connections with other BLM-managed herds in Nevada, and beyond. The genetic background with respect to domestic breeds is very similar to that of many other herds managed by the BLM, with closest similarity to North American Gaited Breeds, and New World Iberian Breeds; no unique alleles were detected (Cothran 2004). Desatoya HMA is not among the three HMAs that were noted as having especially high influence of Spanish ancestry (NAS 2013).

The 2013 National Academies of Sciences report included further evidence that shows that the Desatoya HMA herd is not genetically unusual, with respect to other wild horse herds. Specifically, Appendix C of the 2013 NAS report is a table showing the estimated 'fixation index' (Fst) values between 183 pairs of samples from wild horse herds. Fst is a measure of genetic differentiation, in this case as estimated by the pattern of microsatellite allelic diversity analyzed by Dr. Cothran's laboratory. Low values of Fst indicate that a given pair of sampled herds has a shared genetic background. The lower the Fst value, the more genetically similar are the two sampled herds. Values of Fst under approximately 0.05 indicate virtually no differentiation. Values of 0.10 indicate very little differentiation. Only if values are above about 0.15 are any two sampled subpopulations considered to have evidence of elevated differentiation (Frankham et al. 2010). Fst values for the Desatoya HMA herd had pairwise Fst values that were less than 0.05 with 3 other sampled herds (New Pass / Ravenswood HMA and Twin Peaks HMA in California; and Green Mountain HMA in Wyoming), and Fst less than 0.075 with 104 additional sets of sampled herds from throughout the west. These results support the interpretation that Desatoya HMA horses are components in a highly connected metapopulation that includes horse herds in many other HMAs.

Diet

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 seasons (Ganskopp 1983; Ganskopp and Vavra 1986, 1987; McInnis 1984; McInnis and Vavra 1987; Smith et al. 1982; Vavra and Sneva 1978). A strong potential exists for exploitative competition between horses and cattle under conditions of limited forage (water and space) availability (McInnis and Vavra 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% (Hanley 1982; Hansen et al. 1977; Hubbard and Hansen 1976; Krysl et al. 1984; McInnis and Vavra 1987). Horses are cecal digesters while most other ungulates including cattle, pronghorn, and others are ruminants (Beever 2003; Hanley and Hanley 1982). Cecal digesters do not ruminate and must 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 (Beever 2003; Bauer et al. 2017; Hanley and Hanley 1982).

Wild horses can exploit the high cellulose of graminoids, or grasses, which have been observed to make up over 88% of their diet (Hanley 1982; McInnis and Vavra 1987). 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 (Beever 2003; Menard et al. 2002; Symanski 1994). 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.

Wild horses also compete with wildlife species for various habitat components, especially when populations exceed AML and/or habitat resources become limited (i.e., reduced water flows, low forage production, dry conditions, etc.). Smith (1986a, b) determined that elk and bighorn sheep were the most likely to negatively interact with wild horses. Hanley and Hanley (1982) compared the diets of wild horses, domestic cattle and sheep, pronghorn antelope, and mule deer and found that horse and cattle diets consisted mostly of grasses, pronghorn and mule deer diets consisted mostly of shrubs (>90%) and sheep diets were intermediate. Due to different food preferences, diet overlap between wild horses, deer, and pronghorn rarely exceeds 20% (Hanley and Hanley 1982; Hanse et al. 1977; Hubbard and Hansen 1976; Meeker 1979).

There is growing concern about limited water and forage available to wild horses, livestock, and wildlife in the desert climate of the Great Basin. Heavy use of forage near available water and competition between wild horses, livestock, and wildlife for limited forage and water has increased. In addition, wild horses can have an impact on native wildlife around water sources (Gooch et al. 2017, Hall et al. 2016). Game camera taken within this district have shown multiple times mule deer leaving a water source as wild horses' approach.

Livestock permittees often haul water, transport water in water pipelines, or pump wells to provide water for their livestock. Because there are limited sources of water in the HMA, the wild horses tend to stay closer to, and concentrate around, those sources of water. Forage around the water sources is heavily impacted because of the high concentration of wild horses in that area. Wild horses must travel greater distances to meet both their forage and water needs. Increasing competition at the water source, can cause increased stress to the animals and can lead to emergency conditions where a failure to act may result in the suffering or death of individual wild horses.

Results of WinEquus Population Modeling

The Action Alternatives (1, 2 and 4) were modeled using Version 3.2 of the WinEquus population model (Jenkins 2000). The purpose of the modeling was to analyze and compare the effects of the action Alternatives on population size, average population growth rate, and average removal number. The WinEquus population model lacks a feature that would allow permanent sterilization, so modeling Alternative 3 was not possible. Alternatives 1 and 2 both reduce the population. Alternative 4 results in a large population increase that could result in up to 2,049 wild horses within 10 years, though the maximum average was 632 – 914 (see Appendix I).

3.2.7 Threatened or Endangered Animal Species

The Lahontan cutthroat trout occur within the HMA in Edwards Creek and Topia Creek. Gather operations would not impact trout habitat as the creeks would be avoided. By managing wild horses within the AML range trout habitat would improve as riparian vegetation improves and erosion decreases from less horse use.

3.2.8 Socioeconomics

Affected Environment

Churchill and Lander counties in Nevada are largely rural and sparsely populated. Fallon, with a population of 8,606 in 2010, is the largest town in Churchill County. Battle Mountain, with a population of 3,635 in 2010, is the largest town in Lander County.

The economy of Churchill County is primarily based on retail trade, construction, and health care and social services. Lander County's economy is dominated by mining with smaller sectors in transportation and warehousing and government services, which includes public education, road maintenance, and military employment. In recent years, the populations of the two counties have adjusted with changes in economic conditions. In 2018, the total population of the analysis area was estimated to be just over 30,000, with Churchill County accounting for 24,440 and Lander County accounting for 5,575 persons in the same year. The two counties together comprise 6,747,949 acres. The BLM manages 69.1 percent of the region (4,662,570 acres) and the Forest Service manages 4.4 percent (296,542 acres); 19.7 percent of land (1,328,194 acres) within the study area is privately owned.

Social Effects

Across the U.S., many individuals and members of non-profit advocacy organizations feel a personal connection to wild horses and burros, regardless of whether or not they visit the area in person. Existence value is recognized by economists as a non-market measurement of the degree

to which society places value on a particular feature of the environment. Those who value wild horses and burros are keenly interested in the health and well-being of wild animals, equines in particular. The status of wild horses in Nevada has also become controversial over time: A recent web search for "wild horses Nevada" produced nearly 5.5 million results, an indication of the level of interest and concern over the status of wild horses in the state. It is assumed that all interested parties do not want horses to suffer from malnutrition or dehydration, which can occur when the total number of animals present exceeds the carrying capacity of the landscape. Maintaining optimal herd numbers facilitates better horse conditions and better land health as well.

Economic Effects

In addition to watershed and rangeland impacts, there are economic costs and benefits associated with gathers, removal of wild horses and burros from management units, and treatment and release programs as indicated in Table 3-3.

Table 3-3: Economic Costs Associated with Gathers

Cost*		
Short term holding	$1,891	/yr/animal
Time in short term holding	5	years
Long term holding	$568	/yr/animal
Time in long term holding	20	years
Capture Cost	$954	/captured animal
PZP-22 vaccine & labor cost	$345	/treated mare
PZP-22, % of capture treated	0.4	
ZonaStat-H vaccine & labor cost	$287	/treated mare

*Internal BLM calculations

The present value of the total cost of holding an animal for five years in short term holding plus an additional twenty years of holding in long term holding, using a discount rate of three percent, is approximately $15,950.

Economic benefits of gathers include improved forage for livestock and wildlife. On average, each wild horse or burro removed from a management unit or surrounding area could be expected to consume approximately the same amount of forage as would a 700 to 1,000-pound cow. The amount of forage needed to support an animal in this size range is approximately equal to an Animal Unit Month (AUM). Accordingly, the economic value of the forage consumed by a wild horse or burro is approximately equal to 12 AUMs per year. Using an estimated current value of replacement grass hay in Nevada of $68 per AUM, the present value of the AUMs that would have been consumed by an animal left to forage on range over 25 years is $14,209. This is an economic benefit of gathering and removing wild horses and burros from a management unit or rangeland.

An additional potential economic benefit from gathers is a possible reduction in the number of collisions between vehicles and animals on highways in the area. While documented collisions of

this type are few in number, they do constitute a risk of any animals being loose on open range areas.

4.0 Environmental Consequences

4.1 Introduction

This section of the EA analyzes the potential environmental impacts which would be expected with implementation of Alternatives 1, 2, 3, or 4. These include the direct impacts (those that result from the management actions), indirect impacts (those that exist once the management action has occurred), and cumulative impacts for the resources that were identified as issues to analyze—cultural resources, livestock, upland vegetation, riparian/wetland zones, soils, wildlife, and wild horses.

4.2 Environmental Consequences and Cumulative Impacts

The direct, indirect, and cumulative impacts to these resources which would be expected to result with implementation of the Action Alternatives, or No Action Alternative are discussed in detail below.

The NEPA regulations define cumulative impacts as impacts on the environment that result from the incremental impact of the Proposed Action when added to other past, present, and reasonably foreseeable future actions (RFFAs), regardless of what agency or person undertakes such actions (40 CFR 1508.7). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. The cumulative impacts study area for the purposes of evaluating cumulative impacts is the HMA and adjacent areas where horses have strayed outside the HMA boundary.

For the purposes of analyzing cumulative impacts on all affected resources, Section 4.2 describes the past, present, and RFFAs within the HMA.

The time frame considered to be most appropriate for evaluating the incremental effects of RFFAs is approximately 10 years. The reasonable scope of the cumulative analysis would be restricted to connected, cumulative, and similar actions to the Proposed Action within the CESA.

4.2.1 Past and Present Actions/Reasonably Foreseeable Future Actions

Livestock Grazing

Livestock have grazed in allotments within the HMA since the late 1800s. Today, it is one of the dominant uses in the cumulative impact assessment area. A variety of range improvement projects have been implemented through the years to improve grazing management and rangeland health. These include spring exclosures, cattle guards, wells, vegetative treatments, spring developments, and water pipelines. Past livestock grazing activities affected the vegetation resources within the impact assessment area by eliminating or greatly reducing the primary understory plants. The present-day implementation of livestock grazing systems, changes to livestock numbers, and range improvements has reduced past impacts and improved vegetation understory conditions in the higher elevation areas. In the lower elevations of the Clan Alpine, Edwards Creek, and Porter Canyon allotments, the primary understory plants are few in number or absent altogether and a change in livestock management would likely not improve the

understory conditions. Proposed future seeding projects may assist in improving the understory component in the lower elevations.

Livestock grazing is expected to continue at similar stocking rates and utilization of the available vegetation (forage) would also be expected to continue at similar levels. The BLM would also continue to manage the HMA and wild horse grazing as outlined above in order to achieve ecological balance.

Recreation

Recreation use has occurred mainly in the form of wilderness recreation, hiking, camping, and hunting. Activities that have occurred with very low frequency are wildlife observation, and nature study.

Vegetation and Riparian-Wetland Areas

Current and past livestock grazing activities have affected the vegetation and riparian-wetland resources within the impact assessment area by eliminating or greatly reducing the primary understory plants. The present-day implementation of livestock grazing systems and projects have reduced past impacts and improved vegetation understory conditions in the higher elevation areas

Within the last 10 years to present, there has been various vegetation treatments within the area that include PJ removal, willow planting, and seeding treatments within uplands and riparian-wetland areas. For PJ removal there has been 14,516 acres of lop and scatter and 1,385 acres of mastication, followed by 479 acres of seeding treatments within some of those removal areas. Approximately 10 riparian enhancement projects have been implemented in the last 10 years through the DHR. These projects have included fencing riparian areas, moving and herbicide of rabbit brush, installing troughs and pipelines, etc. Since the implementation of these projects' habitat conditions have been improving.

Ongoing restoration and rehabilitation efforts include restoring riparian and wet meadows through spring head development, off-site watering, and spring protection fencing to increase cover, composition, and vigor of riparian vegetation and hydrologic function within these areas. Maintaining a balance of grazing animals by controlling the timing, intensity, and duration of grazing and the amount of forage consumed each year by livestock and wild horses is crucial to maintaining healthy riparian plant communities and hydrologic function for the future. There are approximately 12 new riparian-wetland area improvements proposed by the BLM to be completed within the HMA. These include PJ tree removal, riparian-wetland habitat improvements, riparian protection fencing, spring developments, willow plantings, and noxious weed treatments. So long as these restoration projects are not hampered by excessive grazing pressure, the proposed treatments within the HMA would be expected to improve overall health and function of riparian-wetland areas by increasing cover, composition, and vigor of riparian vegetation, decreasing streambank degradation, and reducing soil loss by erosion.

Wildfire and Noxious Weeds

Over 35 wildfires are known to have occurred within the HMA. These wildfires have influenced native vegetation and potentially affected cultural resources. There have been numerous seedings within the HMA in response to wildland fires. Past seedings include the use of both native and non-native plant species. Noxious weeds may also spread and increase post-wildfire. The BLM has conducted integrated weed management for the past 30 years to monitor and treat infestations of noxious weeds and invasive species within the HMA. Drought events have the potential to cause conditions in which large wildfires may become more likely.

It is predicted that additional wildfires may occur in the future, and the lands affected may have emergency stabilization or rehabilitation efforts implemented on them. Future actions would likely be related to the effects from wildfires. Ongoing restoration and rehabilitation efforts include planting native shrubs and beneficial herbaceous species to increase cover, biodiversity and function. This type of action also increases soil health and productivity. Reseeding or other revegetation projects would be the primary action to reduce wind and water soil erosion. Other actions could include juniper and pinyon pine thinning and removing Phase I stands that are encroaching on sagebrush dominated rangelands. No new roads are expected to be built.

The BLM would continue to monitor and treat infestations of noxious weeds and invasive species in the HMA using Integrated Weed Management. BLM also plans to continue reducing pinyon juniper and pinyon pine cover to reduce encroachment to improve sagebrush communities.

Wildlife

Hunting for various wildlife species within and outside of the HMA occurs. Forage allocations for livestock, wild horses, and wildlife have been established in the past by the BLM. Additionally, annual livestock numbers, seasons of use, and other factors in livestock grazing management have been implemented to improve rangeland and ecosystem health benefiting wildlife.

Wildlife habitat needs and hunting of game species would continue to occur in the HMA. The DHR and its program area goals, objectives, and management decisions would continue to be implemented for the benefit of GRSG and other wildlife species. RFFAs also include the monitoring of GRSG lek counts, which would continue within the HMA to assist in contributing to population data and to monitor habitat conditions.

Wild Horse

Historically, wild horses have used the HMA. In years that the populations of wild horses have exceeded the established AML range, disturbance to vegetation and to cultural resource sites has occurred in some areas. Since 1976, the BLM has conducted eight gathers of wild horses inside and outside of the HMA to remove excess animals to manage the population size within the established AML ranges. The excess animals removed have been transported to short-term corral facilities where they were prepared for adoption, sale (with limitations), long-term pasture, or other statutorily authorized disposition.

Continued livestock and wild horse grazing would likely occur. Over the next 10 to 20 year period, RFFAs include gathers with a frequency of up to every two years (helicopter gather) to

remove excess wild horses and/or implement fertility controls in order to manage population size within the established AML range could occur. Water bait/water trapping could occur at any time when wild horses could be trapped to treat or retreat mares or remove excess animals. An MOU may be entered into with private parties to trap horses for treatment or removal. The excess animals removed would be transported to ORCs where they would be prepared for adoption, sale (with limitations), or off-range pastures. Annual remotely delivered fertility control program or one administered in conjunction with future gathers could also reduce population growth. Any future wild horse management, aside from the proposed management actions specified in this EA, would be analyzed in appropriate environmental analysis/documentation following site-specific planning with public involvement.

The last gather of wild horses from the HMA was conducted in 2019. In 2019, 456 wild horses were gathered, 432 were removed, 10 mares were treated with PZP-22 and released along with 14 stallions.

The current population within and outside the HMA for 2020 is at least 215 wild horses (based on a direct count, a statistical analysis of the double-observer survey results has not been performed yet). The actions which have influenced today's wild horse population are primarily wild horse gathers, which have resulted in the capture of wild horses, removal of excess wild horses, and release of wild horses back into the HMA.

Socioeconomics

RFFAS for the No Action Alternative are that land health would degrade and available forage for livestock and wild horses would decline in rangeland health conditions and could lead to suffering from malnutrition, starvation, dehydration and/or lead to fatalities. This could lead to an increased cost of operations and negative effect the socioeconomic resilience of the ranching community and competition of water holes, condition of wells and spring, and range improvements conditions.

4.3 Impacts to Affected Resources

4.3.1 Livestock Grazing

Impacts Common to Action Alternatives (1, 2, and 3)

Wild horses directly compete with livestock for available forage and water. Alternatives 1, 2, and 3 would have less impact on social and economic values associated with livestock grazing operations than the no action Alternative (4). Grazing systems for individual allotments are designed to function in a TNEB with wild horse populations within the established AML range. Within the established AML range, livestock operations and grazing systems would function properly, and forage plants would be less heavily used by excessive season-long wild horse grazing. Furthermore, livestock operators could improve pasture rotation and defer spring rest in areas where year-round wild horse use has negatively impacted deep rooted perennial grasses and riparian areas.

Impacts of Alternative 1 and 3

With Alternatives 1 and 3, a thriving natural ecological balance would be achieved and maintained longer than with Alternative 2. A thriving natural ecological balance would not be achieved with Alternative 4. Alternatives 1 and 3 would allow for longer recovery and less overall use of forage species and would result in healthier livestock and forage.

Impacts of Alternative 2
With Alternative 2, wild horse populations would exceed high AML again in four to five years after achieving low AML, and the benefits to livestock and wildlife would be shorter-term than benefits resulting from Alternative 1 or Alternative 3. Additionally, livestock operators would be more likely to receive reductions in permits due to poor range condition from continual, yearlong grazing by wild horses under Alternative 2.

Impacts of Alternative 4 (No Action)
Utilization by authorized livestock has been directly impacted due to the overpopulation of wild horses, both within and outside the HMA. Wild horses are currently using more than their forage allocation resulting in heavy to severe utilization of vegetation. The indirect impacts of Alternative 4 include increased damage to the rangelands, continued competition between livestock, wild horses, and wildlife for the available forage and water, reduced quantity and quality of forage and water, and undue hardship on the livestock operators who would continue to be unable to make use of the forage they are authorized to use. Additionally, further damage to range improvements such as water troughs and riparian protection fencing would also occur as a result of large numbers of horses concentrating in one location competing for water. This amount of use and destruction increases maintenance and labor costs to repair and inspect each development.

Cumulative Effects
Through the land-use planning process and grazing permit renewal decisions, livestock grazing permits have been set at a level that balances forage resources between livestock and wild horses. The terms and conditions of livestock grazing permits are designed to allow forage resources to rest from grazing at various times of each year and to ensure that plants have adequate time for regrowth after grazing. When horse numbers become higher than the established AML, overall impacts to forage resources are higher, as more forage is consumed in the same time periods. This does not allow the livestock grazing systems to function as they have been designed, as no rest occurs on forage plants after livestock are removed from the pasture or allotment since they are continuously grazed by higher numbers of horses than the range can sustain.

By removing excess wild horses as described in Alternatives 1, 2, and 3, livestock operations and grazing systems would function properly, and forage plants would receive rest from grazing during scheduled rest periods. The health and condition of vegetation would be maintained, and plant communities that have been impacted by wildfires or past heavy livestock grazing would continue to improve in condition. Forage quality and production for livestock grazing would be expected to be maintained.

Implementation of Alternative 4 would result in substantial increases in wild horse numbers, and competition for forage and water would become more prevalent between livestock, wild horses, and wildlife. Plant communities that are still recovering from the effects of past heavy horse

grazing would be the most vulnerable to further degradation. As wild horse numbers increase, plant communities would experience a serious decline in condition, forage quality, and production. Forage resources for livestock would be highly degraded, and changes to grazing permits would most likely need to be made because of declining rangeland health. Such changes could result in economic harm to the permittee and the surrounding area.

4.3.2 Migratory Birds

Proposed Action

If wild horse gather operations involve the use of a helicopter it would not directly impact populations of migratory bird species because operations would occur after breeding season when species are not nesting. However, for reasons described in the environmental consequences section under the **Fish, Wildlife, and Key Habitat** category, attaining proper AML levels of wild horses should help restore degraded habitat conditions that would benefit migratory bird species that utilize these Key Habitats. Attaining and maintaining proper AML may also help to maintain Key Habitat areas that exhibit healthy vegetation in their current state.

No Action

Over-utilization of forage by free-roaming horses would continue to occur if population numbers stay above or increase above the current level above the high AML.

Cumulative Effects

When combined with the effects from past, present, and RFFAs, cumulative effects from the Proposed Action to key habitats, and in turn migratory and resident birds, are expected to be negligible or positive. This is because the Proposed Action would help accomplish the objectives of enhancing and/or maintaining resilient plant communities and watersheds by decreasing over-utilization of vegetative resources by excess wild horses, generally increasing plant diversity; and improving and maintaining wet meadows, springs, and riparian areas that are so crucial to many birds in the project area.

4.3.3 Upland Vegetation

Impacts of Action Alternatives (1, 2, and 3)

Under Alternatives 1, 2, and 3, numbers of wild horses would be reduced, and maintained within the AML range, which would result in decreased impacts to vegetation throughout the HMA. While removal of excess wild horses may not be able to restore plant communities that have crossed ecological thresholds to annual grass dominated communities, having the number of horses in the HMA within AML would help prevent areas dominated by annual grass species from spreading. Generally the removal of grazing pressure from excessive numbers of wild horses would lessen the impacts to perennial grasses, thus allow them to better recover from natural disturbances such as fire and livestock grazing, and to compete with non-native annual grasses such as cheatgrass. These positive effects would be increased by Alternatives 1 and 3 additional birth control measures taken in these Alternatives would further reduce horse populations and their impacts to vegetation than would Alternative 2 which only consists of removal.

During gather operations, there would be some short-term direct effects to the vegetation within the gather sites and the temporary holding facilities as well as the paths taken by the horses to get to these sites. Each of the gather sites (<1 acre) is expected to be used for only a short duration

(1 to 3 days) and at a level of use where effects would be short-term. Holding sites would be used for 1 to 30 days. Vegetation would be disturbed at the location of trap sites and holding facilities due to congregation and trampling by wild horses and the increased vehicle and foot traffic. The amount of vegetation that would be disturbed or affected is dependent on the number of wild horses gathered at a specific site and the duration those wild horses remain at the trap site/holding facility. However, impacts to vegetation due to trampling would be expected to be minimal because effort would be made to place trap sites in areas that have already been disturbed. Given the timeframe for these gathers (July 1 – March 1), annual vegetation would have already senesced for the season and perennial grasses would have completed the their growing season, so the effects would be greater shrubs and to some extent perennial grasses. This short-term, localized effect is outweighed, however, by reducing the long-term impacts to vegetation from heavy grazing by high numbers of (above AML) on the upland vegetation.

Impacts of Alternative 4

Under Alternative 4, wild horses would not be gathered and removed from the HMA. There would be no impacts associated with gather activities such as disturbed vegetation. Not removing excess horses would result in a continued increase in the number of wild horses above AML resulting in increased utilization of vegetation and trampling. This would have compounding impacts upon upland vegetation. Initial impacts would be seen in sites that are already close to crossing an ecological successional threshold, or on sites that are near water sources. The increased grazing pressure from horse numbers in excess of the high AML range would result in a decrease in native perennial species, and an increase in non-native annual species (e.g., cheatgrass) or shrubs tolerant of disturbance (e.g., rabbitbrush) that have lower forage value and provide fewer ecosystem goods and services (Chambers et al. 2014). These changes would decrease the stability, biodiversity, vigor, and production of native plant communities within the HMA.

Cumulative Effects

Activities that have impacted vegetation in the past and would be expected to continue to impact vegetation in the analysis area include livestock and wild horse grazing, spread of noxious weeds, wildfires, and vegetation treatments (e.g., pinyon pine and juniper removal and seeding).

By removing excess wild horses as described in Alternatives 1, 2, and 3, cumulative impacts are expected to be positive for vegetation resources. Implementation of these Alternatives would contribute to isolated areas of vegetation disturbance during the gather activities. In the long term, however, the achievement of AML in conjunction with proper grazing management and other foreseeable actions such as vegetation and weed treatments, would contribute to improved vegetative resources. While livestock grazing also results in removal of forage, the number of animals, season of use, duration, and species of grazing animal is controlled to avoid long-term degradation of vegetation. Sustaining a balance of grazing animal and controlling the timing and amount of forage that is consumed each year by livestock and wild horses is crucial to maintaining healthy native plant communities. Maintaining this balance would provide plant communities the opportunity to build resiliency such that if a wildfire or drought occurred, they could recover more quickly. This resiliency would also allow for plant communities to resist the spread of noxious weeds.

Alternative 4 would result in the increase in wild horse numbers and increased disturbance to

native vegetation and soils, which could lead to increased damage to upland vegetation. Plant communities that have been and may be impacted by wildfires, historic and current livestock grazing, and annual invasive weeds would be more vulnerable to losing native perennial grasses, due to the high amount utilization and trampling from excessive wild horses. The constant overuse of rangeland vegetation would decrease the ability of plants to complete their growth cycle and recover from grazing. As a result, many sites that have been previously disturbed may irreversibly transition from native perennial plant communities to invasive annuals plant (e.g., cheatgrass) communities making these communities more vulnerable to fire. This change in functional/structural groups would have a negative impact on the vegetation resources in the HMA, further affecting other aspects of these sagebrush ecosystems such as soils and wildlife.

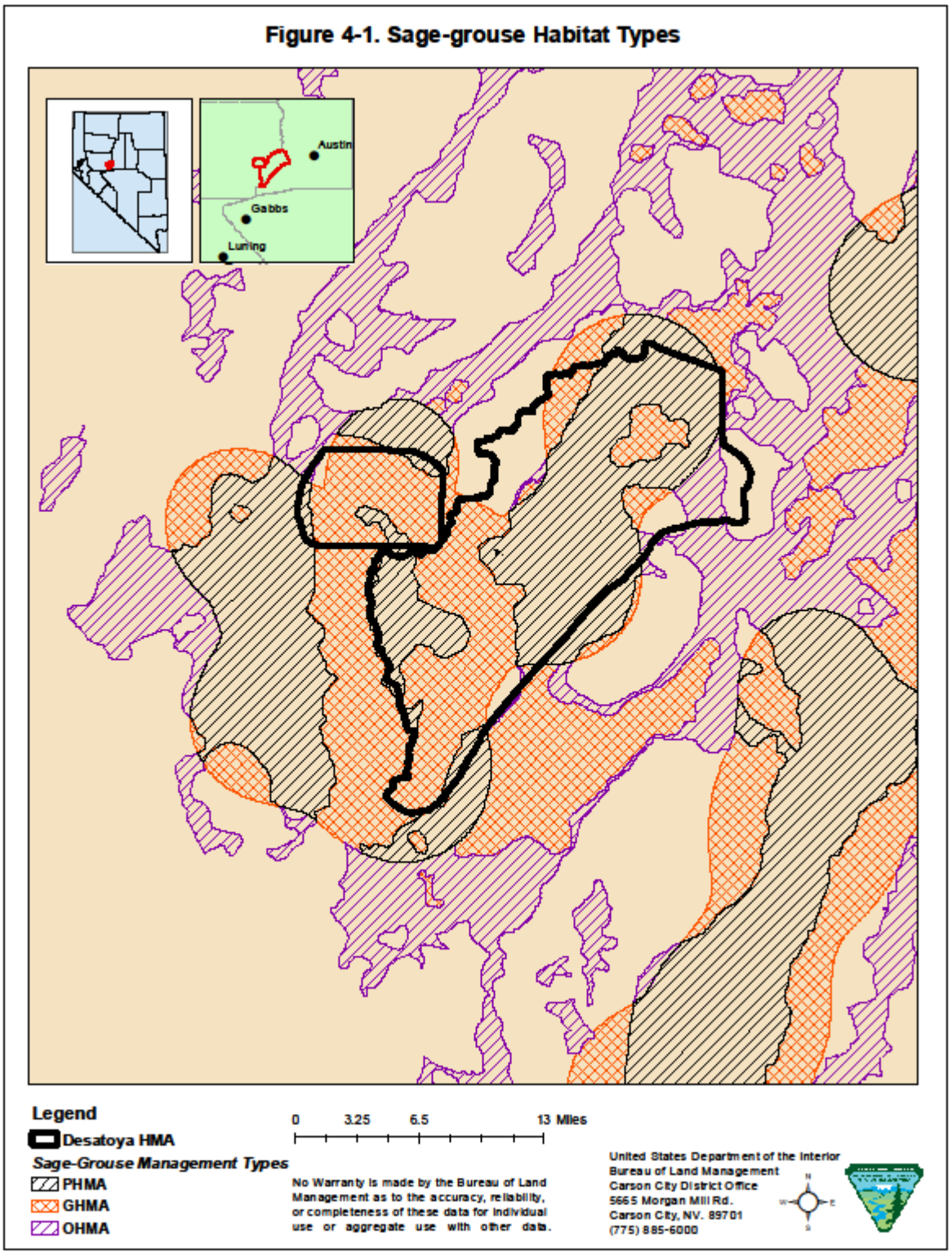
4.3.4 Sensitive Species: Animals

Impacts of Action Alternatives (1, 2, and 3)

Impacts would generally be the same to BLM designated sensitive species as described in the environmental consequences section under the **Fish, Wildlife, and Key Habitat** section. Maintaining, expanding, or developing corridors to facilitate sage-grouse connectivity between core breeding areas and seasonal habitats (Figure 4-1) would be expected to increase survival rates.

Maintaining proper wild horse AML should also help maintain habitat conditions that, over time, may benefit sensitive species that utilize these key habitats by providing a diverse vegetation structure that provides for multiple life requirements that any given species may need to successfully reproduce. If the Proposed Action is successful, decreasing competition for forage from horses from current levels would benefit sensitive species dependent on these key habitats for food, water, and cover. Additionally, sensitive species such as golden eagle or burrowing owl that prey on wildlife that inhabit the project area should benefit from a robust prey base and proper functioning water sources.

Figure 4-1. Sage-grouse Habitat Types



No Action
Over-utilization of forage by wild horses would continue to occur as the population numbers continue to increase above the current level above high AML.

Cumulative effects
When combined with the effects from past, present, and RFFAs, cumulative effects from the Proposed Action to key habitats, and in turn sensitive species, are expected to be negligible or positive. This is because the Proposed Action would help accomplish the objectives of enhancing and/or maintaining resilient plant communities and watersheds by decreasing over-utilization of vegetative resources by excess wild in some wet meadow areas; generally increasing plant diversity; and improving and maintaining wet meadows, springs, and riparian areas that are so crucial to multiple species in the project area.

4.3.5 Fish, Wildlife, and Key Habitat (Vegetative Resources)
Proposed Action
Because of physiology, wild horses primarily eat native bunchgrasses when available; consequently, dietary overlap between horses and mule deer, as well as pronghorn, has been documented as minimal (1%). However, shrubs – including sagebrush – can represent a large part of a horse's diet, at least in summer in the Great Basin (Nordquist 2011). Dietary overlap of wild horses with desert bighorn sheep has been documented around 50% when averaged throughout the year (Hanley & Hanley 1982; Hansen et al. 1977). However, native plant communities can only sustain a certain level of grazing utilization. The upper limit of the AML range is the maximum number of wild horses that can be maintained within an HMA to achieve a thriving natural ecological balance and not adversely impact the plant community in combination with other multiple uses such as wildlife and livestock grazing. The Proposed Action would also help in achieving and maintaining the wild horse populations within AML, thus vegetative health within key habitats would be promoted

When AML is exceeded and maintained over time, overutilization of vegetation and water sources by wild horses occurs, decreasing plant diversity and in turn changing habitat structure (Beever and Brussard 2000; and references therein). This is currently occurring in parts of the project area. Beever at al. (2008) conducted a study of vegetation response to removal of horses in 1997 and 1998 (part of study was in the Clan Alpine HMA, which is close to the Desatoya HMA). The paper concluded that horse-removed sites exhibited 1.1–1.9 times greater shrub cover, 1.2–1.5 times greater total plant cover, 2–12 species greater plant species richness, and 1.9–2.9 times greater cover and 1.1–2.4 times greater frequency of native grasses than in horse-occupied sites.

Effects of wild horses are not uniform across the landscape. For instance, horses would most utilize areas of the HMAs that have more grasses because they are primarily grazers. However, when horses are substantially over AML they would also overgraze shrub species such as winterfat, budsage, and four-wing salt bush, which takes away available forage for browsers such as mule deer. While impacts to water from horses are different than cattle due to behavior (horses tend to not linger at a source and drink in the morning and at night), decreased cover and diversity of grasses and shrubs as well as decreased mammal burrow density have been documented from wild horses at water sources (Beever and Brussard 2000; Ganskopp and Vavra

1986). Small mammals are a prey base for many species. Thus, less prey can negatively affect raptors and carnivores that may inhabit the area. Sage-grouse require specific amounts of grass cover for optimal nesting habitat, an abundance of forbs for brood-rearing habitat, and free water with sufficient vegetation to support insects and to provide cover (Connelly et al. 2000). If grass is over-utilized by horses or livestock, sage-grouse habitat can be negatively affected. Keeping wild horses at AML is expected to alleviate these effects.

Overall, if the gather and any form of fertility control methods are successful, increased understory plant species and cover, healthier wet meadows throughout the HMA, and maintaining less competition for forage would benefit species dependent on these key habitats for food, water, and cover. Additionally, species that prey on wildlife that inhabit these plant communities, such as golden eagles, and other raptors may benefit from an increased prey base over time.

Direct short-term impacts from gather activities include disturbance to wildlife from the presence of people, vehicles, helicopters and wild horses at the trap locations and temporary holding facilities during gather operations. Impacts to GRSG would be minimized, as the gather would not take place during the lekking or nesting periods.

Implementation of Alternatives 1, 2, and 3 would provide the greatest benefit to wildlife. The habitat would be able to recover and improve, and there would be less competition for resources between wild horses and wildlife populations. Specifically, shrub, native grass, total plant cover and species richness would increase, and invasive species would decrease (Beever et al. 2003, 2008). Riparian areas and meadow function would also improve as well as their associated perennial grasses and forbs—all of which would increase nest and brood survival of GRSG (Doherty et al. 2014) and other species, increase hiding cover, and result in the overall improvement of habitat quality for wildlife species. Alternatives 1, 2, and 3 would also make progress towards meeting or making progress towards GRSG Habitat Objectives.

Impacts of Alternative 4 (No Action)

No Action

Over-utilization of forage by free-roaming horses would continue to occur if population numbers stay above or increase above the current level of above high AML. Some Key Habitats could become further degraded by continual pinyon pine and juniper encroachment, which would decrease forage and cover available to sagebrush dependent wildlife species. Further increases of pinyon pine and juniper density would further increase the catastrophic fire risk over time as well as diminishing available quality woodland habitat for woodland dependent species. Over time it is expected that the diversity and abundance of species that inhabit the project area would decrease, which may in turn decrease the prey base for wildlife species that forage in the area.

The direct impacts of this Alternative would eliminate the short-term impacts from gather activities including disturbance to wildlife from the presence of people, vehicles, helicopters and wild horses at the trap locations and temporary holding facilities during gather operations.

Indirect impacts from this Alternative would be the continued degradation to wildlife habitats including reduced quantity and quality of vegetation and degradation of riparian, meadows, and water resources necessary for wildlife. In the long-term, this Alternative would continue to promote fewer plant species, lower the occurrence of native grasses, increase the presence of invasive species, and decrease vegetative cover (Beever & Aldridge 2011), all of which would result in a decrease in nesting and brood survival of GRSG (Doherty et al. 2014, Coates et al. 2020) and other species. This Alternative would also increase predation of wildlife species by reducing hiding cover. Alternative 4 would not conform to the Greater Sage-Grouse Conservation Plan (2014) or the North Central Nevada Sage-Grouse Conservation Plan (2014). The plan for the Desatoya sage-grouse Population Management Unit (PMU) identified wild horse grazing as a high risk to sage-grouse: "These horses use the forage resource year-round and year-round grazing is known to cause adverse changes in sagebrush/grass plant communities. Yearlong grazing from an excessive number of horses located both inside and outside the HMA was rated as a high-risk factor to sage-grouse in the PMU."

"The current level of grazing by wild horses has created a moderately high to high level of risk to most, if not all birds in the PMU because: 1. Large areas of early brood and late brood rearing habitat that are used by horses lack adequate cover and production from perennial grasses; 2. Large areas of early brood and late brood rearing habitat that are grazed by horses lack adequate cover and production from desired forb species; and 3. There is insufficient residual herbaceous material in both the early brood and late brood habitat. The risk of wild horses preventing or reducing access to water, meadows, or other critical habitat is considered moderate to moderately low and is expected to remain so into the future."

Cumulative Effects

When combined with the effects from past, present, and RFFAs, cumulative effects from the Proposed Action to key habitats, and in turn fish and wildlife, are expected to be negligible or positive. This is because the Proposed Action would help accomplish the objectives of enhancing and/or maintaining resilient plant communities and watersheds by decreasing over-utilization of vegetative resources by excess wild horses; generally increasing plant diversity; and improving and maintaining wet meadows, springs, and riparian areas that are so crucial to fish and wildlife in the project area.

Maintaining a balance of grazing animals and controlling the timing and amount of forage that is consumed each year by livestock and wild horses is crucial to maintaining healthy upland plant communities that provide important wildlife forage and cover. By removing excess wild horses, as described in Alternatives 1, 2, and 3, cumulative impacts to wildlife habitat are expected to be beneficial. Habitat enhancement projects, including the fencing of riparian and spring sites from livestock and wild horses further improve habitat quality for GRSG and other wildlife.

Implementation of Alternative 4 would result in the further degradation of riparian/wetland sites. It is estimated that with the projected increase in the wild horse population under this Alternative, over the next five years approximately 187 riparian/wetland sites including 6 streams within the HMA could become severely degraded and/or dewatered (based on the average population growth rate). These impacts would cause a rapid decline in the amount and quality of riparian habitat for many wildlife species. Riparian and wetland sites that are currently

rated as "Proper Functioning Condition" would also be at risk of degradation. Over time, drinking water for wildlife could become nonexistent in some areas or be of very low quality due to the high amount of sediment in the water from horse trampling. GRSG habitat would become degraded, especially in riparian and wetland communities. Nesting success would be impacted as sites become devoid of native perennial species and have reduced amounts of plant cover and litter.

4.3.6 Wild Horses

Impacts of Alternative 1 (Proposed Action)

Under Alternative 1, wild horses would be released back to the range to achieve a post-gather sex ratio of 60:40 percent stallions to mares at low AML for the potential breeding population. Under this Alternative, band size would be expected to decrease, competition for mares would be expected to increase, recruitment age for reproduction among mares would be expected to decline, and size and number of bachelor bands would be expected to increase. These effects would be slight, as the proposed sex ratio is not an extreme departure from normal sex ratio ranges (refer to review in Appendix C. Modification of sex ratios for a post-gather population favoring stallions would further reduce growth rates in combination with fertility control.

Although some fertility control treatments may be associated with a number of potential physiological, behavioral, demographic, and genetic effects, those impacts are generally minor and transient, do not prevent overall maintenance of a self-sustaining population, and do not generally outweigh the potential benefits of using contraceptive treatments in situations where it is a management goal to reduce population growth rates (Garrott and Oli 2013). Fertility control methods that affect individual horses does not prevent the BLM from ensuring that there would be self-sustaining populations of wild horses in this HMA. Although treated individuals may experience long-lasting effects, even including sterility in some cases, that does not of itself cause significant negative impacts at the level of populations, which are the object of BLM management.

Impacts of Alternative 2

Alternative 2 would have similar impacts to Alternative 1, except that there would be no impacts to individual mares from administering a contraceptive.

Impacts Common to Alternatives (1 and 3)

Contraception

All fertility control methods in wild animals are associated with potential risks and benefits, including effects of handling, frequency of handling, physiological effects, behavioral effects, and reduced population growth rates (Hampton et al. 2015). Contraception by itself does not remove excess horses from an HMA's population, so if a wild horse population is in excess of AML, then contraception alone would result in some continuing environmental effects of overpopulation. Successful contraception reduces future reproduction.

Successful contraception would be expected to reduce the frequency of gather activities, as well as wild horse and burro management costs to taxpayers. Bartholow (2007) concluded that the application of 2 or 3-year contraceptives to wild mares could reduce operational costs in a

project area by 12 to 20 percent, or up to 30 percent in carefully planned population management programs. He also concluded that contraceptive treatment would likely reduce the number of horses that must be removed in total, with associated cost reductions in the number of private placements and total holding costs. Population suppression becomes less expensive if fertility control is long-lasting (Hobbs et al. 2000). BLM acknowledges that mares treated four or more times with fertility control may become sterile (Nunez 2018). Although contraceptive treatments may be associated with a number of potential physiological, behavioral, demographic, and genetic effects, detailed in Appendix C, those concerns do not generally outweigh the potential benefits of using contraceptive treatments in situations where it is a management goal to reduce population growth rates (Garrott and Oli 2013).

Fertility Control Vaccines, Physical Sterilization, and IUDs

Fertility control vaccines (also known as immunocontraceptives) meet the BLM requirements for safety to mares and the environment (EPA 2009a, 2012). Because they work by causing an immune response in treated animals, there is no risk that vaccines, physical sterilization methods, or IUDs would cause hormones or toxins to be taken into the food chain when a treated mare dies. Refer to appendix C for a detailed analysis of various fertility control techniques that may be employed for this HMA.

Impacts of Alternative 3

Implementation of Alternative 3 would result in capturing fewer wild horses in the future than Alternatives 1 and 2. Alternative 3 would be similar to Alternative 1 except that some mares could be physically sterilized or receive IUDs, and some stallions could be gelded.

In addition, up to 25 percent of the male horses would be released as sterilized animals to bring the population to mid-AML. At no time would the sex ratio exceed roughly 60 percent male horses.

Effects of Sterilization

Various forms of fertility control can be used in wild horse herd management. These can help with the goals of maintaining herds at or near AML, reducing fertility rates, and reducing the frequency of gathers and removals. The WFRHBA specifically provides for sterilization (16 U.S.C. 1333 section 3.b.1). Fertility control measures have been shown to be a cost-effective and humane treatment to slow population increases in wild horse herds or, when used in combination with gathers, to reduce herd size (Bartholow 2004; de Seve and Boyles-Griffin 2013; Fonner and Bohara 2017). An extensive body of peer-reviewed scientific literature details the expected impacts of various fertility control methods on wild horses and burros (see Appendix C). No finding of excess animals is required for BLM to pursue sterilization in wild horses or burros.

Population growth suppression becomes less expensive if fertility control is long-lasting (Hobbs et al. 2000), such as with spaying and neutering. Here, ‘neutering’ is defined to be the sterilization of a male horse (stallion), either by removal of the testicles (castration, also known as gelding) or by vasectomy, where the testicles are retained but no sperm leave the body, as a result of severing or blocking the vas deferens or epididymis.

Impacts Common to Alternatives 1, 2, and 3

For over 40 years, various impacts to wild horses and burros as a result of gather activities have been observed. Under Alternatives 1, 2, and 3 impacts to wild horses would be both direct and indirect, occurring to both individual horses and the population as a whole.

In any given BLM WHB gather, gather-related mortality averages only about one half of one percent (0.5 percent), which is very low in comparison to the mortality rates typical in wild animal capture efforts (Scasta 2020). Approximately, another six-tenths of one percent (0.6 percent) of the captured animals could be humanely euthanized due to pre-existing conditions and in accordance with BLM policy (GAO 2008, Scasta 2020). These data affirm that the use of helicopters and motorized vehicles has proven to be a safe, humane, effective, and practical means for the gather and removal of excess wild horses and burros from the public lands. The BLM also avoids gathering wild horses and burros by helicopter during the 6 weeks prior to and following the peak foaling season (i.e., March 1 through June 30).

Impacts to Individual Horses

Individual, direct impacts to wild horses include the handling stress associated with the roundup, capture, sorting, handling, and transportation of the animals. The intensity of these impacts varies by individual and is indicated by behaviors ranging from nervous agitation to physical distress. When being herded to trap site corrals by the helicopter, injuries sustained by wild horses may include bruises, scrapes, or cuts to feet, legs, face, or body from rocks, brush, or tree limbs. Rarely, wild horses would encounter barbed wire fences and would receive wire cuts. These injuries are very rarely fatal and are treated on-site until a veterinarian can examine the animal and determine if additional treatment is indicated.

Other injuries may occur after a horse has been captured and is either within the trap site corral, the temporary holding corral, during transport between facilities, or during sorting and handling. Occasionally, horses may sustain spinal injuries or fractured limbs but based on prior gather statistics, serious injuries requiring humane euthanasia occur in less than one horse per every 100 captured. Similar injuries could be sustained if wild horses were captured through bait and/or water trapping, as the animals still need to be sorted, aged, transported, and otherwise handled following their capture. These injuries result from kicks and bites, or from collisions with corral panels or gates.

To minimize the potential for injuries from fighting, the animals are transported from the trap site to the temporary holding facility where they are sorted as quickly and safely as possible, then moved into large holding pens where they are provided with hay and water. On many gathers, no wild horses or burros are injured or die. On some gathers, due to the temperament of the horses and burros, they are not as calm, and injuries are more frequent. Overall, direct gather-related mortality averages less than one (1) percent (GAO 2008, Scasta 2020).

Indirect individual impacts are those which occur to individual wild horses after the initial event. These may include miscarriages in mares, increased social displacement, and conflict between males. 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 1 to 2-minute skirmish between older studs which ends when one stud retreats. Injuries typically involve a bite or kick with bruises which do not break the skin. Like direct individual impacts, the frequency of these impacts varies with the population and the individual. Observations following capture indicate the rate of miscarriage varies but can occur in about one to five percent of the captured mares, particularly if the mares are in very thin body condition or in poor health.

A few foals may be orphaned during a gather. If the mare rejects the foal, the foal becomes separated from its mother and cannot be matched up following sorting, the mare dies or must be humanely euthanized during the gather, the foal is ill or weak and needs immediate care that requires removal from the mother, or the mother does not produce enough milk to support the foal. On occasion, foals are gathered that were previously orphaned on the range (prior to the gather) because the mother rejected it or died. These foals may be in poor, unthrifty condition. Every effort is made to provide appropriate care to orphan foals. Veterinarians may administer electrolyte solutions or orphan foals may be fed milk replacer as needed to support their nutritional needs. Orphan foals may be placed in a foster home to receive additional care. Despite these efforts, some orphan foals may die or be humanely euthanized if the prognosis for survival is very poor.

In some areas, gathering wild horses during the winter may avoid the heat stress that could be associated with a summer gather. By fall and winter, foals are of larger body size and sufficient age to be weaned. Winter gathers are often preferred when terrain and higher elevations make it difficult to gather wild horses during the summer months. Under winter conditions, horses are often located in lower elevations due to snow cover at higher elevations. This typically reduces the distance between horse concentrations and trap sites reducing the potential for fatigue and stress. While deep snow can tire horses as they are moved to the trap, helicopter pilots allow the horses to travel slowly at their own pace. Trails in the snow are often followed reducing the stress to the trap site. On occasion, trails can be plowed in the snow to facilitate the safe and humane movement of horses to a trap. Wild horses may be able to travel farther and over terrain that is more difficult during the winter, even if snow does not cover the ground. Water requirements are lower during the winter months, making distress from heat exhaustion extremely rare. By comparison, during summer gathers, wild horses may travel long distances between water and forage and become more easily dehydrated.

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 Policy for Animal Health, Maintenance, Evaluation and Response 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 or deformed limbs) that cause lameness or prevent the animal from being able to maintain an acceptable body condition (greater than or equal to BCS 3); old animals that have serious dental abnormalities or severely worn teeth and are not expected to

maintain an acceptable body condition, and wild horses that have serious physical defects such as club feet, severe limb deformities, or sway back. Some of these conditions have a causal genetic component and the animals should not be returned to the range to prevent suffering, as well as to avoid amplifying the incidence of the problem in the population.

Wild horses not captured may be temporarily disturbed and moved into another area during the gather operation. Except for changes to herd demographics from removals, direct population impacts have proven to be temporary in nature with most, if not all, impacts disappearing within hours to several days of release. No observable effects associated with these impacts would be expected within one month of release, except for a heightened awareness of human presence.

It is not expected that genetic health would be impacted by the action Alternatives. Baseline genetic diversity sampling in 2004 indicated an average level of observed heterozygosity (Cothran 2004), the herd size has often been above AML since then, and the AML range of 127 to 180 animals should provide for a low rate of loss of heterozygosity. Furthermore, periodic, ongoing genetic monitoring is included in Alternatives 1-3. That genetic monitoring would inform the BLM as to whether genetic diversity, as measured by observed Ho, is acceptable, or whether any mitigating actions would need to be taken (BLM 2010). If monitoring of observed Ho levels, as measured from genetic monitoring samples, gives indication that genetic diversity should be increased, the BLM may consider introducing animals to the herd. Under Alternatives 1-3, management of the Desatoya HMA herd could continue to use wild horse introductions from other HMAs to augment observed heterozygosity, the result of which would also be to reduce the risk of inbreeding-related health effects. Introducing a small number of fertile animals every generation (about every 8-10 years) is a standard management technique that can alleviate potential inbreeding concerns (BLM-4700-1).

Even if it is the case that repeated treatment with a fertility control vaccine 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. As is generally the case for wild horses in most herd management areas, wild horses in Desatoya HMA appear to be descendants of a diverse range of ancestors coming from many breeds of domestic horses (Cothran 2004). The existing genetic diversity in the majority of HMAs does not contain unique or historically unusual genetic markers (Cothran 2004). 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 (i.e., see the table of Fst values in NAS 2013). 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 showed that the risk of the loss of genetic heterozygosity is extremely low except in cases 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. None of those conditions are likely to be risk factors in Desatoya HMA.

By maintaining wild horse population size within the AML range, there would be a lower density of wild horses across the HMA, reducing competition for resources and allowing wild horses to utilize their preferred habitat. Maintaining population size within the established AML would be expected to improve forage quantity and quality and promote healthy, self-sustaining populations of wild horses in a thriving natural ecological balance and multiple use relationship on the public lands in the area. Deterioration of the range associated with wild horse overpopulation would be avoided. Managing wild horse populations in balance with the available habitat and other multiple uses would lessen the potential for individual animals or the herd to be affected by drought, and would avoid or minimize the need for emergency gathers, which would reduce stress to the animals and increase the success of these herds over the long-term.

Water/Bait Trapping

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 wild 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. Wild 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 wild 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 HMA 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 wild 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.

Impacts to individual animals would be similar to those for helicopter gathers and could occur as a result of stress associated with the gather, capture, processing, and transportation of animals. The intensity of these impacts would vary by individual and would be indicated by behaviors ranging from nervous agitation to physical distress. Mortality of individual horses from these activities is rare but can occur. Other impacts to individual wild horses include separation of members of individual bands and removal of animals from the population.

Indirect impacts can occur to horses after the initial stress event and could include increased social displacement or increased conflict between studs. These impacts are known to occur intermittently during wild horse gather operations. Traumatic injuries could occur and typically involve bruises caused by biting and/or kicking. Horses may potentially strike or kick gates, panels or the working chute while in corrals or trap which may cause injuries. These impacts, like direct individual impacts, are known to occur intermittently during wild horse gather operations. Since handling, sorting and transportation of horses would be similar to those activities under Helicopter drive trapping, the direct and indirect impacts would be expected to be similar as well. Past gather data shows that euthanasia, injuries and death rates for both types of gathers are similar.

Transport, Off-range Corrals, Off-range Pastures, and Adoption Preparation
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.

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.

During the preparation process, potential impacts to wild horses are similar to those that can occur during transport. Injury or mortality during the preparation process is low but can occur.

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

Off-Range Pastures (ORPs), known formerly as long-term holding pastures, are designed to provide excess wild horses with humane, and in some cases life-long care in a natural setting off the public rangelands. There, wild horses are maintained in grassland pastures large enough to allow free-roaming behavior and with the forage, water, and shelter necessary to sustain them in good condition. Mares and sterilized stallions (geldings) are segregated into separate pastures except at one facility where geldings and mares coexist. About 37,000 wild horses that are in excess of the current adoption or sale demand (because of age or other factors such as economic

recession) are currently located on private land pastures in Oklahoma, Kansas, Iowa, Missouri, Montana, Nebraska, Utah, Wyoming, and South Dakota. The establishment of ORPs is subject to a separate NEPA and decision-making process. Located mainly in mid or tall grass prairie regions of the United States, these ORPs are highly productive grasslands compared to more arid western rangelands. These pastures comprise about 400,000 acres (an average of about 10-11 acres per animal). Of the animals currently located in ORP, less than one percent is age 0-4 years, 49 percent are age 5-10 years, and about 51 percent are age 11+ years.

Potential impacts to wild horses from transport to adoption, sale or off-range pastures (ORP) are similar to those previously described. One difference is when shipping wild horses for adoption, sale or ORPs, 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 water and two pounds of good quality hay per 100 pounds of body weight with adequate space to allow all animals to eat at one time.

A small percentage of the animals may be humanely euthanized if they are in very poor condition due to age or other factors. Horses residing on ORP facilities live longer, on the average, than wild horses residing on public rangelands, and the 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 (GAO09-77, Page 52)

Wild Horses Remaining or Released Back into the HMA following Gather Under the Proposed Action and Alternative 3,

The wild horses that are not captured may be temporarily disturbed and may move into another area during the gather operations. With the exception of changes to herd demographics and their direct population- wide impacts from a gather 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 HMAs.

No observable effects associated with these impacts would be expected within one month of release, except for a heightened awareness of human presence, and possible changes in specific band composition. There is the potential for the horses that have been desensitized to vehicles and human activities to return to areas where they were gathered if released back into HMA's. The wild horses that remain in the HMA following the gather would maintain their social structure and herd demographics (age and sex ratios) as the proposed gathers would mainly be targeting specific individual or bands of horses. No observable effects to the remaining population from the gather would be expected.

Impacts of Alternative 4 (No Action)

Under Alternative 4, there would be no active management to control the population size within the established AML at this time. In the absence of a gather, wild horse populations would

continue to grow. Without gather and removal now, the wild horse population could reach between 1,271 and 2,049 wild horses within 10 years.

Use by wild horses would continue to exceed the amount of forage allocated for their use. Competition between wildlife, livestock and wild horses for limited forage and water resources would continue (NRC 2013). Damage to rangeland resources would continue or increase. Over time, the potential risks to the health of individual horses would increase, and the need for emergency removals to prevent their death from starvation or thirst would also increase. Over the long-term, the health and sustainability of the wild horse population is dependent upon achieving a thriving natural ecological balance and sustaining healthy rangelands. Allowing wild horses to die of dehydration or starvation would be inhumane and would be contrary to the WFRHBA which requires that excess wild horses be immediately removed when necessary to achieve a thriving natural ecological balance. Allowing rangeland damage to continue to result from wild horse overpopulation would also be contrary to the WFRHBA which requires the BLM to "protect the range from the deterioration associated with overpopulation", "remove excess animals from the range so as to achieve appropriate management levels", and "to preserve and maintain a thriving natural ecological balance and multiple-use relationship in that area."

Cumulative Effects

Impacts Common to Action Alternatives (1, 2, and 3)

The cumulative effects associated with the capture and removal of excess wild horses includes gather-related mortality of less than one (1) percent of the captured animals, about five (5) percent per year associated with transportation, short-term holding, adoption or sale with limitations and about eight (8) percent per year associated with long-term holding. This compares with natural mortality on the range ranging from about five to eight percent per year for foals (animals under age 1), about five percent per year for horses ages 1 to 15, and 5 to 100 percent for animals age 16 and older (Garrott and Taylor 1990; Jenkins 2000). In situations where forage and/or water are limited, mortality rates increase, with the greatest impact to young foals, nursing mares and older horses. Animals can experience lameness associated with trailing to/from water and forage, foals may be orphaned (left behind) if they cannot keep up with their mare, or animals may become too weak to travel. After suffering, often for an extended period, the animals may die. Before these conditions arise, the BLM generally removes the excess animals to prevent their suffering from dehydration or starvation.

While humane euthanasia and sale without limitation of healthy horses for which there is no adoption demand is authorized under the WFRHBA, Congress prohibited the use of appropriated funds for this purpose between 1987 and 2004 and again since 2010 for this purpose.

The other cumulative effects which would be expected when incrementally adding either of the Action Alternatives would include continued improvement of upland vegetation conditions, which would in turn benefit permitted livestock, native wildlife, and wild horse population as forage (habitat) quality and quantity is improved over the current level. Benefits from a reduced wild horse population would include fewer animals competing for limited forage and water resources. Cumulatively, there should be more stable wild horse populations, healthier rangelands, healthier wild horses, and fewer multiple use conflicts in the area over the short and long-term. Over the next 15 to 20 years, continuing to manage wild horses within the established

AML range would achieve a thriving natural ecological balance and multiple use relationship on public lands in the area.

Cumulative Impacts of Alternatives 1 and 3 (Proposed Action)
Application of fertility control, implementation of a non-reproducing portion of the male population and adjustment in sex ratios to favor males should slow population growth and result in fewer gathers and less frequent disturbance to individual wild horses and the herd's social structure. However, return of wild horses back into the HMA could lead to decreased ability to effectively gather horses in the future as released horses learn to evade the helicopter.

Cumulative Impacts of Alternative 2
Since contraceptives, spaying and skewing the sex ratio to favor males would not be done, more horses would need to be removed in the future as a result of a greater rate of population increase.

Cumulative Impacts of Alternate 3
Impacts would be similar to Alternate 1 except that some animals would be spayed or nurtured. Spaying results in a permanent sterilization of female animals which would require fewer gathers to retreat mares if only contraceptives were used as contraceptives are only effective for one to a few years.

Cumulative Impacts of Alternative 4 (No Action)
Under the No Action Alternative, the wild horse and population could exceed 430 wild horses in four years. Movement outside the HMA and onto private lands would be expected as greater numbers of horses search for food and water for survival, thus impacting larger areas of public lands. Heavy to excessive utilization of the available forage would be expected and the water available for use could become increasingly limited. Eventually, ecological plant communities would be damaged to the extent that they are no longer sustainable, and the wild horse population would be expected to crash.

Emergency removals could be expected to prevent individual animals from suffering or death because of insufficient forage and water. These emergency removals could occur as early as the next drought and perennial water sources become dry early in the season. During emergency conditions, competition for the available forage and water increases. This competition generally impacts the oldest and youngest horses as well as lactating mares first. These groups would experience substantial weight loss and diminished health, which could lead to their prolonged suffering and eventual death. If emergency actions are not taken, the overall population could be affected by severely skewed sex ratios towards stallions as they are generally the strongest and healthiest portion of the population. An altered age structure would also be expected.

Cumulative impacts would result in foregoing the opportunity to improve rangeland health and to properly manage wild horses in balance with the available forage and water and other multiple uses. Attainment of site-specific vegetation management objectives and Standards for Rangeland Health would not be achieved. AML would not be achieved and the opportunity to collect the scientific data necessary to re-evaluate AML levels, in relationship to rangeland health standards, would be foregone.

4.3.7 Threatened or Endangered Animal Species

Impacts of Alternatives 1, 2, and 3
There would be no direct cumulative impacts to Lahontan cutthroat trout as the trap sites would be located away from creeks, and the horses would be herded around the creeks.

When the wild horses are within the AML range, less use occurs in riparian areas reducing the overuse of riparian vegetation, soil compaction and erosion.

Impacts of Alternatives 1 and 3
These Alternatives would have the greatest positive impacts to wild horses as the population would be at a lower level for a longer period due to growth suppression techniques.

Impacts of Alternative 2
While all the impacts would be positive the wild horse population would increases more quickly causing more use in riparian areas as opposed to Alternatives 1 and 3.

Impacts of Alternative 4 (No Action)
Overuse of riparian areas including those along creeks occupied by Lahontan cutthroat trout would continue and increase resulting in decreasing habitat conditions which could jeopardize the populations in these creeks.

Cumulative Effects
Alternatives 1,2, and 3 would result in improved habitat for Lahontan cutthroat trout. Alternative 4 would result in declining habitat for Lahontan cutthroat trout potentially jeopardizing the populations.

4.3.8 Socioeconomics

Impacts of Action Alternatives (1, 2, and 4)
Cumulative Impacts for these alternatives would result in reaching capacity for existing facilities and more short and long-term holding facilities would need to be established and/or purchased.

Alternative 3
Under Alternative 4, there would be a minimal chance of cumulative impacts due to the effectiveness of the suite of management objectives being proposed.

5.0 Monitoring and Mitigation Measures

The BLM COR and PIs assigned to the gather would be responsible for ensuring contract personnel abide by the contract specifications and the SOPs (Appendix B). Ongoing monitoring of forage condition and utilization, water availability, aerial population surveys, genetic diversity, and animal health would continue.

Fertility control monitoring would be conducted in accordance with the SOPs (BLM IM 2009-090: https://www.blm.gov/policy/im-2009-090). Monitoring the herd's social behavior would be incorporated into routine monitoring. This would not constitute a research study; the objective of any additional monitoring would be to document anecdotal information as to whether or not

additional studs form bachelor bands or appear to become more aggressive with breeding bands for the forage and water present.

Required Design Features (RDF)

The following RDFs would be applied to be consistent with the Greater Sage-Grouse Conservation Plan (2014):

1. RDF Gen 12: Control the spread and effects of nonnative, invasive plant species (e.g., washing equipment, minimize unnecessary surface disturbance). All projects would be required to have a noxious weed management plan in place prior to construction and operations.
2. RDF Gen 13: Implement project site-cleaning practices to preclude the accumulative of debris, solid waste, putrescible wastes, and other potential anthropogenic subsidies for predators of GRSG.
3. RDF Gen 19: Instruct all construction employees to avoid harassment and disturbance of wildlife, especially during the GRSG breeding (e.g., courtship and nesting) season. In addition, pets shall not be permitted on site during construction.
4. RDF Gen 22: Load and unload all equipment on existing roads, pull outs, or disturbed areas to minimize disturbance to vegetation and soil.

6.0 List of Preparers

The following list identifies the interdisciplinary team member's area of responsibility:

6.1 Persons, Groups, or Agencies Consulted

Table 6-1: Persons, Groups or Agencies Consulted

Nevada Department of Wildlife
Fallon Paiute-Shoshone Tribe (during public comment period)
Yomba Shoshone Tribe (during public comment period)

6.2 Preparers/Reviewers

The following list identifies the interdisciplinary team member's area of responsibility:

Table 6-2: BLM Preparers/Reviewers

Name	Title	Project Expertise
Kenneth R. Collum	Stillwater Field Manager	Authorized Officer
John Axtell	Project Lead; WH&B Specialist; Wildlife Biologist	Wild Horses & Burros; Migratory Birds; Threatened or Endangered Species; Sensitive Species Animals; General Wildlife
Cassandra Rivas	Natural Resource Specialist	Vegetation
Christine McCollum	Archaeologist	Cultural Resources; Native American Religious Concerns; Paleontology
Dave Schroeder	Environmental Compliance Specialist	Wastes, Hazardous or Solid; Geothermal Resources
Dean Tonenna	Botanist	Vegetation; Sensitive Species Plants
Elizabeth Freniere	Rangeland Management Specialist	Livestock Grazing

Name	Title	Project Expertise
Jason Wright	Archaeologist	Visual Resources
Julie A. Suhr Pierce, Ph.D.	Great Basin Socioeconomic Specialist	Environmental Justice and Socioeconomics
Keith Barker	Fire Ecologist	Fire Management
Sarah Hill	Geologist	Geology; Mineral Materials
Mark Mazza	Weeds Coordinator	Invasive and Non-native Species, and Noxious Weeds
Melanie Hornsby	Planning and Environmental Coordinator / Military Liaison	NEPA Compliance
Michelle Stropky	Hydrologist	Air Quality, Farmlands (Prime & Unique), Floodplains, Water Quality (Surface/Ground), Wetlands/Riparian Zones, Global Climate/GHG Emissions, Soils, Water Quantity (Surface/Ground)
Paul Amar	Outdoor Recreation Planner	Recreation; Travel Management; Wilderness/WSA; Lands with Wilderness Characteristics
Kira Treich	Realty Specialist	Land Use Authorization; Access

WH&B: Wild Horse and Burros; NEPA: National Environmental Policy Act; WSA: Wilderness Study Area

7.0 References

Bartholow, J.M. 2004. An economic analysis of Alternative fertility control and associated management techniques for three BLM wild horse herds. USGS Open-File Report 2004-1199.

Bartholow, J.M. 2007. Economic benefit of fertility control in wild horse populations. Journal of Wildlife Management 71:2811-2819.

Bauer, L.E., K.A. Schoenecker, and M.D. Smith. 2017. Effects of feral horse herds on rangeland plant communities across a precipitation gradient. Western North American Naturalist 77(4): 525-539.

Beckett, T., A. E. Tchernof, and M. J. Toth. 2002. Effect of ovariectomy and estradiol replacement on skeletal muscle enzyme activity in female rats. Metabolism 51:1397–1401.

Beever, E. 2003. Management implications of the ecology of free-roaming horses in semi-arid ecosystems of the western United States. Wildlife Society Bulletin 31 (3):887-895.

Beever, E. A., and C. L. Aldridge. 2011. Influences of free-roaming equids on sagebrush ecosystems, with a focus on Greater Sage-Grouse. Pp. 273–290 in S. T. Knick and J. W. Connelly (editors). Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology (vol. 38), University of California Press, Berkeley, CA.

Beever, E. A., R. J. Taush, and W. E. Thogmartin. 2008. Multi-scale responses of vegetation to removal of horse grazing from the Great Basin (USA) mountain ranges. Plant Ecology 196:163–184.

Beever, E.A. and C.L. Aldridge. 2011. Influences of free-roaming equids on sagebrush ecosystems, with focus on greater sage-grouse. Studies in Avian Biology 38:273-290.
Beever, E.A. and P.F. Brussard. 2000. Examining ecological consequences of feral horse grazing using exclosures. Western North American Naturalist 63:236-254.
BLM 1992. Clan Alpine and Edwards Creek Multiple Use Decision. Carson City, NV.
BLM 1999. Desatoya Mountains Ecosystem Management Plan. Carson City, NV.
BLM 2001. *Consolidated Resource Management Plan*, Carson City Field Office. Carson City, Nevada. May.
BLM 2010. BLM-4700-1 Wild Horses and Burros Management Handbook. Washington, D.C.
BLM 2012. Final Environmental Assessment, Desatoya Mountains Habitat Resiliency, Health, and Restoration Project. Carson City District. US Department of the Interior, Bureau of Land Management.
BLM 2020.Preliminary Environmental Assessment: Edwards Creek, Carson and Porter Canyon Allotments Grazing Permit Renewal DOI-BLM-NV-C010-2020-0024-EA. https://eplanning.blm.gov/eplanning-ui/project/2000791/570. Retrieved Dec. 5, 2020.
Bohrer, B.M., W.L. Flowers, J.M. Kyle, S.S. Johnson, V.L. King, J.L. Spruill, D.P. Thompson, A.L. Schroeder, and D.D. Boler. 2014. Effect of gonadotropin releasing factor suppression with an immunological on growth performance, estrus activity, carcass characteristics, and meat quality of market gilts. Journal of Animal Science 92:4719-4724.
Chambers et al. 2014 Resilience and Resistance of Sagebrush Ecosystems: Implications for State and Transition Models and Management Treatments. Rangeland Ecology and Management 67(5) 440-454 (2014).
Coates, P.S. 2020. Sage-grouse leks and horses. Presentation of unpublished USGS research results to the Free-Roaming Equid and Ecosystem Sustainabilty Network summit. October 2020, Cody, Wyoming.
Cothran, E.G. 2004. Genetic analysis of the Desatoya Mountain, NV feral horse herd. Report to the BLM. University of Kentucky Department of Veterinary Science, Lexington, Kentucky.
Connelly, J.W.,C.E. Braun, A.R. Sands M.A. Schroeder 2000. Guidelines to Manage Sage-Grouse Populations and their Habitats. Wildlife Society Bulletin 28(4) 967-985.
Crist, Michele R.; Chambers, Jeanne C.; Phillips, Susan L.; Prentice, Karen L.; Wiechman, Lief A., eds. 2019. Science framework for conservation and restoration of the sagebrush biome: Linking the Department of the Interior's Integrated Rangeland Fire Management Strategy to long-term strategic conservation actions. Part 2. Management applications. Gen. Tech. Rep. RMRS-GTR-389. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 237 p.
de Seve, C.W. and S.L. Boyles-Griffin. 2013. An economic model demonstrating the long-term cost benefits of incorporating fertility control into wild horse (*Equus caballus*) management in the United States. Journal of Zoo and Wildlife Medicine 44(4s:S34-S37).
Doherty, K.E., D.E. Naugle, J.D. Tack, B.L. Walker, J.M. Graham, and J.L. Beck.2014. Linking conservation actions to demography: grass height explains variation in greater sage-grouse nest survival. Wildlife Biology 2014 20 (6), 320-325
EPA 2009a. Pesticide Fact Sheet: Mammalian Gonadotropin Releasing Hormone (GnRH), New Chemical, Nonfood Use, USEPA-OPP, Pesticides and Toxic Substances. US Environmental Protection Agency, Washington, DC

EPA 2013. Notice of pesticide registration for GonaCon-Equine. US Environmental Protection Agency, Washington, DC.
EPA. 2009b. Memorandum on GonaCon ™ Immunocontraceptive Vaccine for Use in White-Tailed Deer. Section 3 Registration. US Environmental Protection Agency, Washington, DC.
EPA. 2012. Porcine Zona Pellucida. Pesticide fact Sheet. Office of Chemical Safety and Pollution Prevention 7505P. 9 pages.
EPA. 2015. Label and CSF Amendment. November 19, 2015 memo and attachment from Marianne Lewis to David Reinhold. US Environmental Protection Agency, Washington, DC.
Fonner, R. and A.K. Bohara. 2017. Optimal control of wild horse populations with nonlethal methods. Land Economics 93:390-412.
Frankham, R., J. D. Ballou, and D. A. Briscoe. 2010. Introduction to conservation genetics, second edition. Cambridge University Press, New York, New York.
Ganskopp, D.C. 1983. Habitat use and spatial interactions of cattle, wild horses, mule deer, and California bighorn sheep in the Owyhee Breaks of Southeast Oregon. Ph.D. Dissertation, Oregon State University.
Ganskopp, D.C. and M. Vavra. 1986. Habitat Use by Feral Horses in the Northern Sagebrush Steppe. Journal of Range Management 39(3):207-211.
Ganskopp, D.C. and M. Vavra. 1987. Slope Use by cattle, feral horses, deer, and bighorn sheep. Northwest Science 61(2):74-80.
Garrot. R. A., and I. Taylor. 1990. Dynamics of a feral horse population in Montana. Journal of Wildlife Management 54:603-612.
Garrott, R.A., and M.K. Oli. 2013. A Critical Crossroad for BLM's Wild Horse Program. Science 341:847-848.
Gooch, A.M.J., S.L. Petersen, G.H. Collins, T.S. Smith, B.R. McMillan, D.L. Egget. 2017. The impact of feral horses on pronghorn behavior at water sources. Journal of Arid Environments 138:38-43.
Government Accountability Office (GAO). 2008. Bureau of Land Management; Effective Long-Term Options Needed to Manage Unadoptable Wild Horses. Report to the Chairman, Committee on Natural Resources, House of Representatives, GAO-09-77.
Griffin, P.C., Ekernas, L.S., Schoenecker, K.A., and Lubow, B.C., 2020, Standard operating procedures for wild horse and burro double-observer aerial surveys: U.S. Geological Survey Techniques and Methods, book 2, chap. A16, 76 p.
Hall, L.K., R.T. Larsen, M.D. Westover, C.C. Day, R.N. Knight and B.R. McMillan. 2016. Influence of exotic horses on the use of water by communities of native wildlife in a semi-arid environment. Journal of Arid Environments 127:100-105.
Hampton, J.O., T.H. Hyndman, A. Barnes, and T. Collins. 2015. Is Wildlife Fertility Control Always Humane? Animals 5:1047-1071.
Hanley, T.A. 1982. The nutritional basis for food selection by ungulates. Journal of Range Management 35 (2): 146-151.
Hanley, T.A., and K.A. Hanley. 1982. Food resource partitioning by sympatric ungulates on Great Basin rangeland. Journal of Range Management 35 (2): 152-158
Hansen, R.M., R.C. Clark, and W. Lawhorn. 1977. Foods of wild horses, deer, and cattle in the Douglas Mountain Area, Colorado. Journal of Range Management 30 (2): 116-118.

Hobbs, N.T., D.C. Bowden and D.L. Baker. 2000. Effects of Fertility Control on Populations of Ungulates: General, Stage-Structured Models. Journal of Wildlife Management 64:473-491.

Hubbard, R.E., and R. M. Hansen. 1976. Diets of wild horses, cattle, and mule deer in the Piceance Basin, Colorado. Journal of Range Management 29 (5): 389-392.

Jenkins, S.H. 2000. Wild Horse Population Model. Version 3.2.

Krysl, L.J., Hubbert, M.E., Sowell, B.E., Plumb, G.E., Jewett, T.K., Smith, M.A. & Waggoner, J.W. 1984. Horses and cattle grazing in the Wyoming Red Desert. I. Food habits and dietary overlap. Journal of Range Management, 37, 72– 76.

McInnis, M.A. 1984. Ecological relationships among feral horses, cattle, and pronghorn in southeastern Oregon. Ph.D. Dissertation. Oregon State University.

McInnis, M.A. and M. Vavra. 1987. Dietary relationships among feral horses, cattle, and pronghorn in southeastern Oregon. Journal of Range Management. 40(1):60-66.

Meeker, J.O. 1979. Interactions between pronghorn antelope and feral horses in northwestern Nevada. Master's Thesis, University of Nevada, Reno.

Menard, C., P. Duncan, G. Fleurance, J. Georges, and M. Lila. 2002. Comparative foraging and nutrition of horses and cattle in European wetlands. Journal of Applied Ecology 39 (1): 120-133.

Muñoz, D.A., P.S. Coates, and M.A. Ricca. 2020. Free-roaming horses disrupt greater sage-grouse lekking activity in the great basin. Journal of Arid Environments 184:104304.

National Research Council (NRC). 2013. Using science to improve the BLM wild horse and burro program: a way forward. National Academies Press. Washington, DC.

NDOW 2013. Nevada Wildlife Action Plan. Nevada Department of Wildlife 402 pp.

NRC (National Research Council). 2013. Using science to improve the BLM wild horse and burro program: a way forward. National Academies Press. Washington, DC.

Nordquist, M. K. 2011. Stable isotope diet reconstruction of feral horses (*Equus caballus*) on the Sheldon National Wildlife Refuge, Nevada, USA. Thesis, Brigham Young University, Provo, Utah.

Nuñez, C.M.V. 2018. Consequences of porcine zona pellucida immunocontraception to feral horses. Human-Wildlife Interactions 12:131-142.

Olsen, F.W., and R.M. Hansen. 1977. Food Relations of wild free-roaming horses to livestock and big game, Red Desert, Wyoming. Journal of Range Management 30 (1): 17-20.

Roelle, J.E., and J.I. Ransom. 2009. Injection-site reactions in wild horses (*Equus caballus*) receiving an immunocontraceptive vaccine: U.S. Geological Survey Scientific Investigations Report 2009–5038.

Rutberg, A., K. Grams, J.W. Turner, and H. Hopkins. 2017. Contraceptive efficacy of priming and boosting does of controlled-release PZP in wild horses. Wildlife Research, 44(2)174-181.

Scasta, J.D. 2020. Mortality and operational attributes relative to feral horse and burro capture techniques based on publicly available data from 2010-2019. Journal of Equine Veterinary Science, 102893.

Science and Conservation Center (SCC). 2015. Materials Safety Data Sheet, ZonaStat-H. Billings, Montana.

Smith, M.A and J.W. Waggoner, Jr., 1982. Vegetation utilization, diets, and estimated dietary quality of horses and cattle grazing in the Red Desert of west central Wyoming. BLM Contract No. AA851-CTO-31.

Smith, M.A. 1986a. Impacts of feral horses grazing on rangelands: An overview. Equine Veterinary Science, 6(5):236-238.

Smith, M.A. 1986b. Potential competitive interactions between feral horses and other grazing animals. Equine Veterinary Science, 6(5):238-239.

Stiver, S.J., A.D. Apa, J.R. Bohne, S.D. Bunnell, P.A. Deibert, S.C. Gardner, M.A. Hilliard, C.W. McCarthy, and M.A. Schroeder. 2006. Greater Sage-grouse Comprehensive Conservation Strategy. Western Association of Fish and Wildlife Agencies. Unpublished Report. Cheyenne, Wyoming.

Symanski, R. 1994. Contested realities: feral horses in outback Australia. Annals of the Association of American Geographers 84:251-269.

Turner, J.W., I.K. Liu, D.R. Flanagan, K.S. Bynum, and A.T. Rutberg. 2002. Porcine zona pellucida (PZP) immunocontraception of wild horses (*Equus caballus*) in Nevada: a 10 year study. Reproduction Supplement 60:177-186.

Vavra M., and F. Sneva. 1978. Seasonal diets of five ungulates grazing the cold desert biome. Proceeding of the International. Rangeland Congress. 1:435-43.